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Ectoparasite control in dairy animals with special reference to resistance development: An Indian scenario

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Ectoparasites of dairy animals including lice (*Damalinia*, *Haematopinus*, *Linognathus*), mosquitoes (*Aedes*, *Culex*), flies (*Tabanus*, *Stomoxys*, *Haematobia*), ticks (*Rhipicephalus*, *Hyalomma*) and mites (*Demodex*, *Psoroptes*) cause a major threat to sustainable dairy industry in a tropical country like India where the warm, humid climate favours their perpetuation and propagation almost throughout the year. Heavy infestations produce direct losses like anaemia, reduced growth rates and milk production; hide damage and toxicosis along with the indirect loss in terms of transmission of various economically important bovine diseases (tropical bovine theileriosis, bovine babesiosis, anaplasmosis, trypanosomosis). Large scale repeated use of chemical insecticides viz., organochlorines, organophosphates (OP), synthetic pyrethroids (SP), amidines and macrocyclic lactones (ML) have predominantly been used to control arthropods on domestic animals worldwide. In India, presently the most commonly used insecticides include coumaphos, dichlorvos, diazinon, malathion (OPs), amitraz (amidines), fenvalerate, deltamethrin, cypermethrin, flumethrin (SPs), ivermectin (ML). However, application of these chemical insecticides have limited efficacy in reducing ectoparasite infestations and is often accompanied by serious drawbacks, including the development of resistance, environmental contamination, and contamination of milk and meat products with insecticide residues. Indiscriminate use of acaricides has led to resistance particularly in one-host tick *Rhipicephalus* (*Boophilus*) *microplus* to almost all currently used acaricides whereas; resistance in multi-host ticks (*Hyalomma anatolicum*) is less widespread. As the availability of new chemicals for the control of resistant ectoparasites is scarce, and there are concerns over resistance and residues problems, it becomes the urgent need of the hour to formulate and implement alternative pest management strategies for effective control of these ectoparasites.

Keywords: Chemotherapeutics, dairy animals; ectoparasite control; India, insecticide resistance.

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