EFTBA Veterinary Newsletter 14

Fig. 1 Two ticks *(ixodes holocyclus)* before and after feeding (Leaf, 2004).

Equine Piroplasmosis (EP)

Preventive means:

- movement restrictions
- vector control
- premunition strategies

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. EP prevention is a very ambitious task.
. Transmission occurs by vectors and their control is extremely difficult.
. Vaccination isn't possible
. Movement restrictions, control and removal of ticks and the management of pastures, fields and paddocks are most essential.

"Many thanks to Mrs. Eva-Maria Bucher-Haefner, Moyglare Stud Farm, for her valued sponsorship of this newsletter."

Profound Beauty (Danehill) owned and bred by Moyglare Stud.

Welcome to EFTBA's veterinary newsletter

Dear Breeders,

To start 2015, it is a great pleasure to address to all the European breeders, the 14th edition of the EFTBA Veterinary Newsletter. As you know, our future successes in our studs and on the racetrack reside in a deeper knowledge of all veterinary and sanitary matters. With joined forces from all member countries at the EFTBA level, the Veterinary Committee is working year long on current and important issues such as the newborn commission on anabolic steroids chaired by Dr Des Leadon and involving well known experts around the table. I would like to thank for their dedication and contribution to the improvement of our Industry; not forgetting Hans-peter Meier, the great "chef d'orchestre" of this newsletter.
I shall take this opportunity to wish you, on behalf of all the Breeder's associations composing the EFTBA, a wonderful year on and off the racetrack.

With kind regards,

Loïc Malivet

Chairman EFTBA
president Syndicat des Eleveurs

Editorial

In the last two newsletters, we delved deep into the nature of Equine Piroplasmosis (EP), above all to find means for prevention, mainly for the sake of animal health, welfare and economy. However, in the case of EP, this target is difficult to achieve for several reasons. First of all because there doesn't exist a vaccine and because the transmission occurs by means of vectors, mainly by ticks, but also by other insects and humans. These are species whose control usually is a difficult case.
Therefore, this issue of our newsletter is - willy-nilly - again pretty comprehensive (but still far from completeness). Many thanks for your sympathy.

Dr Hanspeter Meier

EFTBA veterinary advisor & Newsletter editor

Introduction

All the extensive and detailed informations on the historical perspective, the special and complicated nature of the disease, its etiology, pathogenesis and the life cycles of the parasites in the last two newsletters are a clear hint that the **prevention of Equine Piroplasmosis** (EP) must be a **very demanding task**. The usual methods and means of prophylaxis for infectious diseases are management practices under the term of biosecurity, which hopefully reduce the chance that those will be carried onto a farm by animals or people and their spread on the farm. In many cases, such actions can be undertaken quite reasonably, but in the case of EP, mainly two issues make such endeavours difficult. First of all the nature of this infection as a vector disease and secondly the unavailability of a vaccine. Therefore, any possible other prophylactic measures have to be taken.

> **An ounce of prevention is worth a pound of care**
> (Benjamin Franklin)

Preventive means and methods

According to Rothschild and Knowles (2007), several experimental immunization strategies have been tested for EP. At present, however, there are **no effective, commercially available vaccines for *T. equi* or *B. caballi***.
Therefore, **control of EP largely relies on drug therapy**, **restrictions in the movement of infected horses, vector control and premunition strategies**. The possibilities of drug therapy were already dealt with in newsletter 13 and here, we occupy ourselves only with all the other subjects.

Restrictions in the movement of infected horses

As already mentioned in the last issue, in these days some countries are recognized as nonendemic (Australia, Canada, United States, England, Ireland, and Japan). It is therefore clear that control measures vary depending on the piroplasmosis status of the location. Restrictions in the movement of horses differ and currently, the countries that restrict the movement of serologically positive horses include the U.S., Canada, Australia, Japan, Mexico, and Brazil. In some other countries, the entrance of infected horses and ticks is closely monitored and in further locations control doesn't exist at all.
The situation with these regulations gets even more complicated in the view of nomenclature, as one sometimes speaks of "infected" and in other cases of "serologically positive" horses. The latter means that the animal did have contact with the causative agents. For the equid in question, this can be positive that it may have some immunity, but in other instances, e.g. in the case of a possible (silent) carrier, it might be a negative fact as further transmission can occur.
For the breeder, such situations are therefore often difficult to manage. Cases as these are hard to define and the question may arise whether a positive test signifies a real case or just a silent seroconversion to an event at an indeterminate previous time. Therefore, does the result of such an immunological response on a pre-export test justify export restrictions ? Beside this, in spite of the vulnerability of the equine industry to the introduction of EP in some European countries, no legal requirements exist to limit its incursion. Therefore, breeders are advised to seek the advise of veterinarians when considering importing equines (Thiemann and Phipps, 2009).
For import into the U.S., a horse testing positive for *B. caballi* is quarantined. The horse may be allowed entry after appropriate drug treatment and when subsequent serologic testing demonstrates lack of *B. caballi* antibodies. Horses that test positive for *T. equi* are denied entrance. If a domestic horse is found to be seropositive for *T. equi*, it must be quarantined, exported, or even euthanized. Implementation of compliance is through the respective state and federal authorities. If a domestic horse is seropositive for *B. caballi*, the horse may be allowed to remain in the country under quarantine and treated until the infection is cleared. Under all these circumstances, immediate notification of appropriate state or federal authorities is required, and compliance is usually monitored by these authorities (Rothschild and Knowles, 2007). Veterinary advise is very commendable here also.

Precautionary endeavours by the industry

The threat of EP may be a hindrance for the trade, a most important aspect of our industry. It therefore is most welcome that some sales companies support preventive measures with informations on EP in the conditions of sale in their catalogues, as for instance at the Sales of Arqana in Deauville:

Arqana Vente D'Elevage De Décembre 2014 / Article 6 ter – Piroplasmosis

1 - Unless the information that it is positive for piroplasmosis without qualification has been published and announced from the rostrum, any lot shall be returnable to the vendor in the case when the blood sample taken from this lot, on the purchaser's request, on the sales grounds or their annexes, no later than the day after the sale, by the veterinary surgeon appointed by ARQANA and tested by a registered laboratory using the ELISA + IFAT protocols, reveals the presence of *Theileria equi* and *Babesia caballi* according to the conditions and levels specified by OIE.

2 - Any blood sample shall be taken according to the following conditions:

. The purchaser must irrevocably instruct ARQANA to take a blood sample on the said lot, and to have it tested for the presence of Equine Piroplasmosis.

. The blood test instruction must be given in writing, on the day of the sale, by the purchaser to ARQANA, which will appoint a veterinary surgeon to take the sample, no later the day after the sale, on the sales grounds or their annexes. ARQANA shall only accept instructions that are given according to this procedure.

. The purchaser commits to paying all charges incurred by taking and testing the blood sample.

3 - The results of the analysis of the blood sample for the said lot will be communicated with the greatest confidentiality.

4 - The decision will then be notified to the vendor and purchaser, and ARQANA shall not be liable for any loss or expenses caused to any party as a result of this decision.

5 - In the case when the purchaser exports any lot outside the European Union, before ARQANA has been informed of the results of the analysis of the blood sample for the said lot, he will have to keep the lot and pay the purchase price in full, including in the event when the results reveal that the lot is positive to Equine Piroplasmosis.

6 - In all other cases, when the purchaser decides to return the lot to the vendor, such decision must be notified to ARQANA by registered post with recorded delivery, within seven days from the date of ARQANA informing the purchaser of the result of the blood test. The decision must be notified in writing to ARQANA's headquarters and will only be considered by ARQANA when it has expressly accepted it (Anon., 2014).

Notice 1: EP-positive horses are also returnable at Tattersalls and Goffs.

Notice 2: The test methodologies at auctions may or may not be stipulated by Sales Companies, but in non-endemic countries, it may be worthwile to attempt to validate or contradict the IFAT test, which can give false positives. If an IFAT positive is obtained under these circumstances, it can be helpful to carry out an ELISA and a PCR (see issue 13). If both are negative, the IFAT testing laboratory can be advised accordingly and be asked to repeat the IFAT test in the knowledge that the ELISA and PCR have proven negative. This approach has led to the revision of the IFAT-result in a number of cases, thus enabling export sales that would otherwise have been impossible (Leadon, 2015).

Vector control of EP

In regard to infectious diseases, the prevention of transmission is of greatest importance. In the case of EP, the control of vectors (e.g. ticks, other biting insects, shared needles and instruments, blood contamination) takes priority.

Control of Ticks

The control of the main actors – the ticks – would be our first goal, of course. But according to Traub-Dargatz and co-workers (2010), this task is difficult, first of all and very simply because of their size. These ectoparasites are small (Fig. 1), especially during early developmental stages, which makes them a challenge to find on or off a host; further on, because they can be attached to a host for varying time periods. Moreover, in the case of multi-host ticks, one or more larval, nymphal, or adult stages may each involve a different host, depending on feeding preferences and host availability. When multi-host ticks are not blood feeding, they are normally free living in the environment, further complicating detection and effective control.

Since ticks have seasonal patterns of abundance, it is important to select control strategies that are most effective against a specific developmental stage before pathogen transmission might occur.

In the case of tick species that seek different hosts, awareness of the common questing practices can help in the development of management practices that minimize host exposure to ticks. For one-host ticks, each life stage may remain on the same host after feeding, and early detection followed by preventive treatment is critical. Varying host preferences among one- and three-host tick vectors make it unlikely that any single control strategy will succeed. Rather, a range of control methods is needed to prevent equine tick exposure and to avoid pathogen transmission (Traub-Dargatz et al., 2010)

Ticks
"Ticks are the most dangerous animal in Germany" – is the opinion of Mackenstedt (2014), because they can transmit more than 50 different pathogens.

Examining horses for ticks

For the inspection of horses for ticks, the USDA guidance for a thorough and systematic examination is very helpful. The following procedure, known as "scratching" for ticks, is recommendable (Traub-Dargatz et al., 2010):

- Beginning at the horse's head, examine the both ears and palpate inside of each ear, examine the false nostrils visually and palpate with the forefinger (Fig. 2).

- Move to the forelock and, with thumb opposed to fingers, examine the forelock, continuing down the mane to the withers.

- Examine the sub- and intermandibular space using flattened hand and fingers, feeling for any unevenness of the skin (Fig. 3).

- Examine the axilla of one side, visually and through palpation.

- Examine the posterior fetlock to the coronet of the front foot, visually and through palpation.

- Visually examine the udder/scrotum area on one side.

- Examine the tail and perineum, visually and through palpation (Fig. 4).

- Examine the posterior fetlock to the coronet of the back foot, visually and through palpation

- Examine the udder/scrotum of the other side.

- Examine the posterior fetlock to the coronet of the other back foot, visually and through palpation.

- Examine the posterior fetlock to the coronet of the other front foot, visually and through palpation.

- Examine the axilla of the other side, visually and through palpation.

- Give special attention to warm/dark thin-skinned areas such as between the hind legs (udder or sheath areas, too)

- Perform hand hygiene after examining each animal (Traub-Dargatz et al., 2010, Brassard and James, 2014).

Nowhere is it more true that "prevention is better than cure" than in the case of Parasitic Disesases
(Rudolf Leuckart)

Fig. 2 A massive infestation of ticks *(Anocenter nitens)* in the ear of a Brazilian horse (photo: courtesy of Prof. K.T.Friedhoff)

Removing attached ticks (tick-extraction tools and **repellents)**

Traub-Dargatz and coworkers (2010) warn that many **traditional methods used for the removal of attached ticks** from a host are based on **folklore** and **might cause additional harm** to the animal. Some of the common folk methods include applying petroleum jelly, fingernail polish, 70% isopropyl alcohol, or a hot kitchen match to the attached tick. While these methods are thought to induce a tick to "back out" of an attachment site, **they actually stimulate a tick to secrete more saliva**, cause

Fig. 3 Ticks in the sub- and intermandibular space of a Brazilian horse (photo: Heim A., 2008)

Fig. 4 Ticks *(Anocenter nitens)* in the perineum of a Brazilian mare (photo: courtesy of Prof.K.T.Friedhoff)

regurgitation, or introduce other tick-body secretions or excretions into the wound. These procedures therefore increase also the risk of secondary infection around the bite location.

The best method is to implement the following procedures in sequence:

1. Using blunt curved forceps, grasp the tick as close to the skin surface as possible and pull up-ward with a steady even pressure.

2. Avoid squeezing, crushing, or puncturing the tick's body.

3. Do not handle the tick with bare hands.

4. Cleanse the bite site with soap and water.

As a possible and good alternative to forceps, commercial **tick-extraction tools** (e.g. Ticked-Off, Tick Nipper, and Pro-Tick Remedy) are an improvement (Fig. 5). These tools work well for removing nymphs and adults by taking advantage of the tick's mouthpart morphology (Fig. 6) and body size to minimize mistakes that can be made when using forceps (Traub-Dargatz et al., 2010).

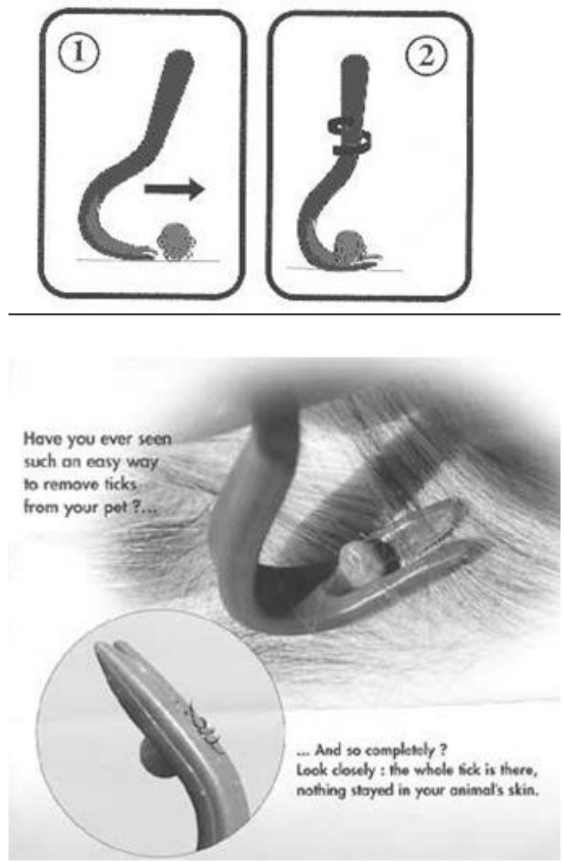

Fig. 5 One example of a useful tick-extraction tool.

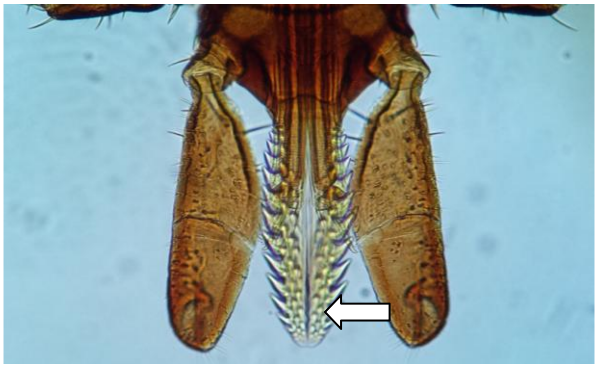

Fig. 6 The **hypostome** (arrow) is a calcified harpoon-like structure near the mouth area of certain parasitic arthropods including ticks, that allows them to anchor themselves firmly in place on a host mammal while sucking blood. This mechanism is normally very strong and removal of the tick must be done carefully (photo: courtesy of U.Loeliger).

Another method for removing ticks is spraying the ticks with **repellents** as for instance pyrethrins or pyrethroids containing aerosol repellent, then spraying again within 1 minute. Ticks will fall off after treatment (Traub-Dargatz et al., 2010).

Treatment without prevention is simply unsustainable (Bill Gates)

Preventing tick infestations

Preventing equine tick exposure is complicated by the specific biological requirements of a tick species and whether a tick's life cycle is dependent on one or multiple hosts. If a tick species utilizes multiple hosts, then host availability, access to suitable questing sites, and seasonal changes in tick abundance play a role in the likelihood of an equid becoming infested with ticks.

Different studies in Brazil identified some risk factors, but due to the great variety of the different ticks and their biology (e.g. different hosts, environmental habitats), the results didn't allow to formulate universally valid recommendations. Similarly, applying a topical acaricide did not control some infestations *(A. nitens)*. Sorry-to-say, such investigations are too comprehensive to be discussed in detail here satisfactorily.

But once more and at least, this complexity illustrates our difficulties very well and for further informations on this, please refer to the "USDA Literature Review of Equine Piroplasmosis" (Traub-Dargatz et al., 2010) and/or "Equine Piroplasmosis: Focus on Prevention" (House 2010).

Fig. 7 Swiss Long Rider Aimé Tschiffely faced many challenges during his epic journey with his two Criollos (*Mancha* and *Gato*) from Buenos Aires to New York in 1925. While riding through Central America the ticks attacked his horses so savagely, Tschiffely devised blankets to help ward off the insects (Leaf 2004, Tschiffely).

The nonchemical control of ticks in their habitat

Ticks live in our environment and are abundant mainly in **pastures** with a mixed over-growth of tall grasses, dense vegetation as shrubs and with infected other (wild) animals. Therefore, **pasture management** is a helpful means, first of all the choice of fields and paddocks and their maintenance. This type of landscape management is known as "tickscape practice", a modification to create an environment unattractive to primary tick hosts. Such modifications serve to reduce the abundance of questing ticks and lessen host exposure (s. Stafford K.C. (2007): Tick Management Handbook, p. 46).

Tickscape management plans should include habitat edges, where a greater diversity of vegetation types is likely to occur, so called ecotones (transition areas where two communities meet and integrate, e.g. the zone between a field and forest) (Traub-Dargatz ezl al., 2010).

However, landscape practices to create a lower risk tick zone will not directly eliminate many ticks and one may need to consider integrating other tick control practices in the overall program (Stafford, 2007).

Examples of host-limiting habitat modifications include fencing, repellents for wild animals, and substituting less palatable plants in a landscape. Admittedly, this approach works well in suburban residential landscapes, but it might be impractical in rural areas (Traub-Dargatz et al., 2010)

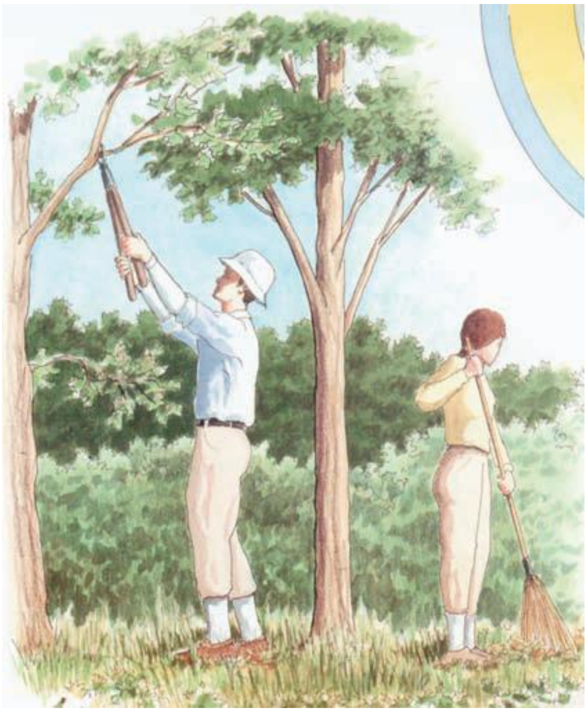

Fig. 8 Tickscape practice: landscape management or modification to create an environment unattractive to primary tick hosts (s. Stafford, 2007: Tick Management Handbook).

Management of paddocks, fields and pastures

According to a study in Brazil, mowing pastures once a year (only !) was an effective means of avoiding high infestations of *A. cayennense* (Traub-Dargatz et al., 2010). This result corresponds with the fact that ticks prefer to live on tall grasses, and moreover also with our traditional habit of managing grass for horses, cutting or topping it, respectively (O'Beirne-Ranelagh, 2005).
Another management method is grazing on shared pastures with cattle, who - due to the way of eating - cannot graze very short, (O'Beirne-Ranelagh, 2005). It is to assume that this natural method works better than spraying acaricides on horses, even outweighing the fact, that in one study the infestation on horses with *B. microplus* was correlated with the presence of cattle on a shared pasture (Traub-Dargatz et al. 2010).
The advantage of grazing fields with ruminants didn't escape the attention of Beckhoff (2011) also, who investigated this sort of extensive cultivation of pastures and the risk of Borreliosis (which is also transmitted by ticks) in humans. This study showed that both the total number of ticks and the part of *Borrelia*-infected ticks was distinctly smaller than in the neighbouring fallow. In this investigation of many years, the risk of infection of humans with *Borrelia burgdorferi* on fields with grazing ruminants was 60-times lower than on fallows. Cattle and goats are blind alleys for this parasites and therefore act protectively (Beckhoff, 2011).

Control of other vectors

***T. equi* can also be transmitted iatrogenically** by contaminated needles or surgical instruments, administration of contaminated blood transfusions, or failure to properly clean and sterilize equipment that contacts equine blood (e.g. stomach tubes, dental instruments, tattoo equipment). Reports on such unpleasant events are known from Switzerland, Florida, Missouri, Kansas and Australia (Hermann et al., 1987; Traub-Dargatz et al., 2010; Rothschild and Knowles, 2007).
Contrary to all the prophylactic means as above, this mode of transmission can be prevented easily. All dental, surgical, and tattoo equipment must be thoroughly disinfected between horses. A new sterile needle and syringe should be used for each injection, whether into a muscle or a vein. Additionally, a previously used needle should never be inserted into a drug or vaccine multidose vial - A clean one has to be used each time (House, 2010).

Premunition strategies

(Premunition: a protective immune response to a particular pathogen due to chronic infection by the pathogen)

In endemic areas, premunition strategies may be an important method to control outbreaks of disease caused by EP. Premunition is a state of prior infection and obtainment of carrier status for maintenance of protective immunity. Attempts to chemosterilize horses should be avoided in endemic areas, and only moderately to severely sick horses should be treated with babesicidal drugs. Under highly intensive management systems, it may be feasible to control EP by eliminating tick infestation on horses with regular application of acaricides. In these endemic areas, strategic tick control should agree with seasonality of tick infestation, when animals are not being moved. Exposure of foals to ticks and natural infection may result in immunity without overt signs of disease. Development of acaricide resistance is a serious problem in many heavily tick-infested areas and is a consideration for limited use (Rothschild and Knowles, 2007).

Summary and recommendations

The main vectors for the transmission of EP are ticks and humans. Beside this, the importation of equines is not as well regulated in Europe as would be desirable. Introduction of infected ticks by domestic, wild, and zoo or other exotic animals is also a threat. Furthermore, the increasing global temperatures may favor the establishment of tick-populations in new regions.

Prevention therefore is a challenge and one of the best prophylactic means for infectious diseases, a vaccination, is not commercially available. Prophylactic measures refer mainly to the control of the trade, the examination of assumedly infested horses, the careful removal of ticks, the well planned management of paddocks, fields and pastures and, finally, preventing iatrogenic transmission.

While the need for biosecurity might seem urgent and front-of-mind during and immediately after an outbreak, the conscientious approach asks for its application every day (Anderson, 2013; Rothschild and Knowles, 2007; Thiemann and Phipps, 2009; Traub-Dargatz et al., 2010).

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