Parasites Of The New-Born Calf.

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As far as parasutes are concerned the new-born calf is in a very lucky position. There are almost no parasites which are transmitted intrauterinely and only a few which the calf may contract through the colostrum. Intrauterine infections may occur occasionally in fasciolosis and there are some doubtful cases of prenatally acquired babesiosis, but on the whole,calves are born free of parasites. However,there is a considerable risk for the calves during their intrauterine lives from parasitic diseases of the mothers and from parasites acquired during the first months of their lives.

Coccidiosis:

Coccidial infections are widespread in calves in Germany. Approximately 10 per cent of the calves pass oocysts with their faeces. There are 10 Eimeria species occuring in central Europe two of which, E. zuerni and E. bovis, may cause severe clinical symptoms in calves or older animals (HIEPE et al., 1978, HENKER et al., 1979). Calves start excreting oocysts at the age of about 3 weeks and normally do not develop clinical signs of diseases as long as they are suckling or kept in single boxes. The most dangerous period are the first 3 weeks after the transfer of the animals from single boxes to feedlots which is at about the age of 10 weeks. The infection rate may reach a 100 per cent in these feedlots and up to 50 per cent of the animals may develop clinical coccidiosis with a mortality rate of 30 per cent (HIEPE et al.,1978). Clinical symptoms persist for 3 to 5 days, the most prominent signs being haemorrhagic diarrhoea,anorexia and listlessness. The surviving animals soon develop immunity which drastically reduces but does not completely prevent the output of oocysts.

In some countries prophylaxis is applied by adding cocci-
diostats to the feed for about 3weeks after the transfer of
the animals to the feedlots. Amprolium (5-23 mg/kg), Monensin
(1 mg/kg)and Salinomycin (2 mg/kg) may be used as coccidios-
tats (NORCROSS et al., 1974; Mc DOUGALD, 1978; BENZ and ERNST,
1979).Therapy can be attempted with sulfonamides: Sulfadiazine
200 mg/kg at day one and 100 mg/kg each at day 2&4 (SUPPERER ,
1973).

Toxoplasmosis:

Some years ago Toxoplasma gondii was thought to cause
abortions in cows and losses among calves. In the light of our
own results this seems to be very unlikely. We have examined
several hundred calves and beef cattle for the presence of
Toxoplasma cysts and we never succeeded in isolating a single
strain from this animal species whereas sheep and pigs in
Germany showed to be highly infected (BOCH et al., 1965;
JANITSCHKE et al., 1967). We then inoculated calves experimen-
tally to see what would happen to the calves and to the paras-
ites. The calves developed transient fever and high antibody
titres, but no serious clinical signs could be observed.
Regardless of what strain we used for experimental infection
the parasites multiplied rapidly and were detectable in almost
all organs after two weeks. Six weeks post infection the ani-
mals had cleaned themselves completely from the parasites and
usually toxoplasmas could no longer be detected in the previo-
usly positive organs (ROMMEL et al., 1966). These findings
have been confirmed recently by workers in England (BEVERLEY
et al., 1977).

In order to investigate the possibility of the excretion
of Toxoplasma gondii with the milk during the short febrile
period we infected 3 lactating cows and examined their milk
for the presence of Toxoplasma for several weeks by inocula-
ting samples into mice. No toxoplasmas could be detected in
the milk (ROMMEL and BREUNING, 1967). Also STALHEIM et al,
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(1980) were not able to isolate Toxoplasma gondii from colostrum or milk of experimentally infected cows. The oral a application of oocysts to pregnant cows was followed by only slight febrile reaction and abortions were not observed (MUNDAY, 1978; STALEIM et al., 1980).

Sarcocystosis:

A more serious problem seems to be acute sarcocystosis caused by Sarcocystis bovicanis. This parasite causes a severe disease with high mortality in calves and cattle when a certain number of sporocysts is taken up orally (ROMMEL, 1979). The infectious stages, the sporocysts, are excreted in an already fully sporulated state in dog's faeces following the ingestion of Sarcocystis infected beef. They are spread either directly with dog's faeces or through sewage water and floods on pastures where they are ingested by grazing animals. Presumably in the jujenum the sporozoites leave the sporocysts, penetrate into blood vessels and spread to various internal organs. In endothelial cells of capilleries they grow to schizonts. When the schizonts are mature and their merozoites are relaeased into the blood stream at about 3 weeks post infection the calves develop fever, anorexia, listlessness and pronounced anaemia in the course of which many of them die. The post mortem picture is characterized by numerous petechial or ecchymotic haemorrhages in all organs. Pregnant animals invariably abort during this period (FAYER et al., 1976). There is no transplacental transmission of the parasite to the foetus, the aborted calves always being free of Sarcocystis. In surviving animals the well known muscle cysts are formed which do not cause any clinical signs when they are mature. The cystozoites within these cysts reach infectivity for dogs at about 90 days post infection. In cyst-infected animals the parasite is obviously not transmitted

transplacentally to the progeny (ALCOCER, 1973). The possibility of galactogenic transmission of Sarcocystis has not yet been investigated. Almost all of the calves acquire the infection as soon as they go out on pastures. Why experimental infections are always followed by severe disease whereas the acute disease is only occasionally seen under natural conditions is not yet known. The youngest calf reported of having died from acute sarcocystosis under natural conditions was only two weeks old. In this case it was not possible to find out how the animal had acquired a fatal dose of sporocysts from dog's faeces (SCHMITZ and WOLF, 1977).

Babesiosis:

In tropical and subtropical countries babesiosis is a serious threat for calves. The two Babesia species occurring in cattle in Germany are of only limited importance (FRIEDHOFF, and LIEBISCH, 1978). B. divergens which is transmitted by Ixodes ricinus is restricted to certain areas where it is controlled by the treatment of diseased animals. The second species, B.major, is transmitted by Haemaphysalis punctata . It occurs only sporadically on some of the East- and North Friesian islands (LIEBISCH et al.,1976 a). In North Africa and in the Middle East babesiosis is much more widespread. The two species occurring there in cattle, B.bigemina and B.bovis, are known to be transmitted by Boophilus species. Calves in highly enzootic areas are protected by transcolostrally acquired maternal antibodies (HALL et al., 1968). When these calves are infected with Babesia by tick bites they develop premunition which may last for a life time provided the animals are regularly reinfected, and losses due to babesiosis are negligible. However, there is considerable danger for calves living in the margin zones of highly enzootic areas and for animals which are brought into enzootic areas from Babesia free zones.

These animals have to be vaccinated with the local Babesia strains to enable them to survive. Even after vaccination their performance is usually not as good as it would be in a Babesia free country.

Theileriosis:

There is only one single report by LIEBISCH et al. (1976 b) of the occurrence of a theilerial species in cattle in Germany. The species isolated by these authors was nonpathogenic and it was presumably Theileria sergenti since its vector was Haemaphysalis punctata . In subtropical countries theileriosis is an extremely important disease. It is estimated that in North Africa and in the Middle East the mortality of calves is as high as 40 per cent and that about half of these losses are due to Theileria annulata infection (LIEBISCH 1975). There is no protection transferred through the colostrum from immune mothers to their calves. Calves of immune mothers are, however, more resistant against the infection than calves of susceptible animals. The mechanisms by which this protection is acquired is not yet knwon (PIPANO, 1974). In exotic stock the disease follows a more severe course than in local breeds. According to the investigations of RAHMAN and LIEBISCH (1980) in Egypt the main vector of Theileria annulata seems to be Hyalomma anatolicum anatolicum. This is in contrast to other countries of the Middle East where the tick Hyalomma detritum is the main vector. Hyalomma anatolicum anatolicum lives in stables and may thus attack calves before they are brought out on pasture. Premises on government farms are usually free from ticks due to their solid construction and due to regular insecticide spraying. Calves from these farms are at risk when they transferred to tick infested small holdings in the country. They will invariably contract theileriosis and since they have no protection whatsoever

many of them will die unless they are vaccinated with a tissue culture vaccine prepared from local _Theileria_ strains before they are distributed in the country (PIPANO _et al._,1977). Unfortunately, vaccines are available in only very few countries: in Algeria, in Iran and in Israel and there is a FAO-Project for the establishment of a vaccine production in Turkey. Protection given by these vaccines is never a 100 per cent and outbreaks may occur when the vaccinated animals are attacked by large numbers of ticks.

Ascaridosis:

Toxocara vitulorum is widespread in calves of cattle and buffaloes in Egypt and it occurs also in some foci in Germany, especially in Bavaria and near the cost of the North Sea in Lower Saxony. Research in recent years has brought foreward that this parasite is exclusively transmitted through the milk and not, as it was previously thought, through the placenta (TONGSON, &971; MIA _et al._; 1975; GAUTAM _et al._,1976 a). After the oral uptake of embryonated eggs, the larvae migrate in the adult cow via the bloodstream to the liver and from there on to the lungs. From here they are disseminated in the body of the host with the arterial blood stream. It is not yey known in which organs they concentrate and for how long they may remain there. In experimentally infected mice, larvae could be recovered in greater numbers from the musculature (WARREN, 1971) and it is likely that this is also the place where they are arrested in cattle. In experimentally infected, pregnant cows larvae are excreted with the colostrum and the milk for about 3 weeks (WARREN, 1971). It is not yet knwon whether there is also excretion of larvae with the milk of animals which had acquired the infection already before pregnancy like it is known to occur in _Toxocara_ infections of bitches (STOYE, 1976). The larvae which are acquired by the calves with the

milk do not migrate again but develop directly to sexual maturity in the small intestine and start with egg laying when the calves are about 20 days old. Their presence causes reduced weight gain and occasionally even death. Buffalo calves are more severely affected than cattle. Infected calves release a strong smell of butyric acid. This smell is also present in the meat as a result of which affected calves have to be condemned during meat inspection. At the age of about 3 months all ascarids are expelled spontaneously.

The worms can easily be removed by piperazin salts (200 - 300 mg/kg), and some of the modern broad-spectrum anthelmintics are also expected to be highly effective: Fenbendazole 10 mg/kg (GAUTAM et al., 1976 b) and Levamisole 5 mg/kg (THIENPONT et al., 1977). By the treatment of all calves at the age of 2 - 3 weeks during a period of one year followed by the disinfection of the stable the ascarids can be exterminated on a farm.

Strongyloidosis:

Strongyloides papillosus is another helminth of new born calves which is, however, of only secondary importance. The larvae of this worm penetrate through the skin into the cow, migrate via the blood stream to the lungs, and are disseminated with the arterial blood in the cow. Larvae reaching the musculature are arrested and remain dormant until the following pregnancy. At the end of the pregnancy they regain activity, most probably due to hormonal stimuli, and migrate towards the mammary glands where they are excreted with the milk. Larvae occur in the colostrum and in the milk for about 30 days. (PFEIFFER and SUPPERER, 1969; LYONS et al., 1970). Not all the larvae present in a cow are excreted with the milk during the first lactation period. A considerable number remains in the

musculature only to regain activity during the next or one of the following lactation periods. In the calves the lactogenously acquired worms reach maturity after 6 - 7 days without performing another somatic migration, and thus do not cause any damage to the lungs. Calves may also acquire the infection through percutaneously penetrating 3rd stage larvae. These larvae have to perform a migration through the lungs and the trachea and reach maturity in the small intestine after 9 days. Adult worms are present predominantly in calves of less than 6 months of age. In 2- year- old animals adult Strongyloides never occur in conspicuous numbers.

This parasite is only occasionally diagnosed in calves in Germany. However, it is estimated that in Central Europe about 35 per cent of the calves are infected (SUPPERER, 1973). The worms in the small intestine may cause reduced weight gain, and percutaneously acquired larvae are considered to be responsible for severe lung lesions with coughing in calves . In adult animals migrating larvae do not cause any symptoms.

Thiabendazole (100 mg/kg) is considered to be the most reliable drug against Stongyloides, Pyranteltartrate (20 mg/kg) and the more modern benzimidazoles like Fenbendazole (7 ,5 mg/kg) being also effective. To eradicate the worms treatment has to be started at the age of six days and has to be repeated every sixth day for at least 6 weeks.

In conclusion it can be said that parasites of new born calves are of relatively little economic importance in Germany apart from perhaps sarcocystosis the role of which has to be elucidated. In tropical and subtropical countries babesiosis and theilerioses are the most serious threats for calves , especially, for those of exotic breeds. In some areas Toxocara vitulorum still representes a problem too.

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