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## *Calf Note #229 – Recent research on cryptosporidiosis, part 3*

### Introduction

Keeping calves healthy is a critical job for all calf raisers. We plan their housing, nutrition, movements, and other activities around the concept of maintaining the vitality of the calf's immune system and reducing the potential vectors for infection with pathogens such as *E. coli*, rotavirus, and (of course) cryptosporidium. All calf raisers know that crypto is one of the most important causes of disease in young calves.

We generally base our prevention strategies around how these organisms are transmitted – whether they're airborne, transmitted via water, feed, birds, or contaminated feces – we try to break the cycle of infection through some essential practices – sanitation, separation of infected animals, and treatment of feed and water to reduce the risk of infection.

So, when research is published that reports on management factors associated with infection with an important organism, I generally try to put the findings in perspective of the biology of the pathogen (and calf) and how the organism moves from one animal to another.

A couple of studies have recently been published that look at the risk of transmission of cryptosporidium (especially *Cryptosporidium parvum*) in young calves. So, I was very interested to see what these researchers found and whether their findings were consistent with our understanding of the pathology of this parasite. Let's take a look.

The first study was a report from Conceição et al. (2021) from Brazil. These researchers monitored shedding of *C. parvum* oocysts in calves up to 10 months of age in Pernambuco, Northeastern Brazil, by collecting 385 fecal samples and determining the presence of oocysts. They found that 25.7% (99/385) scored positive for the presence of *Cryptosporidium* spp. Factors that increased the risk of infection (odds ratio, OR) were contact with other goats and sheep, OR = 3.33), use of a semi-intensive rearing system (OR = 1.70) and fecal contamination of food and water (OR = 1.64). To put this into context, calves that had contact with goats or sheep were 3.3 TIMES more likely to be infected compared to calves that didn't have similar contact.

These data are very consistent with our understanding of the biology of transmission of crypto. That is, infected animals shed huge numbers of oocysts in their feces. These oocysts can live in the environment for up to six months and become the vector for transmission. When contaminated feces (potentially from sheep and goats) contaminates water or feed, then calves easily become infected. The intensity (i.e., more animals in a limited space) of animals simply increases the concentration of oocysts in the environment and increases the number of animals potentially exposed.

The second study by Brainard et al. (2020) provided an exhaustive review of many management factors that might be involved in risk of infection with *C. parvum* in young calves. These researchers reviewed as many scientific publications as possible to outline which factors are most important in *C. parvum* transmission. Then, they ranked these studies relative to their quality – methods used in collecting, analyzing, or reporting their data. Unfortunately, this evaluation eliminated nearly 90% of the studies available in the scientific literature. Thus, their evaluation of “quality studies” only included 14 publications from the 121 available. The paper includes results from the lower quality studies, but places a greater emphasis on the 14 quality studies.

Here is a short list of some (not all) of the factors NOT associated with *C. parvum* transmission in the reports reviewed:

1. Sex of the animal
2. Breeding systems
3. Beef or dairy farms
4. Birth BW
5. Breed of cow
6. Intake of starter or milk replacer
7. Parity of the dam
8. Birth score (assisted or not assisted)
9. Twins or single calves
10. Navel disinfection
11. Ventilation in barns
12. Dehorning

When we think about the biology of infection, all of these factors wouldn't necessarily be associated with risk of infection.

The researchers also reported on factors that MAY be associated with risk of infection (i.e., reported in some studies, but not in others):

1. Calves born into pens that held multiple dams.
2. Time with the dam – one study reported that leaving the calf with the dam >1 hr increased the risk of diarrhea whereas other studies didn't report an effect on risk of infection.
3. Feeding colostrum may reduce risk of infection, though not every study supported this conclusion. Method of delivery didn't seem to be important, though letting calves nurse the dam increased risk in at least one study.
4. Feeding whole milk versus milk replacer was shown to reduce risk of infection, but there were several studies that showed no effect.
5. Herd size – at least some studies showed that larger herds were associated with a greater risk of infection.
6. Inadequate cleaning of utensils.

Factors that consistently are associated with risk of infection

1. Calves housed in close contact with other calves.
2. Large herds are associated with increased risk.
3. Proximity to other animals. One study concluded that if a pen had an empty period between housing animals, the risk of infection was reduced.
4. Type of flooring – hard floors reduced the risk of infection.
5. Warm and wet weather increased the risk of infection

Let's go back to the biology of *C. parvum* to see if this all makes sense. We know that the parasite is transmitted by the fecal-oral route. So, when calves are in close proximity to one another and can “share” fecal oocysts, it certainly makes sense that this could be a risk factor for infection. Improper cleaning also can increase the risk of infection.

Consistent with the biology of infection is the idea that flooring that is easy to clean (concrete) is more protective against infection, as is slatted flooring that removes potentially infected feces from the calves. Of course, if a farm does a good job managing softer bedding types (straw, shavings, etc.), the risk of infection may be reduced, also. Thus, we need to consider not only the factors outlined in this review, but also how the infection cycle repeats itself within

Generally, most factors that increased the risk of infection with *C. parvum* – contact with other animals (especially goats and sheep, it seems), failure to remove infected feces from the environment and incorrect or inconsistent cleaning protocols are definite risk factors. Most studies indicate that warm, wet environments are conducive for transmission, also.

## Summary

If we understand the route of infection of a potential pathogen in a calf, we can understand how to reduce the risk of infection. Management practices in these two studies are consistent with the idea that keeping calves away from infected animals is a good thing. Cleaning utensils, feeding equipment, bedding and pens will certainly help reduce the risk of infection. Though these studies don't necessarily shed any “new” light on how to minimize the risk of infection with crypto, they're both a good reminder that “Cleanliness is next to Godliness” and that “you can do more good with a shovel than you can with needle”.

## References

- Brainerd, J., L. Hooper, S. McFarlane, C. C. Hammer, P. R. Hunter, and K. Tyler. 2020. Systematic review of modifiable risk factors shows little evidential support for most current practices in *Cryptosporidium* management in bovine calves. *Parasitol. Res.* 119:3571-3586. <https://doi.org/10.1007/s00436-020-06890-2>.
- Conceição, A. I., L.P.S. Almeida, L. O. Macedo, C. L. Mendonça, L. C. Alves, R.A.N. Ramos, and G. A. Carvalho. 2021. *Arq. Bras. Med. Vet. Zootec.* 73:34-40. <https://doi.org/10.1590/1678-4162-12109>.

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