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The nutritional needs of rabbits

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ABSTRACT: Rabbits are strict herbivores who require a high-fibre, abrasive diet for optimum digestive function. Diet plays a key role in preventing or lessening in severity several common health problems, as well as providing environmental enrichment, and therefore feeding rabbits correctly and understanding their nutritional needs is vital for veterinary nurses.

Introduction

Rabbits have species specific nutritional needs, which are often poorly understood by many owners. Correct nutrition is vital for rabbits and can help ensure that many common health problems are avoided throughout life.

Feeding and dentation

Rabbits feed frequently; up to 30 times per day, consuming each time approximately 2–8 grams of food over 4–6 minutes (Mancinelli, 2016).

Rabbits have a total of 28 adult teeth of which the incisors grow 2–3 mm per week and the molars approximately 3 mm per month. Deciduous teeth are present in the foetus but are shed before or just after birth.

Rabbits are strict herbivores, relying upon bacteria in the caecum to ferment food for digestion, and they need a constant throughput of food to ensure maximum gastrointestinal tract motility and function.

Fibre

Both digestible (soluble) and indigestible (insoluble) fibre is important within the diet of rabbits. Fibre is separated into indigestible and digestible components within the proximal colon (Prebble, 2014).

Particles that are larger than 0.3 mm in diameter are moved into the colon and form the copious amounts of droppings that rabbits produce on a daily basis.

These indigestible fibre particles have no nutritional value for the rabbit, but are essential due to the part they play in keeping their gastrointestinal tract moving and the wear provided to the constantly growing teeth.

Those particles under 0.3 mm are moved into the caecum where they undergo fermentation and production of fatty acids, which provides up to half of the rabbit's energy requirements.

The caecotrophs are collected as they are passed from the anus. The digestion of caecotrophs is important and provides vitamins K and B, which are essential. Many rabbits on a high-energy diet, obese or arthritic rabbits, those with large dewlaps or dental disease may be unable to reach around to collect the caecotrophs as they are passed. These are often squashed on the enclosure floor or clag up around the rabbit's tail, leading to an increased risk of flystrike and hygiene concerns.

Rabbits eat grass! This is a saying that should be emphasised to all rabbit owners. Undoubtedly and without question, the single most important foodstuff that rabbits must eat is grass and hay and this should make up a minimum of 80% of the rabbit's daily diet (**Figure 1**).

Grass and hay is highly abrasive and is vital in providing correct dental wear (**Figure 2**). Rabbits chew with a lateral and horizontal chewing motion when consuming natural vegetation, and can chew up to 200 times per minute (Mancinelli, 2016).



▣ **Figure 1.** The importance of hay in the diet can never be underestimated

Photo: C. Speight.



▣ **Figure 2.** Rabbits should have adequate opportunity to graze on fresh grass

Photo: C. Speight.



▣ **Figure 3.** A selection of fresh vegetables can be offered daily

Photo: C. Speight.

Adequate fibre levels will be reached if ad-lib grass and hay is provided and consumed by the rabbit (Prebble, 2014).

Many owners will say that their rabbit refuses hay or will not eat much of it. Often these rabbits have never associated hay as a foodstuff and, much like a small child, are reluctant to try new things.

There are several species of hay available in the UK, and these include: ryegrass, timothy, fescues, meadow grass and Cocksfoot (orchard grass). The fibre content and quality of grass hays varies throughout the year and due to the conditions the hay was grown in (such as the type of soil) and other environmental factors.

Many rabbits have distinct preferences as to what hay they prefer and may refuse to eat certain types. Owners should be encouraged to try a variety of hays, which can be offered by several methods. Hay can be offered in racks raised off the ground, placed into bowls or containers, or stuffed into empty toilet roll tubes, which also acts as toys for entertainment. Many rabbits also like a large litter tray or plastic dog bed filled with hay to dig and forage in. Placing a pile of hay in the litter trays will also encourage them to eat, as rabbits seem to like nothing better than to munch on something as they do their business!

Alfalfa hay should be avoided in non-breeding adult rabbits, because the calcium content is considered too high and has been cited as a possible predisposing factor in the formation of urinary calculi.

Straw can be used as bedding, but has little nutritional value, so hay must also be available if straw is used as a bedding material.

Fatty acids

It is generally considered that the essential fatty acid (EFA) requirements of the rabbit are met by plant materials, and this is achieved with a diet containing 2.5% fat (Lowe, 2010).

Protein levels

Rabbits are prone to obesity, so protein levels of 12–17% are generally adequate for neutered, pet rabbits. Young, growing rabbits or lactating females will need higher protein levels, and those of 18–19% have been suggested (Prebble, 2014).

Dried concentrates

Dried food has its place within a balanced diet, but should make up no more than 5% of the daily food allowance, equating to approximately 1 tablespoon per kilogram of body weight or an eggcup full for the average 2.5 kg rabbit. There are many varieties of concentrates on the market, but muesli foods are no longer recommended and have been shown to be a contributing factor to dental disease (Meredith, Prebble, & Shaw, 2015).

Pellet or nugget concentrates are best as they remove the risk of selective feeding and ensure that the diet is balanced in vitamins and minerals. The fibre content

of the pellet should be as high as possible, over 20% and preferably higher.

Scatter feeding the concentrate portion is a more natural feeding pattern for rabbits rather than sitting at a food bowl. It encourages exercise and foraging, and ensures they take longer to eat the food.

Rabbits should not have free access to dried food all day, but should have a small, measured quantity and spend the majority of their time eating grass and hay.

Water

On average, rabbits will drink 50–100 ml/kg/24 hours (Brewer & Cruise, 1994), but this will vary depending upon the diet offered. Rabbits that have access to grass and fresh greens will get the majority of their fluid intake from these and may not appear to drink very much at all. Those rabbits on a diet which is hay-based are likely to be observed to drink more frequently.

Rabbits prefer a water bowl to a water bottle (Harcourt-Brown, 2011), although it may be better to offer both. Dehydration of the gastrointestinal tract due to the rabbit not being able to access water can lead to gastrointestinal stasis, so in winter, bottles (including the spout), and bowls must be checked several times a day to ensure the water hasn't frozen. Covers can be obtained for water bottles or heat pads placed under water bowls to help prevent the water from freezing.

Fresh vegetables

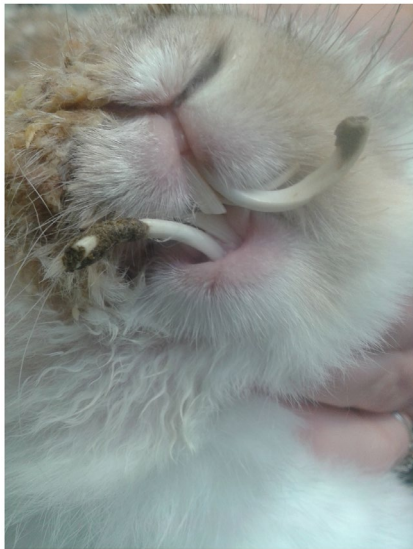
Rabbits have extremely sensitive taste buds, and are believed to have in the region of 17,000 (Speight, 2015). Most rabbits enjoy a daily helping of fresh greens (Figure 3), of which a variety is safe to feed rabbits. By and large the greener the better, so items such as broccoli, fresh greens, herbs, spinach, kale, cauliflower leaves, pea pods, celery, etc., are suitable foodstuff for rabbits. Fruits and carrots are high in sugar, albeit natural, so should be fed only in small amounts and as an occasional treat.

Fresh food quickly spoils so should be removed if uneaten within a couple of hours, especially in summer when it will wilt or in winter when it may freeze.

When introducing new fresh foods, this should be done with care. Introduce one food at a time, gradually building the



❖ **Figure 4.** Poor diet leading to excessive caecotroph production is a contributing factor to flystrike
Photo: C. Speight.



❖ **Figure 5.** Incorrect or poor diet can be a contributing factor to dental disease
Photo: C. Speight.

amount up over a week or two. If there are no adverse effects, then repeat the process with another vegetable. Fresh food should make up around 15% of a rabbit's daily food intake, feeding approximately half a mug full, per kilogram of bodyweight.

Treats

Rabbits do not need treats in their diet, but many owners want to be able to offer their rabbit a treat now and then. All human food (other than vegetables) should be avoided, because rabbits do not digest sugars effectively and this can lead

to dysbiosis within the caecum caused by excess sugar. Any products containing dairy, sugar or those low in fibre should be avoided because they are not suitable for rabbits to eat.

A small piece of fruit or a hay-based, high-fibre treat can be offered occasionally. Items such as raisins, corn cobs, locust bean pods and peanuts must be avoided, not only due to the high sugar content of some, but also due to the choking hazard and possibility of them becoming lodged in the exit of the stomach, potentially causing a blockage.

Dietary alterations

When altering the diet, which may be necessary if the current diet is poor or the rabbit needs to lose or gain weight, it is important to do so slowly and over a minimum of two weeks. The gut flora is sensitive to change and any sudden changes can cause fatal diarrhoea, even in adults.

It is also important not to change the diet of ill rabbits. Ill rabbits should be offered food that is familiar to them, especially those who are in gastrointestinal stasis or slowdown. Once the rabbit has recovered, the diet can be assessed and altered accordingly over a period of time.

Foraging for weeds

Many wild growing plants are suitable to feed. It is imperative that rabbits are fully vaccinated against Myxomatosis and Rabbit Viral Haemorrhagic Disease 1 and 2 before offering any wild plants. All plants must be washed thoroughly before being offered and it is best to advise owners to do their research prior to picking wild plants, as some are not suitable to feed.

Health problems associated to poor or incorrect diet

Many health problems can be prevented or lessened in their degree of severity if rabbits are fed correctly. Diets high in fat or those fed excessive amounts of concentrated dried food or treats often lead to obesity, which in itself can restrict the rabbit's ability to groom and lead to other conditions. Obese and overweight rabbits are more prone to osteoarthritis,

pododermatitis, heart disease and hepatic lipidosis. Obesity, coupled with the rabbit being unable to groom themselves effectively, increases the rabbit's risk of flystrike (**Figure 4**).

Rabbits that are overfed concentrated dried food are unlikely to eat sufficient amounts of hay and grass, leading to a diet low in fibre. These rabbits will be more prone to gastrointestinal stasis. Dental disease has many factors associated with its prevalence, but rabbits fed a diet low in abrasive matter do not get the dental wear necessary, which is one of the main causes of dental disease (**Figure 5**).

Things to remember

Feeding rabbits correctly doesn't need to be complicated and can be achieved by following some simple rules.

- (1) Feed a diet high in fibre
- (2) Offer ad-lib amounts of hay
- (3) Allow rabbits access to graze on fresh grass when available
- (4) Make changes to the diet slowly
- (5) Avoid sugary food items
- (6) Do not allow rabbits to have constant access to dried concentrates
- (7) Any treats should be offered in limited amounts and should be suitable for rabbits
- (8) Encourage rabbits to forage for their food
- (9) Offer a water bottle and bowl
- (10) Monitor the rabbit's weight for signs of loss or gain.

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Multiple Choice Questions

1. A rabbit can eat up to 30 times a day, how much food do they consume each time they eat?

- (a) 6-10 grams
- (b) 2-4 grams
- (c) 2-8 grams
- (d) No more than 6 grams

2. Where in the GI tract are fibres sorted into digestible and non-digestible?

- (a) Caecum
- (b) Stomach
- (c) Oesophagus
- (d) Proximal Colon

3. Per the article, what 2 vitamins do the ingestion of caecotrophs provide to the rabbit?

- (a) A and E
- (b) K and C
- (c) K and B
- (d) E and K

4. What percentage of a rabbit's daily diet should grass and hay make up?

- (a) 80%
- (b) 75%
- (c) 60%
- (d) 90%

5. Who suggested that fats should make up 2.5% of the rabbit's diet?

- (a) Speight, 2015
- (b) Meredith et al 2015
- (c) Lowe, 2010
- (d) Prebble, 2014

6. Rabbits are believed to have how many taste buds?

- (a) 17,000
- (b) 25,000
- (c) 10,000
- (d) 7,000

7. Why should sugary snacks be avoided in rabbits?

- (a) It can cause tooth rot

- (b) They could cause a blockage
- (c) Rabbits don't like them
- (d) Rabbits are unable to digest them properly

8. Obesity in rabbits can lead to a higher risk of which disease?

- (a) Osteoarthritis
- (b) Hepatic Lipidosis
- (c) Pododermatitis
- (d) All the above

9. Incisors grow at how many mm per week?

- (a) 4-5 mm
- (b) 1-2 mm
- (c) 2-3 mm
- (d) 0-1 mm

10. Caecotrophs are normally eaten by the rabbit, if the rabbit cannot eat these what can they become at risk of?

- (a) Obesity
- (b) Fly Strike
- (c) Overgrown teeth
- (d) Overgrown nails

For the answers to the MCQs, please go to: <http://www.bvna.org.uk/publications/veterinary-nursing-journal>

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