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VECTOR CONTROL IN LIVESTOCK

It has been a long struggle to fight against insects and to find a new formulae for vector control to keep livestock and mankind healthy. The ectoparasites like ticks, mites, lice and flies transmit deadly diseases in livestock apart from causing discomfort and reducing their productivity. The Australian scientists have found that the annual loss due to tick infestation is nearly 4 tons of meat in a herd of 100 animals and 182 litres of milk per animal. The overall loss due to ticks alone is estimated as high as AUS $ 33 million.

The U.S. Department of Agriculture has estimated an average annual loss of US $ 500 million due to ectoparasites. In India, we have no such estimates. But the well-known American entomologist, Dr. L.O. Howard in his book "The Insect Menace", written in 1920, has quoted losses due to ectoparasites in India to be as high as £151 million.

Now due to increased cross-breeding programmes, the incidence of vector borne diseases have increased to a great extent, resulting in heavy economic losses. Apart from treating diseases, very few ectoparasiticidal agents like organochlorinated compounds (DDT) and organo phosphorus compounds are used in small quantities because of their problems of toxicity to warm-blooded mammals, lack of bio-degradability and low efficacy on parasites.

The introduction of pyrethroids has come as a big relief in using these compounds without any problem. Butox (Deltamethrin) belonging to the pyrethroids group with its properties of being highly effective, long acting and safe both for livestock as well as the handlers has established very well in the Indian market.

Several University scientists, veterinarians and the farmers who have used it or carried out the clinical trials have expressed excellent opinion of the product. The concept of ectoparasitic control in livestock needs to be engraved in the minds of the farming community through the professional media

ANIMAL HEALTH NATIONAL WEALTH

Foreword

For a 25 year period between 1958-1983, the Veterinary departments of Hoechst AG and Behringwerke AG published the "Blue Book", the aims of the journal being "to report on new research findings in Veterinary Medicine; to publish reports arising from experience in Veterinary Practice and on veterinary topics of a local rather than global interest". In all, 66 editions of the original "Blue Book" were published.

A further 10 years on in 1993, it is with great pleasure that I welcome Hoechst India's initiative to renew this Hoechst tradition with the publication of the first issue of the "Blue Cross Book", this action providing further confirmation both of Hoechst's commitment to Animal Health and to providing a service to customers and to the veterinary and associated professions in general.

I am sure that as with the original "Blue Book", that this new publication will further foster the existing relationships between Hoechst and our friends involved in all areas of Animal Health, Care and Welfare.

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FASCIOLIASIS IN INDIA

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Fasciola gigantica is a common parasite in bile ducts of sheep, goats and cattle in India. Wild ruminants, elephants, pigs and horses are also susceptible and contribute to maintain the infection in nature while dogs, cats, rabbits can be useful experimental animals.

A review of some of the recently conducted surveys indicates a high level of incidence in endemic areas all over the country. In cattle an incidence of 39% has been reported in Haryana (Gupta et al.,1986), 35-39% in Nicobar (Raghavendrarao et al.,1985), 18.4% in Bareilly (Prasad and Mullick; 1991) 831% in Sikkim (Katyar et al.,1983) 13.5% in Jabalpur (Banerjee and Agarwal; 1992), 8.87% and 11.32% in indigenous and crossbred respectively in Parbhani (Maharashtra) (Ratnaparkhi et al.,1991). However, in non endemic areas of Haryana a mere 1.3% incidence (Gupta et al.,1986) and in organized cattle farm at Bombay 0.72% (Raote et al.,1985) have been reported.

In buffaloes in endemic areas the incidence reported is comparatively low viz. 15% in Meerut (Sharma and Lal, 1986) 14.5% in U.P. (Kumar et al.,1986), 18.8% in Parbhani (Ratnaparkhi et al.,1991) and 10.6% in Jabalpur (Banerjee and Agarwal, 1992.) In the stabled buffalo population of Bombay, Narsapur (1991) found 10.2% incidence on the basis of stool examination records.

In sheep the incidence of 20% is reported from Punjab (Chhabra,1978) and 25.76% in Parbhani (Ratnaparkhi et al.,1991). On the basis of slaughter house studies Niphadkar and Narsapur (1975) reported the incidence of 16.86% in sheep in Bombay.

The figures in respect of goats are 14.3% in U.P. (Pachauri et al.,1988) 81% in Sikkim (Katiyar et al., 1983) 20% in Punjab (Chhabra, 1978) and 20.22% in Parbhani (Ratnaparkhi et al., 1991).

Although this information is by no means a complete review, it indicates the extent of infection of fascioliasis in India.

The molluscan intermediate hosts of *F. gigantica* in India are *Lymnea*

accuminata and *L. rufescens* which are aquatic snails living in large permanent bodies of water containing abundant vegetation. Thus ponds, pools, small nallas, irrigation canals, rice fields etc., where water is clean and still or slightly moving provide ideal location for snails to thrive. Similarly infected or non infected snails could float and travel along slow moving water to newer areas to colonise and thereby enlarging the endemic zone.

The introduction of infected animals in the above ecological setup results in successful completion of the lifecycle of *F. gigantica*. The eggs of *F. gigantica* voided in the stools of infested animals hatch in about 17 days and miracidium soon enters into the snails. In the body of the snails so infected, development of sporocysts, rediae and cercariae takes place in a sequential way and the latter emerge out of the snail after about 75 days. There is a high degree pedeogeny in the snails resulting in the formation of nearly 800 cercariae from a single miracidium. The cercariae soon attach to the submerged portion of vegetation and become metacercariae which the final hosts ingests alongwith grass and thereby gets the infection. It appears that many metacercariae drop into the water from the plants and are found in sediment. The animals entering into such ponds disturb the sediment and get substantial infection by drinking such muddy water.

The development of *Fasciola* at every stage is influenced by atmospheric temperature. Thus in winter when mean day and night temperature is below 10°C the development of miracidia in eggs and larva stages in snails is arrested. Above 10°C to 28°C these developments are faster in proportion to rise in temperature. Higher temperatures result in heavy mortality of snails, negatively compensating the faster development of larval stages. Other influencing factors are the drought and rains, the former resulting in aestivation of snails and the latter stimulating their multiplication as well as emergence of cercariae. The combination of these influencing factors marks out two critical periods in a year in India when high population of metacercaria occur in nature and animals are exposed to heavy doses of infection. The primary critical period is from July to September (post onset of monsoon) and secondary from February to March (Spring).

Pathogencity : depends upon the host species and the dose of infection. Thus acute and subacute fascioliasis are common in sheep and goats and occur in the months from July to October. This type is due to paranchymal stages invading and migrating in liver and is characterised by symptoms of sudden high mortality, disinclination to move, distended painful abdomen and anorexia. The post-mortem picture is of traumatic hepatitis with haemorrhags in

abdomen and haemorrhagic tracts in liver. Chronic fascioliasis is due to adult stages and presents the symptoms of progressive anaemia, oedema, debility, emaciation. The post-mortem changes are typical of hepatic fibrosis and hyperplastic cholengitis. Hypoproteinaemia (Hypoalbunaemia) increased globulins, decreased levels of calcium and phosphorus together with increased levels of total serum bilirubin, SGOT, SGPT and Alkaline phosphatase, have been constantly noticed.

Among several drugs available for treatment, most of them are effective on adult stages located in bile ducts. Salicylamides viz. Oxyclozanideand Rafoxanide are effective at higher doses on migratory stages also (Soulsby, 1982). Aromatic amides viz. Diamphenethide is effective on early migratory stages. Salicylamides since become protein bound in blood plasma, are also effective on the blood sucking parasites and have a good half - life of 15 days and side effects are practically absent (Brander and Pugh, 1977). The nil withdrawal period for milk is another advantage of this group of drugs.

The control of *fascioliasis* involves two measures viz. strategic deworming and molluscicide application. The deworming may be undertaken twice or thrice at evenly spaced intervals in monsoon season and once again in spring. Similarly, molluscicide application (copper sulphate to attain 1:100,000 dilution in breeding water) at the same time would greatly help in the control. Measures should also be taken for proper disposal of dung, fencing off the infected areas, and procurement of grass and hay from infection free areas. The grass from the infected areas may be put in silage for 2 months before use, so that the metacercaria would be killed in the process.

The *fascioliasis* control should therefore be a continuous seasonal programme in endemic areas.

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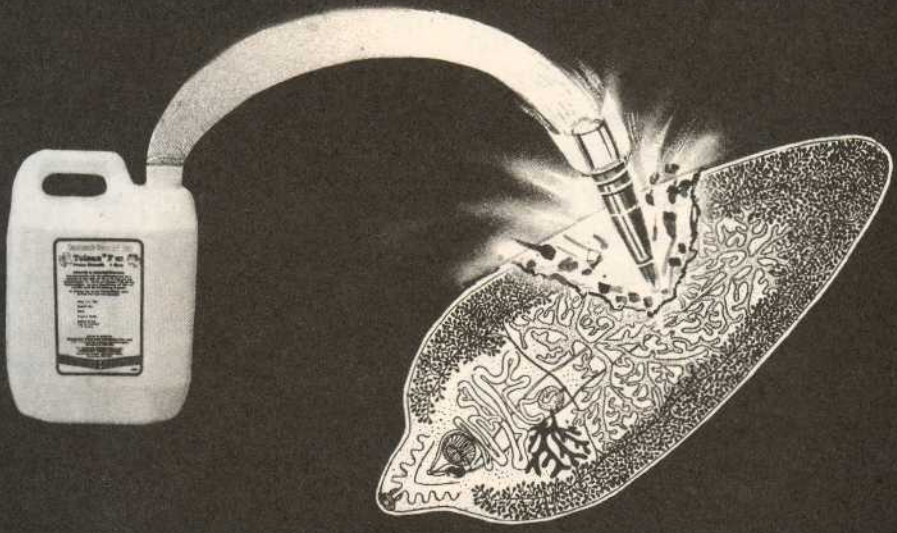

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CLINICAL TRIALS OF BUTOX IN INDIA - A REVIEW

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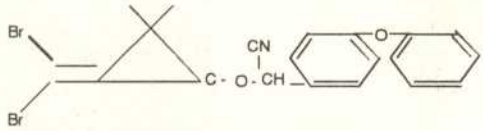
Ectoparasites of domestic animals include ticks, mites, flies, lice and fleas. A number of new pesticides as well as methods of their use have been evolved in recent years. On the other hand other natural insecticidal compounds like pyrethrums existing for centuries are reconsidered for their use due to the excellent insecticidal activity and low mammalian toxicity. However, natural pyrethrins have little value in dealing with major parasites of farm animals, where the persistence of an insecticide is an essential feature of activity and frequent applications of insecticides are impracticable (Brander et al, 1982). Baillie and Wood (1979) have reported synthetic pyrethroids which have considerable activity against ectoparasites. Synthetic pyrethroids have stability on animal body, they are photostable and their action is sufficiently prolonged to give a knock-down and kill effect on insects. Decamethrin (Butox) is one of the pyrethroids used for controlling ectoparasite infestation in animals.

Structural Formula :

Decamethrin is a halogen ester. The chemical structure appears as -



5-x-Cyano-3 phenoxybenzyl (IR, 3R) - 3(2,2-dibromovinyl) -2,2-dimethyl cyclo propane carboxylate.

The toxicity varies with the vehicle used. The formulation of Butox is prepared in a vehicle giving low mammalian toxicity.

Mechanism of Action

Butox is a contact poison giving rapid paralytic action on insects preceded by muscular excitation and convulsions.

Efficacy of Butox

Efficacy of Butox has been tested in laboratory and field by conducting clinical trials in different species of parasites in different animals. The data of trials conducted in India are compiled below.

Studies in cattle and buffaloes

Butox has been investigated in cattle and buffaloes for its activity against common ticks, mites, lice and fleas.

Effect on ticks

For the control of *Hyalomaa a. anatolicum*, Butox has been used in different concentrations. At concentration of 25 ppm, *H. a. anatolicum* was completely eliminated after single application one-day post treatment (Sasmal et al., 1991). However, reinfestation could be avoided only when treatment was repeated on 21st day (Banerjee and Sangwan, 1990).

The effect on nymphal stages is delayed till day 7th when engorged nymphs are killed. At 25 ppm concentration, moulting of nymphs failed and oviposition was inhibited (Pathak et al., 1991)

The efficacy of Butox was also tested against *Boophilus microplus*. Application of 25 ppm Butox resulted in dropping of ticks on the floor, six hours after treatment and 20 ppm concentration killed the ticks within 48 hours of exposure (Shrivastava et al., 1991)

In vitro trials by Pathak et al. (1991) revealed that it is 100% effective against unfed nymphal and adult stages of *H. a. anatolicum* at the concentration ranging from 1000 ppm to 4000 ppm, however the time taken to kill the larval stages varies with the concentration used and increased to six hours when 2000, 500 and 250 ppm concentrations were used.

Effect on mites

Two or three applications of Butox (50 ppm) at 10 days interval could control sarcoptic and psoroptic mange in buffaloes (Mondal and Singh, 1988).

Effect on lice

A concentration of 12.5 ppm was effective against lice infestation in buffaloes (Kulkarni et al. 1991; Sasmal et al. 1991). For *Haematopinus quadripertuses* infestation tail switch was dipped in insecticide solution, twice at interval of 10 days which could protect animals against lice infestation for the full year (Kulkarni et al., 1991)

STUDIES IN DOGS

Effect on ticks

Clinically Butox is found very effective against dog ticks (Bhagwagar, 1991). At concentration of 25 ppm complete clinical and parasitological cure is reported (Mehta et al., 1991).

Effect on mites

Demodex canis, Sarcoptes scabei and *Otodectes cynotis* are the major mites of dog. For the control of mange, Butox was used at concentration from 50 ppm to 150 ppm. The efficacy was tested by skin scraping examination. It was effective against localised demodecosis (Upendra, 1991). Efficacy of Butox at these concentrations against sarcoptes, demodectic and otodectic mange was

also investigated by Sharma et al. (1991). Mange infestation could be cured within 15 days without recurrence.

Effect on fleas

A therapeutic concentration (12.5 ppm) Butox was only moderately effective against fleas when investigated in 27 clinically affected dogs (Bhagwagar, 1991). However, Mehta et al. (1991) and Sasmal et al. (1991) reported 100% clinical and parasitological cure with a single application of Butox at the therapeutic concentration (12.5 ppm).

Effect on lice

Effective control of lice was achieved when Butox was used on animal body, at a concentration 12.5 ppm (Dhanapalan, 1991; Mehta et al., 1991) and 25 ppm (Dixit, 1991).

Studies in sheep and goats

In sheep and goats, Butox (25 ppm) at 10 days interval applied twice was effective against ticks, mites and lice infestation (Sharma et al., 1991). For *Sarcoptes scabei* of goat, 50 ppm Butox was required. For psoroptic mange in sheep, three applications of 50 ppm of Butox resulted in recovery in 40% cases after first spray, 70% after second spray and 100% after third spray (Mondal and Singh, 1988). In flea infestation, single application of 12.5 ppm was 100% effective (Sasmal et al., 1991).

Studies in equines

In India, Parashar and Rao (1991) tested efficacy of Butox in equines, against *Haematophagous flies (H. maculata)*. In pilot trials conducted by them Butox was applied in five different concentrations viz. 10 ppm, 20 ppm, 30 ppm, 40 ppm and 50 ppm. There were 75-90 horses in each group and two litres of Butox was used for each group. The result showed that when Butox was used in higher concentration (40 ppm & 50 ppm) no fly could be detected for 45-90 days whereas other concentrations were effective for 30 days. Based on the results of pilot trials the efficacy of Butox (50 ppm) was confirmed to be 100% against *H. maculata* in a large scale trial conducted on 1563 horses.

Studies in camel

Spraying Butox 50 ppm resulted in reduction in density of mites/cm^2 (*Sarcoptes scabei var cameli*), from 189 to 95, 43 and 0 on day 10, 20 and 30 respectively (Pathak et al., 1991) According to Makkar et al. (1991) frequency of spraying of Butox should depend on severity of infestation whereby it should be sprayed thrice in severe infestation, twice for moderate infections and once for the infections of mild nature.

Studies in poultry

In layers, lice and tick infestation could be controlled by spraying Butox 12.5 ppm (Dash, 1991) and 25 ppm (Rana, 1991) respectively. This resulted in

increase in egg production from 82 to 105 eggs / day (Dash, 1991).

Safety studies

Safety of Butox has been confirmed in buffaloes (Mondal & Singh; 1984) cattle (Singh *et al*; 1991) dogs (Ranade et al; 1991; Sasmal *et al*; 1991; Sharma *et al*; 1991).

Ranade et al; (1991) studied the effect on haematology, liver and kidney functions after spraying experimental dogs with Butox 25 ppm and 125 ppm on three consecutive days and reported no toxic effect even at the concentration of 125 ppm.

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HEPATIC ENCEPHALOPATHY IN A DOG - A CASE REPORT

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The syndrome of hepatic encephalopathy (HE), a complex metabolic disorder is documented in small animals as well as in human beings as a result of acute or chronic hepatic insufficiency. (Barrett, 1980). The present communication puts on record successful management of a case of HE in a dog due to acquired hepatic disease precipitated by iatrogenic factors viz. high protein diet, use of diuretics and sedative drugs.

A four year old, intact female Doberman pinscher was admitted in the inpatient ward of Bai Sakarbai Dinshaw Petit Hospital for animals Parel, Bombay with the history of recurrent ascites. On examination the dog was found depressed, febrile (rectal temp 105°F) and cachectic with obvious abdominal distension (abdominal girth 34 inches). A fluid wave was palpable. The dog was vaccinated regularly against Distemper, Hepatitis, Leptospirosis, Parvovirus and Rabies. The dog was inappetant. Heart rate, respiratory rate and pulse were slightly increased.

The ancillary treatment consisted of 50% Dextrose 50 ml, Inj Oxytetracycline hydrochloride 100 mg and Inj Neohepatex 2 ml intravenously and Inj Furosemide 20 mg I.M. Clear fluid (1.5L) was removed by paracentesis abdominis as the distended abdomen was causing respiratory embarrassment. Abdomen was exposed to Infra red rays to mobilize the fluid.

Stool examination and urinalysis report were normal. Radiographic examination revealed a hazy, opaque abdominal cavity with classic "ground glass" appearance and the serosal surfaces throughout the abdomen were difficult to visualize because of ascites. The treatment was continued for 12 days, however, oxytetracycline was replaced by chloramphenicol 500 mg after 7 days. Paracentesis was repeated on five occasions intermittantly since the fluid was accumulating rapidly.

The dog was anorectic and constipated during the course of treatment. Inj Nandrolone phenylpropionate 25 mg IM and oral administration of Sorboline

was included in the treatment regime with the supplementation of Protinex in the diet. The dog did not show any improvement. On the contrary the condition deteriorated with the development of oedema of hind limbs, laboured breathing and occasional vomiting for which it was given Trifluopromazine hydrochloride syrup orally and Inj Atropine sulphate S.C. The condition worsened with the development of clinical signs suggestive of HE viz. head pressing, ataxia, bidirectional circling, depression, blindness and attempts to climb walls (Strombeck et al., 1975).

Liver function tests revealed values within normal limits. Ultrasonography examination was suggestive of marked ascites and liver and pancreas showed normal appearance. Spleen, kidneys and para-aortic region were also normal.

The modified line of treatment included the reduction of protein in the diet, withdrawal of Trifluopromazine hydrochloride, Fursemide and administration of aminoglycoside antibiotic Neomycin to suppress the number of bacterial urease producers. The response to treatment was favourable with the disappearance of the diverse central nervous system derangement. However, other forms of dietary therapy consisting optimal amounts of protein and increased carbohydrate contents have also been suggested (Strombeck et al., 1983).

DISCUSSION :

Hypokalemia with metabolic alkalosis (often as a result of intensive thiazide diuretic therapy) may induce hyperammonemia. Metabolic alkalosis leads to an increased transfer of ammonia across the blood brain barrier.

Constipation promotes the excessive production and absorbtion of ammonia and other nitrogenous substances.

Tranquilizers may result in HE because of diminished metabolic clearance of these pharmacological agents due to hepatocellular insufficiency (Drazner, 1983).

The report illustrates the importance of measurement of blood ammonia levels in dogs with clinical signs suggestive of hepatic encephalopathy.

SUMMARY :

A case of iatrogenic HE in a dog is described and its successful management has been discussed.

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Results and Discussion	:	
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SUCCESSFUL TREATMENT OF PSOROPTIC MANGE IN A HORSE WITH DELTAMETHRIN (BUTOX)

S. Jagadish, D.P. Bhalerao, D.G. Dighe
Dept of Medicine,
Bombay Veterinary College,
Parel, Bombay - 400 012.

A horse with a history of pruritis with eczematous lesions on the back, withers and neck was admitted to the Bai Sakarbai Dinshaw Petit Hospital for Animals, Parel, Bombay - 12. (Regd. No. 312). The horse was treated with injection Streptopenicillin 2.5 gm(1) and injection Pheniramine maleate 10 mg(2) intramuscularly for five days prior to admission with only slight improvement.

On close examination of the animal it was found that there were multiple patches of exuditive eczema and crusty deposits at several places were noticed. The horse was restless, stamping and exhibiting pruritis.

Skin scraping examined microscopically revealed the presence of psoroptic mites. It was decided to treat this horse topically with Deltamethrin (Butox) liquid(4). The lesions were cleansed with 1% Savalon solution. Later on Deltamethrin was applied topically as 0.005% solution and was repeated thrice at ten days intervals. After first application there was considerable reduction in pruritus. After second application, the lesions appeared dry. Scratching was considerably reduced. Skin scraping after two applications did not show any mites on microscopic examination.

Third application was given after 20 days of the first application. Lesions started regressing. Hair growth was observed under magnifying glass.

Supportive treatment with Vit.A injection 36 lacs I.U.(3) intramuscularly weekly on three occasions was given.

The efficacy of Deltamethrin against mange has been reported in sheep (Mandal and Singh, 1986), and Dogs (Sharma et al, 1991). The purpose of this case report is to put on record the efficacy of Deltamethrin against Psoroptic mange in horse. The results obtained are depicted in the photographs. (Plates 1 & 2).

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3. Prepalin-Forte
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4. Butox (Deltamethrin 12.5%)
   Marketed by Hoechst (India) Ltd.

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PLATE - 1 : A horse showing typical lesions of Psoroptic mange.

PLATE - 2 : Showing clinical recovery, regression of lesions and hair growth after treatment.

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A POWERFUL TOOL TO FIGHT OUT ECTOPARASITES - BUTOX

K.A.MUJUMDAR and V.K.SHARMA
Animal Health Division,
Hoechst India Limited, Bombay.

Thanks to those genius scientists who put everlasting fights against insects to find more and more new formulae to fight ectoparasites and keep livestock and mankind alive.

It is a known fact that ectoparasites like ticks, mites, lice and flies, apart from causing discomfort to livestock also transmit protozoan diseases. The invisible economic loss observed by Australian scientists is really astonishing. They have shown that an average tick, during its life-cycle, consumes 1 to 3 ml blood from its host. Such fifty or more engorging ticks on an animal can cause an annual loss in weight gain to the tune of 0.55 kg per animal, i.e. nearly 4 tons of meat from a herd of 100 animals. The losses in milk production due to ticks have been estimated to be 182 litres per animal per year. Thus, the working animals total loss in Australia due to ticks have been shown as high as Aus. $ 33 mio.

The U.S. Dept of Agriculture has estimated an average loss of US $ 500 mio due to ectoparasites. The well known American Entomologist, Dr. L.O.Howard, in his book, "The Insect Menace," written in 1920 has quoted losses due to ectoparasites in India as £ 151 mio, i.e. Rs. 7550 mio (at the present exchange rate).

It has been a constant struggle to keep control on ectoparasites in order to protect livestock, crops and human beings, with the help of anti-ectoparasitic agents.

During the second world war, Muller and Weisman (1945) introduced Organo chlorinated compounds like DDT and BHC (Lindane). Although DDT saved 25 mio livestock and 500 mio people, it had its disadvantages like development of resistance, lack of biodegradability, persistence in the environment, accumulation in animal and human fat tissue, causing physiological disturbances, and finally residues in the milk and meat. Use of these compounds has now been prohibited in many countries.

Mr. Schrader, a German Scientist working on war gases, which were not used during the war, discovered Organo Phosphorus (OP) Compounds (1960).

The further derivatives of OP's, Carbamates and Amidine groups have advantages over the Organo chlorinated compounds, but still have problems of their efficacy on the ectoparasites and toxicity to warm blooded mammals.

Better control over ectoparasites was noticed with the use of Pyrethroids, as found by Standinger and Ruzika. These were the natural Pyrethrin extracts of Chrysanthemum, Roseum and Cinerariaefoelium. Although they were highly effective on ectoparasites and safe to warm blooded mammals, but had the problem of being photolabile, i.e. compounds that are broken down when exposed to light. Since they were plant extracts (pyrethrum flower), adequate quantities could not be produced. So, the search for synthetic pyrethroids went on.

In 1974, Dr.Michael Elliot, a scientist from Rothmstad Experimental Station of Great Britain discovered a new photostable pyrethroid called Deltamethrin. Deltamethrin is highly active on ectoparasites and safe to animals and human beings with improved physical, chemical properties and greater biological activity. Deltamethrin was first named as NRDC 161 by the National Research Development Corporation. Then, the World Health Organisation gave a code name as WHO 1998. "BUTOX" is an ectoparasiticidal agent containing 12.5% of Deltamethrin.

In 1975, Roussel Uclaf began industrial synthesis of Deltamethrin. Butox is a non-composite pyrethroid with a pure single isomer activity having highly distinct biochemical properties. Butox has an excellent stability, i.e. no breakdown even after storage for 2 years at 40°C.

MODE OF ACTION

BUTOX has a "knock-down-and-kill" action on ticks, mites, lice and flies. Butox acts on parasites by two ways : (1) By contact (principle mode of action) and (2) By ingestion.
Butox has a strong lipophilic activity which means it has a strong affinity towards the lipid molecules, which facilitates its absorption and penetration across the cuticular layer of insects and acarids. Signs of parasites are shown in several successive phases as given below :

1. Hyper excitation
2. Lack of co-ordination
3. Trembling, convulsions and tetanic spasms
4. Prostration (knock-down effect and dehydration)
5. Finally, death (killing effect)

Butox also exhibits repellent properties inhibiting feeding and egg laying. The lipophilic activity of Butox gives a protection of 12 to 15 days duration to the treated animals.

Butox is markedly safer than classical antiparasitic agents. The therapeutic index of Butox is 5400 (Ratio of LD 50 in the rat to LD 50 in common house fly) and that of DDT is 11. Butox offers a wide safety margin both for the user and the animals treated. It has a broad spectrum of activity against ticks, mites, lice and flies, and also acts on all the stages i.e. eggs, larvae, nymph and adult.

SAFETY

The skin of warm blooded animals includes keratin layer. In contrast to the organo phosphorus compounds, Butox practically does not pass through this layer. It, therefore, cannot enter the blood stream. The enzymes esterases in warm blooded mammals have the property of breaking the ester bond of Butox molecule into acid and alcohol radicals which are not toxic. In insects, these enzymes are present in a very small amount and hence, cannot break the Butox molecule into alcohol and acid radical. Therefore, Butox remains unchanged and active and toxic to the insects.

SAFE TO THE ENVIRONMENT

When Butox comes in contact with soil it gets degraded very fast within 1 to 2 weeks. Butox gets absorbed by the colloidal particle of the soil. Consequently, the effect of Deltamethrin on microflora and fauna is negligible. Here, Butox molecule gets broken by the soil micro organisms. The comparative breakdown period for organo phosphorus compounds, when in contact with the soil, is 6 weeks, but organo chlorinated compounds may persist for several years.

References may be obtained on request.

TAIL LICE INFESTATION IN DAIRY CATTLE AND ITS CONTROL BY BUTOX* (DELTAMETHRIN)

*S.V.Danayat, P.D.Kulkarni, P.M.Potdar and K.A.Mujumdar**
Aarey Milk Colony,
Bombay 400 065.

The tail lice infestation in cattle causes scratching, biting and rubbing of infested area, irritation, unthrifty appearance, roughened hair coat, loss of hair. In heavy infestation, it may lead to anaemia. The young stock, dry cows and bulls may escape early diagnosis and suffer more severely. Young calves may even die.

Several insecticides are used for treating lice infestations. Chlorinated hydrocarbons, organo phosphorus compounds, carbamates, ivermectin etc. have been used. However, there is resistance problems with the above drugs. Moreover, most of the above drugs are toxic to the animals and the environment and to the handler.

The pyrethroids are the latest group of ectoparasiticidal agents (Khan and Shrivastava, 1988) Butox (12.5 g/l Deltamethrin) belongs to the group and has been used in India for the control of ticks, mites, lice and flies in cattle, buffaloes, sheep, goats, horses, dogs and camels. (Mandal and Singh, 1984, 1986 Sharma et al, 1991, Gupta 1984, Banerjee 1990, Pathak 1991, Lathore 1973). The present trial was conducted to evaluate the efficacy of Butox against cattle tail-lice infestations.

MATERIAL & METHODS

Five hundred and forty cattle consisting of 400 adult cows and 150 young stock rearing at Cow Unit No. 5 of Aarey Milk Colony were found infested with tail-lice.

The infestation was localised to the tail switch region. The infestation caused irritation and discomfort to the affected animals manifested by wagging of the tail and restlessness. Specimens of the lice were collected and were confirmed as *Haematopinus quadripertusus* (tail lice) from the Parasitology Department of Bombay Veterinary College.

For the present trial, "BUTOX" solution containing (50 g/l) was mixed in one litre of water to make a dilution of 12.5 ppm. Five litres of such Butox solution was prepared in a bucket. As the major portion of lice infestation was localised to the tail region, the tail switch of each

*Hoechst India Ltd. Bombay

animal was dipped in the bucket. Before dipping, the tail was cleaned with tap water to remove dirt and dung. Fresh Butox solution (12.5 ppm) was prepared for every 50 animals. A total of 400 cows and 150 calves were treated. The treatment was repeated after 15 days.

RESULTS AND DISCUSSION

The movement of the tail stopped within 24 hours of treatment and the animals were found to be quite comfortable. Majority of the lice, adult larvae and eggs were all dead and dropped out. The tail looked clean with no lice infestation. After two weeks when the animals were treated once again, complete disappearance of lice infestation was observed. No evidence of reinfestation was noted upto a period of one year.

No toxic symptoms were observed in any of the animals treated as well as the handlers. The results indicated that Butox @ 12.5 ppm is highly effective against Haematopinus (tail lice) and is safe to the animals and the handlers.

SUMMARY

Five hundred and forty cattle consisting of 400 adult cows and 150 young stock were treated with Butox (Deltamethrin) @ 12.5 ppm for lice infestation. Complete disappearance of lice infestation was noticed after two treatments with a 15 day interval. Similar observations were recorded by Sasmal et al (1988). It gave excellent duration of protection for one full year.

No toxic symptoms were noticed in any of the animals treated or the handlers (Ranade et al, 1991) Butox @ 12.5 ppm was found highly effective and safe for the control of tail-lice infestations in dairy cattle.

ACKNOWLEDGMENT

We wish to thank Hoechst India Limited, Bombay for the free supply of samples for the trial.

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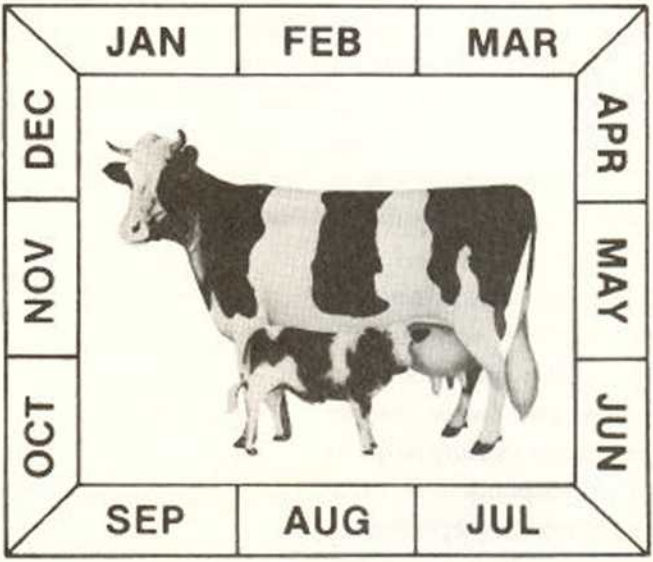

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IMPROVED FERTILITY WITH THE USE OF GnRH (RECEPTAL) DURING POST PARTURIENT PERIOD

K.A.Mujumdar
Animal Health Division,
Hoechst India Limited,
Bombay.

GnRH has been widely used for the treatment of various hormonal imbalance cases. The regulation of reproduction with the normal oestrus cycle has always been a topic of great debate and curiosity of veterinarians in order to get a calf a year, successfully. GnRH administered at 10th and 14th day of post partum stimulates the reproductive physiology and induces regular oestrus cycle which assists in cleaning of uterus and faster uterine involution. The regular cycling helps in reduction of ovary-dependent fertility disorders and improves conception rate. A trial was conducted to evaluate the efficacy of GnRH (Receptal) in improving the conception rate after administration at 12th day of post partum.

MATERIAL AND METHOD

75 cross-bred breeding cows between 2 to 7 years of age which calved in July (24), August (26), September (25) were treated with 5 ml of Receptal on 12th day after calving. The animals were kept under close observation to study oestrus. Per rectal examinations were carried out at 15 days interval to check on uterine involution and ovarian activities. Those expressing oestrus after 60 days of calving with clear discharge were inseminated and pregnancy diagnosis carried out after 45 to 60 days.

RESULTS AND DISCUSSION

Out of 24 animals which calved during July and given Receptal after 12 days, 12 animals (50%) conceived with first insemination. The interval between calving and conception was between 63 to 89 days. 9 more animals conceived after 2nd and 3rd insemination. Two animals were debilitated and one animal showed vaginal granulation. All the three did not conceive.

Out of the August calvings totaling 26 animals given Receptal at 12th day of calving, 16 animals (61.5%) conceived with the first insemination. The interval

between the calving to conception was 62 to 99 days. The other 8 animals also conceived after 2nd and 3rd inseminations leaving 2 animals not conceived. One was weak and debilitated and the other had adhesions at right horn and ovary.

Out of the 25 animals calved in September and treated with Receptal 5 ml on the 12th day, 19 animals (76%) conceived with the 1st insemination. The calving to conception interval was 65 to 92 days. The other 4 animals conceived with the 2nd and 3rd inseminations. Two animals did not conceive in this group.

Out of the total calvings in July, August, September (75), 45 animals conceived on 1st A.I. giving 62.6% of conception. The other 21 animals conceived with 2nd and 3rd inseminations leaving 7 animals not conceived having reasons of debility, adhesion and vaginal granulation.

The overall performance is very good and encouraging compared to last year's performance in the farm. The farm had previously many infertility cases with metritis and repeat breeders.

This trial clearly indicated the advantage of using GnRH (Receptal) at 12th day of calving in improving fertility and conception.

ACKNOWLEDGMENT

The author wishes to thank Father Paul of Ashirwanam Farm for having given the animals and facilities to carry out the trials.

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Indian Vet J. 63. May 1986; 409-413.

COULD THE INDIANS HAVE KNOWN ABOUT EMBRYO TRANSFER TECHNOLOGY 2500 YEARS BEFORE ?

*Reproduced from the original article written by Dr.W.Lampeter**

PICTURE : The antilope headed God Harinaigamaishin moves away with the embryo of Mahavira from the Brahman woman Devananda. Actually the object, which Harinaigamaishin is holding carefully in the hand, appears like a small embryo distinguishable in head part and foot part.

Miniatures from a handscript, West Indian School, 2nd half of 15th century : Museum for Indian Art Berlin, Govt. Museum of Prussian culture-possession.

Orally delivered songs on the Jain - religion contain fantastic pleasing instructions on a process, which dates back to about 2500 years : The founder of the religion Mahavira should have come into the world after an embryo-transfer. Dr.W.Lampeter by chance came across the traces of this old legend, then could collect pictures and additional material, which makes astonishing interpretation possible.

Divine birth after embryo-transfer

From the Indian legends on the Jain religion it is learned, that approximately in the 6th century before Christ the religion founder Mahavira descended on the earth as embryo and was born from a human womb, in order to establish a new religion. But there occurred a misfortune (mishap).

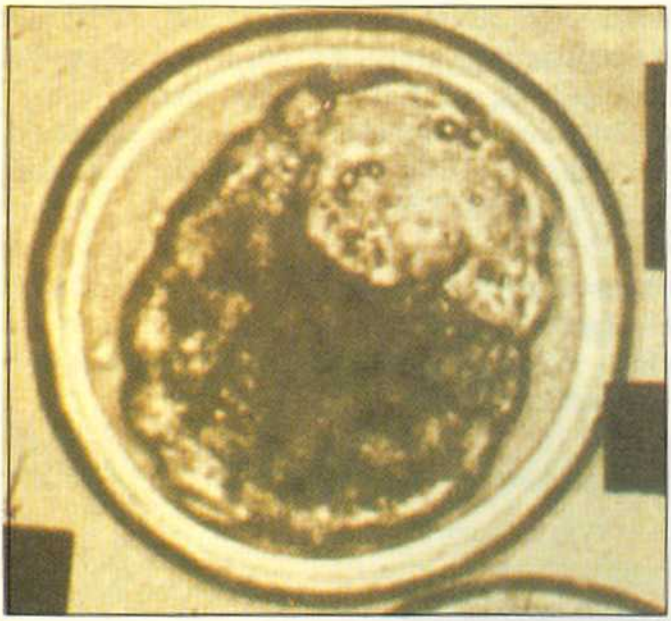
The reverend Mahavira assumed the form of an embryo exactly in Bharat land in the Brahman-quarter of the city Kundagrama "only" in a Brahman woman (still member of the highest priest caste). Now the council of Gods sent one God, Harinaigamaishin, to straighten out the mishap. An embryo-transfer or better said, an exchange must be accomplished. Then what happened, is given in the text accompanying a number of miniatures illustrating this legend, the text reads.

Harinaigamaishin went to the house of Rishabhadatta and to Devananda, here he made his reverence before the reverend ascetic Mahavira and put Devananda along with her maids in deep slumber, then he removed all unclean pieces and put clean pieces in their place and said : "Allow me, Reverend Sir!" and took the reverend Mahavira on his joined hands without hurting Him; then he went to the Kshatriya quarter of the Kundagrama city, to the house of Siddharta and to Trishala.

Trishala is the queen desired by the Gods, present in the same state of pregnancy as Devananda and so the queen receives the divine embryo. In the year 559 BC Trishala gives birth to Mahavira.

Is it actually only mystic speculation, or behind this exists a real knowledge about the earliest processes of impregnation (fertilization) and embryonal development? Did one know a narcosis like state, did one know something about asepsis, and why the text emphasized on an exchange of embryo between woman, who are at the same stage of pregnancy - shows the knowledge that embryos can be exchanged only between synchronous mothers?

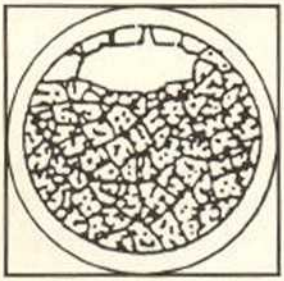
The research can be continued with the help of an article by Reinhold F.G.Mueller on the ancient Indian embryology. On Mahavira-legend he wrote : Their opinion (of older Indians) is mainly due to the fact, that the live embryo is fully considered as an



independent being. A pictorial representation, in which two embryos are exchanged.

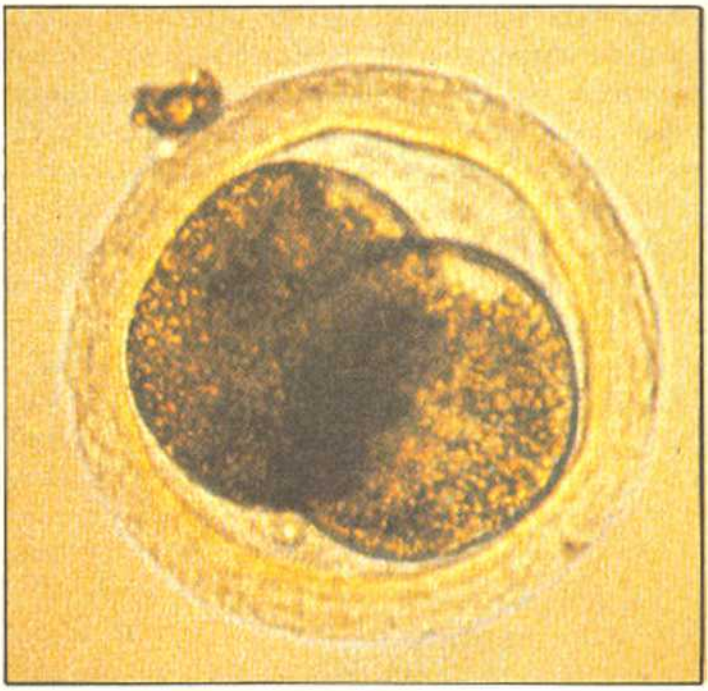
But this has shown the possibility, that the single degree (stage) of development has not only been set-up intellectually, but a direct observation could be followed". In other words: were details of early embryonal development already known?

Many of the old texts - now they are religious, but also medical and philosophical teaching texts - were narrated for a long time only orally and put up in writing only 500 AC onwards. In the medical science of wound-doctors (Sushruta-Samhita) - but also in other common-medical or philosophical-medical theories - for example there are following statements on early and later development of embryo.

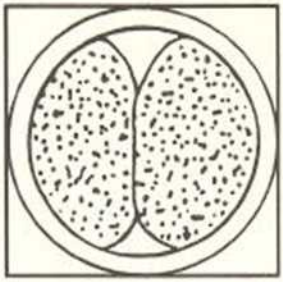


In the first month a small lump is produced.

In the second month, due to cold, heat and wind a big lump is formed by compression. The compression produces, mainly a male form, if a rolled (spherical) body is produced, a female form, if a piece of mass (flesh) and an unmanly (hybrid embryo), when a



polyparting form is formed.
In the third month five protrusions appear for hands, feet and head and there is a clear distribution of the organs (limbs) and secondary organs.



In the fourth month the distribution of limbs and secondary organs become clear.
In the fifth month the conception becomes a more sensible state.
In the sixth starts the consciousness.
In the seventh the distribution of all limbs and secondary (side) limbs become more distinct.
In the eight month, if his strength is not stable, even after birth he should be weak and not remain alive as a result of the participation of a disastrous (ominous) demon.

The birth takes place in the ninth, tenth, eleventh or twelvth month, otherwise it

will not be completely developed. "Tandulaveyaliya" an instruction on the human existence before and after the birth, who mixes up embryology, anatomy and physiology also quotes : Following the semen and blood (sonita) the "kalala", named small flock, is formed. From the kalala a bubble (budbuda) is produced and as is known from the bubble a lump of flesh (pesi) is produced, from this lump gradually limbs are formed and from the limbs the nails and body hair.

Text from the epic Mahabharata XII, Sulabha, illustrations by author.

And following is described in "Garbha-upanishad" a very old vedic source : within the productive span (rtu) after one night a small lump (kalala) is formed, after seven nights it becomes a bubble (budbuda) and in fifteen days a ball. In a month it becomes stiff. In the second month there is formation of head etc.

Besides some peculiar imaginations following points are evident : frequently the terms "kalala" and "budbuda" appear, with which apparently very early embryonic stages are described. Actually an egg after the fertilization is to be described as quite an uniform ball (lump) surrounded by a cover (zona pellucida). Seventh or eight day onwards this uniform ball is divided many times and after the Morula-stage reaches the blastocystic-stage.

The 900 000 "lakka puhutta" (lakka=100 000, puhutta=, about 4-9) can also be relatively easily identified as primordial-follicles, which are "produced and die spontaneously" - now we know at the time of birth there exist about 400000 primordial-follicles. Could the Indians actually observe these processes 2500 years back? Here also many tracks can be followed : In the ruins of Ninive was found a glass object, which was shaped like a magnifier. Wilhelm Rau reports about rock crystals, which in the mountaineous brooks of Pamir-mountain had been cut into lens shape by the water and were found in the palace of King Assurnassirpal II (884-859 BC). The eight to sixteen times magnifications could be achieved with it, which was also used for identification of early embryonic stages.

A specially interesting quotation comes from the clouds "(Die Wolken)" by Aristophanes : Strepsiades and Sokrates converse, how one can get processes : "you have certainly seen the stone with the pharmacist, transparent, smooth and beautiful, with which one can produce fire?

Now how would it, if I take one such and when the secretary will record his protocol (on wax-board), then I will place myself a little away towards the sun and simply melt the writing of complaint away!".

All questions, now arising here, must be certainly carefully answered but certainly one can deal with speculations. A high degree of medical knowledge

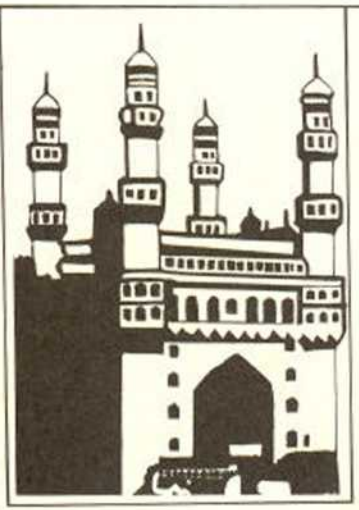
(informations) must already be existing about 2500 years back. But how far this real knowledge could be realized in practical work is left undecided.

* *Dr. W. Lampeter*
Post Box 4
D-8090 Wasserburg 2

Sexualmedizin 19,406-410,1990

Illustration : Trishala, the royal mother looks tenderly at the newborn Vardhamana, who later will become Mahavira. Mahavira is to be considered as honorary title and equivalent to a great person, hero. He founded the Jain religion.

Miniature from a handscript, West Indian School, 2nd half of 15th century.
Museum for Indian Art Berlin, Govt. Museum of Prussian culture-possession.



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IN-VITRO TRIALS ON EFFECT OF BUTOX (DELTAMETHRIN) ON THE STAGES OF RHIPICEPHALUS SANGUINEUS.

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Deltamethrin is a new synthetic pyrethrin having marked cidal properties against ticks (Sharma et al.,1991) and mites (Sharma et al.,1991 and Upendra 1991) in dogs. The insecticide has been reported to be very safe in treating ectoparasitic infestations (Ranade et al.,1991). The trial was therefore conducted to study the in-vitro activity of Deltamethrin against the different stages of *R. sanguineus* a common dog tick in India. In-vitro trials of butox in India have not been reported so far except in case of *Hyalomma sp.* by Pathak et al.,(1991).

MATERIALS AND METHODS

Engorged females of *Rhipicephalus sanguineus* (Acariana : Ixodidae) collected from naturally infected dogs were divided in three (A,B and C) groups (five female ticks in each) in such a way that, the average body weight of each group was nearly the same. Females from A and B groups were then placed in separate petridishes covered with blotting paper and then exposed to two concentrations of Deltamethrin viz. 9 ppm and 7 ppm respectively. Female ticks belonging to group C (control) were sprayed with tap water instead of Deltamethrin. After the spray each tick under study was transferred to a separate glass vial, the open end of which was then secured with muslin cloth and observed daily for mortality, if any. Observations have also been made regarding preovipositions and oviposition periods, quantity (expressed in milligrams) and hatching time of eggs laid by treated and untreated surviving ticks. Similarly, males of *R. sanguineus* were also exposed to two concentrations of Deltamethrin.

OVICIDAL ACTIVITY OF DELTAMETHRIN

The eggs obtained from the ticks of group C (control) were used for this purpose. The egg mass was divided in three equal parts (Ca, Cb, Cc) and treated exactly in the similar fashion as that of adult females and males i.e. Ca, with 9 ppm, Cb with 7 ppm and Cc

(control) with tap water. The eggs from all the three groups (Ca, Cb and Cc) were observed for hatching times.

LARVICIDAL ACTIVITY OF DELTAMETHRIN :

The larvae recovered from group Cc were used for evaluation of cidal activity of Deltamethrin. The larvae were divided equally in three groups (Cc1, Cc2, and Cc3; 25 larvae in each group) larvae from Cc1 and Cc2 were exposed to 9 ppm and 7 ppm of Deltamethrin respectively, and larvae from Cc3 (control) were exposed to tap water. The larvae from all the three groups were observed daily for 10 days for their viability.

OBSERVATIONS

Observations on effects of Deltamethrin on adult female *R. sanguineus* are given in Table-I.

Table-1 : Effect of Deltamethrin on Biology of R.Sanguineus

Groups	Treatment/ concentrations	No. of female treated	No. of female died	Mortality rate (%)	Average weight of female
A	Deltamethrin	5	3	60	155
B	Deltamethrin	5	2	40	153
C	Tap water	5	-	-	153

Groups	Preoviposition period (days)	Oviposition period (days) (mg)	Average egg mass per female mass	Total weight of egg	Larvae recovered
A	8	8-11 (4)	25.5	51	99
B	7	7-11(5)	28.0	84	158
C	4-6	4-13(10)	60	300	713

Deltamethrin was found to be 60% and 40% effective against females and 100% and 60% effective against males of *R. sanguineus* at the concentrations of 9 ppm and 7 ppm respectively. Preovipositions period was prolonged (7-8 days) whereas oviposition period was shortened (4-5 days) in treated groups as compared to controls. The oviposition rate in exposed females was reduced to 42.5 % and 46.6 % in groups A and B respectively. Ovicidal and larvicidal activity of Deltamethrin is given in Table-2 and Table-3 respectively.

Table-2 : Ovicidal effect of Deltamethrin on R.sanguineus.

Group	Treatment concentration	Egg mass treated (mg)	No. of larvae recovered
Ca	Deltamethrin 9 ppm	75	18
Cb	Deltamethrin 7 ppm	75	25
Cc	Tap water	75	140

The data clearly indicates that Deltamethrin has 87.2 % and 85.6 % ovicidal against *R.sanguineus* at the concentrations of 9 ppm and 7 ppm respectively.

Table-3 : Larvicidal activity of Deltamethrin against R.sanguineus

Group	Treatment concentrations	No. of larvae treated	No. of larvae died	Larvicidal activity
Cc1	Deltamethrin 9 ppm	25	25	100%
Cc2	Deltamethrin 7 ppm	25	25	100%
Cc3	Tap water	25	-	-

All the larvae from Cc1 and Cc2 groups were found dead 24 hrs. after the insecticide spray indicating 100 % larvicidal activity at both the concentrations of Deltamethrin used in the study. *R.sanguineus* is a good model for studying in-vitro action of acaricides in laboratory and the results obtained thereon could be applicable in general to all species of hard ticks infesting the animals.

CONCLUSIONS

R. sanguineus adults, larvae and eggs were exposed to Butox (Deltamethrin) at 9 ppm and 7 ppm. Mortality rate was 40-60 % in engorged female and 60-100 % in males. The oviposition in exposed were reduced by 53-58 %. Ovicidal and larvicidal activity of Deltamethrin against *R.sanguineus* was 85-87 % and 100 % respectively.

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