



**Emma Foreman DipHE CVN
DipAVN (small animal) ISFM DipFN RVN**

Emma Foreman has been working in veterinary practice for over twenty years qualifying in 2002. She has worked at first opinion, charity, referral and emergency hospitals and gained the RCVS Advanced Diploma in 2015 and ISFM Feline Medicine Diploma in 2018. Her special interests are in anaesthesia, ECC and theatre practice. She currently works at a small animal first opinion and referral hospital in Stoke-on-Trent and is the BVNA Regional Representative for Staffordshire and Derbyshire..
Email: emmaforeman@outlook.com

Intestinal obstruction in a rabbit: case study

**Emma Foreman DipHE CVN DipAVN (small animal)
ISFM DipFN RVN**

Lime Trees Vets, Staffordshire, UK

ABSTRACT: Rabbits are complex animals with many requirements for them to thrive in the domestic environment. As prey animals, rabbits instinctively mask the signs of illness to avoid appearing vulnerable to predators. When they show signs of being unwell, it is likely that their condition is serious, and they should be presented to the veterinary surgeon promptly which was this case of a rabbit with an intestinal obstruction.

KEYWORDS: obstruction; rabbit; surgery; medicine; nursing; ECC

Signalment

Gizmo, a 3-year-old, fully vaccinated, neutered male English Spot rabbit.

History

The owner discovered that Gizmo was lethargic and inappetent and presented him to the veterinary practice immediately. It was unclear whether he was passing faeces as he lived with his bonded partner who seemed fit and well. He had appeared well the day before and had been seen eating. Gizmo was admitted to the hospital for further investigations and hospitalisation.

Investigations

The initial history and examination lead to suspicions of gut stasis and metoclopramide and ranitidine were administered subcutaneously (s/c). He was significantly hypothermic at 33.3°C so was placed on a heat pad in a portable oxygen kennel (without supplemental O₂) (see Figure 1) away from the sight and sound of other animals, but central to the practice for close observation. His heart rate was 184 beats per minute and his respiratory rate was 76 breaths per minute (see Table 1 for normal rabbit parameters). A blood sample was obtained, and his packed cell volume (PCV) was 52%. Lactated ringers crystalloid intravenous fluid therapy (IVFT) was initiated via a cannula in the marginal ear vein at 6 ml/kg/hr. A blood glucose (BG) was measured which was elevated at 38 mmol/l (see Table 2) and repeated two hours later which was still elevated at 25.4 mmol/l. Buprenorphine 0.06 mg/kg was administered intravenously

(IV) to provide analgesia. After initial stabilisation and warming, Gizmo's temperature increased to 35.5°C and his heart rate increased to 224 beats per minute. Conscious radiographs revealed gastric dilation and gas in his small intestine (see Figure 2). The veterinary surgeon was concerned that Gizmo had a small intestinal obstruction and performed an exploratory laparotomy.

Anaesthesia and surgery

Gizmo was assigned an American society of Anaesthesiologists (ASA) classification of IV(e) due to the severity of his disease and risk of mortality (see Table 3). Gizmo had already received buprenorphine and no further premedication was provided. 100% oxygen was administered via a close-fitting facemask for several breaths and induction with alfaxalone 6 mg IV was administered. Endotracheal intubation was performed with a 3.5 mm internal diameter uncuffed endotracheal tube (ETT) via



Figure 1. Gizmo in the portable oxygen kennel for close observation.

Table 1. Normal rabbit parameters.

Heart rate (beats/ minute)	150–300
Respiration rate (breaths/minute)	30–60
Rectal temperature (°C)	38.5–40
End Tidal CO ₂ (mmHg)	35–45
SpO ₂ %	98–100
Blood pressure—Systolic/Diastolic/Mean (mmHg)	92–135/64–75/80–91

(Kershaw, 2020a; Grint, 2013).

Table 2. Blood glucose parameters in rabbits.

Blood glucose (mmol/l)	Potential reasons	
<2	Insulinoma/metabolic disease	Severe hypoglycaemia
2–4.1	Lack of food	Moderate hypoglycaemia
4.2–8.2		Normal range
8.2–12	Mild stress	Reaction due to handling
12.1–15	Moderate stress	May be stress related but could indicate start of serious disease
15.1–20	Significant hyperglycaemia	Indicates pain and possibly represents need for surgery
20.1–25	Severe hyperglycaemia	Serious disease present and likely surgical intervention necessary
>25	Critically hyperglycaemic	Immediate surgery or terminal illness

(Harcourt-Brown, 2013).

Table 3. American Society of Anaesthesiologists (ASA) classification scale.

ASA Scale	Physical description	Examples
I	Normal patient with no disease	Healthy patient presented for neutering
II	Mild systemic disease which does not limit normal function	Controlled diabetes mellitus
III	Moderate systemic disease that limits normal function	Uncontrolled diabetes mellitus, symptomatic heart disease
IV	Severe systemic disease that is a constant threat to life	Sepsis, organ failure, heart failure
V	Moribund patient not expected to survive >24 hours without surgery	Shock, severe trauma, multiple organ failure
E	Describes patient is an emergency	Gastric dilatation—volvulus, respiratory distress

(Posner, 2016).

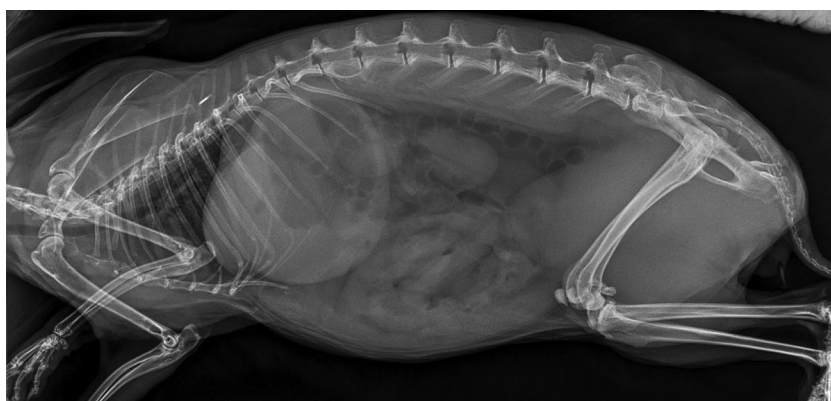


Figure 2. Gizmo's radiograph before surgery.

direct visualisation with an otoscope. Anaesthesia was maintained with 100% oxygen and isoflurane delivered via a paediatric T-piece with APL valve (Mapleson D) (Hughes, 2016). Gizmo was placed in dorsal recumbency with a wedge placed to

gently elevate his head and thorax. Capnography, end tidal CO₂, electrocardiogram (ECG), oscillometric blood pressure, oesophageal temperature and oxygen saturation (spO₂%) were monitored constantly throughout, with readings recorded

every five minutes on the anaesthesia record. Preparation of the surgical site was performed with warmed 2% chlorhexidine surgical scrub solution to prevent further heat loss and lint-free swabs followed by Chlorprep isopropyl alcohol and chlorhexidine applicator.


A midline exploratory laparotomy was performed by the veterinary surgeon, and an obstruction was discovered in Gizmo's distal jejunum/proximal ileum. The veterinary surgeon was able to manually advance the obstruction through the ileocolic valve avoiding an enterotomy. No further abnormalities were detected, and routine closure of the surgical site was performed.

Post-operative care


Despite, active warming, Gizmo's temperature decreased to 34.6°C during surgery (see Table 4) and he was placed back into the portable O₂ kennel (without O₂ delivery) to continue warming rather than the exotics ward which is not central to the practice to enable close observation. Gizmo's temperature gradually increased along with his demeanour. Two hours post-surgery, Gizmo's rectal temperature had increased to 37.3°C and he was becoming more alert and moving around his kennel. Gizmo was offered food including his favourite greens to encourage him to eat which he did not do voluntarily, therefore, syringe feeding commenced with Supreme Recovery food to prevent gut stasis and hepatic lipidosis (Kershaw, 2020b). Gizmo's BG remained high at 25.4 mmol/l immediately post-operatively, but was within normal limits the following morning, when he began eating voluntarily. He continued to receive metoclopramide and ranitidine for their prokinetic effects on the gut and buprenorphine, and meloxicam was added for additional analgesia. He was moved to the exotics ward and as the only patient in there, he was allowed the floor space to exercise with plenty of room for a shelter for privacy, a litter tray, hay and food. His IVFT was decreased to 6 ml/kg/hr and was delivered in frequent boluses rather than a constant rate infusion to allow Gizmo to utilise his space and reduce the risk of him interfering with the giving set. The rabbit grimace scale was used to assist in quantifying Gizmo's pain to ensure that this was controlled (see Figure 3). By 2 pm the day after surgery Gizmo's pain score was 1/10 and the veterinary surgeon reduced the dose of buprenorphine accordingly. He continued to eat well, started to produce normal faecal pellets and his temperature normalised. He was discharged the following day to continue his recovery at home with oral medication in

Table 4. Factors affecting body temperature under general anaesthesia.

The hypothalamus which acts as the body's thermostat is depressed by anaesthesia
Anaesthesia prevents movement and shivering which help to maintain body temperature
Anaesthetic drugs may cause peripheral vasodilation
Clipping large areas of fur for surgery
Cold surgical scrub solutions
Evaporative losses during surgery
(Grint, 2013).



National Centre
for the Replacement
Refinement & Reduction
of Animals in Research


















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"
<p>Orbital tightening</p> <ul style="list-style-type: none"> • Closing of the eyelid (narrowing of orbital area) • A wrinkle may be visible around the eyes 			
<p>Cheek flattening</p> <ul style="list-style-type: none"> • Flattening of the cheeks. When 'obviously present', cheeks have a sunken look. • The face becomes more angular and less rounded 			
<p>Nostril shape</p> <ul style="list-style-type: none"> • Nostrils (nares) are drawn vertically forming a 'V' rather than 'U' shape • Nose tip is moved down towards the chin 			
<p>Whisker shape and position</p> <ul style="list-style-type: none"> • 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 			
<p>Ear shape and position</p> <ul style="list-style-type: none"> • 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: Keating SGL, Thomas AA, Rickard PA, Leach MC (2012) Evaluation of facial expression responses (FUROR) in rabbits. *Changes in physiological, behavioural and facial expression responses*. PLOS ONE 7(9): e44437. doi:10.1371/journal.pone.0044437

To request copies of this poster, please email: enquiries@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 Patricia Heberly, Smith 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 (PAWS) at Newcastle University

Figure 3. The Rabbit Grimace Scale (Keating et al., 2012).

his familiar surroundings. He proceeded to make a full recovery (see Figure 4).

Discussion

Rabbit Welfare Association and Fund (RWAF, 2021) recommend that bonded partners should accompany rabbits with all veterinary practice visits and hospitalisation. It was

decided that due to the severity of Gizmo's condition that it was better to monitor him without his bonded partner being present. Important indicators such as voluntary food consumption and faecal output was easier to monitor with Gizmo being hospitalised alone.

As a prey species it is important to house rabbits away from the sight and sound

of predators and the only options were to house Gizmo in the preparation room where dogs and cats were visible to him or in the exotics ward which was not central to the practice. The portable oxygen kennel was utilised to allow Gizmo to be hospitalised central to the practice away from the sight and sound of predators for close observation (see Figure 1).

Rabbits are known to mask signs of illness to avoid being vulnerable to predators, therefore, when signs of illness are noticeable, the rabbit is likely to be significantly unwell (Harcourt-Brown, 2011). When Gizmo presented hypothermic, anorexic and lethargic it was important to initiate immediate treatment of his presenting signs. Shock can develop rapidly in rabbits and can be difficult to assess compared to dogs and cats; pulses are difficult to palpate in the locations often utilised in dogs and cats, although can be successfully palpated from the auricular artery in rabbits, heart rate and respiratory rate are often rapid when assessed in the veterinary setting due to the stress of unfamiliar surroundings and sounds such as barking dogs, therefore, unreliable indicators (see Table 1) (Harcourt-Brown, 2011). In urgent cases, immediate palliative treatment should commence to keep the rabbit alive even in the absence of a diagnosis. The veterinary surgeon suspected that Gizmo had gut stasis and administered metoclopramide and ranitidine (prokinetic drugs) to attempt to improve this prior to performing diagnostic testing. However, prokinetic drugs are contraindicated if an intestinal obstruction is suspected due to the risk of a gastro-intestinal perforation (King, 2009; Meredith, 2019). Signs of gastrointestinal perforation include the stomach suddenly becoming flaccid on palpation after initially feeling distended and the rabbit rapidly deteriorating and becoming unresponsive (Thompson et al., no date). A blood glucose spot test could have been performed during the initial examination to help to determine between obstructive and non-obstructive causes of the clinical signs (Harcourt-Brown, 2011). Analgesia is vitally important in rabbits as they often mask the signs of pain and if left untreated this and the stress caused by it can stimulate the sympathetic nervous system to produce adrenaline which can slow gut motility and contribute to ileus and hepatic lipidosis (Varga, 2014). It is important to be aware that many dose rates are higher for analgesic drugs in rabbits than in canine and feline patients (Harcourt-Brown, 2011).

Gizmo was severely hypothermic with an initial rectal temperature of 33.3 °C, his PCV was 52%, the normal range for rabbits being



Figure 4. Gizmo at home after making a full recovery.

33–45% with readings >45% indicative of dehydration (Harcourt-Brown, 2013), and his BG was 38 mmol/l indicating critical hyperglycaemia (see Table 2). Therefore, he was in a critical condition.

IVFT was started at 6 ml/kg/hr and increased to 10 ml/kg/hr during surgery as recommended by Eatwell (2014) to avoid evaporative losses when opening a body cavity. Due to the hypothermia, a fluid warmer set to 40°C was utilised to assist in warming Gizmo and preventing further heat loss.

BG is an important indicator to distinguish between gut stasis and gastrointestinal obstruction in painful abdominal conditions in rabbits (see Table 2). Only a drop of blood is required when using a glucometer and samples can be obtained from the ear using a lancet. Most glucometers can only be calibrated for use in dogs and cats and it is recommended to use either setting as long as the same calibration is used each time. Readings >20 mmol/l signify a poor prognosis and may require prompt surgery (Harcourt-Brown, 2011). Gizmo's BG decreased to 25.4 mmol/l within two hours of therapy but was still within the critical hyperglycaemia threshold (see Table 2).

Harcourt-Brown (2013) explained that as rabbits are not able to vomit or eruct due to the tightness of their cardiac sphincter. If an intestinal foreign body is present, there is no way for gas and food to exit the stomach as there is no space for movement into the small intestine due to the blockage. If not treated promptly the stomach can become tympanic and eventually perforation of the stomach or small intestine can occur. Gizmo's stomach

appeared dilated on his radiographs, but not yet tympanic (see Figure 2).

The obstruction may have advanced through the ileocolic junction without surgical intervention as there was signs of improvement following the initial medication. However, due to the risk of perforation, it was decided to perform the exploratory laparotomy without delay. Intestinal obstruction is a common cause of sudden death in rabbits due to the rapid deterioration that occurs and if undetected, rabbits can die 6–8 hours following the occurrence of the obstruction, and Gizmo's raised BG was a good indicator of this as rabbits presenting with gut stasis rarely have a BG >15 mmol/l (Harcourt-Brown, 2013).

The ASA classification system was utilised to give an indication of anaesthetic risk to Gizmo (see Table 3). It can be argued that a healthy rabbit has an ASA of II/III due to the physiological effects caused by the stress of being in the veterinary practice, which can be detrimental to rabbits in the same way as pain and raise catecholamine levels utilised in the fight or flight response which can contribute to gut stasis (Foote, 2020; Varga, 2014). Gizmo was assigned an ASA score of IV(e) meaning that his condition posed a constant threat to life. The 'e' added to signify that the anaesthetic was being performed as an emergency and adequate stabilisation may not have been achieved as a delay would increase the threat to life (Posner, 2016). Emergency resuscitation drug dosages of adrenaline and atropine were prepared before induction of anaesthesia as recommended by Grint (2013) for all patients with ASA IV/V. Atropine may require repeated dosages at 15 minute intervals due to 60% of rabbits having endogenous atropinase which can reduce its efficacy. The use of glycopyrrolate may be more beneficial in rabbits but atropine can be used in emergencies if this is unavailable (Meredith, 2019; Sibbald, 2018).

Pre-oxygenation is important before induction of anaesthesia to delay desaturation in case of difficult intubation (Grint, 2013). This can be provided by close fitting face mask, flow-by or an oxygen kennel (Mancinelli, 2017). There is risk of causing hypercapnia when delivering oxygen in rabbits for prolonged periods of time. This is because they dislike the smell of 100% oxygen which can encourage breath holding, therefore, having the opposite effect of what is intended (Hinde, 2020). Instead of placing rabbits in an oxygen kennel before induction of anaesthesia, it is recommended to give a few breaths of 100% oxygen via a

tight-fitting face mask immediately before administration of induction agents to avoid this (Hinde, 2020; Mancinelli, 2017).

Ideally Gizmo would have been warmed to his normal rectal temperature before surgery because hypothermia increases the risk of mortality and can contribute to prolonged recovery from anaesthesia (Kershaw, 2020b), however, the risk of intestinal perforation outweighed this. Under general anaesthesia there are multiple factors which affect thermoregulation (see Table 4) and it was not surprising that Gizmo's temperature decreased further despite active warming methods.

It is a usual practice to provide a multi-modal combination of premedication drugs which reduces the minimum alveolar concentration (MAC) of volatile agent use, and, therefore, minimising the cardiovascular depressant effects. This was not done with Gizmo as he was severely hypothermic and lethargic, and it was likely that the drugs would have a prolonged duration of action due to this and would have increased the anaesthetic risk further (Grint, 2013). It may have been useful to utilise local anaesthesia methods and/or constant rate infusions to provide additional multi-modal analgesia which would also reduce the volatile agent requirement reducing the MAC further.

An ETT was placed to maintain Gizmo's airway and facilitate delivery of oxygen and isoflurane to maintain the anaesthesia. Other available airway devices are face-masks and supraglottic airway devices. It is sensible to use a device that is familiar in the case of emergency surgery and with intermittent positive pressure ventilation (IPPV) capabilities. An ETT was selected, however, a supraglottic airway device was taken into theatre in case the ETT became dislodged so that an airway could quickly be re-gained if necessary. A face mask was suboptimal in this case due to the increased risk of environmental contamination of inhalant gases and the inability to provide adequate IPPV (Grint, 2013; Kershaw, 2020a).

Rabbits have a small chest cavity and a tidal volume of 6–8 ml/kg compared to that of dogs and cats which is 10–15 ml/kg (Grint, 2013). Care must be taken when providing IPPV not to overinflate the lungs and cause barotrauma. Also, it is important to elevate the head and chest when the rabbit is positioned in dorsal recumbency as rabbits have a much smaller chest size compared to their abdomen and pressure from the abdominal contents on the diaphragm can restrict breathing and reduce the tidal volume further (Grint, 2013). The same monitoring

equipment was utilised to that used when monitoring dogs and cats which includes the standard use of a multi-parameter monitor to measure, ECG, side stream capnography, end tidal CO₂, oesophageal thermistor probe, pulse oximeter and oscillometric blood pressure (Kershaw, 2020b).

Intestinal foreign bodies in rabbits commonly consist of pellets of impacted fur which can sometimes move through the small intestine obstructing periodically but eventually passing. Evidence of this has been seen during surgery or on post-mortem examination revealing multiple inflamed areas of small intestine (Harcourt-Brown, 2013). No other inflamed lesions were seen throughout Gizmo's small intestines, so it is likely that this event was the primary site of the obstruction, yet it remains unclear whether this would have resolved had surgery not been performed.

As soon as Gizmo's rectal temperature improved and he became more alert, it was important to initiate feeding. Assisted feeding is the encouragement of voluntary consumption of food and Gizmo was offered his favourite greens and fresh dandelion leaves. He was not interested initially, therefore, force feeding was necessary to avoid post-operative gut stasis and hepatic lipodosis (Kershaw, 2020b). Supreme Recovery food was selected as it can be mixed with water to a suitable consistency to syringe into the mouth of the rabbit. The RWF recommend that 8–12 ml/kg should be fed four times daily, however, some rabbits will only tolerate small amounts at a time. Gizmo tolerated 10ml and then refused to swallow the food, therefore, this was repeated every two hours until he began to eat voluntarily twelve hours post-operatively.

Throughout Gizmo's hospitalisation, the Rabbit Grimace Scale (RbtGS) (Keating et al., 2012) was utilised as a pain scoring method to quantify his pain and allow for adjustments in his analgesia as required. The RbtGS has five action units that the user must assess, including orbital tightening, cheek flattening, nostril shape, whisker position and ear shape and position (see Figure 3). A score out of ten is given, however, for lop eared rabbits, the ear position section can be omitted and a score out of eight assigned. Unlike other validated pain scoring methods utilised in other species, there is no set intervention

score, therefore, frequent reassessments are recommended to monitor trends following analgesic administration. The assessment should be performed from a distance if possible, to prevent alterations due to human presence (Bradbrook, 2019).

Conclusion

It is contraindicated to administer gut motility drugs to rabbits with gastrointestinal obstructions. At the time of administration, it was not obvious that this was the case with Gizmo as diagnostic testing had not yet been performed. It is possible that surgery may have been avoided and that the supportive treatment and medication may have been enough for the obstruction to pass through the ileocolic valve without causing intestinal perforation. An enterotomy was not required and manual advancement of the obstruction was possible. However, if an intestinal perforation had occurred, the surgery would have posed a much higher risk of mortality for Gizmo. In the future, if cases such as Gizmo present at the surgery it shall be encouraged to perform a BG test as part of the initial triage as it is an essential indicator of the severity of disease in rabbits and assists in distinguishing between gut stasis and gastrointestinal obstruction.

This was an interesting and challenging case and Gizmo made a full recovery and was successfully reunited with his bonded partner a few days following surgery (see Figure 4).

Disclosure Statement

No potential conflict of interest was reported by the author(s).

References

- Bradbrook, C. (2019). Practical acute pain assessment. Retrieved February 14, 2021, from <https://alfaxan.co.uk/news/practical-acute-pain-assessment#:~:text=The%20rabbit%20grimace%20scale%20was%20developed%20for%20use,zero%20to%20two%20and%20a%20final%20score%20calculated.>
- Eatwell, K. (2014). Analgesia, sedation and anaesthesia. In A. Meredith & B. Lord (Eds.), *BSAVA manual of rabbit medicine* (pp. 138–159). British Small Animal Veterinary Association Gloucester.
- Foote, A. (2020). Evidence-based approach to recognising and reducing stress in pet rabbits. *Veterinary Nursing Journal*, 35(6), 167–170. <https://doi.org/10.1080/17415349.2020.1790449>

Grint, N. (2013). Anaesthesia. In F. Harcourt-Brown & J. Chitty (Eds.), *BSAVA manual of rabbit surgery, dentistry and imaging* (pp. 1–25). British Small Animal Veterinary Association Gloucester.

Harcourt-Brown, F. (2011). Critical and emergency care of rabbits. *Veterinary Nursing Journal*, 26(12), 443–446. <https://doi.org/10.1111/j.2045-0648.2011.00119.x>

Harcourt-Brown, F. (2013). Gastric dilation and intestinal obstruction. In F. Harcourt-Brown and J. Chitty (Eds.), *BSAVA manual of rabbit surgery, dentistry and imaging* (pp. 172–189). British Small Animal Veterinary Association Gloucester.

Hinde, J. (2020). *Rabbit anaesthesia: Getting it right for rabbits*. Lecture. Online.

Hughes, L. (2016). Breathing systems and ancillary equipment. In T. Duke-Novakovski, M. de Vries, & C. Seymour (Eds.), *BSAVA manual of canine and feline anaesthesia and analgesia-third edition* (pp. 45–64). British Small Animal Veterinary Association Gloucester.

Keating, S. C. J., Thomas, A. A., Flecknell, P. A., & Leach, M. C. (2012). Evaluation of EMLA cream for preventing pain during tattooing of rabbits: Changes in physiological, behavioural and facial expression responses. *PLoS One*, 7(9), e44437. 0044437 <https://doi.org/10.1371/journal.pone>

Kershaw, T.E. (2020a). A summary of rabbit anaesthesia- part 1: Preparation and pre-operative nursing. *Veterinary Nursing Journal*, 35(9-12), 312–315. <https://doi.org/10.1080/17415349.2020.1806766>

Kershaw, T.E. (2020b). A summary of rabbit anaesthesia- part 2: Intra-operative nursing and the recovery period. *Veterinary Nursing Journal*, 35(9-12), 351–353. <https://doi.org/10.1080/17415349.2020.1806767>

King, C. (2009). Post-operative nursing care of the rabbit patient. *Veterinary Nursing Journal*, 24(2), 24–25. <https://doi.org/10.1080/17415349.2009.11013065>

Mancinelli, E. (2017). Rabbit anaesthesia: How to keep them alive. Retrieved February 13, 2021, from https://d12geb613t2qxc.cloudfront.net/webinar_resources/uploads/2017/01/Rabbit_Anaesthesia_How_To_Keep_Them_Alive_Elisabetta_Mancinelli.pdf

Meredith, A. (2019). *BSAVA small animal formulary 9th edition-part B: Exotic pets*. British Small Animal Veterinary Association Gloucester.

Posner, L. P. (2016). Pre-anaesthetic assessment and preparation. In T. Duke-Novakovski, M. de Vries, & C. Seymour (Eds.), *BSAVA manual of canine and feline anaesthesia and analgesia-third edition* (pp. 6–12). British Small Animal Veterinary Association Gloucester.

Rabbit Welfare Association and Fund (RWF). (2021). Syringe Feeding Guide. Retrieved February 14, 2021, from <https://rabbitwelfare.co.uk/rabbit-health/medical/syringe-feeding-guide/>

Sibbald, R. (2018). Principles of rabbit anaesthesia for veterinary nurses. *The Veterinary Nurse*, 9(4), 202–206. <https://doi.org/10.12968/vetn.2018.9.4.202>

Thompson, L., Shrubsole-Cockwill, A., & Baldrey, V. (No date). Gastrointestinal obstruction/foreign body. Retrieved March 31, 2021, from <https://www.vetstream.com/treat/lapis/freeform/gastrointestinal-obstruction-foreign-body>

Varga, M. (2014). The rabbit-friendly practice. In A. Meredith & B. Lord (Eds.), *BSAVA manual of rabbit medicine* (pp. 59–79). British Small Animal Veterinary Association Gloucester.