| Arthropod | Infestation/Disease | Transmitted pathogenic agents |
|---|---|---|
| Phlebotomes (sand flies) | Phlebotome (sand fly) infestation | *Leishmania infantum* (leishmaniosis)<br>*L. infantum* is the major species in Europe |
| *Cheyletiella yasguri* (in dogs)<br>*Cheyletiella blakei* (in cats) | Cheyletiellosis | none described |
| *Otodectes cynotis* | Otoacarosis | none described |
| *Neotrombicula* (Trombicula) *autumnalis, Straelensia cynotis* | Trombiculosis | none described |
| *Sarcoptes scabiei* | Sarcoptic mange | none described |
| *Notoedres cati* | Notoedric mange | none described |
| *Demodex canis, D. cati, D. inja,, D. gatoi, D. spp.* | Demodicosis | none described |
| *Dipteran fly larvae* (maggots) | Myiasis | |

(European scientific counsel companion animal parasite: Guidelines March 2018)




## TOP STORIES

### Global animal pharma market expected to grow at 7.7% CAGR till 2022
**: P&S market research**

According to market research, global animal pharma market size, share, development, growth and demand forecast to 2022 - Industry Insights by Product, by Animal Type (Companion Animals and Production Animals) by P&S Market Research. The global animal pharma market was valued at $12,614.3 million in 2015, and is expected to grow at a CAGR of 7.7% during 2016-2022. The ectoparasiticides generated largest revenue in the global animal pharma market in 2015. High prevalence of animals affected with ectoparasites is the key factor driving the growth of the ectoparasiticides market.

### Canine heartworm disease incidence on the rise: American Veterinarian, Feb2018

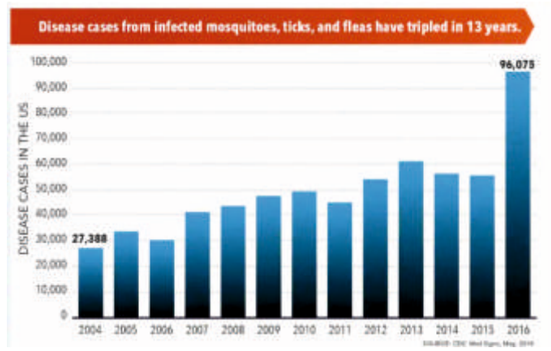
The total number of heartworm tests performed increased by 33%, from 7 million to 9.2 million. The incidence of positive tests increased by 15.3%. An increased number of dogs received heartworm preventives (19.3 to 20 million). Study results indicate a slow increase in positive heartworm tests nationally, despite concerted prevention efforts. Researchers advised veterinary professionals to continue promoting year-round heartworm prevention with ML-containing preventives and annual heartworm testing.

### Tick exposure and kidney disease risk in dogs: American Veterinarian, March 2018

An association was identified between dogs with positive Lyme disease or Ehrlichia test results and an increased risk for CKD in endemic areas. The investigators found that dogs with 1 vector-borne disease had a 300% increased risk of developing kidney disease when Erlichia antibodies were present in dogs living in E canis–endemic areas, and a 43% increased risk of developing kidney disease when Borrelia antibodies were present.

### Disease spread by ticks, mosquitoes and fleas more than tripled in US. :
**The Washington Post May 2018**

A new report from the Centers for Disease control and prevention has found that illnesses from mosquito, tick and flea bites more than tripled in the United States from 2004 to 2016. Climate change can exacerbate many public health threats, including allowing mosquitoes and ticks to thrive in warmer temperatures said Lyle Petersen, director of the CDC's Division of Vector-Borne Diseases. Warmer temperatures tend to make mosquitoes get infected faster and also more infectious. For ticks, the higher temperatures are ideal to make them spread into new areas and puts more people at risk. When the tick season is longer, people are exposed over longer periods.



# Fleas and flea-borne diseases updated

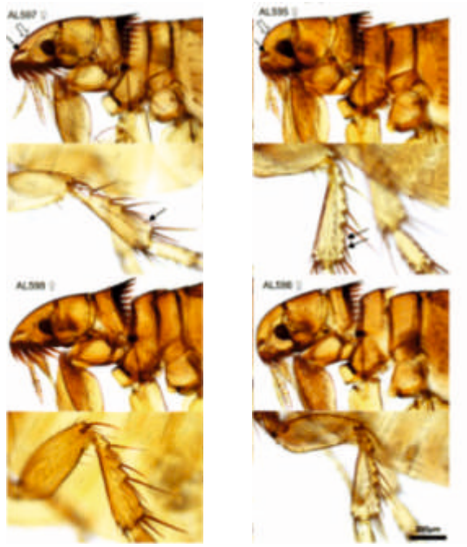
WSV18-0316: SVA Infectious Disease
*S. Shin, Chonnam National University College of Veterinary Medicine, Parasitology, Gwangju, Republic of Korea*

## Introduction

Carpets and companion animals are frequently seen in modern living rooms. However, the combination of the two gives a perfect condition for flea infestation in dogs and cats in a residential house. It is important to control flea infestation in companion animals and larval stages on the ground to prevent severe allergic dermatitis and the transmission of flea-borne pathogens that can cause serious disease in animals and/or in humans.

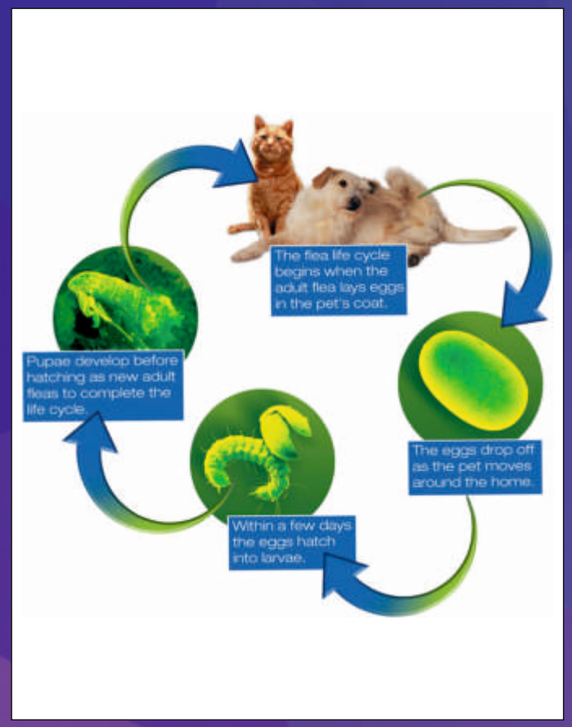
## Flea Biology

Adult fleas live on animals. Unless they're dislodged through grooming, fleas become permanent residents of their acquired host. The Two species of the utmost importance for veterinary practitioners are the cat flea ***Ctenocephalides felis*** and the dog flea ***C.canis.*** Fleas have strongly sclerotized and chitinized bodies.

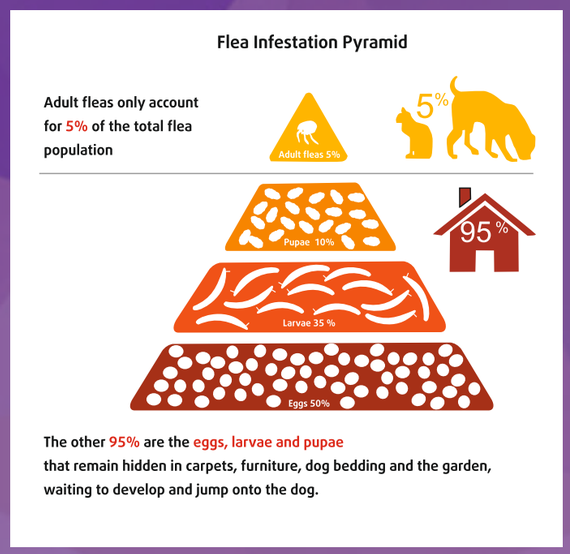



The species *C. felis felis* is characterised by an acutely angled frons and head appears 'pointier' than *C. canis*. Both male and female adult fleas rely exclusively on host blood for living, so the mouth parts of a flea are specialized for blood feeding. Adult fleas imbibe much more blood than they can use. As a result, produce large amounts of feces, consisting undigested blood. Flea dirt is the primary food source of flea larvae. Finding flea dirt on a dog or cat is one of the best ways to diagnose an infestation. When animals scratch and groom themselves this blood gets dislodged.

Roughly one flea egg is produced per hour. And 60% of eggs fall from the host within two hours of being laid. They'll hatch within one and half days in optimal conditions. A mature larva spins a cocoon which is sticky and collects debris from the environment and becomes camouflaged so flea cocoons are difficult to detect.




The complex flea life cycle means that there are a number of challenges for veterinarians, the physical resilience and rapid multiplication in flea numbers; their ability to find alternative hosts; and the presence of environmental conditions in the home that are conducive to flea survival.




## Clinical Signs:

Flea infestation is highly variable and grooming behaviour in dogs and cats can have a major influence.
The frequency and duration of exposure to infestations, the presence of secondary infections or diseases and possible hypersensitivity are important factors.
Animals that are allergic or develop an immunological reaction to flea saliva can develop flea allergy dermatitis (FAD).
Allergic animals may show pruritus, alopecia, broken hairs, papules and erythematous macules with crusts.
Moist dermatitis is typically seen in the dorsal lumbar and tail region. Lesions can extend to the thighs and abdomen.

## Flea Borne Diseases:

Fleas are important clinically as they cause pruritus, flea bite dermatitis, and in young animals can cause anemia as the severe infestation. Fleas are intermediate hosts for filarial nematodes and the tapeworm *Dipylidium caninum* and vectors for various pathogens, including *Bartonella henselae, Rickettsia felis, Haemoplasma species* and *Yersinia pestis.* Cat fleas can also transmit *Rickettsia typhi*, a causative agent for murine typhus - normally transmitted by the rat flea *Xenopsylla cheopis.*
The cat flea, *C. felis,* is the most frequently encountered parasite on both cats (98%) and dogs (93%), and is also the flea species with the most potential for transmitting zoonotic diseases.

## Flea-control in different scenarios:

| Minimal | Regular grooming and visual |
|---|---|
| Infestation risk (e.g. animals with limited or no outdoor access) | Regular grooming and visual inspection using a flea comb.<br>In the event of positive findings, therapeutic treatment required to eliminate the infestation.<br>By the application of registered insecticide at appropriate intervals to ensure better control over both adults and developing stages in the environment. |
| Moderate infestation risk (e.g. animals with regular outdoor access) | Regular prevention at appropriate intervals<br>Daily mechanical cleaning of the house and other places where the animal has rested<br>The largest number of eggs and immature stages are found in the places where dogs and cats spend most of their time. |
| High, continual re-infestation risk (e.g. pet shelters, breeders' premises,mixed-pet households, hunting dogs) | Sustained, integrated flea control is recommended<br>Generally monthly application of insecticides on the dogs/cats with daily vacuuming and mechanical cleaning of cages or beds and bedding<br>Also advised is a treatment for immature stages. |
| Animals with recognised flea allergy dermatitis (FAD) | Exposure to flea salivary antigens to be minimised or eliminated. Long-term flea control is recommended to ensure, to maintain flea populations at very low or non-existent levels. Frequent, regular application of insecticides to the animals<br>Appropriate environmental control measures<br>Other animals to be considered if the animal with FAD lives within a multi-pet household with other dogs, cats or other pet animals |
| Continued flea and tick presence or risk | Sustained tick control with integrated flea control<br>Monthly application of registered acaricides with insecticidal activity on the dogs/cats<br>Daily vacuuming and mechanical cleaning of cages or beds and bedding. |

# TICKS AND TICK-BORNE DISEASES UPDATED

Ticks are more than just creepy; they can spread a number of different diseases that affect both pets and people. And each year, thousands of dogs become infected with serious diseases transmitted by a number of different ticks.

**Tick Biology:** The mouthparts of hard ticks are readily visible from above. The rough hypostome, plunges into the host's skin while feeding. The backward directed projections prevent easy removal of the attached tick. In addition, most hard ticks secrete a cement-like substance produced by the salivary glands which literally glues the feeding tick in place.

## Clinical Signs:

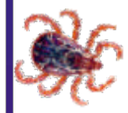
Ticks can be found all over the body but the main predilection sites are the non-hairy and thin-skinned areas such as the face, ears, axillae, interdigital, inguinal and perianal regions. The blood-engorged adult females are readily identified on the coat and skin.

## Types of Tick & Diseases Transmitted

**American Dog tick**
- Tularemia
- Rocky mountain Spotted Fever

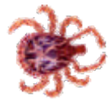
**Brown Dog Tick**
- Rocky Mountain
- Spotted fever
- Q Fever

**Lone Star Tick**
- Southern Tick Rash
- Illness (Start)
- Heartland Virus
- Tularemia
- Ehrlichiosis
- Q Fever



**Rocky Mountain Wood Tick**
- Colorado Tick fever
- Powassan Encephalitis
- Rocky Mountain
- Spotted Fever

**Deer Tick**
- Lyme Disease



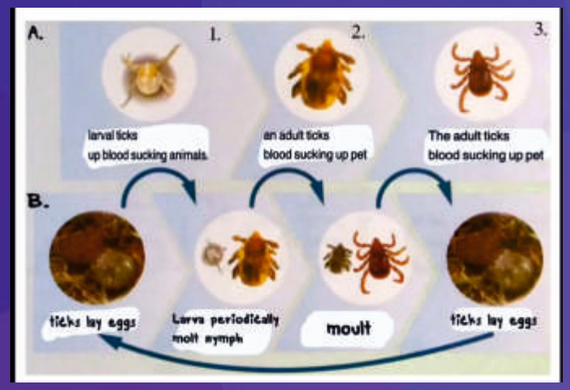
**Cayenne Tick**
- Rocky Mountain Spotted Fever

**Ixodes Ticks**
*(Multiple Species)*
- Lyme Disease
- Babesiosis
- Powassan Encephalitis
- Anaplasmosis (HGA)

**Soft Ticks**

**African Tick**
- Tick - Borne Relapsing Fever

- When the tick finds a feeding spot, it grasps the skin, cuts into a surface and then inserts its feeding tube.
- Many species also secrete a cement-like substance to keep them firmly attached during the meal.
- Ticks also secrete small amounts of saliva with anesthetic properties so that the animal can't feel that the tick has attached itself.
- A tick will suck the blood slowly for several days.
- If the tick contains a pathogen, the organism may be transmitted to the host animal in this way.
- After feeding, most ticks will drop off and prepare for the next life stage. At its next feeding, it can then transmit an acquired disease to the new host.




| | FLEAS | TICKS |
|---|---|---|
| **Type of parasite** | Flea is an **insect.** Wingless, has six legs and can jump really far | Ticks are **arachnids**. Closely related to spiders and most stages have eight legs |
| **Number of hosts** | Have **fewer hosts** than ticks. Hosts include dogs, cats, opossums, coyotes, racoons and foxes | Ticks have **more hosts.** Hosts include dogs, cats, cattle, humans, birds, lizards, snakes, rodents, foxes, deer, squirrel etc. |
| **Life span** | Adult fleas can live for more than 100 days | Ticks can live from a **few weeks upto 3 years.** |
| **Time on host** | Fleas will **live on one host.** Once they find a host, they will live there until they die | Ticks spend most of their **lives off of hosts**. They can wait for extended periods for the right host. They are patient predators |
| **Who feeds** | **Only adult** feeds on the host | **Larvae, nymph and adults** feed on hosts. Ticks feed on different host for these different stages |
| **How many eggs they lay** | **20 to 40 eggs per day for several weeks.** The longer they are on a host, the more eggs they produce. | Lay **thousands of eggs one time**. Ticks can lay potentially thousands of eggs at once, but after that, it dies |
| **Where they lay their eggs** | **Lay eggs where ever the host goes.** The eggs are shed where ever the host roams, thus host goes on depositing the eggs wherever it spends time | **Lay eggs after falling off of the host.** When female has engorged, she detaches from host and lays eggs where ever she falls off. |
| **Climate tolerance** | **Prefer warm temperatures.** | **Can even survive near freezing temperatures.** Ticks are hardier than fleas and tougher to kill |
| Disease spread | **Bartonellosis and tapeworm.** | They can transmit many potential deadly diseases like **Lyme disease and Rocky mountain spotted fever.** |

# RTD
# New options in Ectoparasite control, A Global Roundtable Discussion

(Supported by Fort Dodge Animal Health)

**PARTICIPANTS:**

• **Patrick Bourdeau,** DVM, PhD, DECVD, DEVPC (National Veterinary School of Nantes, France) • **Rick Atwell,** BVSc, PhD, FACVSc (University of Queensland, Brisbane, Australia) • **Emmanuel Bensignor,** DV, DECVD, CSAD, DUAII (Referral Service, Paris/Rennes, France) • **Byron Blagburn**, MS, PhD (College of Vet Medicine, Auburn University, Alabama) • **Ross Bond,** BVMS, PhD, DVD, DECVD, ILTM, MRCVS (Royal Veterinary College, University of London) • **Edward Breitschwerdt,** DVM, DACVIM(North Carolina State University, Raleigh, North Carolina) • **Michael Dryden,** DVM, PhD(Kansas State University, Manhattan, Kansas) • **Christian Epe,** DR.MED. VET., PhD, DEVPC(Veterinary University of Hanover, Germany) • **Maggie Fisher,** BVetMed, DEVPC, MRCVS (Independent Consultant, Vet Parasitology, Malvern, U.K.) • **Leon Fourie,** PhD, HED, Pr. Sci. Nat.(ClinVet International, Bloemfontein, S. Africa) • **Claudio Genchi,** DR.MED. VET., PhD, DEVPC (University of Milan, Italy) • **Klaus Hellmann,** MRCVS, DECVPT (Klifovet AG, Munich, Germany) • **Pablo Martinez** Labat (National Autonomous, University of Mexico) • **Marcelo Labruna,** DVM, PhD (University of São Paulo São Paulo, Brazil) • **John MacDonald,** DVM, DACVD (Auburn University, Alabama) • **Peter F. Miller,** MSc, PhD (University of Technology, Sydney, Australia) • **Nariaki Nonaka,** DVM, PhD (Hokkaido University, Sapporo, Japan) • **Michael Rust,** PhD (Department of Entomology, University of California-Riverside) • **Johan Van Leuven,** DVM, CertVD (De Meren Small Animal Clinic, Mol, Belgium) • **Luigi Venco**, DVM, DEVPC (Veterinary Hospital of Pavia, Italy) • **Guadalupe Miró,** DVM, PhD, DEVPC (University of Madrid, Spain) • **David Young,** DVM, PhD, DACVS (Young Veterinary Research Services, Turlock, California)

## Despite an array of product 'choices'

Fleas, ticks, and other ectoparasites remain a persistent problem for pets and their owners around the world. Recently, a group of experts gathered in Miami, Florida, to discuss 'The current state of ectoparasite control, new options for managing associated diseases, and strategies that can be employed to keep animals healthy'.

**Prevalence of Flea Allergy Dermatitis:**
**Patrick Bourdeau:**
Overall, fleas affect 30% to 40% of the canine population, and flea-bite hypersensitivity seems to be increasing in cats in many parts of the country.

**David Young:** The cases having FAD are difficult-to-control.

**Pablo Martinez Labet:** FAD affected animals experience severe lesions and sometimes self-mutilate as a result.

**Michael Dryden:** With the advent of the newer molecules we could manage FAD much better as long as we could keep patients on the products. But recently, they have rebounded. The exact cause for this perceived resurgence is related to decreased compliance, ecological factors such as climatic changes, or decreased product efficacy.

**Nariaki Nonaka:** In Japan, the population of dogs in homes has increased, and many dogs are infested with fleas.

Same is the case in Italy and Belgium

**Miró:** Individual patient characteristics are very important in FAD.

**Labruna:** the best way to manage FAD is to use chemical control directly on the dog with environmental product application, mechanical procedures such as vacuuming, and good combined education of the pet owner about flea biology and control.

**Bourdeau: If you use any of the modern insecticides properly, it is possible to reduce lesions because you reduce or prevent the allergenic challenge due to flea bites. If you concurrently use anti-inflammatory products like steroids, antihistamines, and shampoos, the clinical signs of flea bite hypersensitivity will resolve more rapidly.**

**Dryden:** Nitenpyram rapidly stops flea feeding and is a great adjunct therapy to help treat FAD.

**Rick Atwell:** The dermatologists also use fipronil spray every two weeks until they have control. They also use prednisone early on to calm pruritus.

**Van Leuven:** My standard FAD treatment is fipronil spot-on combined with lufenuron. I use some steroids in the beginning to control pruritus.

**Young:** In my experience, dogs with FAD cover a spectrum in terms of sensitivity to the antigenic stimulus. Some dogs react to a small number of bites, and some need a larger stimulus to initiate clinical signs. Some dogs are primarily pruritic, while others experience terrible skin lesions but hardly scratch. Some dogs present with a mixture of signs.

## FAD AND COMPLIANCE

**Dryden: One of the biggest problems in controlling flea allergy is compliance. If we don't educate people that continuous therapy is necessary, they think they can apply the products for a couple of months and then stop.**

**Bourdeau:** 50% of owners did not apply flea products correctly, a big compliance problem.

**Bensignor:** We need to re-educate our clients.

**Bourdeau:** Another important point is controlling fleas on other animals.

**Dryden:** That is an extremely important point. Owners often bring in the dog and not the cat, or the cat and not the dog, and you have to ask about other potential flea hosts in the home.

## TICK-BORNE DISEASES

### TICKS AROUND THE WORLD

**Labruna:** Rocky Mountain spotted fever (RMSF), caused by *Rickettsia rickettsii,* and canine monocytic ehrlichiosis (CME), caused by *Ehrlichia canis*. RMSF is the deadliest vector-borne disease in Brazil, and CME is the most important infectious disease in veterinary clinics. Dogs are primary hosts for *A. aureolatum*, making canine infestation a primary risk factor for human RMSF.

**Bond:** Tick-borne disease is becoming an issue in the imported pets.

**Dryden: The No.1 tick-borne disease recognized by most veterinarians and pet owners is Lyme disease, caused by *Borrelia burgdorferi* and transmitted by *Ixodes scapularis*.**

**Fourie: Both ehrlichiosis and babesiosis are very common. Mortality in untreated and per acute cases is high. Complications in the form of autoimmune disease, kidney failure, liver failure, and cerebral damage can be fatal even in treated cases.**

**Nonaka:** *B. gibsoni* found only in hunting dogs, but because of human activity in forested areas, household pets are experiencing much more contact with ticks.

### CHANGING DISEASE PATTERNS

**Cobb:** Are veterinarians adapting readily? Do pet owners recognize that ticks and their diseases are moving into new areas?

**Miró:** We need to educate pet owners about the importance of prevention when they plan to travel with their dogs, as the mobility of companion animals must be a factor in the spread of new disease to our areas.

**Breitschwerdt: International movement of dogs can result in the transport of infected ticks, or, more often, dogs chronically infected with a tick-borne pathogen can carry a new organism to a previously nonendemic location.**

**Christian Epe:** Practitioners need to start expecting the unexpected. So to make an accurate diagnosis, veterinarians need to consider diseases that are not common in their practices.

**Dryden:** Several factors, including wildlife reintroductions, reforestation, climate change, and changes in agricultural practices and pet movement, all contribute to the apparent dramatic shift in tick populations.

**Cobb:** Is the awareness of tick-borne disease driving clients to want to control ticks, or do they simply not want to see a revolting parasite on their animal—or both?

**Blagburn: Tick-borne diseases and the possibility of Lyme disease and potentially associated glomerular nephritis drive tick control in the Northeast. In the Southeast, it is probably the Ehrlichia complex and the repugnant nature of engorged ticks. In the upper Midwest, it is Lyme disease and anaplasmosis. However, we must not forget the importance of other tick-borne diseases like babesiosis and hepatozoonosis.**

## PREVENTION

**Labruna:** Because there is no vaccine for either CME or RMSF, the prevention of both diseases is focused primarily on tick control.

**Labruna:** The product formulation and recommendations are important. An acaricide should be able to kill the ticks infesting a dog at the moment of application and should remain effective for a certain amount of time after that. If a given acaricide shows high efficacy (greater than 95%) for no more than 30 days after treatment, dogs should be retreated at an interval no longer than 30 days. Unfortunately, most dog owners do not respect this predetermined interval and retreat their dog only after infestation has reached high levels again.

**MacDonald: the bottom line is consistency of treatment—and that's dependent on the pet owner.**

## TICK CONTROL STRATEGIES

**Blagburn:** We use tick avoidance strategies, which include knowing when ticks are active, what species and stages are active, and what species transmit what. Then we encourage compliant use of effective products.

**Dryden:** many places in the United States that don't have a non-tick season anymore, so people are moving from reactive control to year-round prevention. It appears that whatever we used to think about tick populations, tick distribution, and tick-vectored diseases is changing.

## CVMP recommendations (Committee for Medicinal Products for Veterinary Use)

(EMA/CVMP/EWP/310225/2014Page20/30) by European Medicines agency. Sept2018

1. Use of an ectoparasitic product for therapeutic/treatment purposes should be based on the confirmation of ectoparasitic infestation, using appropriate diagnostic methods, if necessary, e.g. skin scraping investigations in the laboratory to verify mange mites.

2. Improve pharmacovigilance reporting. Veterinarians and other qualified individuals, as well as farmers and animals keepers, should be encouraged to identify and report any lack of expected efficacy.

3. Develop and harmonise prudent use warnings for similar products, as appropriate.

4. Provide guidance on the resistance data that should be included in marketing authorisation applications for ectoparasiticides (e.g. published literature addressing the concerned regions in Europe) in line with the requirements of the new veterinary legislation.

5.Promote increased availability of ectoparasiticides for minor species to reduce off-label use.

6. Develop specific guidance for minor species in line with the requirements of the new veterinary legislation.

7. Restrict the use of fixed combination products extending the parasite spectrum to situations where all active substances are necessary at the time of administration through appropriate statements in the product literature.

8. A sufficient number of different pack sizes should be made available for the market to allow treatment of different numbers of animals without causing left-overs that could be used inappropriately.

| Arthropod | Infestation/Disease | Transmitted pathogenic agents |
|---|---|---|
| Fleas | Flea infestation, FAD (Flea allergy dermatitis) | *Dipylidium caninum* (dipylidiosis), *Bartonella henselae* (bartonellosis), *Bartonella vinsonii, Rickettsia felis, Acanthocheilonema reconditum* |
| Ticks (*Rhipicephalus sanguineus, Ixodes spp., Dermacentor spp., Hyalomma spp., Haemaphysalis spp.*and others) | Tick infestation | *Babesia canis, B. gibsoni, B. [Theileria] annae* (piroplasmosis, babesiosis). *Cercopithifilaria spp., Hepatozoon spp.* (hepatozoonosis). *Ehrlichia canis & other spp., Anaplasma phagocytophilum, A.platys* (ehrlichiosis, anaplasmosis). *Rickettsia spp.* (rickettsiosis), *Borrelia burgdorferi s.l.* (Lyme disease = borreliosis), *Flaviviruses* (e.g. tick-borne encephalitis, louping ill), *Acanthocheilonema. [Dipetalonema] dracunculoides* |
| Mosquitoes (Culex spp, Aedes spp, Anopheles spp) | Mosquito infestation | *Dirofilaria immitis, Dirofilaria repens* (dirofilariosis), *Acanthocheilonema* [Dipetalonema] spp. (filariosis) |
| Chewing & sucking lice | Louse infestation | *Dipylidium caninum, A. reconditum* |
| Flies (secretophagous and biting flies) | Fly infestation, myiasis | *Thelazia spp.* (ocular filariosis = thelaziosis) |