

# Development of a novel fluke FEC kit

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## What is Fluke?

- *Fasciola hepatica* (liver fluke) and *Calicophoron daubneyi* (rumen fluke) are important parasitic trematodes
- Serious health and welfare issue in grazing livestock worldwide
- Costly diseases for farmers
- Farmers treat without a diagnosis
- Drug resistance is emerging



Figure 1 (A) *Fasciola hepatica* (liver fluke), (B) Liver fluke *in situ* in an ovine liver (C) *Calicophoron daubneyi* (rumen fluke), (D) Rumen fluke *in situ* in a cow's rumen. Images from A: [www.paragone.eu](http://www.paragone.eu) B: [www.vetstream.com](http://www.vetstream.com) C [www.wurmkur-tiere.de](http://www.wurmkur-tiere.de) D [www.cattleparasites.org.uk](http://www.cattleparasites.org.uk).

## What is FEC?

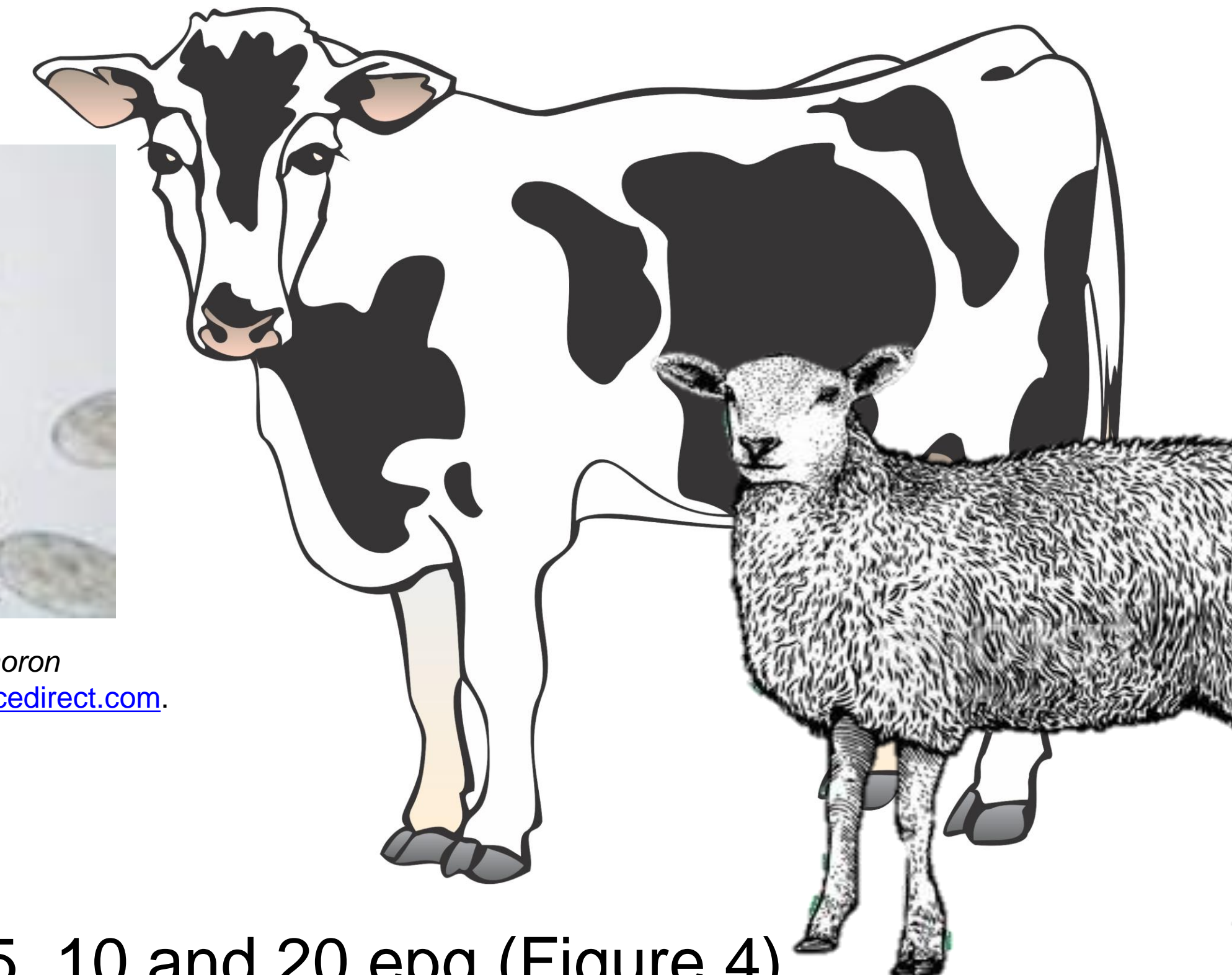
- Faecal egg counting (FEC) is a method used to detect parasitic eggs in stool samples
- FECs are used to diagnose active infection and to test drug efficacy
- **FECPAK<sup>62</sup>** used by UK, Australian and NZ farmers to diagnose and monitor parasitic gastroenteritis in ruminants<sup>1</sup>
- **FECPAK<sup>62</sup> Micro-i** (Figure 2) cannot currently detect fluke eggs



Figure 2 FECPAK2 Micro-i imaging device.



Figure 3 *Fasciola hepatica* (F, liver fluke) and *Calicophoron daubneyi* (P, rumen fluke) eggs. Image from [www.sciencedirect.com](http://www.sciencedirect.com).



## Methods

### Flotation

- Do the liver and rumen eggs (Figure 3) float in a range of commonly used solutions?

### Sedimentation

- Two evaluated – Flukefinder<sup>2</sup> and Becker<sup>3</sup> with spiked sheep and cattle samples at 2, 5, 10 and 20 epg (Figure 4)
- Build sedimentation slide to enable a sample to be read by the **FECPAK<sup>62</sup> Micro-i**
- Test with samples from naturally infected sheep

## Results

### Flotation

Eggs perish when subjected to all flotation media tested. The shells float but the eggs are desiccated and difficult to recover. Fixing the eggs did not prevent deformation.



Figure 5 A deformed liver fluke egg that was fixed in formaldehyde, then exposed to saturated zinc sulphate flotation solution for 5 minutes.

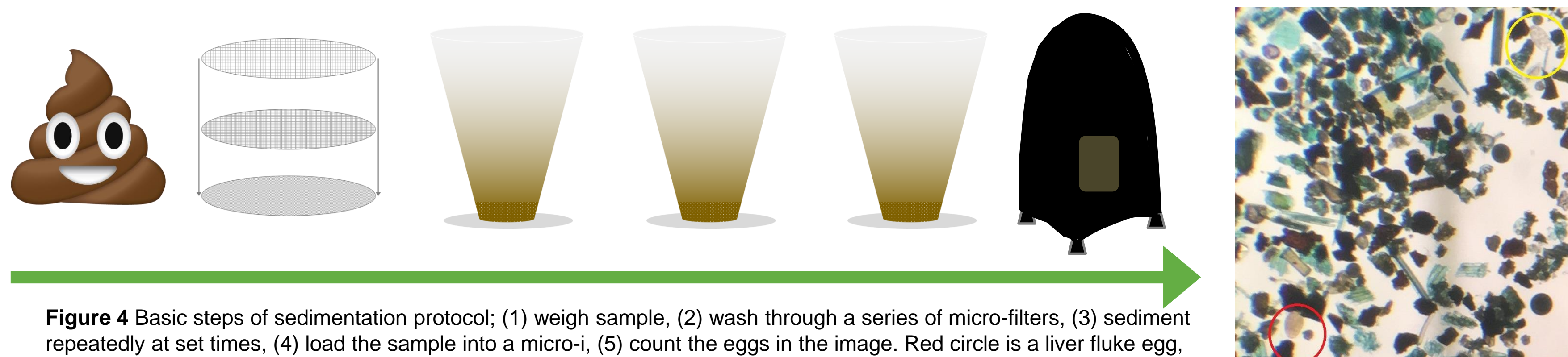


Figure 4 Basic steps of sedimentation protocol: (1) weigh sample, (2) wash through a series of micro-filters, (3) sediment repeatedly at set times, (4) load the sample into a micro-i, (5) count the eggs in the image. Red circle is a liver fluke egg, the yellow circle is a rumen fluke egg.

### Sedimentation

Flukefinder is more sensitive than the Becker method under experimental and field conditions (Table 1).

	Flukefinder	Becker
 Spiked samples	Sensitivity at 2-20 epg <b>92.5%</b> (95% CI 86.6 – 98.4)	Sensitivity at 5-20 epg <b>83.3%</b> (95% CI 73.6 – 93.0)
 Spiked samples	Sensitivity at 2-20 epg <b>88.8%</b> (95% CI 81.7 – 95.8)	Sensitivity at 5-20 epg <b>56.7%</b> (95% CI 4.38 – 69.6)
 Natural samples	10 / 20 samples tested positive for liver and / or rumen fluke	7 / 20 samples tested positive for liver and / or rumen fluke

Table 1 Flukefinder versus the Becker method in spiked cattle and sheep faecal samples, and in naturally infected sheep samples.

## Conclusions

Methods using flotation solutions are not suitable for recovering fluke eggs from faecal samples.

The Flukefinder method is more sensitive than the Becker method when using spiked faecal samples. Flukefinder also performed significantly better ( $X^2$   $p > 0.01$ ) when testing naturally infected samples.

## Next steps

This grazing season we are using the new FEC kit to look at the pattern of egg output from naturally infected individuals, in-flock prevalence, correlations with FAMACHA® and body condition, and the effect of grazing behaviour on fluke burden.

The results of which will be used to inform farmers and vets and translated into practical on farm advice and implemented into a parasite management strategy.

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2. Kleiman F, Pietrovsky S, Gil S, Wisnivesky-Colli C. Comparison of two coprological methods for the veterinary diagnosis of fasciolosis. *Arquivo Brasileiro de Medicina Veterinária e Zootecnia*. 2005 57, 181–5.  
3. Becker A-C, Kraemer A, Epe C, Strube C. Sensitivity and efficiency of selected coproscopical methods—sedimentation, combined zinc sulfate sedimentation-flotation, and McMaster method. *Parasitology Research*. 2016 115, 2581–7.