# Faecal microbiota transplantation: a crap way to treat chronic diarrhoea?

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**Amelia Poole,** DipAVN, DipFelBhv, CertFN, CertECC, RVN

https://orcid.org/0000-0002-9379-940X

**RCVS Knowledge**

**ameliakp@hotmail.com**

Amelia is an RVN who has worked in practice for 13 years, at a variety of privately owned hospitals and rescue centres, concentrating on intensive in-patient care. She is currently completing her top-up degree at Harper Adams University and is working at RCVS Knowledge as a quality improvement project manager.

**ABSTRACT** A feline patient presented with a history of chronic diarrhoea, weight loss, persistent third eyelid protrusion, polyphagia and polydipsia. Diagnostics included blood analysis, faecal analysis and culture, abdominal ultrasound and radiography, full-thickness gastrointestinal biopsies via laparotomy and endoscopic biopsies of the upper and lower gastrointestinal tract.

Diet trials with hypoallergenic food caused worsening of the diarrhoea, and novel proteins only worked for a short period of time (3–4 weeks), after which the diarrhoea developed again. A faecal microbiota transplantation (FMT) was performed. Diarrhoea ceased within 72 hours; self-limiting diarrhoea has occurred since but the FMT treatment was a success.

The RVNs were pivotal in assisting with the FMT procedure, in the preparation of samples, preparation and monitoring of the patient, and advising and supporting the owner during the treatment process.

**Keywords** Feline, microbiota, transplantation, FMT, diarrhoea, gut, microbiome, cat

## Introduction

Wednesday, 1 July 2020 was a memorable day, not because of the Covid-19 pandemic or the heatwave in south-east England, but because, for the first time in 2 years, Logan, a 3-year-old domestic short-haired cat, had passed solid faeces.

Logan's chronic diarrhoea regularly resulted in sporadic faecal incontinence, perianal sores from scooting across the floor, extreme borborygmi and flatulence. Logan's owner was an RVN so numerous diagnostic tests and treatments had been performed but none of them were successful.

## Fragile gastrointestinal microbiome

Logan had a poor start to life. He was brought into the practice as a stray kitten, having been thrown from a moving car. Before he was even 12 weeks old he had undergone surgery to repair a tear in his abdominal wall and treatment for facial injuries. Logan developed diarrhoea at 12 months old. He was initially treated with anthelmintics, a bland diet and probiotics. However, when the diarrhoea failed to improve, further diagnostics were completed. These included diet trials, full blood analysis, faecal analysis and culture, abdominal ultrasound, full-thickness gastrointestinal biopsies via laparotomy, and endoscopic biopsies of the upper and lower gastrointestinal tract. Diet trials

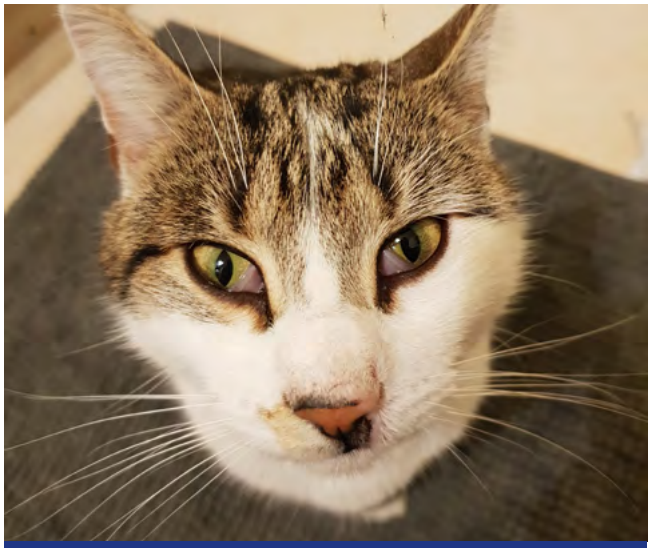

Figure 1. Persistent third eyelid protrusion due to ongoing diarrhoea.

with hypoallergenic food caused worsening of the diarrhoea, and novel proteins only worked for a short period of time (3–4 weeks), after which the diarrhoea developed again.

Blood analysis and B12, folate and trypsin-like immunoreactivity (TLI) were in conclusive. Hypermotility was noted on the ultrasound, and gastrointestinal biopsies were inconclusive. Logan also had persistent third eyelid protrusion **(Figure 1)**, polydipsia, polyphagia and severe weight loss concurrent to his diarrhoea (2.9 kg), resulting in a body condition score (BCS) of 2/9.

A provisional diagnosis of exocrine pancreatic insufficiency (EPI) was made, and Logan was started on vitamin B12 (0.5 mg Protexin Cobalaplex SID), probiotics (1 pinch of Vivomixx 450 billion SID), pancreatic enzymes (VetPlus Lypex 0.6 g SID) and a low-carbohydrate diet (Purina Pro Plan Feline Diabetes Management).

This treatment plan increased Logan's weight to 5 kg (BCS of 4/9) but the diarrhoea persisted throughout. In the summer of 2020, he experienced an acute (within 1 week) weight loss of 900 g, 15% of his overall bodyweight, as well as further diarrhoea, polydipsia (8 ml/kg/24 hours) and polyphagia. Repeat biochemistry, haematology, B12, folate and TLI were within normal limits. With the addition of a negative faecal analysis and culture, a decision was made to perform a faecal microbiota transplantation (FMT).

## FMT: the evidence

The gut microbiome itself is the ecosystem within the gastrointestinal system and is important in balancing digestive health in all mammals. Dysbiosis (microbial imbalances) can cause a decrease in production of short-chain fatty acids, leading to the development of chronic inflammatory conditions within the gut (Suchodolski, 2016). The gut microbiome can be affected by diet and the environment, but also by medication. The human microbiome is affected by the administration of ciprofloxacin, with the microbiome reducing in diversity and never returning to its original state, even when the ciprofloxacin is stopped (Dethlefsen et al., 2008). Dogs are affected in similar ways, with a reduction in bacterial richness and diversity of 40% in dogs after the administration of tylosin (Suchodolski et al., 2009).

FMT involves the administration of a faecal matter solution into the intestinal tract of a recipient to change the microbial composition and improve health (Gupta et al., 2016). FMT has been used in human medicine since 1958 (Eiseman et al., 1958), and can be delivered through a range of routes, including oral capsules, nasoduodenal, nasogastric or colonoscopic administration and via enema. Within feline medicine, FMT had been observed to be successful in practice but studies on the success rates were not widely available. There is an example of a successful case in Israel, where it was performed on a 10-year-old female cat with ulcerative colitis (Furmanski & Mor, 2017). FMT was performed through rectal enema and resulted in an immediate improvement in the texture, colour and odour of the faeces, for the first time in 12 months. The FMT was repeated after a few days due to a relapse of diarrhoea. Afterwards, the patient only required a hypoallergenic diet to maintain healthy faeces.

## FMT: the procedure

The following procedural guidelines were put together by Elise Robertson, MRCVS, the veterinary surgeon responsible for Logan's care. They are based on recommendations from discussions with other veterinary surgeons and on the viscosity required for the sample to be placed endoscopically.

### FAECES DONOR

The donor selected was the second cat in the household, a 1-year-old domestic short-hair with no vomiting or diarrhoea within the last 6 months. This donor was selected as they had been exposed to the same environment as the recipient. A faecal analysis was performed on a sample beforehand to rule out parasites, *Giardia, Salmonella and Tritrichomonas foetus*. Fresh faeces were collected the morning of the procedure and stored at room temperature before being prepared for transplantation.

The RVN was crucial in helping the owner source a donor cat and running the tests to ensure the sample would be suitable. Both cats were owned within the same household, so gaining informed consent, collecting samples and reporting test results to the owner was streamlined.

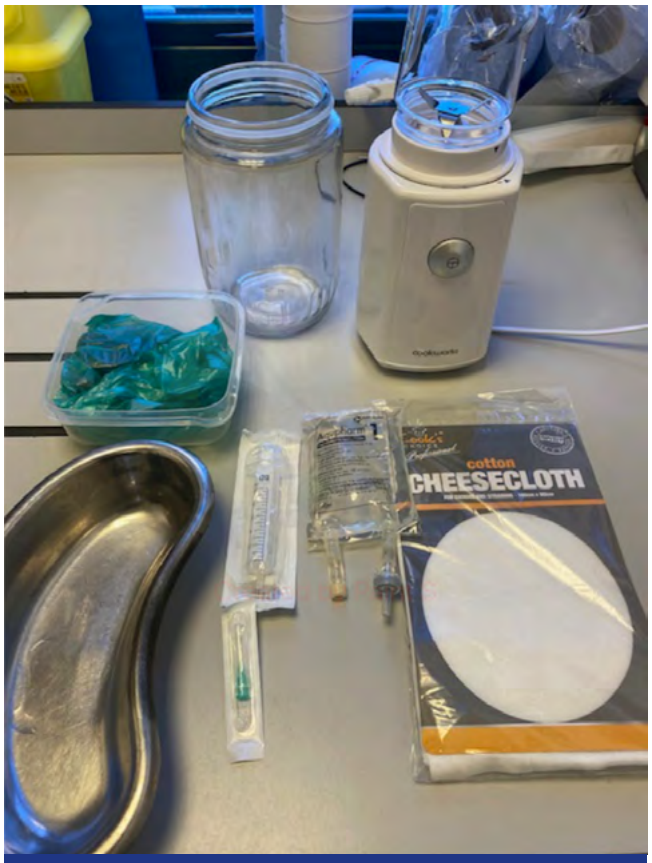


Figure 2. Equipment required to prepare the sample.

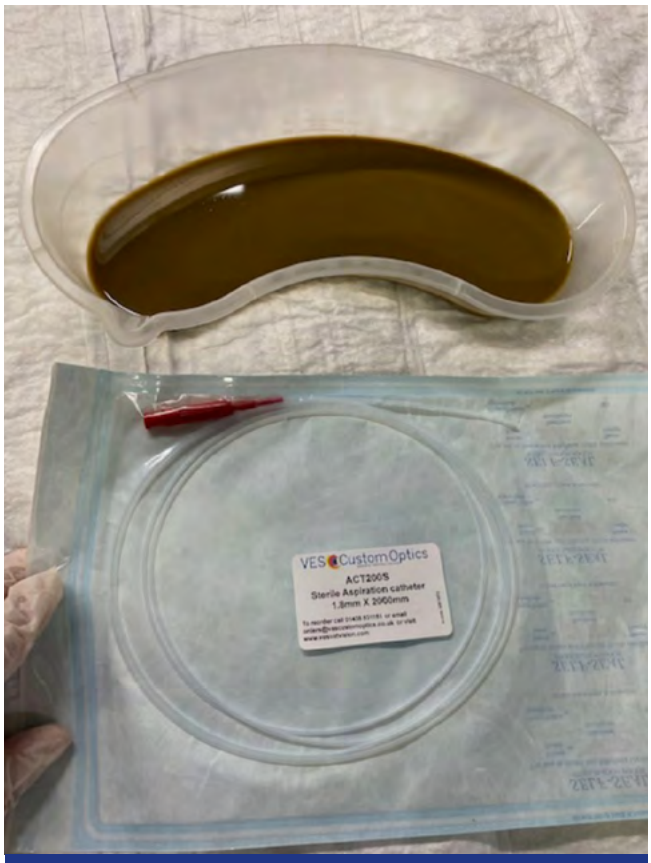


Figure 3. Prepared sample, ready for transplantation.

### PREPARING THE SAMPLE

The sample was mixed at a ratio of 1:6 faeces to saline, blended to a slurry and filtered through a cheesecloth **(Figures 2 and 3)**. The equipment was purchased for the procedure and disposed of afterwards.

### PROCEDURE

Logan was anaesthetised so the sample could be placed endoscopically throughout the gastrointestinal system. A gastroscope was used to examine the oesophagus, stomach and pylorus. A 10 ml volume of the transplant material was distributed into the bowel from distal to proximal direction while retracting the endoscope back into the stomach, stopping at the duodenal papilla.

A rectal exam and Higginson's syringe enema were performed and a gastroscope used to examine the descending colon, splenic flexure, transverse colon, hepatic flexure and ascending colon. The ileocolic aperture was identified and the aspiration catheter containing the transplant material was advanced through until approximately 80 cm was in the distal jejunum. A 10 ml volume of the sample was instilled from proximal to distal direction, transfusing 20 ml overall **(Figure 4)**. Maropitant was given to treat any post-procedure ileus, and Logan recovered from the anaesthesia well.

## FMT: the outcome

Within 48 hours of the procedure, Logan had passed his first solid faeces in 2 years. Over the past year, there have only been two incidences of self-limiting diarrhoea: one shortly after a house move and the other following ingestion of a ripe, fat mouse. Apart from these incidences, his faeces have been solid throughout the period.

After a long struggle to maintain a healthy microbiome in Logan, the FMT seemed to reset his system and break the cycle of diarrhoea and malnourishment that was affecting his quality of life. Due to his suspected EPI, he is maintained on pancreatic enzymes (VetPlus Lypex 0.6 g SID). However, his drinking and eating habits are back to normal, with a BCS of 5/9 and a healthy weight of 5.6 kg.

## Veterinary nurse involvement

Veterinary nurses are often the first point of contact for clients with cats with diarrhoea, whether over the phone or during a nursing consultation. In some cases, clients may not be aware of the persistence of their cat's diarrhoea if they toilet outside. Therefore, in order to gather further information, it would be helpful to teach clients how to body-condition score and identify other signs of illness such as polydipsia. If diet trials are

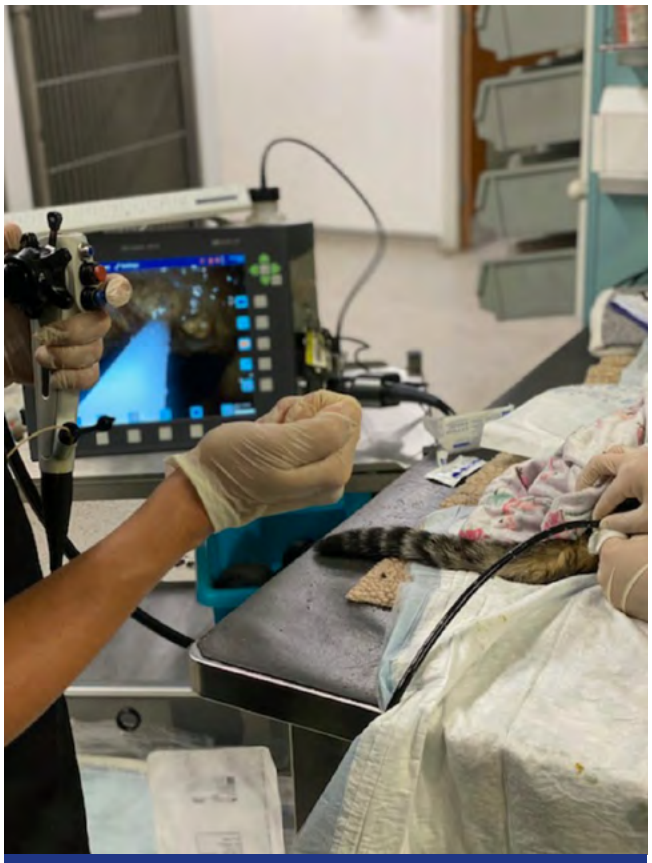

Figure 4. The FMT procedure.

performed, it is important to assist the client with an appropriate diet-change regime, and follow-up support if the diet trials are unsuccessful. In this case, Logan self-regulated his diarrhoea and dehydration by drinking more, but some cats may need additional support with intravenous fluid therapy.

FMT is not a common procedure, with little research available, so this may require discussion between the veterinary surgeon and the client, and other veterinary practices that have performed the procedure, to see if it is suitable for the case.

Collecting samples and sending them to external laboratories would fall to the veterinary nurse, and preparation and storage of these samples is important for accurate analysis. These procedures may differ according to the laboratory used, so should be checked beforehand in order to advise the client exactly how and when to collect the samples.

During the procedure, general anaesthetic monitoring will take place and appropriate set up and care of endoscopy equipment will be required. The sample will need to be prepared, and a patient enema performed to allow for appropriate visualisation of the gastrointestinal system. Temperature monitoring of the patient will be a high priority as an enema can reduce the body temperature rapidly. Temperature probes inserted into the oesophagus should be used for accurate measurement. A warm recovery kennel should be prepared. The patient should be able to return home the same evening.

Follow-up calls should be performed with the client to monitor the patient's motions, as some studies have shown that a repeat FMT needs to be performed to fully stabilise the microbiome. Regular weight checks should be performed to ensure the patient is gaining weight and getting the correct nutrition.

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