Cattle Tick Essay, Research Paper

CATTLE TICK

Nature of the disease

The cattle tick Boophilus microplus is a significant ectoparasite of cattle and a vector for important diseases such as babesiosis

and anaplasmosis.

Classification

SPC List D disease

Susceptible species

B. microplus is primarily a parasite of cattle. However, heavy infestations can also occur on horses, sheep, deer and water

buffalo. Rarely, ticks have been reported on marsupials, goats, dogs, cats and pigs.

Where it occurs

The cattle tick is widely distributed in Central and South America, parts of the southern USA, Africa, Asia, and northern

Australia. The distribution of the cattle tick is largely determined by climatic factors. B. microplus requires high humidity and

ambient temperatures of at least 15-20o C for egg laying and hatching.

Clinical signs

Cattle tick infestation causes:

? damage to hides

? loss of production

? anaemia and death

? weakness leading to greater mortalities during droughts

Post-mortem findings

Animals may be in poor condition, anaemic. Infestations will be obvious by the presence of engorged ticks attached to the

animal’s skin.

Differential diagnosis

Several species of ticks may be found on cattle and it is important to differentiate these from B. microplus. Other ticks include:

? Haemophysalis sp..

? Ixodes holocyclus

Specimens required for diagnosis

Ticks should be collected and forwarded to an entomologist for confirmation of the diagnosis. B. microplus has pale legs, short

mouth parts with transversely ridged palps, small eyes and lacks an anal groove.

Transmission

The life cycle involves free-living stages. After feeding on cattle, engorged female ticks drop to the ground and lay eggs (up to

5000). After hatching, the larvae survive on pasture for several months. The larvae then become quite active and climb up grass

and transfer to animals as they brush past. The larvae attach and feed from the host. They moult to the nymphal stage and then

undergo a further moult to the adult stage.

Risk of introduction

Cattle ticks are most likely to be introduced with the importation of infested cattle. Cattle tick was introduced to New

Caledonia with cattle imported from Australia in this way.

Transport of ticks on dogs is considered a potential risk for introducing the tick to new areas, although egg production is much

reduced in this species and the risk is considered low.

Control / vaccines

There are four methods available for controlling ticks:

1. treatment with acaricides

2. pasture spelling

3. the use of resistant cattle

4. vaccination

Tick control by acaracide dipping has been widely used in endemic areas. Acaracides used for this purpose include various

synthetic pyrethroids, amitraz, and some organophosphates. Dipping may have to be done as frequently as every 4-6 weeks in

heavily infested areas. Many producers in tick endemic area have changed to Bos indicus type cattle because of their greater

resistance to tick infection.

An anti-tick vaccine is also commercially available in Australia. The vaccine antigen, based on a tick gut protein and produced

by recombinant technology, stimulates production of specific antibodies in cattle which damage the gut of engorging ticks,

resulting in a fertility reduction of up to 70% in adult ticks, reducing tick population build-up. This vaccine is of limited use, but can be used as part of an integrated program for the control of ticks.

Each year 150 million dollars is lost to Australia’s beef and dairy industries because of cattle tick infecting

our cattle. Cattle ticks are ecto-parasites which live in the coat of the cattle and suck their blood. By doing

this, many diseases like tick fever can be transferred causing poor health, and the effects can be fatal.

Tick fever is a malaria-like disease and is described by Peter Willadsen as having produced “one of the

biggest disasters in our agricultural history.”

It is not unusual for 1000 female ticks to be found on one cow

at a time. Together they can suck more than ? a litre of blood

in one day. The female ticks then drop to the ground to

reproduce producing another cycle of ticks to infest cattle.

Control for diseases caused by these ticks has to be

continually kept under control. Right now, farmers immerse

their cattle in toxic chemicals to get rid of the ticks. However,

this raises the issue of having these toxic chemicals remain in

the beef, and having toxic waste in the environment. More

alarming, cattle ticks have an amazing history of becoming

resistant to the chemicals used to kill them. It is only a matter of time before the ticks become resistant to

the chemicals being used today.

Due to this, a new vaccine called TickGARD (which is

based on the BM86 protein from the ticks’ gut) is being

introduced. When the tick tries to feed off the cow by

’sucking its blood’ the inside of the tick becomes confused

when the blood from the cow is recognised as blood from

a tick due to the use of TickGARD for the cow. The walls

retract and the blood is released into the rest of the tick

including the arms and the legs. This method cuts down

their survival rate and most importantly makes it less likely

for the tick to reproduce. It does not eradicate the ticks but

they do become severely impaired and have a much

shortened and more difficult life span due to this. Peter Willadsen has said ‘We estimate an overall

reduction of up to 70% in tick fertility using TickGARD. In an integrated control program it should cut the

need for chemical treatments by between two and three applications per season.’ Genetic engineering is

required for the vaccine because to produce Tickgard around 20,000 ticks are needed. This is a difficult

demand to keep up with and so instead of breeding the cattle ticks the traditional way the ticks are

genetically engineered as this is a faster easier method.

A specific antigen is needed to be found and isolated from samples which

are taken from the gut of a tick. The antigen needed was a protein which

triggers the immunity sytem. To isolate the particular protein it had to be

identified from about ten thousand proteins found in the gut. Once the

particular gene is isolated from the tick it is put into the bacterium which

then produces a synthetic antigen. Lastly, this synthetic antigen is inserted

into a stable vaccine.