**Ectoparasiticides**

Parasitic arthropods of Veterinary importance include:

**Insects**

* + - Fleas
		- Lice
		- Flies
		- Blister beetles (not considered as parasite but can cause problems).

**Acarines**

* Mites
* Ticks

Mechanisms by which ectoparasites induce disease include:

* Loss of blood ® anaemia
* Physical damage and irritation of skin and hides.
* Allergic reactions to venoms and toxins
* Decreased resistance to other diseases
* Reductions in weight gains, milk and egg production, and FCE in food animals.
* Reduction in reproduction efficiency
* Transmission of other disease agents.

**Classification**

The major groups are:

* **-  Botanicals (plant-derived agents),**
* **-  Synthetic pyrethroids**
* **-  Chlorinated hydrocarbons**
* **-  Organophosphates**
* **-  Carbamates**
* **-  Formamidines**
* -  **Miscellaneous compounds** e.g. Inorganics, growth regulators and development inhibitors
* **General signs of toxicity include:-**

 -  excessive salivation

 -  lacrimation

 -  defecation

 -  urination

 -  muscle twitching (these are mainly organophosphate toxicity)

 -  skin of some animals are especially sensitive

* + - horse - frequently see urticaria
		- cats - must use lower concentrations of dichlorvos for “collar” than for dogs.

**Types of formulations**

* Spray and dips
* Spot-on, pour-on and dust formulations - do not add excessive moisture to animal’s coat.
* Oil sprays - intended to be applied to hair coat, and not skin, as light mist spray. If high concentration is applied to skin, the oil increases absorption and toxicity.
* Feed additives
* If absorbed - highly effective against blood-sucking ectoparasites
* Absorbed or not absorbed - effective against both larvae in equine stomach and larva and pupal stages of parasites in faeces.
* Gels and pastes for oral administration.

**Carbamates**

**e.g. Carbaryl (Sevin®, Baygon®) , Propoxur**

* MOA: **Ach inhibitor**
* They have lower dermal toxicity than the organophosphates, but there are exceptions.
* They are not “broad-spectrum” insecticides, e.g. houseflies and common cockroaches are less sensitive than rats.

**Formamidines**

**e.g. AMITRAZ**

MOA: kill by **inhibiting monoamine oxidase**

* acaricidal
* good for **cattle ticks, mange, mites** of **swine** and **dogs**.
* good against pests that have developed resistance to organophosphates and carbamates.

 -  in U.S., it is approved for cattle, swine, dogs.

 -  not approved for horses - may cause fatal colon impaction

 -  collar for dogs

 -  can make dog ill if eaten.

 -  sedation is most frequent side effect

**Organophosphates**

**E.g. Chlorfenvinphos, Chlorpyrifos, Coumaphos, Dichlorvos, etc.**

Therapeutic Uses of organophosphates:

* Insecticidal,
* Acaricidal and
* Helminthicidal properties.
* Some have herbicidal or fungicidal properties.

Clinical signs of toxicity

These include:-

* salivation,
* muscle fasciculation and tremors,
* vomiting and diarrhea,
* miosis followed by mydriasis,
* ataxia
* convulsions

Tx

* Massive i.v. And s.c. Doses of **atropine sulphate**
* If early (2 - 24 hours) after exposure, try ache regenerator - **pralidoxime chloride** supportive therapy

Drug interaction

* do not use with phenothiazine anthelmintics or tranquilizers
* do not use with neostigmine or succinylcholine
* do not use with n-butyl chloride or other halogenated hydrocarbons.

**Botanicals**

* derived from either the flowers, leaves, stems or roots of plants.
* Plants oils or resins have attractant, repellent, or toxic effects on arthropods.
* **Pyrethrins**
* **Limonene,**
* **Allethrin** - a synthetic pyrethroid with less dermatitis
* **Linalool**,
* **Resemethrin**,
* **Rotenone** – inhibits cellular respiration metabolism by blocking NADH.
* has a fast “knockdown” and - is used to kill fleas, lice, ticks and mites
* **Fenvalerate, Allethrin, Permethrin.**

**Pyrethrins and Synthetic Pyrethroids**

* Pyrethrins are 6 natural insecticidal esters derived from the flower head of the pyrethrum plant,
* very effective as insecticides

**Insect growth regulators (juvenile hormone analogs)**

* **Cyromazine**
* **Fenoxycarb**
* **Methoprene**

Uses:

* **Cyromazine**, given orally for **faecal maggot control** in **poultry**
* **Fenoxycarb** and **methoprene** for **flea control**. Sprayed in households and on animals to prevent eggs, pupae, and larvae from developing into adult fleas – effective for 21 weeks.
* **Methoprene** is also available as **collar for dogs**.
* **Fenoxycarb** and **methoprene** are mixed **with pyrethroids** to **kill adult fleas**.

**Chlorinated hydrocarbons**

* **DDT(dichlorodiphenyltrichloroethane)**
* **lindane, methoxychlor**

**Drugs effective against heartworm disease in dogs**

* Major damage due to heartworm infection in domestic dogs and other carnivores are caused by adult stages of ***Dirofilaria immitis***.
* Removal of these adult worms is the key stage in heartworm therapy. However complete management includes elimination and prevention of new infection
* Drugs currently approved as Dirofilaria adulticides are
1. **Thiacetarsamide Na (Caparsolate Na®, Filaramide®, Arsenamide®)**
2. **Melarsomine (Immiticide®)**
* These are both organic arsenical
* **Thiacetarsamide** is very **irritating to tissue** hence it is given only by **IV** route.
* **Melarsomine IM** is less toxic than thiacetarsamide
* **Macrocyclic lactones** have microfilaricide activity.