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*The  
Blue  
Cross  
Book*

for the Veterinary Profession



**Hoechst Roussel Vet**

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## PREFACE



**W. J. Bader**  
Managing Director  
Hoechst Roussel Vet Pvt. Ltd.

Dear Ladies & Gentlemen,

Many thanks for your comments and kind suggestions which encourage me and my colleagues to continue with the publication of *"The Blue Cross Book"*. We are sending herewith the 12<sup>th</sup> issue of the same and hope you will like it.

We, in Hoechst Roussel Vet, see innovation, introduction of new technologies and constant quality improvement as key success factors to market leadership in the veterinary industry.

One of the big challenges lying ahead of us will be the eradication (or at least control) of Foot & mouth Disease in India. The economic losses incurred by this disease are enormous. State Governments as well as International Organizations like WHO (World Health Organization) and FAO (Food and Agricultural Organization) place massive significance on their attempts to eradicate foot and mouth disease worldwide. Hoechst Roussel Vet is supporting these efforts by the introduction of a BEI (Binary Ethyleneimine) inactivated foot and mouth disease oil adjuvant vaccine - tradename "Clovax". The main features of the recently launched vaccine will be better and longer immunity.

I trust you will find the scientific reports from all over the world published in this issue interesting and once again I kindly request you to send us your valuable suggestions.

**Best wishes for the New Year !**

**Jochen Bader**



IVRI  
Administrative Building

## INDIAN VETERINARY RESEARCH INSTITUTE, IZATNAGAR

**THE  
PREMIER  
VETERINARY  
INSTITUTE  
IN INDIA-2**

Indian Veterinary Research Institute was established as Imperial Bacteriology Laboratory at Pune on December 9, 1889. It was subsequently shifted to Mukteshwar in Kumaon Hills. The Izatnagar Campus came into existence in the year 1913. In its more than 100 years of eventful journey, the Institute has been the torchbearer for scientific developments in the areas of Veterinary and Animal Sciences. During the process, more than 40 prophylactics, diagnostics and regents, against several dreaded diseases, viral, bacterial and parasitic have been developed and the technologies passed on to state Biological Units. Besides, six new varieties of high yielding cattle, four of pig and one of broiler were released, and several diagnostic processes were standardized. Significant success has been achieved in developing indigenous drugs and surgical techniques. Formulation of livestock and poultry feed, rations with locally available ingredients and non-conventional feeds, helped in meeting the minimum available nutrient requirements of the animals during severe drought, and flood calamities. In the process, it has developed into a National Scientific Organization, probably one of its own kind in Asia. The institute was granted the status of a deemed University by UGC w.e.f. 16th November, 1983. The University

is at present offering Master and Ph.D degree in 23 and 18 disciplines respectively in the area of Veterinary Sciences and Animal Husbandry.

Today, the Institute is comprised of more than 20 divisions and several research sections, and has 3 campuses, viz. Mukteshwar, Izatnagar (Head Quarters), Bangalore and 4 Regional Stations, situated at Palampur, Calcutta, Srinagar (presently at Mukteshwar) and Bhopal and above all every division is having a dedicated scientific force to work upon national problems of livestock health and production. The Institute has a staff strength of 3603, comprising 386 scientific, 615 technical, 534 administrative, 127 auxiliary and 1941 supporting staff.

### Activities :

The scientific activities of the Institute are grouped under four major components. They are :

- A. Research
  - i) Animal Health
  - ii) Animal Production
  - iii) Livestock Products Technology
  - iv) Basic and Social Sciences
- B. Education
- C. Extension
- D. Services and Central Facilities

### Centre for Advanced Studies :

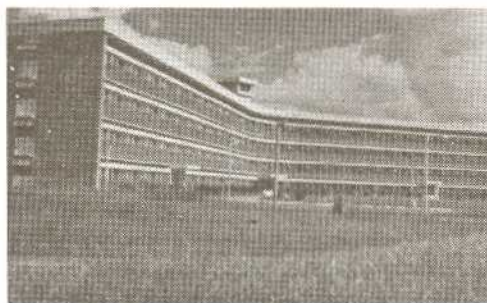
3 Centres for Advance Studies in Animal Nutrition, Animal Physiology and Animal Biotechnology have been established to strengthen the infrastructural facilities and research programmes and also to facilitate training of scientists and faculty members on the aspect of advance technology in their respective fields.

Numerous valuable research works carried out at IVRI since its inception include developing antisera against Rinderpest, Haemorrhagic Septicaemia, Anthrax and Tetanus; vaccine of Black Quarter, and diagnostic regent against Equine Glanders. Nation's first ever vaccine for the control of verminous pneumonia in sheep was also developed here. The most valuable contribution of IVRI to poultry world is the development of prophylactic vaccine against Ranikhet Disease.

For effective implementation of the identified programmes, linkages with



**IVRI Mukteshwar Campus**



**IVRI Modular Building (Y Shape)**

national and international R&D institutions on one hand, with the beneficiaries / farmers / industries through extension activities on the other are essential. IVRI has at present number of ongoing such programmes with effective linkages with R&D agencies. The major emphasis would be on transfer of technology to the ultimate users. IVRI is a unique institution where Livestock Health, Livestock Products Technology and Extension Education are available under the one roof. Due to pioneering work carried out in Poultry Research Division of IVRI, it was given the status of a separate "Central Avian Research Institute" in 1975.

ICMR, DST, DBT Laboratories (CFTRI, CDRI etc.) are the active partners for developing and pursuing research programme in the areas of common interest. FAO, UNDP, WHO, ODA, EFC, IAEA etc. would be approached for international collaboration and resource mobilization for research areas.

We develop guilt feelings by

- putting things off,
- hesitating too much over decisions,
- passing the buck.

Therefore, we must live up to our responsibilities, and promptly.

- J. B. Smith

## Status of Vaccines Against Parasites in Ruminants

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### Introduction :

Though in the near future vaccines are a certainty against some parasitic disease, main problems preventing their rapid development are :

- 1) Complex structure and life cycle of parasite and inadequate knowledge about their xenology and immunology
- 2) Chronicity of parasitic infections and their efficient host immune-evasion
- 3) Inefficient sterilizing immunity against parasites.

Certain encouraging aspects of the parasitic vaccine development are :

- i) Sterilizing immunity is recorded against certain parasites viz., *Theileria parva* infection in cattle and
- ii) Concomitant immunity could be absolute, such as *T.annulata* infection.

It is now realised that for the parasitic vaccines the "Golden Standards" set by certain viral vaccines such as rinderpest and bacterial toxoids such as tetanus will have to be lowered and set at standards comparable to BCG and TB and the vaccines against influenza.

### Vaccines against Blood Protista :

*Theileria*, *Babesia*, *Trypanosoma* and *Anaplasma* are the important blood protista of ruminants

### *Theileria parva* Infection (East Coast Fever) :

*Theileria parva* infection costs farmers in Africa more than US \$ 170 million per year.

It is a threat to 25 million cattle in Burundi, Kenya, Malawi, Mozambique, Rwanda, Zaire, Zambia and Zimbabwe.

### Immunization with schizont cultures :

Following demonstration of in vitro infection and transformation of lymphocytes using infective particles of *T.parva* collected from tick salivary glands by Brown *et al.*, (1973) and Malmquist and Brown (1974) established *T.parva* infected lymphoblastoid cell lines. Using different cell lines, it was shown that  $10^8$  attenuated cells given subcutaneously, could immunize cattle against homologous strains (Brown *et al.*, 1976). However, because of the difficulties in the cultivation of *T.parva*, requirement of large immunizing dose and uncertain results of inoculation, use of attenuated schizont cultures have not been used for immunization against East Coast Fever.

### Novel Vaccines :

Scientists of the then International Laboratory for Research on Animal Diseases (ILRAD), Kenya, were able to clone the gene that codes for the 67 Kd protein molecule in sporozoites, which produces antibodies that neutralize sporozoites of *T.parva*. The gene has been expressed in *Escherichia coli* and the recombinant 67 Kd antigen is being evaluated in mice and large animals (Anon, 1989 and 1995).

The Kd-67 gene of *T.parva* has also been cloned in vaccinia virus and its inoculation into mice, rabbits or cattle by scarification of the ear pinna, is reported to provide protection.

### **Vaccine against Schizonts :**

Experiments at ILRI have shown that animals recovered from East Coast Fever possess specialized cytotoxic cells that destroy the lymphocytes infected with *T.parva*. Schizonts in lymphocytes possess two proteins, which stimulate cytotoxic T-cell response. Genes coding for these proteins have been identified, sequenced and inserted into vaccinia virus. It is felt that in future, there may be need to immunize cattle with the recombinant vaccines against sporozoite as well as the schizonts, for effective control of East Coast Fever (Anon, 1995).

### **Theileria annulata Infection (Tropical Theileriosis) :**

Bovine tropical theileriosis is prevalent in the entire Indian subcontinent, China, Pakistan, Southern Russia, 13 Middle East countries viz, Iran, Iraq, Turkey and some of the North African countries viz, Egypt and Sudan. *T.annulata* is transmitted various species of Hyalomma ticks, which are abundantly present in the warm and humid climate. As compared to *T.parva*, mechanical transmission of *T.annulata*, using infective blood and tissues is much easier and hence development of vaccines has been comparatively easy.

### **Early Immunization Procedures :**

During the thirties, immunizations against tropical theileriosis were practised by inoculating blood from animals suffering from acute disease (Sergeant *et al.*, 1932; Adler & Ellenbogen, 1934 and Delpy, 1937). However, some of the recipient animals used to die of the immunizing inoculum.

### **Irradiated vaccines :**

Several reports regarding the use of gamma irradiated *T. annulata* infected ticks or sporozoites as immunizing agent are

available from Russia and India (Baranikov, 1970a & 1970b; Kamalov, 1975 and Singh *et al.*, 1978). However, use of irradiated organisms is not considered as a practical method.

### **Tissue culture attenuated vaccines :**

Prolonged in vitro cultivation of schizont infected lymphocytes resulted in their attenuation (Tsur, *et al.*, 1964). It is now known that in case of attenuated schizont vaccine, the parasite establishes and undergoes a limited multiplication in the host cells, leading to the development of immunity.

Scientists at Biotechnology Laboratory, National Dairy Development Board (NDDB), Anand, developed a safe as well as highly effective schizont vaccine, wherein *T.annulata*, at 150 passage is being used at the dose rate of  $5 \times 10^6$  schizont infected cells. The vaccine provides protection against all the isolates of *T.annulata* maintained in that laboratory. It is being produced and marketed since 1989, under the trade name 'Rakshavac-T', by the Indian Immunologicals, Hyderabad.

### **Novel vaccines against Tropical Theileriosis :**

Sporozoite surface antigens of *T.annulata*, capable of producing antibodies, which neutralise sporozoites have been purified. Genes coding for these antigens have been cloned and studied (Hall *et al.*, 1991). It is also reported that 67 Kd antigen of *T.parva* also cross protects cattle against *T.annulata* sporozoites.

### **Babesiosis :**

Several species of *Babesia* infect domestic animals, some of which are of zoonotic importance. Infection in young calves in

enzootic areas is usually mild with low grade parasitosis, if they are born of immune cows. This resistance can wane with the advancement of age.

#### **Immunization :**

*Babesia bovis* and *Babesia bigemina* are the major parasites of large dairy animals. First vaccinations of cattle against babesiosis were performed some 92 years ago, in the United States of America and Australia, probably against *B.bovis* and *B.bigemina*, when these parasites were known as *Pyrosoma bigeminum* (Anon, 1984). Inoculation of parasitized blood into cattle caused mild infection in the recipients, which on recovery were resistant to homologous challenge. Tick Fever Research Centre, Queensland, Department of Primary Industries at Wocol, near Brisbane in Australia, produces vaccine made by this method which is also recommended by FAO for use in Sri Lanka and other countries.

Initially, vaccine donors are prepared by infecting them artificially with laboratory strains of *Babesia*, maintained by repeated needle passage in cattle. The blood for immunization is collected several weeks after clinical recovery (Callow and Tammemagi, 1967). The most obvious risk of vaccination by this method is severe reactions in a few cases and of transmitting other infectious agents such as viruses from the donors of the vaccine.

#### **Use of Exoantigens :**

Vaccination programme at the University of Illinois consists use of culture derived soluble exoantigens released by *Babesia* in the blood plasma of the animals or into the supernatant medium of in vitro cultures. Immunization with soluble *B.bovis* exoantigens can partially protect cattle (Levy & Ristic, 1980 and James, 1987). Work on

similar lines for developing vaccines containing exoantigens is in progress at IVRI, Izatnagar, India.

#### **Anaplasmosis :**

Punctiform bodies in erythrocytes of cattle suffering from acute anaemia were named as *Anaplasma marginale* and the infection as anaplasmosis. *Anaplasma* is an arthropod-transmitted rickettsial organism of ruminants. Five species are recognised, of which *A.marginale* and *A.centrale* are of significance in cattle. The disease has been recorded in the Middle East, Far East, Asia, Australia, Europe, South and Central America and USSR (Ristic, 1968).

#### **Inactivated Vaccines :**

Initial vaccines used against anaplasmosis consisted of inactivated *A.marginale*, however, many reports regarding failure of these vaccines such as 'ANAPLAZ' are on record.

#### **Attenuated *A.marginale* vaccine :**

An attenuated vaccine "AMVAC" was first made at the University of Illinois. It consisted of attenuated *A.marginale* produced by 58 or more serial passages in sheep and involved use of blood from cattle infected with the attenuated strain. Since it was to be stored at -70°C, and was counter indicated for use in pregnant cows, it is not being used routinely (Ristic, 1968).

#### ***Anaplasma centrale* vaccine :**

Vaccination against pathogenic *A.marginale* with a relatively benign but related organism *A.centrale*, has been an accepted procedure in Australia, Sri Lanka, Israel, Uruguay and South Africa. In Australia and South Africa, 400,000 doses of the vaccine are used annually. Method of preparation of the vaccine is almost similar to that described for



*Babesia bovis*. The strain isolated by Theiler, in the early years of this century is being used. The strain is stored frozen in LN2 as infected blood, wherein ideally  $2 \times 10^8$  *A.centrale* / ml of blood are incorporated. Inoculation of 10ml of such blood produces patent infection in calves, within 3 weeks. The strain has to be maintained in cattle, properly protected from ticks or else the vaccine strain may get contaminated with *A.marginale*, *Theileria sp.*, etc.

In most countries, *Anaplasma* and *Babesia* infections are recorded together, as such "Bivalent" or "Trivalent" vaccines, containing *A.centrale*, *B.bovis* or *A.centrale*, *B.bovis* and *B.bigemina*, are being produced. These vaccines contain  $10^7$  *A.centrale*,  $10^7$  *B.bigemina*, the volume being made to 2 ml by cell free diluent. The vaccines stored at refrigeration temperature remain effective upto one week and are inoculated S/C or I/M.

There are some difficulties in the use of these vaccines viz, (i) the reactions following vaccinations in the form of mild fever can occur first at 3-4 weeks due to *Babesia* and then at 7 weeks due to *Anaplasma* (ii) at times, these vaccines can get contaminated with extraneous agents, particularly viruses such as bovine leukosis, (iii) many cows get immunized to erythrocytes in vaccine, resulting to neonatal haemoglobinurea in calves and (iv) breakdown of immunity can take place (Callow and Mellrose, 1966).

#### **Trypanosomiasis :**

Trypanosomes are protozoan parasites which infect variety of domestic and wild animals, as well as humans. In Africa, tsetse fly (*Glossina spp.*) transmits four species i.e. *Trypanosoma brucei brucei*, *T.congolense*, *T.simiae* and *T.vivax* that cause serious forms of trypanosomiasis in cattle, sheep,

goats, pigs and horses. Whereas, in parts of North Africa and almost entire Asia, *T.evansi* transmitted by biting flies other than tsetse are recorded, specially in cattle, buffaloes, horses, pigs, dogs and camels.

#### **Difficulties in developing vaccines :**

When an animal or man is infected with Trypanosomes, it produces antibodies, however, these are not able to remove the parasite, because the Trypanosomes quickly change their surface antigens called variable surface glycoproteins (VSGs). This phenomenon, called as antigenic variation, allows Trypanosomes to survive in host system.

Group of scientists at ILRI have identified a Trypanosome enzyme named as "Cyclophilin", a protein molecule. This enzyme adversely affects the immune function of host macrophages, thus resulting into development of disease. Efforts are now on to prevent production of cyclophilin by the Trypanosomes, so that the parasite and the host can not have cross talk and thus restore the host immune response. Gene coding for cyclophilin has been cloned in *Escherichia coli* for developing recombinant antigen against cyclophilin (Anon, 1995).

#### **Ticks :**

Mosquitoes and ticks are the major vectors for many human and animal viral, rickettsial, bacterial and protozoan diseases. In animals, ticks are considered to be the most important vectors. Efforts for developing vaccines against ticks are being made in several laboratories, because frequent use of chemicals required to control ticks is expensive, causes environmental pollution and results in development of insecticide resistance in ticks.

Several antigens derived from ticks have

been tested. Extracts of whole tick body homogenates, organs such as salivary glands and mid-GUT of partially fed female ticks, when injected into animals, induce degree of protection, which is manifested in the form of reduced feeding performance of ticks, reduced egg laying and even death of some ticks (Willadson *et al.*, 1988, Essuman *et al.*, 1992 and Thakur *et al.*, 1991). Efforts are now being made to improve the adjuvants and to make the vaccines user friendly, by developing slow release devices, for boosting the immunity, because the present vaccines requires repeated inoculations.

As a result of 10 years collaborative research between CSIRO laboratories and Biotechnology Australia, a member of Hoechst Roussel Vet group, a recombinant vaccine representing Bm-86 antigen of *Boophilus microplus* guts has been developed. The vaccine is being sold as "Tick GARD" and contains 25 (g/ml of Bm 86 antigen as water in oil emulsion. "Tick GARD" has been extensively evaluated. It provides protection in 6-8 weeks and needs bimonthly booster. A combination of dipping and "Tick GARD" immunisation is recommended.

Animals to be vaccinated should be in good condition and primary vaccination should be carried out 2 months before the tick season. It is desirable to start the use of "Tick GARD" with a low tick population. Therefore, chemical treatment should be used for reducing tick population.

Similarly, Heber Biotech, SA, Post Box 6162, Havana, Cuba have released a commercial recombinant vaccine "GAVAC™", which is reported to reduce the population of *B. microplus* tick population on cattle as well as the incidence of Babesiosis in Argentina, Brazil & Colombia. The vaccine contains recombinant Bm-86 (rBm-

86) mid GUT antigen of *B. microplus* produced in *Pichia pastoris* yeast (Rodriguez *et al.*, 1995).

#### **Flies :**

*Lucilia cuprina* (Sheep Blow fly) causes heavy losses in sheep by attacks of adult fly and by migration of larvae in the nasal passage. Bowels *et al.*, (1987) in Australia demonstrated that intranasal administration of larval excretory and secretory (ES) products, significantly reduced larval survival following post immunization infections.

#### **Helminths :**

Vaccines produced against helminth extracts are usually not protective. There is a need to identify stage specific surface / excretory / secretory antigens which are involved in host parasite interactions and are responsible for immunity. Assays designed to detect parasitic excretory / secretory products are necessary, as these indicate presence of infection, whereas antibodies may be indicators of exposure to infection, which may not be persisting at the time of screening. Of all helminth infections, development of vaccine against cestodes is the most feasible, as there is evidence that Taenid infections can be easily eliminated by immune mechanisms (Harison & Joshua, 1986).

#### **Conclusion :**

In view of their complex life cycle, many developmental stages, their capacity to evade the host immune system and sub-clinical form of disease, development of vaccines against parasites is likely to be slow. However, with rapid development of resistance in the parasite against anthelmintics and the insecticides, efforts for developing vaccines against parasite are likely to be more serious than in the past. With the advancement of knowledge in the

field of biotechnology and with the development of tools that enable identification of protective antigens, progress towards development of vaccines is likely to be faster.

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## Strongyloidosis in Canines : an Overview

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### Introduction :

The strongyloidosis in dogs is caused by a minute plasmid round worm *Strongyloides stercoralis*, which often parasites proximal bowels. The roundworm is predominantly distributed in tropical and sub-tropical countries and exhibits multiplicity of biotypes (Noble and Noble, 1982; Urquhart *et al.*, 1988; Mehlhorn, 1988). A pioneering report on the occurrence of the parasite in dogs, from India, was published from Madras (Ware and Ware, 1923). In man, the infection is chronic and may last for several decades (Gill *et al.*, 1977; Pulletier Jr., 1984). The parasite is of anthroponozoonotic significance as it gets transmitted from infected owners to their pets (dogs and cats). This review is an attempt to provide a concise overview on historical events, morphological biotypes of the parasite, clinical manifestation in man and dogs beside therapeutic and prophylactic aspects of the disease.

### Historical Events :

The parasite was first reported from faeces of French colonial troops suffering from uncontrolled diarrhoea (Normand, 1876), and later from British prisoners of World War II. Subsequently, Fulleborn (1914) and Faust (1933, 1935) described the filariform infective larvae of the parasite. In India, the parasite was reported from Madras in dogs suffering with gastrointestinal disturbances (Ware and Ware, 1923). Detailed morphological description of *Strongyloides stercoralis* recovered from dog was given by Luckner (1942) and those from man was documented by Desporters (1948). In 1947,

Stoll estimated global prevalence of the disease in man to be 34.9 million, assigning 21.0 million to Asia, 8.6 million to tropical American, 3.3 million to Africa, 0.9 million to USSR and 0.4 million to North America beside 0.1 million to Pacific Islands. Just nearly more than a decade before, Pulletier Jr. (1984), published a detailed account of chronic strongyloidosis in prisoners of war, who picked up infection while working on Burma Thailand Rail road. Similar reports are also available from the Great Britain (Gill *et al.*, 1977) and Australia (Grove, 1980) as well. In 1980, Malone and co-workers observed focal dermatitis alongwith bloody diarrhea, anemia and lymphadenopathy in Boston Terrier dogs, positive for *S. stercoralis* infection. Recently pruritus associated with *S. stercoralis* infection in pet dogs has also been documented from India (Varshney *et al.*, 1977).

### Aetiology :

The cause of *strongyloidosis* in man and his pet dogs is a minute roundworm of less than 3.0mm length. The worm *S. stercoralis*, on attaining maturity of the host, establishes in tunnels in the surface epithelium near the base of villi of anterior small intestines. *S. stercoralis* is primarily a parasite of man particularly those confined to prisons and mental hospitals (Gill *et al.*, 1977; Grove, 1980; Pulletier Jr., 1984). Other mammalian hosts of the parasite relationship of the parasite and gibbon. Desporters (1945) reviewed the host-parasite relationship of the parasite and documented that chimpanzee strain could infect dog, cat and man, experimentally. There exists a great geographical strain variation in respect of

interspecies transmission of the parasite in mammalian hosts (Galliard, 1948 & 1951).

### **Biotypes :**

*S. stercoralis* is unique in exhibiting multiplicity of biotypes (Levine, 1971; Urquhart *et al.*, 1987; Mehlhorn, 1988). The free living generation undergo a – heterogonic lifecycle on top soil with an excess of water during warm climate (Fig. 3). The adult male and female worms (Fig. 3; 6.1 & 6.2) mate together, and non embryonated eggs are produced (Fig.3; 7) which in turn hatch and moult three times to produce rhabditiform L4 larvae that grow into adult male and female worm (Fig. 3). The entire cycle is of 24-48 hours duration.

The worm however undergoes homogonic life cycle during unfavourable geoclimatic conditions (Fig. 3). The rhabditiform larvae metamorphose into the post feeding filariform larvae with caudal notch (5). The filariform larvae, on contact with human skin or buccal mucosa, penetrate into blood vessels, carried to the lungs and develop into the adlescent worm (1). The female worms are fertilized in bronchi, trachea or while being swallowed, before penetrating the intestinal epithelium. The rhabditoid adult male worms are not tissue parasite, therefore, after a brief presence in human body, they are voided out in faeces. The female worms may also reproduce parthenogenetically, and autoinfection of the host through endogenous route results in chronic infection, lasting several decades (Levine, 1971; Urquhart *et al.*, 1982; Melhorn 1988). The free living generations of adult worms are smaller (female forms 1.7-2.7 mm by 30-40 m). The incubation period in man is about 28 days or less.

### **Clinical Signs :**

Clinical strongyloidosis reflects heavy infection build up for some time in the past.



**Fig 1 : Erythematous lesion on the abdomen.**

The clinical signs in human beings include skin rashes, creeping eruptions, pruitus ani, abdominal pain, heart burn, indigestion, shortness of breath, chest pain, constipation, diarrhoea, nausea, cough, anorexia, loss of weight, vomiting and rarely asthma (Pulletier Jr., 1984). The disease is extremely common in persons confined for prolonged duration in prisons and mental hospitals (Gill *et al.*, 1977; Grove, 1980 & Pulletier Jr, 1984). The parasite does not interface with intestinal absorption (Kotcher *et al.*, 1966). Primary infection in dogs, with *S. stercoralis* generally cause gastro-intestinal disorders including catarrhal to ulcerative enteritis, debilitation and reduced growth rate with normal appetite (Ettinger, 1975, Fraser *et al.*, 1991 & Sharma *et al.*, 1977). Temperature remains normal in the absence of intercurrent / cuncurrent infection. In advanced stage pneumonic changes are evident making the prognosis grave Pelletie Jr, 1984. Mehlhorn, 1988 & Sharma *et al.*, 1997). Such lesions are characterised by erythema (Fig. 1), itching and dermatological lesions, which are usually



**Fig 2 : Pustular Lesions of hair follicles on the abdomen.**

distributed on ventral abdomen, perianal region, tail and hind legs. Later due to secondary infection of hair follicles, pustules are formed (Fig.2). The dogs generally acquire infection from their owner, harbouring chronic infection. Thus *S. stercoralis* infection is of anthrozoönotic significance. Recently, Varshney *et al.*, (1997) reported anemia marked by low haemoglobin and packed cell volume besides eosinophilia and leukocytosis, in *S. stercoralis* infected dogs.

#### **Diagnosis :**

On coproscopic examination, standard floatation techniques fail to demonstrate the developmental stages of the parasites. Therefore thin direct smear of faecal anal swabs or skin scraping / intestinal mucosa are used to demonstrate the presence of thin shelled eggs and developing larvae of *S. stercoralis*. The larvae can be concentrated by placing some faeces on filter paper strip, placed on a platform made of microscopic slides in a petri dish and adding water to the dish. Preponderance of larvated eggs, rhabditiform and filariform nematode larvae (Fig. 3) on coproscopic examination of fresh anal swabs confirm the diagnosis of

strongyloidosis. Sharma *et al.*, (1998) observed that the thin shelled transparent larvated eggs (2 of Fig. 3) were ovoidal to ellipsoidal in shape (52-60  $\mu$  in length by 26 – 32  $\mu$  in width); rhabditiform larvae measured  $140 \pm 11.5$   $\mu$  in length and  $17 \pm 3.2$   $\mu$  in width) with a characteristic rhabditiform oesophagus, extending nearly one third of total body length (3 of Fig. 3). While the filariform larvae (5 of Fig. 3) measured 95-620  $\mu$  in length and 13 – 18  $\mu$  in maximum width with a long filariform oesophagus extending upto 40% of body length (210 – 285  $\mu$ ). It was further observed that there were 22 intestinal cells, rectangular, whereas rest of the cells were binucleated. The tail of the larvae was characteristically notched (5 of Fig. 3). Similar developmental stages of *S. stercoralis* have also been described by earlier workers (Yamaguti, 1916; Little, 1966 & Levine, 1971).

#### **Differential Diagnosis :**

The *S. stercoralis* larvae isolated from anal swabs and skin lesions could be differentiated from that of hookworm by the presence of filariform oesophagus extending upto 40% of total body length, 22 intestinal cells arranged in dorsal and ventral rows first and last pair of cells being non nucleated, whereas other cells are binucleated and the characteristically notched tail. Whereas hookworm larvae though possess rhabditoid oesophagus but their tail is finely tapering and does not terminate in a notch.

#### **Treatment :**

Dithiazanine iodide had been used as a drug in the past for the treatment of strongyloidosis in man and dogs (Sharma *et al.*, 1997). However, of late continuous feeding of Thiabendazole at 0.01 to 0.05 percent level in ration has been reported to prevent mature *Stongyloides spp* infection in dogs. Some

workers (Malone *et al.*, 1980 & Varshney *et al.*, 1998) have reported a high Thiabendazole given orally at a dose rate of 12 mg/kg body weight daily, for 5 days in clinical cases of canine strongyloidosis. Mebendazole has also been tried in experimental infection. Reports are also available on the use of Diethyl carbamazine in *S. stercoralis* infection.

**Prophylaxis :**

Poor sanitation and close association of susceptible pets with human being harbouring

*S. stercoralis* infection lead to rapid build up of the infection in the host. Hence, proper hygiene in kennels with high sanitary standards of owners and timely deworming can prevent the dogs from picking up the disease.

**Acknowledgements :**

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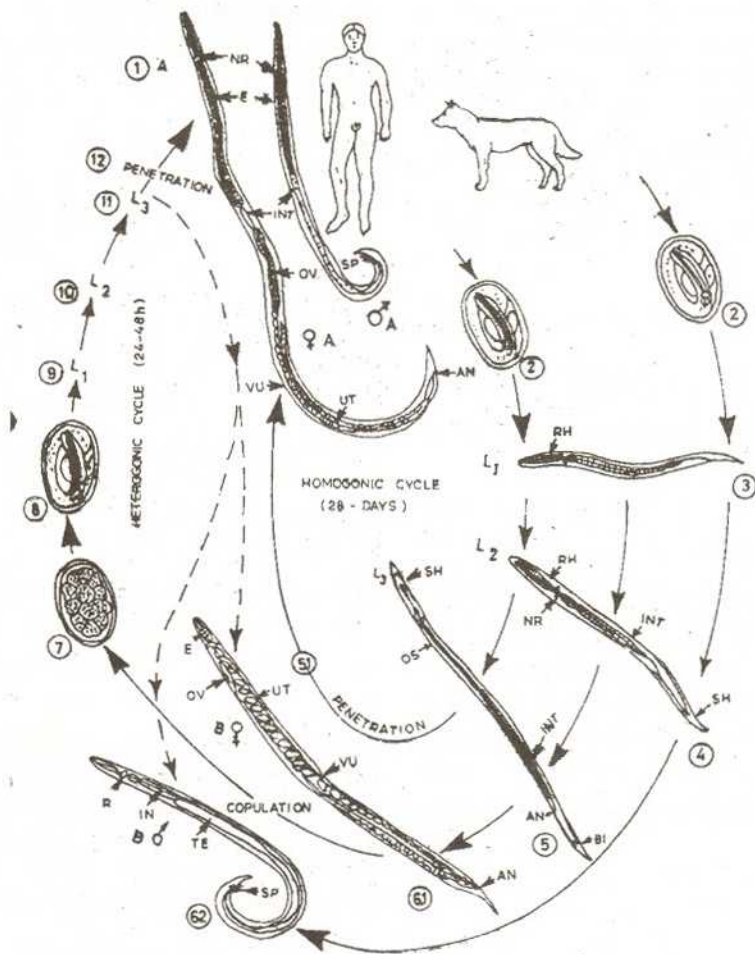


Fig. 3 : Developmental stages and variable biotypes of *S. stercoralis*

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## Efficacy of Amitraz (Taktic 12.5% EC) Against Scabies in Camels

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### Introduction :

Sarcoptic mange (scabies) is generally recognised as one of the most common skin disease of camels, caused by *Scaroptes scabiei var cameli*. Camels are seriously disturbed by sever dermatitis and prurities manifested as itching, as irritation increases, the camel rubs, bites and scratches the affected area in an attempt to alleviate the itchiness (Higgins, 1985) thus causing production losses. They may stop grazing and milk production may show a rapid fall.

Mange control has acquired great importance due to the increasing awareness and concern for the loss of productin in animals. Development of resistance to acaricides (Drummond, 1977; Baker, 1978 and Solomon, 1983) is one of the main bottleneck in the ectoparasite control programmes universally. In India, there is also information available on acaricidal resistance. However, deltamethrin (Butox, Hoechst Roussel Vet Pvt. Ltd.) has been extensively used to control mange in camels but information is quite scarce on efficacy of Amitraz in camels. In view of this, a clinical investigation was undertaken to determine the efficacy of Amitraz against mange.

Taktic®, a new acaricide containing amitraz (amidine group of ectoparasiticide) controls sarcoptic mange in pigs (Harrison & Burbidge, 1980; Griffiths 1975; Johanson *et al.*, 1980; Harrison *et al.*, 1972 and Hogg, 1986), chorioptic mange in goats (Wright *et al.*, 1988) and demodectic mange in dogs

(Medleau & Willemse, 1991). Field trials on the effect of Taktic (amitraz 12.5% w/w) on sarcoptic mange in camel was conducted successfully (non-chronic cases) by Prof. Dr. Samir Afram Michael, 1987 (Personal Communication).

In India, studies have been conducted on Amitraz against *in-vitro* efficacy of *Boophilus microplus* (Maske *et al.*, 1994) and treatment of Tick infestation in canine (Maske *et al.*, 1994a). Singh *et al.*, 1992 reported the comparative acaricidal effect of Amitraz and Deltamethrin in camel and crossbred cows. The present report describes an integrated programme using Taktic 12.5% EC to control sarcoptic mange in camels. The report is based on field studies, conducted at Bikaner.

### Materials & Methods :

The study was conducted on male camels (Bikaneri breed, aged between 5 to 9 years). These were draft camels being stalled and used mostly at urban locales for transportation of goods. 25 mild to severely affected camels with sarcoptic mange were brought to the clinic of College of veterinary and Animal Sciences, Bikaner.

These were divided into three groups, based on the clinical signs which are discussed below :

#### Group I – Mild form

10 camels were selected for this group having mild form of infestation with local alopecia in axilla, groin and upper parts of the legs, occasional scratching with teeth and rubbing

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\* Hoechst Roussel Vet Pvt. Ltd., Neeta Park, Airport Road, Yerwada, Pune

against the wall or tree.

### **Group II – Moderate form**

This group also consisted of 10 animals with moderate form of infestation. All the camels had patchy alopecia over legs, thoraco abdominal region and part of the neck and face. Animals rubbed the mangy skin against tree or wall and scratched it with teeth.

### **Group III – Severe form**

5 camels with severe form of infestations were incorporated in this group. These camels had chronic dermatitis (exudative type), extensive alopecia with thickening of skin, crust formation involving face, neck, thoracoabdominal region, axilla, groin and legs. There was a persistent rubbing of mangy skin against the wall or tree. Due to intense irritation animals occasionally bite on the skin lesions. They were restless and had a depraved appetite. There was a loss of general condition and draftability.

### **Preparation of the animals :**

Entire body of each animal from each group i.e. I, II & III was washed with a washing soap followed by scrubbing with a hard bristle brush and allowed 12 hours gap to make it complete dry, prior to spray with Taktic 12.5% EC. The camel owner discontinued administering any acaricide to these animals, 35 days prior to this study in order to ensure that animals are sufficiently infested.

### **Treatment :**

Taktic 12.5% EC was diluted in water @ 1:750 i.e 30 ml of Taktic 12.5% EC was mixed with 10 litres of water, to make a trial concentration of Amitraz (0.0375%). The mangy skin of these animals were sprayed with the Taktic. A special attention was

given so that alopecia area get a thorough spray with the drug.

The details of treatment given with the Taktic is as under :

- Group I : Single spray treatment only.  
No other medicine was given.
- Group II : Two spray treatments with repeat spray on 10<sup>th</sup> day after first spray.  
No other medicine was given.
- Group III : Three spray treatment were given at weekly intervals. On 4<sup>th</sup> week additionally 13-15ml of Ivermectin 1% solution was administered subcutaneously to all 5 animals.

### **Results and Discussion :**

Diagnosis of sarcoptic mange is often based on clinical signs alone although occasionally the disease is confused with ringworm or camel-pox. In the early acute and in the chronic or quiescent stages of the infection, however, a final diagnosis may be required by taking a skin scrapping and identifying the presence of the mange mite. One practical method for taking a skin scrapping from a camel has been recently described in details by Higgins (1985). Because mites are frequently found deeply seated in tunnels, it is necessary to scap a lesion carefully with a scalpel blade until blood oozes gently from the surface. The best areas to scap are often the papular elevations of otherwise healthy looking skin, the edges of suspected active lesion and the valleys of wrinkled skin. Scrappings are mixed with 10% potassium hydroxide, heated to dissolve debris and after centrifugation, the sediment is examined

under low power microscopy for the presence of the mite.

#### Post treatment sampling :

Skin scrappings were taken from each camel at 1, 7, 10 and 25 days after treatment for determination of mites mortality. Amitraz (Taktic) caused > 98% mortality of mites at 1 day after treatment.

#### Behavioural changes :

In the present field trial camels of Group I, stopped rubbing and scratching after a short period of simple spray with 0.375% of Amitraz. Alopecia disappeared after 10 days of treatment.

In camels of Group II, rubbing and scratching were minimised after one week of the first treatment and alopecia disappeared after the 2<sup>nd</sup> treatment i.e. on the 25<sup>th</sup> day of the first treatment.

But in camels of Group III, where infestation was in chronic and severe form, rubbing and scratching minimised but did not stop completely and alopecia remained more-or-less same even after the third spray with 0.0375% of Amitraz (Taktic 12.5% EC).

#### Preventive measure / Adjunct treatment

The camels of Group I and Group II did not require further treatment. However, their places of lying were changed frequently in order to prevent recurrence of the infestation through sand bed.

The camels of Group III with severe infestation, Amitraz 0.0375% was found effective but as a precautionary measure the camels were frequently translocated and additionally as an adjunct to the Taktic, 15 ml of Ivermectin 1% injection was administered subcutaneously which led to elimination of mange infestation from the body, as evident from skin scrappings.

#### Conclusions :

From this field report it can be concluded that Taktic at 0.0375% concentration was effective in mild to moderate form of mange infestation in camel. The effect of Taktic in severe exudative form of mange infestation needs repetition of spray application as well as an injection of Ivermectin as an adjunct to this treatment.

There was no adverse reactions or side effects with this concentration and a weekly repeat of application were noticed.

#### Acknowledgement :

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**The exceptional ectoparasiticide for the control of Ticks, Mites, Lice & Keds in Cattle, Sheep & Goat.**




Application : Taktic is recommended by spray or dip treatment.

Animal		Spraying		Dipping	
		Taktic 12.5%	Lt. of water	Initial Fill	Replenishment
<b>Cattle</b>	Ticks	10 ml.	5	1 lt. Taktic per 500 lt. of water added.	1.5 lt. Taktic per 500 lt. of water added.
	Mange	10 ml.	5	1 lt. Taktic per 500 lt. of water added.	1.5 lt. Taktic per 500 lt. of water added.
<b>Sheep Goat</b>	Ticks	10 ml.	5	1 lt. Taktic per 500 lt. of water added.	1.5 lt. Taktic per 500 lt. of water added.
	Mange Lice/ Keds	20 ml.	5	2 lt. Taktic per 500 lt. of water added.	3 lt. Taktic per 500 lt. of water added.

- **Presentation** : Available in 50 ml. and 250 ml. tin packs with measuring Caps.
- **Precaution** : Do not drink or smoke during treatment. Store in cool place. Keep out of reach of children.
- **Antidote** : Symptomatic treatment only. Do not use Atropine.

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## Efficacy of Levamisole Alone and with Butox® (Deltamethrin) Against Sarcoptic Mange in Sheep

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In India infestation with sarcoptic mites is most common among the livestock (Sen and Fietcher, 1962). Sarcoptic mange caused by *Sarcoptes scabiei* in man and animals in much more severe than other forms of mange. Severe afflictions are an obstacle in the profitable livestock production due to dermatitis, damage to hide, loss of hide, loss of wool, decreased meat and milk production and reproduced performance.

Immune suppression or failure has been thought to be contributory factor in production of disease or in low response to treatment. Hirsh *et al.*, (1975).

The acaricide Deltamethrin has been found effective to a varying degree in different species of animals (Kamboj *et al.*, 1993, Mitra *et al.*, 1994 and Shantakumar and Suryanarayan, 1995). The present study was undertaken to assess the efficacy of an immo-modulator, levamisole administered alone or in combination with topical application of deltamethrin for sarcoptic mange in sheep.

### Materials and Methods :

Animals : Bannur sheep (n=18) aged above three months and upto six years, having chronic skin lesions were grouped as follows:

**Group A :** These animals (n=6) received levamisole (Lemasol-75, Ranbaxy Lab), subcutaneously at the dose rate of 2.5 mg/kg b.w., at weekly interval.

**Group B :** Animals (n=6) included in this group received levamisole subcutaneously at the dose rate of 2.5 mg/kg b.w. along with

topical application of deltamethrin (Butox® Hoechst Roussel Vet Pvt. Ltd.) diluted in water (@4ml/litre) and applied at weekly interval.

**Group C :** This group (n=6) served as untreated control.

Clinical efficacy was evaluated on the basis of clinical signs and symptoms, alleviation of lesions leucocyte profile and serum protin analysis.

Blood smear examination : Total leucocyte (TLC) and differential leucocyte counts (DLC) were carried out and T-lymphocyte count was performed using alpha-naph-thyl acid esterase method (Knowels *et al.*, 1978, Giorno and Beverly, 1981)

### Results and Discussion :

Values of total and differential leucocyte counts, T and B lymphocytes and Serum protines recorded before and after treatment are as shown in tables I, II and III respectively.

No significant difference was noticed in the TLC values after treatment in all treated groups, compared to pre-treatment values. There was a marginal rise in lymphocyte count in all treated groups significant increase was observed in group A, which could be ascribed to the effect of levamisole. After treatment there was marginal decrease in eosinophil count and was significant in group B. This decrease in eosinophil count could be due to reduction in mite population (Sargison *et al.*, 1995).

Increase in T-lymphocyte count after treatment could be attributed in

**Table I : Mean  $\pm$  S. E. values of total leucocyte count (TLC) and differential Lencocyte count (DLC) in Sheep affected with Sarcoptic mange, before treatment (BT) and after treatment (AT)**

Group	TLC / cmm		Lymphocytes/cmm		Neutrophils/cmm		Eosinophils/cmm	
	BT	AT	BT	AT	BT	AT	BT	AT
A	9.8 $\pm$ 1.0	10.9 $\pm$ 2.8	5.2 $\pm$ 2.9	6.6 $\pm$ 3.9*	4.2 $\pm$ 8.0	3.9 $\pm$ 4.8	0.32 $\pm$ 1.3	0.38 $\pm$ 1.5
B	11.6 $\pm$ 1.0	12.8 $\pm$ 1.3	6.2 $\pm$ 4.3	7.6 $\pm$ 7.5	4.9 $\pm$ 5.3	4.9 $\pm$ 6.0	0.59 $\pm$ 1.3	0.25 $\pm$ 6.2
C	9.9 $\pm$ 4.6	10.4 $\pm$ 3.3	5.6 $\pm$ 3.4	5.7 $\pm$ 4.6	3.7 $\pm$ 4.5	4.2 $\pm$ 3.1	0.56 $\pm$ 1.1	0.39 $\pm$ 1.1

\* Significant at 5% level (P < 0.05)

immunomodulatory effect of levamisole (Brunner and Muscoplat, 1980). Untreated group C showed marginal decrease in the count.

In group A and C, it was evident that the clinical signs and gross lesions on the body remained uncharged even after 56 days post-treatment. However, the intensity was severe in group C as compared to group A. Levamisole though had an immuno-

In group B, variation in clinical recovery was noticed which was dependent on severity of lesion pre-treatment. Mild cases showed drying of crusts and less itching after first treatment and showed good improvement after second treatment, except for one animal which needed third treatment. Moderate cases required five to six treatments, whereas severe cases showed improvement after eight treatments.

**Table II : Mean  $\pm$  S. E. values of T and B Lymphocytes in Sheep affected with Sarcoptic mange, before treatment (BT) and after treatment (AT)**

Group	T-Lymphocyte %		B-Lymphocyte %	
	BT	AT	BT	AT
A	51.33 $\pm$ 2.25	56.00 $\pm$ 1.82	48.67 $\pm$ 2.25	44.00 $\pm$ 1.82
B	54.67 $\pm$ 2.52	57.05 $\pm$ 2.07	45.33 $\pm$ 2.52	42.50 $\pm$ 2.01
C	52.17 $\pm$ 4.98	50.67 $\pm$ 5.45	47.83 $\pm$ 4.98	49.33 $\pm$ 5.45

modulatory effect, it did not affect the mite population. Therefore, satisfactory clinical improvement in group A could not be achieved.

Topical applications of deltamethrin has been practised in other animals suffering from sarcoptic mange and Pathak *et al.*, (1991) reported spectacular cure of mange in camels

**Table III : Mean  $\pm$  S. E. values of Serum protins in Sheep affected with sarcoptic mange, before treatment (BT) and after treatment (AT)**

Group	Total protines (g/dl.)		Albumin (g/dl.)		Globulin (g/dl/)		A : G Ratio	
	BT	AT	BT	AT	BT	AT	BT	AT
A	8.03 $\pm 0.33$	7.22 $\pm 0.33$	2.93 $\pm 0.15$	3.20 $\pm 0.33$	5.10 $\pm 0.42$	4.02 $\pm 0.47$	0.60 $\pm 0.06$	0.86 $\pm 0.16$
B	8.02 $\pm 0.23$	6.97 $\pm 0.61$	3.10 $\pm 0.09$	2.87 $\pm 0.10$	4.92 $\pm 0.31$	4.10 $\pm 0.68$	0.65 $\pm 0.06$	0.79 $\pm 0.12$
C	7.18 $\pm 0.16$	6.83 $\pm 0.08$	3.05 $\pm 0.06$	2.98 $\pm 0.15$	4.13 $\pm 0.14$	3.85 $\pm 0.19$	0.74 $\pm 0.03$	0.80 $\pm 0.06$

with three applications of deltamethrin applied at 10 days interval. Similar effectes were also observed by Singh *et al.*, (1993) in buffaloe, calves and Kamboj *et al.*, (1993) in dogs.

#### Summary :

Deltamethrin applied topically along with levamisole injection was found to be effective in destroying the mite population and there was improvement which was clinically noticeable.

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## A Trial of Butox Against Lice Infestation in Goats

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A field trial of Butox against lice infestation in goats, belonging to Veterinary College goat unit, was conducted during June 1996 and the results are reported in the present paper.

### Materials and Methods :

A flock of 50 goats severly infested with sucking lice *Linognathus stenopsis* were selected for the trial. The density of lice population on goats skin was very high (approximately 30-32 lice per sq. inch area). Butox (Deltamethrin 1.25% EC, Hoechst Roussel Vet) diluted @ 2ml per litre of water, was spray all over the body of goats. Goats were daily observed for the presence of lice. One more spray of Butox was given at the same dilution mentioned above on the day 16 of first treatment.

### Results and Discussion :

On the 1st, 2nd 3rd day post-treatment (PT) the lice population started disappearing and on the 4th day of PT, complete disappearance of lice was observed. However, few nits (eggs) still persisted. After the 3rd day of spraying all the goats were found completely free from lice infestation. The high efficiency of Butox against all types of ectoparasites (ticks, lice, mites, fleas) is well documented (Sharma *et al.*, 1991 a, Jani *et al.*, 1991 in dogs, Mondal and Singh, 1988 in buffaloes, Sharma *et al.* 1991b in goats and Mukherjee *et al.*, 1995 in swine).

### Conclusion :

Efficacy of Butox against lice in goats Sharma *et al.*, (1991b) had shown the complete recovery by single treatment. In the present study all the adult lice and nymphal stages were killed along with maximum number of nits (eggs) in the first treatment. Still few nits were persisted on the body of host after the first treatment which might have emerged as nymphs and adults after 1-2 weeks time and hence few lice were detected on the 15th day of PT. The second spray, undertaken on the 16th day of PT, resulted in complete recovery of lice infestation. Butox was found to be very safe for the animals as well as to the handlers.

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# Prevalence and Chemotherapy of Various Endoparasites of Pheasant (*Phasianus colchicus*)

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## Introduction :

Helminth infestation namely *Ascaridia compar*, *A.hamalosa*, *Capillaria caudinflata*, *C.annulata*, *C.anatis*, *C.contorta* and *Heterakis gallinarum* are causing tremendous losses to Fancy game birds especially pheasants. No work has been done so far on the prevalence and chemotherapy of various parasitic diseases of pheasants. The present study was designed to record the prevalence of various endoparasites of pheasants and therapeutic trials were carried out by using Fenbendazole at the recommended dose rate.

## Materials and Methods :

### 1. Survey of endoparasites by faecal examination

Fresh faeces from 200 pheasants of various ages and both sexes were collected in each month from Jaloo Park Zoo, Lahore in a clean and separate plastic bottle. These faecal samples were examined by direct smear, sedimentation and floatation technique as described by Urquhart *et al.*, (1988) for various species of endoparasites. Identification of various species was accomplished by the keys described Soulsby (1982). Month and season wise prevalence was recorded. For this purpose the year was apportioned into 4 seasons with the following breakup, winter (November to February), spring (March to April), summer (May to August) and autumn (September to

October). Prevalence in relation to age and sex was also recorded.

### 2. Chemotherapeutic Trials

Fenbendazole (Panacur®) a product of Hoechst Roussel Vet, was given orally at the rate of 30 mg/kg mixed in feed for 3 days. Faeces were examined and faecal eggs counts were made by Mc Master eggs counting technique (Coles, 1986) on the 0, 3<sup>rd</sup>, 7<sup>th</sup> and 18<sup>th</sup> day post-treatment. The efficacy of the drug was calculated on the basis of reduction in faecal egg counts. Side effects of the drug if any were also recorded.

## Results :

During the one year study period i.e. from January, 1996 to December, 1996, a total of 200 pheasants of various ages and of both sexes were examined. Of these 46 were found positive for endoparasites. The overall prevalence was thus 23%.

### Monthwise prevalence :

The overall month-wise prevalence of various endoparasites is presented in Table I. The highest prevalence was recorded in the month of October with the infection rate of 29.16%. The lowest incidence was recorded during the month of January being 4.76%.

### Season-wise prevalence :

The highest prevalence was recorded in the spring season i.e. 27.39%, while the lowest in winter i.e. 9.74% (Table II). Sex did not

effect the prevalence as well as severity of the disease. Nearly equal prevalence was recorded in birds of all ages.

#### Species-wise prevalence :

Out of 200 birds 46 were found positive for various species of nematodes. Species commonly recorded were *Ascaridia compar* (21.35%), *A. hamalosa* (17.39%), *Capillaria caudinflata* (15.25%), *C. anatis* (10.86%), *C. conhorta* (8.69%), *Heterakis gallinarum* (13.04%). Mixed nematodes infection was recorded in 18 birds.

#### Chemotherapeutic trials :

The efficacy of Panacur® (fenbendazol) was 40% on 3rd day, 75% on 7th day followed by 100% on 18th day post-treatment.

#### Discussion :

Although numerous studies have been conducted on helminth parasites of pheasants in some countries, no information is available on the species of helminth parasites in pheasants from Pakistan. In the present studies the prevalence of endoparasites was 23%. The various species of nematodes however occurred either individually or in

**Table I : Showing monthwise prevalence of helminth infestation**

Month	No. examined	No. affected	%age of infestation
January	42	2	4.76
February	30	3	10.00
March	32	9	28.12
April	41	11	26.80
May	33	4	12.12
June	30	6	20.00
July	25	5	20.00
August	34	6	17.64
September	37	9	24.30
October	24	7	29.16
November	36	5	13.80
December	46	5	10.86

**Table II : Showing season-wise prevalence of helminth infestation**

Season	No. examined	No. affected	%age of infestation
Winter	154	15	9.74
Spring	73	20	27.39
Summer	122	21	17.21
Autumn	61	16	26.22

combination. The highest incidence of nematode infection could be explained by the fact that these parasites do not need any intermediate host for their transmission and development also on the basis of seasonal and climatic variation. In the present studies species of nematode i.e. *A.compar*, *A.hamalosa*, *C.caudinflata*, *C.annulata*, *C.anatis*, *C.contorta*, *H.gallinarum* were recorded. These species of nematodes were also recorded by Chroust (1990), Schricke (1991), Hillgarth (1990), Amin *et al.*, (1987) and Margaret (1969). The variation in the degree of infestation could be attributed to the method of management, use of anthelmintic and improved feeding programme.

In the present study Fenbendazole (Panacur®) seems to be very effective anthelmintic with a wide spectrum of activity. The results of the present study are closely related to many other workers, Krisch (1984), Lawrence (1985) and Kovalenko (1988). They reported that Fenbendazole (Panacur®, Hoechst Roussel Vet) cure 90-100 percent cases.

### Summary :

A total of 200 fresh faecal samples of Pheasant were examined for the presence of various species of endoparasites. Of these 46 (23%) were found positive for various endoparasites. Seven species of nematode in order of their frequency i.e. *Ascaridia copar* (10, 21.73%), *A. hamalosa* (8, 17.38%), *Capillaria caudinflata* (7, 15.21%), *C. Cannulata* (6, 13.04%), *C. anatis* (5, 10.86%), *C. controrta* (4, 8.67%), *Heterakis gallinarum* (4.67%). No species of cestode and trematode were recorded. The prevalence of endoparasite was higher in spring followed by summer, autumn and winter. It was also reported that birds of all ages and both sexes were equally affected. The results of therapeutic trials by using Fenbendazole (Panacur®, Hoechst Roussel

Vet) indicated that it was very effective in the treatment of nematode infection in pheasants.

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## Experimental Visceral Larva Migrans in Dogs : Haematological and Pathological Changes

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### Introduction :

The seriousness of *Toxocara canis* infection in dogs and its public health hazards in human beings have been appreciated by both veterinary and medical professionals. In the past, to study the nature and pathology of visceral larva migrans (VLM), number of experimental animal models like mice, pigs, sheep, goats, macaques monkeys, rabbits, etc. have been used with success. Although, lesions of VLM have been observed in dogs (Magnussen, 1970), but reports are scanty on the clinical and pathological changes of VLM in this natural host, which initiated us to undertake this study.

### Materials and Methods :

After proper deworming, 14 stray pups of about one month age were divided into two groups of 10 (Group I) and 4 (Group II), which were maintained separately under strict hygienic conditions for another 4 months. At the age of 5 months, each dog of Group I was infected orally with 20,000 embryonated eggs of *T.canis* using milk as a vehicle (Dubey, 1979), and Group II dogs served as healthy control. Out of the 10 infected dogs, in Group I, 4 were used to study the haematological changes. Blood samples of these experimental dogs and 4 control dogs (Group II) were collected on the day 0, 7, 15 and 30 Post-infection. The same were examined for Hb, PCV, TEC, TLC and DLC values.

From the remaining 6 infected dogs, 3 each were sacrificed on day 8 and 16 Post-infection. Their visceral organs were examined for gross lesions. Tissue samples

from liver, lungs, spleen, kidneys, mesenteric lymphnodes, eyes, brain and skeletal muscles were processed and stained with H & E stain to study the histopathological changes.

### Observations and Discussion :

**Haematological changes** (Table 1) were compared with to noninfected animals. Infected dogs showed marked leucocytosis and eosinophilia accompanied by neutrophilia and lymphocytopenia, particularly on the 15<sup>th</sup> and 30<sup>th</sup> day post- infection. Although, the Hb, PCV and TEC values of infected dogs were slightly lower than control ones on the 15<sup>th</sup> and 30<sup>th</sup> day post- infection. Those differences were nonsignificant.

Leucocytosis and eosinophilia in response to *T.canis* infection has been observed in paratenic hosts (Sugana and Oshima, 1984, Lukes, 1985), human beings (Smyth, 1994) and in dogs (Hayden and Kruiningen, 1975). High degree of eosinophilia, a characteristic feature in many helminth infections, could be an immune mechanism of the body in response to migrating larvae of *T.canis* in the tissues (Jain, 1986). Increase in the number of circulating neutrophils in response to tissue damage and inflammation during any established infection is a common phenomenon (Jain, 1986) and this neutrophilia coupled with marked eosinophilia could be the reason for high leucocyte count.

**Pathological changes** were noted on the 8<sup>th</sup> day post-infection, the gross lesions consisted of uniformly distributed white to creamy coloured spots of 0.5 – 2 mm in diameter on the liver, lungs, cortex of the kidneys,

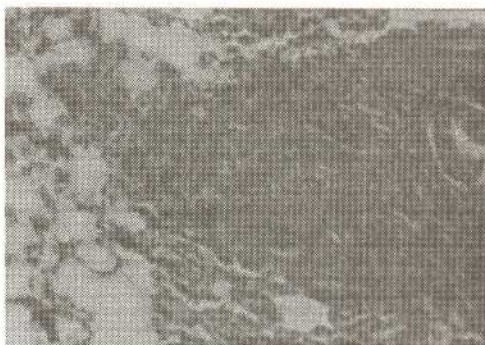
diaphragm, spleen and mesenteric lymphnodes. The livers were dark-red and slightly swollen, lungs were congested and haemorrhagic, and the kidneys appeared yellowish brown. However, no gross lesions were marked in the heart, brain, eyes and skeletal muscles. On the 16<sup>th</sup> day post-infection, the gross lesions increased in size, became nodular and in some places were confluent. In addition, the lungs became haemorrhagic and oedematous, and the mesenteric and hepatic lymphnodes were swollen and oedematous.



**Fig 1 : Cross section of liver of dog showing infiltration of eosinophils and lymphocytes in the portal area and severe fatty changes due to Visceral Larva Migrans (VLM).**

The histopathological changes in different visceral organs were more or less similar on the 8<sup>th</sup> and 16<sup>th</sup> day post-infection. The liver lesions consisted of infiltration of eosinophils, lymphocytes and plasma cells around the portal vessels with severe fatty changes of the hepatocytes (Fig 1), and development of few granulomas in the parenchyma.

Similar granulomatous lesions infiltrated with eosinophils and mononuclear cells were also observed in the lung parenchyma (Fig 2). Besides, the lungs also showed severe atelectasis and fibrinous exudation into the alveolar septa with infiltration of eosinophils and macrophages in the alveolar space.



**Fig 2 : Cross section of liver of dog showing development of granulomatous lesions due to Visceral Larva Migrans (VLM).**

Degeneration and oedema of the media of the arteries, and peribronchial and peribronchiolar fibrosis were also marked.

Lesions in the kidneys included marked thickening of the capsule and swelling of glomeruli and tubular epithelial cells obliterating the lumen. Few tubules were distended and contained fibrinous exudates.

The cardiac muscles showed marked intermuscular oedema, focal necrosis, extensive fatty changes and degeneration and fragmentation of muscle fibres.

The microscopic changes in other organs included marked depletion of lymphocytes from white pulp of the spleen; marked congestion of meningeal vessels and thickening of meninges; and increase in the number of lymphoid follicles, depletion of lymphocytes, development of few granulomas, and infiltration of plasma cells, eosinophils and lymphocytes in the lymphnodes.

More or less identical pathological changes due to the migration of 2<sup>nd</sup> stage larvae of *T.canis* has been reported in paratenic hosts (Dene *et al.*, 1960; Burren, 1986; Sinha, 1970; Glickman and Summers, 1983) as well as natural host (Magnussen, 1970; Hayden

and Kruiningen, 1975). Variation in the magnitude of microscope changes between the present and previous studies could be due

to the difference in the dose of inoculum (Hayden and Kruiningen, 1975). Although it is difficult to pinpoint to reasons for such

**Table I : Showing Haematological changes in dogs infected with 20,000 embryonated eggs of *T.canis* (I), compared to uninfected control dogs (C)**

	Blood Components	0 Day	7 <sup>th</sup> Day	15 <sup>th</sup> Day	30 <sup>th</sup> Day
1.	Hb (gm/dl)				
	I.	10.50 ± 0.28	10.67 ± 0.31	10.17 ± 0.22	10.02 ± 0.20
	C.	10.42 ± 0.58	10.60 ± 0.47	10.62 ± 0.51	10.45 ± 0.48
2.	PC.V. %				
	I.	32.17 ± 1.36	31.97 ± 0.58	29.70 ± 0.80	29.52 ± 0.48
	C.	11.70 ± 0.27	11.93 ± 0.22	12.07 ± 0.37	12.22 ± 0.33
3.	TEC (10 <sup>6</sup> / Cu mm)				
	I.	5.24 ± 0.23	5.10 ± 0.27	4.82 ± 0.28	4.70 ± 0.21
	C.	5.23 ± 0.39	5.24 ± 0.30	5.21 ± 0.32	5.17 ± 0.34
4.	TLC (10 <sup>3</sup> / Cu mm)				
	I.	11.80 ± 0.17	12.69 ± 0.23	16.22 ± 0.77	19.53 ± 0.94
	C.	11.70 ± 0.27	11.93 ± 0.22	12.07 ± 0.37	12.22 ± 0.33
5.	Neutrophil %				
	I.	53.25 ± 1.75	65.50 ± 2.72**	18.25 ± 0.85	23.25 ± 2.68
	C.	49.25 ± 2.20	51.00 ± 1.08	40.75 ± 3.94	40.75 ± 4.42
6.	Lymphocyte %				
	I.	41.50 ± 1.19	30.25 ± 3.30*	18.25 ± 0.85	23.25 ± 2.68
	C.	44.00 ± 2.16	43.50 ± 1.65	40.75 ± 3.94	40.75 ± 0.86
7.	Eosinophil %				
	I.	3.75 ± 0.47	3.25 ± 0.62	11.75 ± 0.85	17.50 ± 1.32
	C.	3.75 ± 0.47	3.75 ± 0.85	4.75 ± 0.47	4.50 ± 0.86
8.	Basophil %				
	I.	1.00 ± 0.40	0.50 ± 0.28	0.75 ± 0.47	0.75 ± 0.25
	C.	1.50 ± 0.28	1.00 ± 0.40	1.00 ± 0.00	0.75 ± 0.25
9.	Monocyte %				
	I.	0.50 ± 0.28	0.50 ± 0.28	1.0 ± 0.40	1.0 ± 0.00
	C.	1.50 ± 0.28	0.75 ± 0.47	0.75 ± 0.25	0.50 ± 0.28

\* = P < 0.05

\*\* = P < 0.01

pathological changes, infiltration of leucocytes and formation of granulomas could be a defensive mechanism of the body to trap and kill the migratory larvae. Other pathological changes might have resulted due to the damage caused by the migratory larvae as well as host response to infection.

#### Conclusion :

Infection of 5 months old dogs with 20,000 embryonated eggs of *T.canis* resulted in the development of visceral larva migrans with haematological and pathological changes nearly similar to those observed in paratenic hosts.

Haematological changes mainly consisted of leucocytosis, eosinophilis, neutropenia and lymphocytopenia and the important pathological changes included evenly distributed small white foci, and granulomatous lesions in the liver, lungs and other visceral organs with infiltration of lymphocytes, eosinophils and neutrophils.

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## Studies on the Paramphistomiasis in Cattle and Its Treatment With Tolzan F

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Paramphistomiasis is a very important parasitic disease of cattle. It is caused by *P.cervi*, *P.microbothriodes* and others and is accompanied by fatal diarrhoea, weakness, dehydration and decreased milk yield. Submaxillary oedema and death are also very common in them and thus it causes a great economic loss to the livestock industry (Blood *et al.*, 1983). The immature amphistomes have more pathogenic effect than the adult worms. A number of outbreaks of immature amphistomiasis in cattle have been recorded in India by Pande (1985) from Assam and Sahai (1981) from Bihar. Immature amphistomiasis causes high degree of morbidity as well as mortality. Pande (1985) reported 21 to 38.8% mortality in cattle from Assam while Sahai (1981) observed 30% to 40% mortality and 65% to 75% morbidity in an outbreak of the disease in cattle from North Bihar. The outbreaks are noticed mostly between September / October to February / March.

To control this deadly malady of the livestock, a variety of anthelmintics viz. Resorantel and Rafoxanide (Soulsby, 1982), Thiophanate and Albendazole (Mahapatra *et al.*, 1990) have been used with varying results. But there is paucity of literature on Oxyclozanide against amphistomiasis in cattle in field conditions except a few (Bhaumik *et al.*, 1994). Therefore, Tolzan F, a product of Hoechst Roussel Vet containing Oxyclozanide was selected for its efficacy against mature paramphistomiasis in naturally infected cattle.

### Materials and Methods :

Twenty cross-bred Jersey and Holstein adult cattle harbouring heavy paramphistome infection with the symptoms of indigestion, diarrhoea, weakness and dehydration were selected for this study. The conjunctival mucous membranes were pale and their body coats were rough and dry. General health conditions were poor. Some of them showed moderate to marked submaxillary oedema and the lactating cows showed decreased milk yield.

The faecal samples of each animal were examined by sedimentation method and the Eggs Per Gram (EPG) of the faeces were determined. The blood samples of each animal were also collected for the estimations of SGOT, SGPT (Reitman and Frankel, 1975), Serum alkaline phosphatase (Oser, 1979), total serum protein, albumin and A/G ratio (Wooton, 1974).

These animals were then divided at random in two groups comprising 10 each. The animals of Group A were kept as infected untreated control, while the animals of Group B were treated with Tolzan F @ 10 mg./kg. body weight. The EPG of the faecal samples of each of the animals of both the groups were done 0, 5, 10, 29, 30 and 40<sup>th</sup> day post treatment and the average EPG was determined. Blood parameters of these animals were estimated on 0, 20 and 40<sup>th</sup> days post treatment. The mean values of each parameter were determined and the statistical analysis was as per Snedecor and Cochran (1968). The efficacy of the drug was



assessed on the basis of reduction in faecal egg count, disappearance of clinical symptoms and improvement of blood biochemical parameters. These animals were further prevented from grazing on contaminated marshy lands during the experimental period.

### Results and Discussions :

The data obtained on the flukicidal activity of Tolzan F on EPG count and its effect on blood biochemical parameters are presented in Table I and Table II respectively.

The results in the Table - I clearly indicates that the drug (Tolzan - F) has a marked efficacy against mature paramphistomes of cattle in reducing the EPG count of stool. It showed 96% efficacy on 40<sup>th</sup> day post treatment observations while it was 95% on 10<sup>th</sup> day. This findings corroborates the observations of Chhabra and Ball (1976) and Georgiev and Gruev (1979) in paramphistomiasis in cattle treated with Oxyclozanide. The former noticed 100% efficacy in clinical cases of amphistomiasis in cattle. Bhaumik *et al.*, (1994) used Tolzan F in the treatment of amphistomiasis in cattle on the basis of microscopic examination of faeces, they detected 39% of animals recovered from amphistomiasis with the treatment. Barragry (1994) opined that, Oxyclozanide acts by uncoupling the

oxidative phosphorylation in the parasite and causes energy depletion and thus ultimately the mature worm dies. On the contrary, the untreated control animals (Group A) continued to show gradual increase of faecal egg count in the subsequent observations on 20<sup>th</sup> and 40<sup>th</sup> days as evident in Table - I

Before treatment, the clinical cases of both the groups showed weakness, unthriftiness, inappetance, anaemia, submandibular oedema, polydypsia and profuse foetid diarrhoea. The milk yield was also markedly reduced. However, following therapy in Group B, these symptoms gradually disappeared within 15<sup>th</sup> to 20<sup>th</sup> days of post treatment and there was a overall improvement of the general conditions of the treated animals while the untreated cases (Group A) continued to show the earlier symptoms.

The total serum protein concentration of the clinical cases in both the Groups were found decreased on 0 day and simulated the findings of Horak and Clark (1963) in *P.microbotrium* infected sheep and Sahai (1984) in experimentally infected paramphistomiasis in kids. Similarly, the albumin levels were also found less in both the groups on 0 day (Table I). Horak & Clark (1963) were of the opinion that reduction in the plasma protein concentration is mainly due to poor plasma albumin

**Table I : Effect of Tolzan-F against paramphistomes on the basis of reduction of EPG after treatment.**

Group	No. of Animals	Average EPG before treatment	Average EPG after treatment					Efficacy %
			5 <sup>th</sup> day	10 <sup>th</sup> day	20 <sup>th</sup> day	30 <sup>th</sup> day	40 <sup>th</sup> day	
Group A (Untreated Control)	10	300	307	311	321	329	342	--
Group B (Tolzan-F Treated)	10	286	30	15	14	12	12	96

**Table II : Serum protein and serum enzyme activities in clinical cases of paramphistomes and in Tolzan-F treated clinical cases.**

Days and Groups	No. of Animals	Total Serum protin (G %)	Albumin (G %)	A/G ration	SGOT (F Unit)	SGPT (F Unit)	Alkaline Phosphatase (Bodansky Units / 100 G)
0 day (before treatment Group A	10	6.38±0.18	2.66±0.14	0.72±0.01	52.31±3.19	17.32±1.79	6.89±0.83
Group B	10	6.46±0.24	2.69±0.16	0.71±0.04	52.74±4.42	16.57±2.31	7.12±1.13
20th day Group A	10	6.34±0.19	2.65±0.17	0.71±0.01	54.71±3.87	17.24±2.16	7.24±1.23
Group B	10	6.93±0.21	3.32±0.21	0.92±0.02*	49.11±3.94	17.19±2.19	5.21±0.89
40th day Group A	10	6.31±0.23	2.63±0.22	0.71±0.01	55.93±3.81	16.69±1.94	7.26±0.96
Group B	10	7.05±0.28	3.58±0.19*	1.03±0.02**	45.32±4.02	17.02±2.04	4.23±0.49

\* Statistically significant at 5% level (P < 0.05)

\*\* Statistically significant at 1 % level (p < 0.01)

concentration of the blood. The A/G ratio also decreased markedly in the clinical cases on the 0 day in this study.

However, following treatment in Group B the total serum protein level increased and was found normal on 40<sup>th</sup> day post-treatment. The serum albumin level increased significantly (P<0.5) on 40<sup>th</sup> day while the A/G ratio also increased significantly (P<0.01) on the same day of observations of post treatment. It is postulated that decrease in worm load, improvement of appetite and lessening of diarrhoea helped in the increase of plasma protein concentration, and A/G ratio. The submandiular oedema noticed in these animals was suggested due to low level of total serum protein and severe anaemia (Sahai, 1984) and treatment with Oxycezanide in Group B killed the worms and helped in the increase of plasma protein level and also helped in disappearance of submandibular oedema. But in the control animals (Group A), there was no change of

values of Total Serum Protein (TSP), Albumin or A/G ratio on the 20<sup>th</sup> and 40<sup>th</sup> day observations.

There was little increase of SGOT level on 0 day in both the groups. Since considerable amount of GOT activity is found in almost all the tissues of mammals (Kaneko and Cornelius, 1971) and as the immature flukes cause severe catarrhal and haemorrhagic inflammatory changes in duodenum and jejunum with destruction of the intestinal glands etc. (Soulsby, 1982), a little rise in SGOT levels were noticed in both Group A & Group B before treatment.

The SGPT levels however did not alter either in Group A or in Group B animals before or after treatment.

The alkaline phosphatase levels were found increased in both the groups of animals of clinical amphistomiasis before treatment. Coles (1986) remarked, alkaline phosphatase

are distributed in high concentrations in the intestinal mucosa. Since the immature flukes cause massive invasions of the mucosa of duodenum and jejunum (Soulsby, 1982), a rise in SAP level gradually declined in the treated group (Group B) on the 20<sup>th</sup> and 40<sup>th</sup> days observations of post treatment while it remained elevated in the control animals (Group A).

From the above observations, it was concluded that Tolzan F is an effective drug in the treatment of amphistomiasis in cattle.

### Summary :

Twenty crossbred Jersey and Holstein adult cattle with heavy paramphistome infection were selected for this trial. Ten cattle were kept as untreated control while the rest 10 were treated with Tolzan F bolus @ 10 mg. / kg. body weight. On the basis of EPG count of faecal samples, clinical symptoms and some blood biochemical changes before and after treatment in both the groups Tolzan F was found to be an effective drug in the treatment of amphistomiasis in cattle.

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# Hook Worm Infestation in Dogs, its Zoonotic Importance and Chemotherapy with Panacur® (Fenbendazole)

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## Introduction :

Hook worm disease in dogs caused by *Ancylostoma caninum* and *A. braziliense* is a wide spread parasitic malady of puppies and adult dogs. The parasites occur commonly in the small intestine of dogs and various wild carnivores (Levine, 1983). The larval stages of ancylostomiasis is associated with creeping eruptions in man which is generally referred to as Cutaneous Larva Migrans (CLM). The migration of parasitic larva in the skin produces progressive linear eruptive lesions. This condition is known as Dermatitis linearis migrans (Pathak, 1987). These parasites are voracious blood suckers and each worm can suck upto 0.8 ml of blood per day (Lanasberg, 1939). Ancylostomiasis thus causes anaemia, diarrhoea, prostration and even death. Keeping in view the importance of this disease the present study was undertaken to determine the prevalence of Ancylostomiasis and to observe the effect of Fenbendazole. (Panacur®, Hoechst Roussel Vet)

## Materials and Methods :

Faecal samples of dogs attending the clinics of the Department of Clinical Medicine and Surgery, University of Agriculture, Faisalabad (Pakistan) collected as materials for examination under microscope by both direct smear and concentration methods. The faecal examination and Egg Per Gram (EPG) of faeces were made on 0, 3<sup>rd</sup>, 7<sup>th</sup> and 15<sup>th</sup> day by MC Master egg counting technique (Coles, 1986). The parasitic ova

were identified on the basis of morphology described by Soulsby (1982).

The breed, sex and age wise prevalence of Ancylostomiasis was also recorded. Sixty five positive cases were randomly divided into two groups i.e. A and B. Animals in group A (50) were given Fenbendazole (Panacur®, Hoechst Roussel Vet) at the dose rate of 20mg/kg body weight while 15 animals in group B acted as control. No treatment was given to the dogs of this B group. Efficacy of drug was calculated on the basis of reduction in faecal egg counts. Side effects of the drug if any were also recorded.

## Results and Discussion :

A total of 325 faecal samples were examined during the study period i.e. from January - December 1994 and 65 were found positive for *Ancylostoma* eggs, indicating the positive prevalence of 20%. The breed wise distribution of positive cases revealed that out of 65 positive samples the highest incidence was recorded in 26 Alsatian dogs (40%) followed by German Shepherd 20 (31%). Doberman 13 (20%) and 6 Golden Retiver (9%). The varying rate of breed wise susceptibility may be due to the care and management given to pets by dogs owners (Table I).

The highest prevalence of the infection was observed in the age group below one year 39 (60%) followed by 13 (20%) age group of 1-2 years and 10 (15%) group of 2-5 years age group and was lowest 3(5%) in the dogs in age group of 5 years and above. The results

showed that the highest incidence was observed in age group below one year and the lowest incidence was recorded in older dogs of age group of 5 years and above. This might be due to the low level of immunity of young pups as result of which susceptibility to infection increased. Similar results were also recorded by Bhutia *et al.*, (1995).

The efficacy of (Panacur<sup>®</sup>) Fenbendazole was 43%, 78% and 100% on 3<sup>rd</sup>, 9<sup>th</sup> and 15<sup>th</sup> day post-treatment respectively. Nearly similar results were also recorded by Panda *et al.*, (1986), Amin and Maqbool (1990).

From the present study it can be concluded that incidence of Ancylostomiasis is very high in dogs which certainly suggest hazards to human population in acquiring cutaneous larva migrans. The parks, public grounds and play ground used as recreational place in urban areas could be infected with faeces of such infected dogs which might serve as a source for human infection (Anon. 1979) and dogs should be regularly dewormed with effective anthelmintics so as to control the hookworm infection.

#### Zoonotic Importance :

Six dogs owners which had close contact with their dogs affected with ancylostomiasis, developed cutaneous larva migrans. These cases were diagnosed at Allied Hospital, Faisalabad, Pakistan. Sprent (1969) also recorded similar cases.

The larval form of *Ancylostoma* species are associated with creeping eruptions (cutaneous larva migrans) and Dermatitis linearis migrans in children. Sometime the larval form burrow through skin causing ground itch between toes or some times they cause also other form of larva migrans. They migrate to the lungs via the blood stream and ultimately reach to the gastro-intestinal tract. They cause abdominal pain iron deficiency, anaemia, anasarca mental and physical depression, constipation and general debility (Setasuban and Waddell, Sprent, 1969).

#### Summary :

The prevalence of hook worm infestation, its zoonotic importance and chemotherapy in dogs was studied at the outdoor clinics of the Department of Clinical Medicine and Surgery and Department of Veterinary Parasitology, University of Agriculture, Faisalabad, Pakistan. A total of 325 dogs of different breeds came to the clinics over a period of one year, 20% were found to be infected with hook worm. The infection rate was higher in young dogs (less than one year) than adult dogs. The larval stages of hook worm species were associated with creeping eruptions (cutaneous larva migrans) and Dermatitis linearis migrans in human being. Forty positive cases were treated with Fenbendazole (Panacur<sup>®</sup>) at their recommended dose rate. Results showed that Panacur<sup>®</sup> (Hoechst Roussel Vet) was 100 percent effective against hook worm in dogs.

**Table I : Showing Breed-wise incidence of Ancylostomiasis**

Total No. of Dog	Total No. of Positive Case	Breed			
		Alsatian	German Shepherd	Doberman	Golden Retivar
325	65	26	20	13	6
	20%	40%	31%	20%	9%

**Table II : Showing Age and sex wise incidence of Ancylostomiasis**

Age-wise	Positive Cases	% Infection
Below 1 Year	39	60
1-2 Years	13	20
2-5 Years	10	15
Above 5 Years	03	5
<b>Sex-wise</b>	<b>65</b>	<b>100</b>
Male	35	54
Female	30	46
<b>Total Cases</b>	<b>65</b>	<b>100</b>

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## Efficacy of Amitraz (Taktic 12.5% EC) Against Sarcoptic Mange in Camels

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### Introduction :

The camel (*Camelus dromedarius*) is an economically important animal in the arid and semi-arid regions of Africa, Asia and Middle East. Lives of millions of some of the most marginalised people depend almost entirely on the health and productivity of this truly sustainable agricultural resourced animal. Camels are hardy animals which tolerate the rugged climate and extreme of temperature in the desert. They do, however, suffer from a number of important diseases including sarcoptic mange caused by *Sarcoptes scabiei* var. *cameli*. Mange is a highly contagious, obstinate and debilitating disease of camels and poses a threat to camel health (Lodha, 1966). It is considered to be of economic importance due to high prevalence, undermined productivity and loss of condition of the affected animals resulting from intense pruritis and restlessness (Higgins, 1983). It affects camels of all ages and both sexes and frequently occurs in flocks kept under poor husbandry conditions (Rathore and Lodha, 1973).

To combat sarcoptic mange, many remedies have been tried (Tikaram *et al.*, 1980; Raisinghani *et al.*, 1989; Chhabra and Singh, 1991; Pathak *et al.*, 1991). The problem of resistance and high cost of ivermectin warrant the search for safer, economical and effective remedies. Amitraz (Taktic 12.5% EC, Hoechst Roussel Vet) is a new ectoparasiticide which has been proved to be very effective in controlling ticks in cattle (Davy *et al.*, 1984), in sheep (Platt, 1978) and in camel (Rinkanya *et al.*, 1992). As no

report seems to be available of its efficacy in camel mange, this study was designed to assess its efficacy in the treatment of naturally occurring sarcoptic mange in camels.

### Materials and Methods :

Fifteen adult camels (age 3-6 years) of two herds naturally exhibiting extensive mange lesions accompanied with pruritus, confirmed by demonstration of mites (*Sarcoptes scabiei* var. *cameli*) formed the material of this investigation. In most of the cases the lesions were confined to the neck, brisket, inner surface of the thigh and perineum. They were divided at random into three groups, taking 5 animals in each. The animals of group A and B after cleaning with brush were treated with Taktic 12.5% by means of pressure spray with stirrup pump as per following schedule.

Group A - Treated with Taktic 12.5% @ 4ml/litre of water

Group B - Treated with Taktic 12.5% @ 2ml/litre of water

Group C - Untreated control

Chronic lesions were dressed to ensure thorough soaking. A total of two applications were made at the interval of 7 days each. The animals of group C were kept as the untreated control and were given a placebo wash. The animals were kept under observation for relief in clinical condition and healing of lesions. Skin scrappings were collected and examined on the 0, 10, 20 and 30 day to check the presence of mites.

Negative skin scrappings, stoppage of itching, gradual healing of gross lesions, and restoration of smoothness of the lesions surface were taken as the criteria to assess the efficacy of the drug.

### Results and Discussion :

Camels of group A were infected with an average of 230 mites per cm<sup>2</sup> of the skin before the treatment which include various stages of life - cycle viz., eggs, larvae, nymph and adults. Five days after treatment with Taktic 12.5% EC @ 4ml/lit. of water, camels stopped scratching and biting. Marked progressive improvement in the appearance of lesions was observed. The effect of Amitraz was evident from significant reduction in the mite population, on day 10 there were average 85 mites/cm<sup>2</sup> of the skin and on day 20 the mites were absent from the scrapping material. Alopecia, wrinkling and keratinization were gradually reduced. There was 100% recovery after the second spray.

The mangy camels in group B were infected with an average of 200 mites per cm<sup>2</sup> of the skin before treatment. Marked progressive improvement in the appearance of lesions of mange was evident following second spray of the drug; biting, scratching and uneasiness were completely subsided 10 days after the treatment. Scraped wounds showed improvement in healing. The effect of Amitraz was comparatively slow. On day 10 there were 110 mites per cm<sup>2</sup> of the skin. The mites on day 20 30. were altogether absent from the scrapping material.

There was no change in lesions and symptoms of the infected untreated control camels, which remained mangy and kept on scratching the affected skin throughout. Eventually these animals were also successfully treated with Taktic @ 4ml/lit of water. No side effects of Taktic were

observed in any of the treated camels.

Control of sarcoptic mange particularly chronic mange is difficult and hardly any chemical acaricide is fully effective. The rise of toxic effects and the repeated use of chemicals, resistance and cost factors weigh heavily against the benefits. In the present study, Taktic 12.5% EC revealed to have remarkable miticidal effect in two dilutions. However, the effect was more significant and quick at the dose rate of 4ml/lit of water which brought complete parasitological and clinical cure in camels naturally suffering from mange. The results are in line with those obtained by Jacquiet *et al.*, (1994) against *Hyalomma dromedarii* infection in camels.

### Acknowledgement :

The author is thankful to Dr. A. K. Datta, Hoechst Rousell Vet Pvt. Ltd., Pune for arranging free samples of Taktic 12.5% EC for this study.

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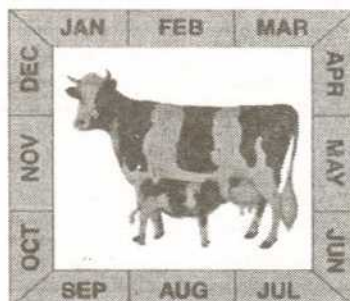
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## A New Technique for Repair of Umbilical Hernias in Male Calves

M.T. Nassef

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The external hernia is a displacement of abdominal contents beyond the abdominal cavity (Fig.1). In this context the hernia is composed of a hernial sac, accessory hernial covering, the hernial orifice or hernial ring and the hernial contents.

The hernial protrusion is covered with skin and subcutaneous tissues (Nieberle and Cohn, 1967).

Most umbilical hernias are reducible and do not cause serious problems, umbilical herniorrhaphy is thus performed.

Ideally, surgical treatment should be performed after making sure that apparent external resolution is not going to occur and before the animal increases in size and weight.

The traditional technique includes elliptical incision around the outer hernial sac with removal of part of the skin covering the hernia. In most cases the main disadvantages in this method are hanging down of the prepuce, as well as presence of skin wound directly in front of the orifice of the prepuce. Accordingly, a new surgical approach should avoid such complications.

The details of the technique are described here under :

### **Anesthesia and preparation of the patient :**

The calf must be fasted 24 hours before operation. Tranquilization with Rompun (Bayer) and infiltration analgesia at the operative site using xylocain 2% were performed. The animal was placed in a

dorsal recumbency and prepared for aseptic surgery in a routine manner.

### **Surgical procedure :**

A double V-shaped incision (Fig.2) was made in the skin at both sides of the outer hernial sac and the angles including the hernial swelling, the hernial ring and preputial orifice. The arms of the V-shaped were directed caudo lateral, while the apex was dissected cranially toward the xyphoid . The skin between the two V-shaped incisions was removed by scissors and the skin takes the shape of triangle, its base was caudal and the apex was directed cranially.

The shape length and width of the skin incision was suitable to assume sufficient skin that remains at the wound edges to allow apposition without undue tension.

The V-shaped skin flap was dissected from underlying tissues and reflected posteriorly down to hernial sac and ring. Further more a sharp dissection was applied around the base of the hernial sac delineates the hernial ring, this dissection was extended around the ring and outward about 1 cm. The edge of the hernial ring was trimmed to ensure natural anatomical healing at this area. After the hernial sac and ring had been dissected out of its fascia, then the sac was inverted inward and the hernial ring was closed using mattress pattern suture with absorbable suture material (Chronic gut # 3). The skin flap covering the site of hernia was then replaced in corrected position. The apex of the flap was sutured at the anterior angle with the skin by silk threads to fix the flap in position. Subcutaneous tissues all around the skin flap

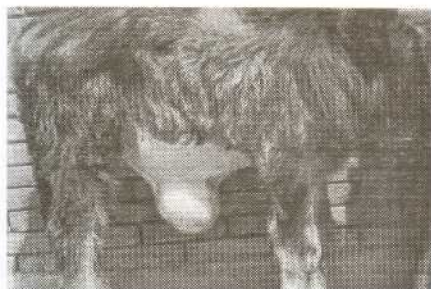


Fig. 1

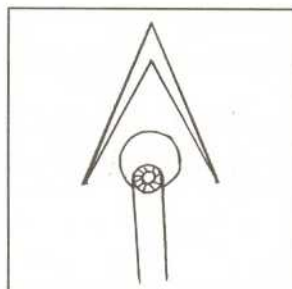


Fig. 2



Fig. 3



Fig. 4



Fig. 5

was sutured with the subcutis of the skin flap itself from its inner surface with absorbable suture material (Chronic gut # O).

The skin of the lap and all round of the abdomen was sutured by mattress pattern with # 3 silk threads (Fig.3).

#### **Post-operative management**

Antibiotics was administered for three successive days. Regular feeding with good quality of food but of little amount for one week. Skin sutures were removed 10 days post-operation (Fig.4).

With this technique the problems of herniorrhaphy in male calves were overcome. Thus the prepuce takes the normal position and situation (Fig 5).

This technique has been successfully applied for 50 cases (30 buffalo calves and 20 cattle calves) without obvious complication. Follow up was continued for 6 months with satisfactory results.

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## Case Report :

### Clinical Cases of Photosensitization in Cattle and Buffaloes

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#### Introduction :

Photosensitization is a condition where animal shows marked sensitivity to sunlight following ingestion of photodynamic substance. The reaction to bright light in a hyperphotosensitive animals is characterised by rapid development of erythema and pruritis, followed by odemaous exudation scab formation and usually necrosis of the affected skin.

Photosensitization occurs worldwide and may effect any species but is not common in cattle and sheep (Fraser *et al.*, 1991). The disease has been major problem in cattle and sheep industries in the U.S.A., South Africa, New Zealand and European countries (Gibbon, 1970). In India, the disease has acquired a great importance as the indigenous animals also seem to be susceptible to photosensitization (Singh *et al.*, 1978).

The present paper describes eight clinical cases of photosensitization comprised of six Red Kandhari bulls and two buffaloes reported for treatment at Veterinary Polyclinic, MAU, Parbhani (Maharashtra).

#### History and Clinical examination :

The condition of photosensitization was recorded in eight clinical cases comprised of six Red Kandhari bulls and two buffaloes. The animals were treated for dermatitis and eczema with minimum curative success. The cases were referred to Veterinary Polyclinic for further diagnosis and treatment.

The history was taken in regard to feeding, duration of illness, other animal affected and treatment adopted. It comprised of grazing on lush pasture and 'kadbi' damaged with rains which were stacked in bundles. The skin lesions were distributed mainly on the dorsum of the body and diminishing in degree down the sides and were totally absent on the ventral surface.

In six Red Kandhari bulls, erythema, edema and intensive pruritis over the dorsum of body while in two buffaloes necrosils and peeling of the skin with intense puritis were observed. Skin scrapings of all the affected animal did not reveal any parasitic infestation.

#### Treatment and control measures :

The feeding of suspected mouldy 'kadbi' was completely withdrawn. The affected animals were not allowed to graze and were stalled during the treatment. The animals were removed from direct sunlight and kept in isolated shade. A full course of antihistaminic drugs. (Avil Injection, Hoechst Roussel Vet, @ 10 ml, intramuscularly) was given for five days. Topical dressing of skin lesion was performed with nitrofurazone ointment and parenterally liver tonic (Livogen Injection, @ 10ml) was given for three days. Gibbon (1970) reported that photosensitivity in cattle had been associated with feeding of mouldy hay and grasses damaged by rains or frost like Bermuda, Alfalta, Lantana, algae and millet grasses. He also found toxic factor in solvent extract of these grasses.

In the present study, after the animals were kept in shade and the source of photodynamic agent removed, the skin lesions in all the cases responded well to treatment with local application of antibacterial cream and parenteral use of antihistaminic and liver tonic injection. All cases responded to the treatment.

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## Case Report : Incidence of Conjoined Twins (Siamese) in a Buffalo

**K. Ananda Kumar**

Veterinary Dispensary Shivally, Mandya Taluk, Karnataka

### History :

A case of dystokia in a buffalo aged about seven years was reported to veterinary dispensary on 10.7.98 at 9.00 am. Animal had shown signs of parturition on 9.7.98 at 7.00 pm. Despite severe straining animal could not deliver the calf. After visiting the case, a thorough examination was carried out, animal was exhausted, birth canal was dry. After proper lubrication, pervaginal examination revealed conjoined twins. Cervix was well dilated. The presentation was anterior longitudinal. After few obstetrical operations, we failed to deliver the calf. Caesarean section was not thought of because of lack of technical assistance. Foetotomy was performed. The head of one of the foetus was amputated using wire saw. After Foetotomy with little traction we were able to deliver the calf.

### Discussion :

According to Hancock (1954) and Bonnier (1946), the incidence of monozygous twins is 0.05 to 0.3%. Bovine monozygous twins arise from single fertilized ovum that divides into two zygotes. Whereas, conjoined twins or siamese twins are also from single fertilized ovum that divides into two but incomplete separation. According to Hancock (1954) and Arthur (1956), the incidence of siamese twins in bovines is one in one lakh births. In the present case, the conjoined twins is Diplopagus that is symmetrical monozygotic twins with all the components or parts similar. They are monozygotic twins except for fusion from sternum to abdomen. Heads are separate and limbs are not fused. These are



**Fig. 1 : Showing the conjoined twins (Siamese) of Buffalo.**

technically called as Ziphopagus and Ischiopagus. There are other types of conjoined twins also like Dicephalus dipus dibrachius that is duplication in the cranial region.

Unequal and asymmetrical conjoined twins are composed of one very imperfect and incomplete twin called the parasite dependent on the other twin the autosite. Not much literature is available on the occurrence of conjoined twins in buffaloes. Post-mortem on twins was not conducted due to lack of consent from the owner.

### References :

- Arthur, G.H. (1956). *Vet. Rec.*, **68** : 389.
- Bonnier, H. (1946). *Act. Agr. Suecana*, **1**, p. 147.
- Hancock J. (1954). *Academic Press, N.Y.C.* **6** : 141.
- Robert, T.S. *Veterinary obstetrics and genital disease. Second Indian Edition, CBS Publishers, India.*

## READERS' COLUMN

**1. Dr. Sunil Kumar**

Vety. Hospital, Allahabad

I like this issue because it contains information on research based results as well as field cases but it contains the trial results of Hoechst products mainly.

I want to send my article entitled, 1) Induction of lactation in different crossbred cows 2) Induction of cyclicity in pubertal animals by Jan '99.

**2. Dr. K. Krishna Rao**

Assistant Director, Animal Husbandry, Parvathipuram, Vizianagaraw, Andhra Pradesh

The issue has variety of cases with clinical trials. It is a big boon to field veterinarians who are away from the technical suggestions to be obtained by teaching staff of the veterinary college. 'The Blue Cross Book' is self explanatory. Thanks to Dr. B.K. Pradhan for his article on 'Dagnella Disease'. Hearty wishes to Dr. A.K. Datta, the Editor, for his enormous strain in composing and collection of data on various veterinary problems.

**3. Dr. A. Sivarama**

Veterinary Assistant Surgeon, Erode

All the clinical articles are very useful for field veterinary practice. Please keep it up. Invitro Antimicotic sensitivity is a good and useful article. Dagnella disease treatment line suggested is informative.

*Theileria anulata* and *Anaplasma marginale* the published figure is not clearly visible (pg. 45). If possible, kindly publish a fresh photographs once again. It will be very useful for Laboratory work.

**4. Dr. Y. Sudhindra**

Raichur, Karnataka

I like this issue because case reports are important tools for field vets.

I do not like this because it is published only by 6 months interval.

I want to send my article entitled, "Blue tongue epidemic in Raichur (Dt.) Karnataka due to rain havoc".

## READERS' COLUMN

**5. Dr. K. Ramanujam**

Associate Professor & Head, Veterinary College, Namakkal

Research articles when published under medicine/surgery will be beneficial to research worker to collect literature under above headings easily by going through back volumes.

**6. Dr. N.N. Gandhi**

Piggery Development Officer, Rajasthan

- a) On Page 3, 4<sup>th</sup> line – the year 1986 should have been 1886
- b) The Pioneer Veterinary Institute in undivided India was Punjab College of Veterinary Science & A.H. at Lahore (now in Pakistan) which was shifted to Hissar (Haryana) at the time of partition in the year 1947.
- c) Please trace its history and publish its present status in Pakistan for the benefit of readers.

Further improve the design of your address preferably in BOLD LETTERS on the card.

**7. Dr. K.E. Vinayagam**

Clinician, Kancheepuram - 631502

It is field oriented and gives very useful information about diagnosis of schistosomiasis particularly nasal schistosomiasis in symptomless carriers like buffaloes. We are successfully treating maggot wound with Butox for the past five years and it is very effective.

**8. Dr. Harish Verma**

Civil Lines, Ludhiana

I like this issue because excellent and informative articles are published in this journal (book).

- a) Article – “Pretreatment with GnRH Analogue enhances synchronization efficiency of PGF<sub>2</sub> in Ewes” is very much informative.
- b) Article - “Invitro antimycotic sensitivity of fungi isolated from mastitis milk” is a good article.



## READERS' COLUMN

**9. Dr. S.C. Pathak**

Professor of Surgery, Khanapara Vety. College, Assam - 781022

Congrats for starting 'The Pioneer Veterinary Institute in India'. Hope you'll start a 'pet section' in future. Articles with innovative ideas or new concepts be given priority rather than publishing routine clinical case reports. Looking forward for more informative issue. Dr. A.K. Datta deserves kudos for maintaining excellent getup. Some articles like Deltamethrin as treatment for myiasis should be published as short communication. Please think it over.

**10. Dr. Devendra Prasad**

Veterinary Hospital, Purnia - 854330

More emphasis has been given on diagnosis and treatment of various ailments and related discussions of altered physiologic status and the procedures that aid in the solving of medical problems has been enlarged where possible. It is quite informative and useful for practicing veterinarians.

I want to send my article entitled, "Case Report of vaginal and cervical prolapse in buffalo" in late pregnancy by mid Dec '98.

**11. Dr. R.S. Dadke**

Live Stock Development Officer, Aurangabad

Most appreciated new column "The Pioneer Veterinary Institute in India". Expecting great contribution of IVRI, Izatnagar; Crown of Veterinary Education.

I want to send my article entitled, "Cyclops in Lamb", Case Report by Dadke R.S. *et.al.*

**12. Dr. D.N. Sabharwal**

Ex-veterinary Officer, Kanpur Zoo, Kanpur - 208002

The articles are highly informative and provides good information on the latest products and their field trial. This book will be more helpful if more articles on canines are dealt with. Best wishes to Dr. A.K. Datta, Editor, "The Blue Cross Book".

I want to send my article on my experience as a Vet on the Zoo animals.

## READERS' COLUMN

**13. Dr. B.K. Sinha**

Prof. & Head, Bihar Veterinary College, Patna – 800014

The articles published are highly informative and provide latest information in the field of veterinary research. This book is very useful to practicing veterinary research scholar and teachers of veterinary colleges. Best wishes to Dr. A.K. Datta, Editor.

I want to send my article entitled, "Importance of post-mortem examination in animals and poultry".

**14. Dr. K. Sivasubramanian**

Veterinary Surgeon, Sulur, Coimbatore - 41

I like this issue because it is highly informative with latest information on treatments.

I do not like this issue because it is biannual, it should be bimonthly.

I want to send my article entitled, "Turkey Rearing"

I want the previous issues of 1 to 5.

**15. Dr. Sushovan Roy**

Professor, College of Vety. Sc. & AH, Durg, MP - 491001

It provides valuable information for veterinarians specially for canine practitioners.

I want to send my article entitled, "Therapeutic evaluation of Taktic 5% EC against canine tick infestation".

Please send a copy of the article entitled "Post-bite efficacy of Candur-R vaccine in dogs.

**16. Dr. A. Sharma**

Lecturer, Animal Husbandry Trg. School, Mokhapada, Rajasthan

I like this issue because of its informative articles as well as pharmaceutical presentations.

I would like to send my article which is in process.

"*In vitro* antimycotic sensitivity of fungi isolated from mastitis milk" is most sensitive and practical article, published in this issue.

## READERS' COLUMN

**17. Dr. S.B. Saha**

Senior Research, Asst., Inst. of AH & Biol., Calcutta - 700037

I like this issue because it covers all aspects of animal sciences.

Please try to incorporate articles on diseases of Poultry (specially field problem) and their treatment and management at least one in each issue.

I want to send my article entitled, "Some observations on the incidences of mastitis in West Bengal".

**18. Dr. K.P. Sinha**

Ranchi Veterinary College, Kanke, Ranchi - 834007

The articles require thorough editing

**19. Dr. H. Sen**

Veterinary Practitioner & Farm Consultant, Silchar - 788055

I like this issue because of the article "Efficacy of Floxidin (Enrofloxacin) in the prevention of CRD in Broiler" by V.S. Narsapur & A.K. Datta. The same has helped me in confirming my own opinion about Floxidin (Enrofloxacin) in Broiler.

Please register my home mailing address with a request to despatch "*The Blue Cross Book*" for timely receipt.

**20. Dr. Mohinder Singh**

Pet-Care Clinic, Panchkula, Haryana

I like this issue because of article "cysticercosis of zoonotic importance and uraemia in spitz - case report".

Floxidin is very effective in canines but causes pain at the site in some cases.

**21. Dr. V. D. Padmanavan**

TANUVAS, Chennai

The year will be 1886 for establishment of "The Pioneer Veterinary Institute", Bombay Veterinary College. May be a printing mistake. Please do correct it in the subsequent issue.

## THE 1998 NOBEL LAUREATES



Courtesy : Times of India

The 1998 Nobel laureates pose at the Swedish Academy in Stockholm. Back row, from left : Horst L. Stoermer and Robert B. Laughlin (Physics), Amartya Sen (Economics), John A. Pople (Chemistry), Ferid Murad (Medicine). Front row, from left : Louis J. Ignarro (Medicine), Daniel C. Tsui (Physics), Jose Saramago (Literature), Robert F. Furchgott (Medicine).

#### Economic Sciences :

**Professor Amartya Sen**, Trinity College, Cambridge, U.K. (Citizen of India)  
**“for his contributions to welfare economics”**.

Dr. Amartya Sen has made several contributions to the research on fundamental problems in Welfare Economics. His contributions range from axiomatic theory of social choice, over definitions of welfare and poverty indexes, to empirical

## NEWS

studies on famines. In empirical studies, Dr. Sen's applications of his theoretical approach, have enhanced our understanding of the economic mechanisms of underlying famines.

### **Physiology or Medicine :**

**Dr. Robert F. Furchgott**, SUNY Health Science, Centre, Brooklyn, New York, U.S.A.

**Dr. Ferid Murad**, Pharmacologist, The University of Texas, Medicinal School, Houston, Texas, U.S.A.

**Dr. Louis J. Ignarro**, Pharmacologist, UCLA School of Medicine, Los Angeles, CA, U.S.A.

**“for their discoveries concerning “Nitric oxide as a signalling molecule in the cardiovascular system”.**

Nitric Oxide (NO) is a gas that transmits signals in the organism. Signal transmission by a gas that is produced by one cell, penetrates through membranes and regulates the function of another cell represents an entirely new principle for signalling in biological systems.

Research results rapidly confirmed that NO is a signal molecule of key importance for the cardiovascular system and it was also found to exert a series of other functions. We know today that NO acts as a signal molecule in the nervous system, as a weapon against infections, as a regulator of blood pressure and as a gate keeper of blood flow to different organs. NO is present in most living creatures and made by many different types of cells.

### **Physics :**

**Professor Robert B. Laughlin**, The Stanford University, California, U.S.A.

**Professor Horst L. Stormer**, The Columbia University, New York & Bell Labs New Jersey, U.S.A.

**Professor Daniel C. Tsui**, The Princeton University, New Jersey, U.S.A.

**“for discovering that electrons acting together in strong magnetic fields can form new types of “particles”, with charges that are fractions of electron charges. They discovered a new form of quantum fluid with fractionally charged excitations.**

## NEWS

### Chemistry :

**Professor Walter Kohn**, The University of California, Santa Barbara, U.S.A.

**Professor John A. Pople**, The North Western University, Evanston, Illinois, U.S.A.

Nobel laureates have made pioneering contributions in developing methods that can be used for theoretical studies of the properties of molecules and the chemical processes in which they are involved. The award to Prof. Walter Kohn is for his development of the density functional theory and to Prof. John Pople for his development of computational methods in quantum chemistry. Prof. Walter Kohn's theoretical work has formed the basis for simplifying the mathematics in descriptions of the bonding of atoms, a prerequisite for many of today's calculations. Prof. J. Pople developed the entire quantum-chemical methodology, now used in various branches of chemistry.

### Literature :

**Jose Saramago**, Portugal

**"Who with parables sustained by imaginations, compassion and irony continually enables us once again to apprehend an elusory reality."**

*"The only true duty is to be unattached and work as free beings, to give up all work unto God. All duties are His".*

*- Swami Vivekananda*

*"My formula of success ? It is very simple. I am merely a man who knows how to enlist in his service better man than himself".*

*- Andrew Carnegie*

# *The Blue Cross Book*

for the Veterinary Profession

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