Effective biosecurity: Cryptosporidiosis control in ruminants

Cryptosporidiosis is an intestinal parasitosis caused by Cryptosporidium, protozoa belonging to subclass Coccidia, phylum Apicomplexa. In ruminants, cryptosporidiosis is presented, with neonatal diarrhoea, with the most important aetiologic agent Cryptosporidium parvum.

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C. parvum is not host specific and can develop, with or without clinical manifestations, in many hosts, including humans.

Oocysts, the resistant forms of the parasite in the external environment, contain spores and are directly infectious. They can survive for several months in the external environment.

Source and transmission of infection

Oocysts are responsible for the transmission of infection via the faecal-oral route, via licking the contaminated surface or ingesting water or different contaminated feed.

As non-specific parasites, cross-parasitic invasions can occur between cattle, goats and sheep when sharing premises or pastures, and between animals and humans on the farm.

Cryptosporidiosis in ruminants

Ruminants are most susceptible in the neonatal period. Along with E. coli, rotaviruses and coronaviruses, C. parvum, alone or in combination, is one of the most common pathogens of neonatal diarrhoea. Cryptosporidiosis is most common at peak times or at the end of the calving period, when the concentration of animals is the highest.

The disease occurs with diarrhoea in neonates, most commonly aged between five and 15 days. If C. parvum is the only aetiological agent, there is a high morbidity but no mortality in calves, contrary to what is observed in small ruminants, where the fatal outcome is frequent due to a lack of early treatment. After the first infection is overcome, the animals are immunised but continue to secrete a few numbers of oocysts. There are no symptoms in older animals, but they are a reservoir of parasites.

Disease control

Colostrum administration and quality nutrition, as well as the prevention of viral and bacterial pathogens, can reduce the severity of C. parvum-related diarrhoea.

Implementation of biosecurity principles is an essential element in cryptosporidiosis control.

● Limitation of contaminant entry into the site

The introduction of animals poses a major risk to livestock, which implies checking the health status of the buyer's animals and the animal purchased.

Quarantine in a remote area, specifically designed for this purpose, is always a necessary precautionary measure.

Professionals and visitors should be met in an area equipped with a footdip or boot washing facilities. With vehicles, trucks for animal carcase disposal are the greatest risk of contamination. Therefore, a secure place should be provided for carcases to be stored away from the farm premises. Other vehicles (those of livestock dealers, inseminators, etc) should not move on the farm and have access to the animals.

Oocysts.

● Installation of sanitary barriers and biosecurity on site

It should be emphasised that attention should be paid to cleansing the area just in front of the entrances, cleansing and disinfection of water supply installations, disinfection of entrances and drainage around the barns, as well as their drying during the depopulation period.

Immediately after disinfection, any recontamination should be avoided by:

- Providing footdips at entrances.
- Providing a functional washbasin and a footdip (or an outdoor tap) for visitors, and clean boots and dedicated clothing in each of the barns.
- Cleansing and disinfecting the tractors and trailers used for manure removal.

● Limitation of contaminant spread inside the livestock farm

Animals at risk should be protected and isolated. Neonates are a priority and being born in a calving box limits the infection. They should remain isolated from the older calves: placing them in an individual box until the age of two weeks is the best

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Table 1. Resistance to external environment of infectious agents responsible for neonatal diarrhoea in cattle.

Viruses	Rotaviruses, BVD, Coronaviruses (in presence of organic matter)	Several months Several weeks
Bacteria	Colibacilli Clostridia Salmonella	Several months, Several years (spores) Several months
Parasites	Cryptosporidium Coccidia Ascaris Strongyloides	1-2 years Several years Several years Live in the external environment

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solution, and then they should be collected in small groups of the same age in individual boxes. If it is not possible to provide individual accommodation, the isolation of calves of up to three days of age in a well-isolated nursery with its own equipment (footdip, special clothing) is a good measure. Strict rules of hygiene and management of the rearing process should be administered:
• Cleansing of the barns (collecting the litter and cleaning).
• Disinfection of the barns with a disinfectant with oocysticidal, bactericidal, fungicidal, yeasticidal and virucidal activity.
• Regular disinfection of the used equipment (boots, clothes, small equipment) by means of spraying or soaking.
• If the animals are reared by the same person, then the diseased should be looked after last to avoid spread.

Depopulation period

The stage of disinfection should be followed by a depopulation period during which any presence of animals in the disinfected barn should be excluded. This period allows for the disinfectant to continue its action and especially for the soil and the floor to dry.
• The disinfected barn is not sterile.
• Whilst there is moisture, the number of viable colonies increases, and the parasitic elements become infectious. Drying contributes to reducing the number of viable colonies.

In cattle breeding, these attempts to disinfect are made when the animals are brought out to pasture, so that the depopulation period is as long as possible.

Choice of disinfectant

● **Disinfection of dirt floors:**
Dirt floors are difficult to disinfect because most disinfectants are highly deactivated by organic matter. The tip is to use caustic soda or quicklime after cleansing (sweeping). Lime facilitates the drying of the floor and thus removing of the litter at the end of the flock. However, this practice should be prohibited in any barn intended for rearing ruminants.

In fact, these highly alkaline products will alkalise the soil and thus facilitate the maintenance and increase of colibacilli in the environment. Therefore, it is preferable to use a disinfectant whose activity is slightly altered by organic matter and whose efficacy against oocysts of coccidia and cryptosporidium has been demonstrated.

● **Destruction of parasitic elements:**
Most classic disinfectants, at their usual concentrations, are ineffective. The synthesised phenols are a new generation of phenolic derivatives.

These products are more efficient and have a much more favourable toxicological and ecotoxicological profile than the old molecules. In this chemical class, phenols have unique and very specific properties: they are slightly affected by the presence of organic matter and have a persistent activity over time.

Huvepharma SA Laboratory conducted comparative tests on the efficacy of various phenols against oocysts of coccidia and cryptosporidium. At the end of 2018, solid results were obtained with a brand new formulation, Prophyl S.

● **Prophyl S – Mode of action:**
The mobility of disinfectants in dry soils is low to moderate. Conversely, wet soils represent an important process of phenol transfer. Prophyl S diluted in water at a concentration of 2% should be sprayed on soils – 0.3-0.5 litre of disinfection solution per m^2. This considerable coverage is due to the fact that the soil must be well moistened to allow the product to penetrate deeply. On the other hand, the humidity should not be too high for the barns to be dry when the animals arrive.

It is important to never conduct double treatment – with lime or soda and then with Prophyl S, the main effect of which would be to reduce the efficiency of disinfection due to the mutual neutralisation of the products. In addition to soil, disinfection should also be carried out on walls up to the animal height as well as equipment (clothing, boots, gloves, various utensils).

Prophyl S is broad spectrum and proven to be effective, according to the new European standards, in a 2% solution for footdips and wheeldips for one-minute contact time and vehicle disinfection for five-minute contact time.

Disinfection with Prophyl S at 2% allows for sixfold soil disinfection – bactericidal, fungicidal, yeasticidal, virucidal, mycobactericidal and oocysticidal. ■

References are available from the author on request

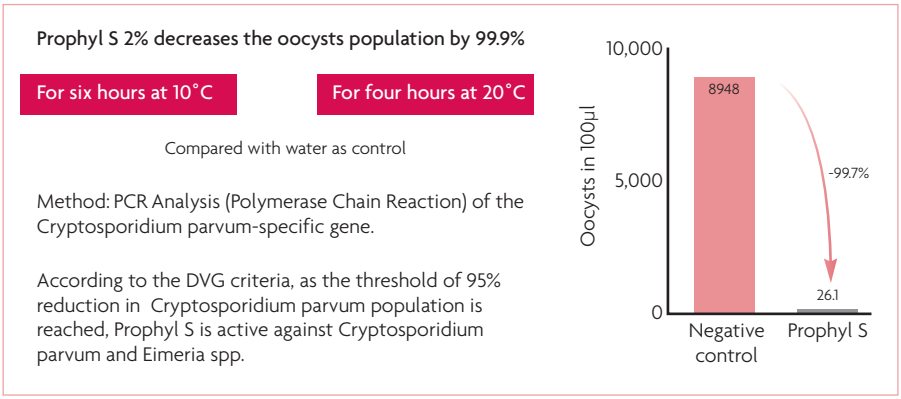

Fig. 1. Efficacy of Prophyl S against oocysts of Cryptosporidium parvum and Eimeria spp.