

Leonie Ager RVN

Leonie has been nursing for 9 years, she has worked in Exotic Referral and Small Animal Referral. She is currently working in a First opinion small animal practice where she is studying the Vets Now ECC Certificate. She has two pet rabbits, who have both suffered from ileus in the past, which has inspired her to write this article.

Email: leonieager@aol.co.uk

Ileus in rabbits – current thinking in treatment, nursing and prevention

Leonie Ager RVN

Abbotsley Veterinary Group, 107 High Street, West Malling, Kent ME19 6NN, UK

ABSTRACT: There are an estimated 1.2 million pet rabbits in the UK, so their nursing care has never been more crucial and we should all feel comfortable nursing them to a high standard. Gut health in rabbits is always fundamental, but never more so than when dealing with ileus, as this is one of the most common illnesses we see in practice and it can be the most deadly if treated incorrectly. It is important to be up to date with current drugs, protocols and nursing tips for these sensitive patients requiring species-specific care.

Introduction

Rabbits have become increasingly popular as pets. At present, there are an estimated 1.2 million pet rabbits in the UK.

As a profession, we should be confident nursing them to a high standard. A common condition that affects rabbits is ileus, which is defined as adynamic or paralytic ileus (bowel dilation or intestinal stasis) due to impaired motor function, or is secondary to obstruction (Flecknell, 2000). The common name for this is gut stasis (GS).

Rabbits are hind-gut fermenting herbivores and have complex and sensitive digestive tracts. Many factors can trigger ileus, including stress, diet, dental issues, inappetence, impaction from inappropriate food ingestion (i.e. carpet, cardboard), underlying disease, pain, dehydration, lack of exercise and obesity.

Rabbits are a prey species and hide illness well, which is why it is often detected late. If a rabbit's gut motility slows down, gastric stasis often occurs first, and if untreated or unresolved will usually progress to intestinal stasis, caecal stasis or impaction. Gastric stasis alone is uncommon and some degree of more generalised ileus or stasis is usually present by the time the owner notices the rabbit is unwell (Meredith, 2010). If a rabbit stops eating or producing faeces for more than 12 h you should consider the condition an emergency (Krempels, 2005).

Clinical signs

- Anorexia – this is often the first thing owners will notice
- Reduced, abnormal shaped, different consistency or no faecal pellets
- Lethargy
- Tachycardia
- Tachypnea
- Hunched position
- Depression
- Reduced gut sounds
- Dehydration
- Tooth grinding
- Bloating
- Hypothermic
- Reduced or absent gut sounds

Diagnostic tests

X-rays

Once ileus has been diagnosed it is important to rule out an impaction, as this can lead to perforation, peritonitis and death.

X-rays should be taken to check the gastrointestinal (GI) tract for gas, dilation, gastric dilation volvulus (GDV, which is rare) and impaction. If the obstruction is not moving, as determined by serial radiographs, then the case becomes surgical (Fisher (2011)).

Table 1. Prokinetic drug doses

Drug	Dosage
Ranitidine	4–6 mg/kg SC PO 8–12 h
Metoclopramide	0.5–1 mg/kg SC PO 6–12 h
Cisapride	0.1–1 mg/kg PO 8–12 h

Source: Meredith (2015).

Ultrasound

Ultrasound may be less useful due to the presence of gas, but can be used to check for peristalsis.

Blood analysis

A blood sample should be taken for Haematology and Biochemistry to help fully diagnose the overall disease process.

Blood can be taken from the marginal ear vein, jugular, cephalic, or saphenous veins. The marginal ear vein and the saphenous vein are the easiest and most accessible in conscious rabbits, the others are safer to be used in anaesthetised rabbits.

Blood glucose gives an indication of pain and progression of the disease, helping the clinician decide if the case is medical or surgical. Low blood glucose is seen in rabbits with GI stasis, whereas obstructions likely to be surgical often have a high blood glucose (Clark & Saunders, 2012).

Treatment

Once ileus has been diagnosed, stabilising the patient must start immediately. This includes: warmth, analgesia, fluids, prokinetic medication, antibiotics if required and syringe feeding.

Most rabbits that are admitted to the practice with ileus are in some degree of shock and should have their temperature, pulse, respiration (TPR) and weight checked on admission to give a baseline for all future readings and to assess the condition of the patient.

Fluid therapy

Isotonic crystalloid fluids can be given at 100 ml/kg/day (Benato, 2015) depending on how dehydrated the patient is, and it helps to soften and rehydrate any faecal impactions.

The fluids can be given:

- Subcutaneously (SC)
- Intraperitoneal (IP)
- Intravenous (IV)
- Intraosseous (IO)

The IP route is not advised due to the risk of gut perforation leading to peritonitis. For the IO route the tibia or femur are the ideal site; this is painful and should be reserved for very small or very collapsed patients where IV access is impossible.

The marginal ear vein is the easiest to access, but the smallest vein. The larger cephalic and saphenous veins can also be used, but are more difficult to access without a lot of patient restraint.

Local analgesia

When taking blood samples or placing intravenous (IV) catheters ideally local analgesia should be applied. There are two topical anaesthetics which are currently used.

Emla, which is a numbing cream: apply a thick layer of the cream to the skin and cover with a bandage for 45–60 min prior to venepuncture (Meredith, 2015); it can also be toxic if a large amount is used as it contains lidocaine.

Ethycalm is a relatively new vapocoolant spray containing ethyl chloride which works in a few seconds but has a shorter acting duration.

Decompression

Acutely bloated rabbits can be decompressed via a stomach tube to try and alleviate the gas and fluid. If the rabbit is stable enough, then a stomach tube is passed for decompression from gas or fluid. Never decompress a distended stomach by needle puncture; the result will be peritonitis and death (Flecknell, 2000).

Gastrointestinal (GI) drug doses

Table 1 shows drugs which can be used for GI stasis.

Prokinetics are contraindicated in cases of obstruction as they can cause pain and perforation, leading to peritonitis and death.

A product that is not usually kept on the shelf is Simethicone. It works by decreasing the surface tension of gas bubbles, causing the bubbles to break or merge with other bubbles within the GI tract that can be more easily passed (Watson, 2014). Dose 1–2 ml (20 mg/0.3 ml) once an hour for 2–3 doses (Krempels, Cotter, & Stanzione, 2000).

Metoclopramide and Cisapride may work better together than separately, because each has a different mode and site of action in the GI tract (either drug is contraindicated in cases of true obstruction) (Krempels et al., 2000). It may take

Table 2. Analgesic drug doses

Drug	Dosage
Buprenorphine	0.03–0.06 mg/kg transmucosal SC IM IV 6–12 h
Butorphanol	0.1–0.5 mg/kg SC
Carprofen	2–4 mg/kg q24 h SC 1.5 mg/kg PO q24 h
Meloxicam	0.3–0.6 mg/kg PO SC q24 h
Tramadol	3–10 mg/kg PO q8–12 h
Fentanyl	0.1–0.5 mg/kg IM
Methadone	0.3–0.7 mg/kg slow IV IM

Source: Meredith (2015).

Table 3. Oxbow mammal small herbivore feeding calculations

Body weight		Dry product	
lb	kg	Tablespoon	Grams
1.1	0.5	1.7	15.6
2.2	1	2.9	26.3
3.3	1.5	4	35.6
4.4	2	4.9	44.1
5.5	2.5	5.8	52.2
6.6	3	6.6	59.8
8.8	4	8.2	74.2
11	5	9.8	87.8

Source: Oxbow (2016).

up to three or more days for the rabbit to begin passing faeces once more (Meredith, 2010).

Assessment of pain

Ileus is painful, especially when there is bloat, so it is important to give adequate pain relief. Prey animals such as rabbits hide pain extremely well.

Newcastle University has designed an evidence-based rabbit pain scoring system called the grimace scale. It is calculate on a scale of 0–3 for each area being observed, and gives a good insight into facial expressions associated with pain. Lethargy and not eating are often the first signs that owners notice. See attached **Figure 3** for the diagram for the grimace scale.

Pain relief

Table 2 shows some dosages for analgesic used in rabbits.

These are the most common drugs used for pain relief that most practices have in stock. Meloxicam and Carprofen are contraindicated in cases with renal impairment Benato (2015) Opioids such as oxymorphone or hydromorphone can readily be used and have not been shown to cause GI stasis ileus Mayer (2016).

The following are some less-common types of pain relief kept on the shelf. Flunixin meglumine is a non-steroidal anti-inflammatory drug (NSAID), dose 1–3 mg/kg IM or SC q12–24 h up to 3 days. It is contraindicated in animals with renal disease (Krempels et al., 2000). Sulfasalazine anti-inflammatory drug reduces inflammation of intestinal mucosa, dosage 1/8–1/4 crushed 500 mg tablet per rabbit q8–12 h (Krempels et al., 2000).

Constant rate infusions

Specialist exotics referrals may regularly use constant rate infusions (CRIs), but in the author's opinion some first-opinion practices do not routinely use them for dogs or cats, let alone rabbits.

Many practices don't have a syringe driver, the CRI drug calculations can be complicated if you aren't used to them, and some of the medication used for CRIs may not be available or commonly used.

In this case, referral might be a better option, or using drugs that the vet is familiar with but are also adequate pain relief.

Pineapple and papaya juice

Pineapple juice has been used in the past to help break down hair ball impactions. Hair that rabbits ingest through grooming is commonly referred to as hairball, trichobezoar or wool block (Meredith, 2010).

Only fresh or frozen pineapple will provide active enzymes (bromelain). However, neither bromelain nor papain (papaya enzyme) dissolves keratin, the main protein component of hair. The sugars in pineapple juice may actually promote overgrowth of *Clostridium* spp. (Krempels et al., 2000), which can cause other serious complications such as enterotoxaemia. Enterotoxaemia is caused by the alteration of gastrointestinal microflora (dysbiosis) leading to proliferation of *Clostridia* spp. and *Escherichia coli* (Benato, 2015). Therefore, these are not recommended. Clients should be advised to groom their rabbits regularly to help prevent hairballs in the future.

Alternative/complementary treatments

Massaging therapy

Massaging the abdomen can help stimulate intestinal motility and break down impacted GI contents with gentle, deep abdominal massage. If the rabbit is not critical, encourage exercise to stimulate GI motility (Kelleher, 2010). This is contraindicated in cases of impaction because the bowel could perforate. After manual massage, try an electric vibrating massager. This seems to be as effective as manual massage (Krempels, 2005).

Vibration therapy

Vibration therapy (preferably in the form of commercially available vibrating beds) is better tolerated in rabbits that are not used to being handled and become stressed by being restrained; after the initial surprise of going onto the bed, they soon settle. They are easy to use and small enough to put into a kennel.

Assisted feeding

Donor caecotrophs

Feeding caecotrophs from a healthy rabbit might help supply normal intestinal flora, but the stress of this procedure may outweigh the possible benefits (Krempels et al., 2000). Also, they can be hard to obtain.

The donor needs to wear a buster collar so they don't eat their caecotrophs, which can be stressful and even cause ileus in the donor. Rabbits don't like eating other rabbits' caecotrophs so they will need to be syringe-fed, which can be stressful for the recipient, and the blending of the caecotrophs to make a paste can damage the protective coating and introduce bacteria

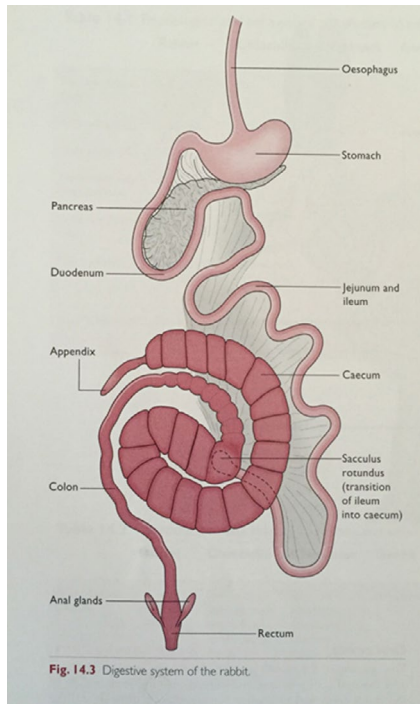


Fig. 14.3 Digestive system of the rabbit.

Figure 1. Digestive system of the rabbit
Source: Aspinall and Cappello (2009).



Figure 2. Photograph of abnormal and normal faeces
Source: Krempels et al. (2000).

which will cause more harm than good. So the author does not recommend this.

Hepatic lipidosis

Sudden anorexia can cause hepatic lipidosis and gastric ulcers. Obese rabbits are more prone to this and this should be monitored closely. Hepatic lipidosis can be combated by ensuring syringe feeding is done. The patient should be weighed daily to monitor the progress and interventions taken as required, such as increasing the amount of syringe feed being given.

Syringe feeding

Alongside medication, supportive feeding is very important in rabbits with ileus, as this will help to get peristalsis going and move the faeces along the intestines. Table 3 shows feeding calculation for Oxbow critical care. Oxbow is the brand used by the author, but there are other brands available. Mix one part critical care with two parts warm water to the desired consistency. Amounts are general

guidelines and should be adjusted based on the patient condition. Divide feeds between four and six feeds (Oxbow, 2016).

A wide-bored syringe should be used when administering a critical care formula. The food should be administered slowly, waiting for the patient to swallow between each mouthful to avoid aspiration, as you would when syringing any liquid. If the patient will not tolerate syringe feeding then in extreme cases nasogastric feeding tubes can be placed. The sooner the rabbit eats the sooner the intestinal motility will return to normal. Vitamin B complex injections or Cyproheptadine 1–4 mg/rabbit PO 12–24 h may act to stimulate appetite (Fisher, 2011).

Diet

Rabbits are often now referred to as fibrevores as they need a high-fibre diet consisting of digestible and indigestible fibre. Fibrevores are a select kind of herbivore. This group of animals includes rabbits, chinchillas and guinea pigs. What they have in common is that their diet requires mostly fibre because their entire digestive system centres around the nutrient (Burgess, 2015).

When the digestible fibre passes through the caecum it is fermented in symbiotic bacteria that help to digest cellulose and produce vitamin B. This is excreted in sticky droppings called caecotrophs which are usually passed in the night/morning. These droppings are high in nutritional value and have to be re-eaten.

In healthy rabbits caecotrophs should not be seen in the hutch or stuck around the anus, as this indicates poor gut health. Indigestible fibre has no nutritional quality and is excreted as a hard, round pellet, i.e. the normal pellets seen by owners. See Figure 1 for a diagram of the rabbit's digestive system. See Figure 2 for a picture of normal and abnormal faeces.

Changing diets

Patients fed an inappropriate diet should only have the diet changed once fully recovered at home. It is not advised to do this while they are inappetent in hospital as they are less likely to eat unfamiliar food and a sudden diet change can itself cause ileus, which can be detrimental to their recovery.

Rabbits fed a muesli-style rabbit food will eat selectively, which makes this an unbalanced diet. It can lead to dysbiosis and

obesity if they only eat the higher-calorie parts. Dysbiosis refers to the disruption of normal enteric flora, pH and peristalsis. This may occur as a result of stress, improper diet or the administration of antibiotics (Flecknell, 2000).

The pelleted rabbit diet is much better as it cannot be selectively eaten; therefore, it is nutritionally balanced and easy to measure. Rabbits should only be fed one egg cup full of pellets a day as this is all they nutritionally require; extra feed will cause weight gain. When a new diet is introduced it should be done gradually over 14–28 days so as not to upset the animal's digestive health. The new pelleted diet should be gradually added to the feed and the amount of muesli gradually cut down as the pellets are increased in portion size until the diet is completely pellets. It should always be impressed on owners that hay/grass should be the main bulk of the diet.

Feeding guide

As a guide, a rabbit's diet should consist of 80% hay (usually a pile of hay equivalent in size to the rabbit) and available ad lib, 10% vegetables, 5% pellets equivalent to one egg cup full and 5% healthy treats.


Reducing stress

Bonded pairs should not be separated as this can cause more stress and slow down the patient's recovery. This can make it harder to tell when the patient has passed faeces and how much it has eaten. In this case, a pen or barrier can be used so they can see each other and touch through the bars. If a mate can't accompany then some scented bedding from the mate should be brought in to try and reduce stress and provide some comfort.


When stressed or in pain, rabbits release catecholamines that act to decrease gut motility; therefore, stress or pain from an underlying illness can be subtle (Clark & Saunders, 2012).

Keeping rabbits stress-free in hospital is invaluable to their recovery. Ways to reduce this are cardboard boxes to hide in, plastic hideouts to mimic burrows, a towel to cover the front of the kennel, Pet Remedy diffusers and being hospitalised away from predator species. As rabbits are prey species they find being hospitalised very stressful. Midazolam 0.02–2 mg/kg IV IM (Meredith, 2015) can be used in extremely stressed patients.

Pet Remedy has a blend of essential oils and extracts that helps to calm the nerves



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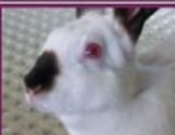
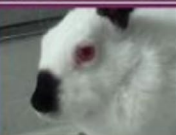






Newcastle
University

The Rabbit Grimace Scale

Research has demonstrated that changes in facial expression provide a means of assessing pain in rabbits.

The specific facial action units shown below comprise the Rabbit Grimace Scale. These action units increase in intensity in response to post-procedural pain and can form part of a clinical assessment alongside other validated indices of pain. The action units should only be used in awake animals. Each animal should be observed for a short period of time to avoid scoring brief changes in facial expression that are unrelated to the animal's welfare.

	Action units		
	Not present "0"	Moderately present "1"	Obviously present "2"
Orbital tightening • Closing of the eyelid (narrowing of orbital area) • A wrinkle may be visible around the eye			
Cheek flattening • Flattening of the cheeks. When 'obviously present', cheeks have a sunken look. • The face becomes more angular and less rounded			
Nostril shape • Nostrils (nares) are drawn vertically forming a 'V' rather than 'U' shape • Nose tip is moved down towards the chin			
Whisker shape and position • Whiskers are pushed away from the face to 'stand on end' • Whiskers stiffen and lose their natural downward curve • Whiskers increasingly point in the same direction. When 'obviously present', whiskers move downwards			
Ear shape and position • Ears become more tightly folded / curled (more cylindrical) in shape • Ears rotate from facing towards the source of sound to facing towards the hindquarters • Ears may be held closer to the back or sides of the body			

Read the original paper: Hastings JCL, Thomas AM, Rowell PA, Leach MC (2012) Evaluation of facial grimace for assessing pain during tailing of rabbits. Changes in physiological, behavioural and facial expression responses. PLOS ONE 7(8): e44437. doi:10.1371/journal.pone.0044437

For guidance on using the Rabbit Grimace Scale, additional images of each action unit, research papers that describe this technique, and for grimace scales in other species, visit: www.nc3rs.org.uk/gimacescales

To request copies of this poster please email: anika@nc3rs.org.uk

The NC3RS provides a range of free resources at www.nc3rs.org.uk/resources

Images kindly provided by Dr Matthew Leach, Newcastle University, and Dr Patrick Hedberg, Swedish University of Agricultural Sciences

The Rabbit Grimace Scale would not have been developed without the continuing work of the Pain and Animal Welfare Sciences Group (PAWQ) at Newcastle University

Figure 3. The Rabbit Grimace Scale

Source: Used with permission. For further reading on the grimace scale, see www.nc3rs.org.uk/gimacescales.

of anxious or stressed pets. It works by enhancing the production of GABA (gamma amino butyric acid), a natural chemical produced by the brain, transmitted from nerve to nerve as a calming message when the body is stressed.

Further reading on this can be found on the link at www.petremedy.co.uk/why-it-work/

Conclusion

Prevention is key to managing ileus. This can be done by reducing stress, feeding a

good consistent balanced diet which can also help prevent dental issues, regular health checks to identify underlying disease, pain management with appropriate analgesia, adequate hydration, preventing ingestion of foreign materials, exercise and prevention of obesity.

Another important factor which can trigger ileus is anaesthesia. Starving may actually be deleterious to the patient's health as it causes a cessation in gut motility and may lead to ileus. It is useful, however, to ensure that no food is present in the mouth at the time of induction of

anaesthesia: a period of 30–60 min starvation (Welsh, 2009).

A combination of dehydration, post-operative pain and the minimum starvation time pre-anaesthesia can all be contributing factors to ileus post-anaesthesia. Unless the primary cause of ileus is determined, the condition may return or become chronic (Krepmpels et al., 2000). Therefore, clients should be made aware of this and educated on how to prevent ileus and what signs to look out for to help with earlier detection and treatment in the future.

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