Investigation of calf scour outbreaks often involves the submission of samples to the laboratory for the diagnosis of the cause of scour. This is expensive: the submission of two or three samples from scouring calves can result in a bill of over £100 to the farmer.

The question that is often not asked is whether this is of value to the stock owner, or even of value in terms of a diagnosis. Too often the answer to both of these questions is probably not. As Sutherland (1985) stated two tests for the value of a diagnosis are:
1. Can the diagnosis be defended on the basis of objective data?
2. Does it allow the formulation of treatment and preventative strategies?

It is likely that many submissions fail on both of these grounds.

**CAN THE DIAGNOSIS BE DEFENDED?**

Because of the nature of the pathogens causing calf scour in the UK, there is not a simple relationship between the presence of a pathogen in a sample and the diagnosis of disease due to that pathogen. The problem is three-fold.

Firstly, not all affected calves may excrete the pathogen. This means that, no matter how sensitive the test for the pathogen is, a single negative result does not mean that that pathogen is not causing the disease. Thus a single sample cannot rule out disease.

The second problem is that most pathogens can also be found in healthy calves. For example studies on rotavirus have found that on average 15–20% of normal calves can excrete rotavirus (Reynolds and others 1986) though up to 50% of normal calves may excrete the pathogen (Scott and others 2004). Thus finding a pathogen does not mean that it is causing disease.

The third problem is that most diarrhoea outbreaks are multifactorial. Snodgrass and others (1986) reported that 75% of outbreaks were associated with two or more potential pathogens. Thus again the result from a small number of samples may not accurately reflect the true cause.

All these problems can generally be overcome by testing at least four diseased calves, and if possible testing a similar number of healthy calves. However the cost of this is often prohibitive, for example testing four sick calves and four healthy calves would cost well over £200.

So, irrespective of the test used, using faecal samples to diagnose the cause of scour is often not conclusive for most of the major pathogens associated with scour in UK (including rotavirus, cryptosporidia, coronavirus and coccidia). Post-mortem examination of fresh calves is by far the most accurate method of diagnosis, giving information as to the significance of pathogens, particularly if histopathology is used.
DOES LABORATORY ANALYSIS AID THE FORMULATION OF TREATMENT AND PREVENTATIVE STRATEGIES?

This is the most critical point as even if the diagnosis was 100% certain, if it didn’t lead to better treatment and prevention it would be of no value. So we need to know whether diagnosis will do this.

**E. coli**

Except for specific enterotoxigenic *E. coli* (K99 primarily), there is little value in the isolation of *E. coli* from faecal samples. Spurious antibacterial sensitivities are perhaps the most likely result. *E. coli* K99 can be strongly suspected from the clinical signs (watery diarrhoea) and age of calf (<5 days of age). Control and treatment measures can thus be implemented without a definitive diagnosis (with follow-up if either proves ineffective).

**Rotavirus**

There are no specific treatment strategies for rotavirus, so diagnosis is of little value in treatment. (Products containing specific immunoglobulins are available, but there is little evidence of their value in treatment.) It is often suggested that diagnosing rotavirus prevents the unnecessary use of antibiotics. However, the presence of rotavirus does not preclude the active involvement of bacteria in the scour, so the choice of whether to use antibiotics or not may be best made on clinical grounds, with more severe cases receiving antibiotics.

**Cryptosporidia**

Although a specific treatment (halofuginone) is available for cryptosporidiosis, this pathogen is frequently found in normal animals (Snodgrass and others 1986). This, combined with its potential toxicity, means that halofuginone should only be used after a thorough investigation has confirmed *Cryptosporidia* as the primary cause of diarrhoea.

**Coronavirus**

In regard to treatment the situation for this pathogen is similar to that of rotavirus, no specific treatment so little diagnostic value. Both of the vaccines available in the UK for rotavirus protection also protect against coronavirus.

**Coccidia**

Unlike the viral diseases, specific treatments are available for *Coccidia* so diagnosis is of value. However it is important to remember that the absence of oocysts is not evidence of the absence of pathogenic *Coccidia*. Multiple samples are therefore vital in order to rule out coccidiosis.

**Salmonella**

As significant zoonoses the isolation of *Salmonella* spp. is always of significance and importance. However, particularly for *S. Dublin*, not all cases of salmonellosis in calves are associated with excretion, so multiple samples are essential for diagnosis.

**PRACTICE LABORATORY TESTING**

Several dipstick-style ELISA tests for rotavirus, coronavirus and *E. coli* K99 are available which are suitable for use even in the least well equipped practice laboratory. These tests are modifications of those used in the main diagnostic laboratories and are accurate, being almost as specific and sensitive. They cost around £3 per calf for each pathogen tested so can save the farmer money. However the same problems apply to these tests as to those from the diagnostic laboratory; interpretation is not simple, with false negatives and false positives leading to uncertain diagnoses.

**CONCLUSION**

Significant amounts of money are spent annually on diagnosing calf scour. However in many cases that money adds little to knowledge and does not influence treatment or control measures. In cattle >1 week of age restricting routine analyses to *coccidia* and *Salmonella* would save farmers’ money which can be better spent on non-specific control measures such as improved disinfection and better colostrum management.
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1. Does a finding of rotavirus from a single scouring calf suggest:
   a. Diarrhoea is due to rotavirus
   b. Diarrhoea is not due to rotavirus because the test is for protective antibodies
   c. Rotavirus is present but clinical significance is uncertain
   d. Rotavirus is present on the farm and all cattle should be vaccinated

2. Post-mortem examination of fresh carcasses is the best method of determining cause of scour because:
   a. Rotavirus is more easily isolated from SI than faeces
   b. Gross findings are routinely diagnostic
   c. Histopathology will usually identify the primary pathological changes occurring in the intestines
   d. Cattle that die are more likely to have high levels of the primary pathogen

3. When testing for rotavirus it is recommended that you test:
   a. Four scour cases
   b. Four scour cases and one healthy calf
   c. Four healthy calves
   d. Four scour cases and four healthy calves

These multiple choice questions are based on the above text. Readers are invited to answer the questions as part of the RCVS CPD remote learning program. Answers appear on page 99. In the editorial panel’s view, the percentage scored, should reflect the appropriate proportion of the total time spent reading the article, which can then be recorded on the RCVS CPD recording form.