

<p><b>Institution:</b> University of Edinburgh and SRUC, Scotland's Rural College</p>
<p><b>Title of case study:</b> Widespread removal of muesli-style diets from retail outlets and changes to feeding policy following the identification that they are detrimental to rabbit health.</p>
<p><b>1. Summary of the impact</b></p> <p><b>Impact:</b> Animal Health and Welfare, Policy. Immediate impact on changing the dietary advice for pet rabbits including the withdrawal of muesli-type diets from the UK's largest pet food retailer chain (Pets at Home).</p> <p><b>Significance:</b> Rabbits are popular companion animals, with an estimated 1.7 million pet rabbits in the UK. Feeding of muesli-type diets is detrimental to rabbit digestive and dental health.</p> <p><b>Beneficiaries:</b> Pet rabbits, rabbit owners, veterinary surgeons, rabbit rescue and welfare organisations.</p> <p><b>Attribution:</b> Prof. Meredith, Dr Shaw and Ms. Lord (University of Edinburgh, UoE).</p> <p><b>Reach:</b> International: Widespread national (UK) recognition of the adverse effects of muesli-type diets to pet rabbit health and welfare. In addition, Professor Meredith's research was adopted into the new <i>European-wide Rabbit Nutritional Guidelines</i> published by FEDIAF (European Pet Food Industry)</p>
<p><b>2. Underpinning research</b></p> <p>Despite the popularity of rabbits as companion animals, feeding trials to determine basic dietary requirements of pet rabbits have not been performed, resulting in variable dietary recommendations. Nutritional guidelines currently available for rabbits have remained unchanged since the 1970s and are based on research conducted on short-lived commercially farmed or laboratory rabbits. Diets formulated to these guidelines, in particular muesli-type diets, have been implicated for many years by clinicians and welfare organisations as playing an important role in many disease processes, particularly when fed in the absence of hay or grass. The 2011 PDSA Animal Wellbeing Report [3.1] found that of 11,000 UK pet owners estimated that at least 750,000 rabbits are not getting the recommended daily amount of hay or grass, 49% of owners feed muesli diets as the main food, and inappropriate diet was the primary rabbit welfare concern of vets and vet nurses responding to the survey. The most recent 2012 PDSA Animal Wellbeing report [3.2] found that 44% of owners continue to feed mainly muesli and continued to identify inappropriate diet and dental disease as the top welfare concerns for rabbits.</p> <p>Our research (Meredith (Professor of Zoological and Conservation Medicine), employed 1992-onwards; Shaw (Senior Lecturer, statistics), employed 2000-onwards and Lord (Lecturer in Rabbit Medicine), employed 2008-2011) involved a two-year (from 2010) controlled feeding trial on 32 Dutch rabbits at FERA (The Food and Environment Research Agency), assessing the effects on rabbit health and welfare of four diets: Hay only (fed ad lib Timothy hay); Nugget and hay (fed 50g/day extruded nuggets and ad lib Timothy hay); Muesli only (fed 125g/day muesli); and Muesli and hay (fed 60g muesli/day and ad lib Timothy hay). The key aims of this study were to investigate the effects of these diets on body weight and body condition score, food and water intake, faecal output, dental health and behaviour.</p> <p>The study found statistically significant evidence that feeding of muesli is associated with:</p> <ul style="list-style-type: none"> <li>• Obesity (BCS&gt;4) and inactivity - rabbits fed muesli only spent the least time feeding and most time inactive [3.3]</li> <li>• Selective feeding, leading to intake of an unbalanced diet with low fibre intake. Rabbits fed muesli selectively ate the grains and extrudates, and left the stalks and fortified pellets [3.4]</li> <li>• Reduced water intake [3.4]</li> <li>• Smaller droppings and low faecal output, indicating reduced gastrointestinal motility (3)</li> </ul>

## Impact case study (REF3b)

- Uneaten caecotrophs [3.4].
- Dental disease - increased tooth length and curvature (PM1) and widening of interdental space between M1-M2 in both groups fed muesli, indicating early dental pathology. 37.5% rabbits in muesli-only group developed clinical dental disease and had to be removed from the study [3.4].

### 3. References to the research (max 6)

- 3.1. PDSA Animal Wellbeing Report (2011) <http://tinyurl.com/q9z6rht>
- 3.2. PDSA Animal Wellbeing Report (2012) <http://tinyurl.com/obgwy2e>
- 3.3. Prebble JL, Meredith AL. Food and water intake and selective feeding in rabbits on four feeding regimes. Journal of Animal Physiology and Animal Nutrition (accepted, in press). (Copy of paper available on request.)
- 3.4. Meredith, A. Feeding Rabbits And Getting It Right – The Effects Of Diet On Health And Behaviour: presented to the veterinary and pet food communities at the:
  - North American Veterinary Congress, Orlando, January 2013
  - BSAVA Congress, Birmingham, April 2013
  - One Health in Asia Pacific joint conference in Singapore 25-29 Sept <http://tinyurl.com/ol3grx9>

### 4. Details of the impact

The impact of this research is on health and welfare of rabbits and policy with regards advice given to pet owners. This research provided evidence that the commonly fed and widely available muesli-type foods cannot be recommended for pet rabbits, and has led to widespread publicity from vets, petfood manufacturers and retailers, and animal welfare organisations including the RWA, PDSA and RSPCA, to stop the feeding of muesli to rabbits and promote better nutritional advice. It led to large-scale removal of muesli-type diets from sale. In summary:

- Major petfood Retailer Pets at Home have withdrawn muesli-diets from their shelves and their CEO Nick Wood has written personally to more than 25 of his counterparts in the retail sector asking them to de-list muesli-style foods [5.1]
- Extensive On-line coverage in the veterinary press [5.2-5.4]
- Extensive media coverage including articles in The Daily Telegraph, The Daily Express, The herald, The Scotsman, The People, Telegraph and Argus [5.5]
- Included as a major campaign for Rabbit Awareness Week (RAW) in May 2013, an annual campaign run by a partnership including the RSPCA, PDSA, Wood Green Animal Charity and the Rabbit Welfare Association and Fund [5.6].
- Policy Informing a new PDSA/RWA rabbit nutrition leaflet supported by BSAVA [5.7]
- Policy informing FEDIAF Rabbit Nutritional Guidelines (adopted May 2013) [5.8]

### 5. Sources to corroborate the impact (indicative maximum of 10 references)

- 5.1. "Pets at Home calls on retailers to pull rabbit muesli from shelves". Article in VetsOnline. 2013. <http://tinyurl.com/pytevid>
- 5.2. "Muesli-style foods are detrimental to rabbit health, study concludes". 2013. www.cabi.org news article. <http://tinyurl.com/py6fank>
- 5.3. Rabbits Online article "Muesli based diets - new research". 2013. <http://tinyurl.com/pgo9lv6>
- 5.4. PetProductMarketing.co.uk article "Muesli-based diet detrimental to rabbit health, says study" 2013. <http://tinyurl.com/pmhvy4x>
- 5.5. Herald Scotland article, "Muesli-style pet food 'risk to rabbits'" 2013. <http://tinyurl.com/q5gu7e2>

**Impact case study (REF3b)**

- 5.6. Rabbit Awareness Week...because rabbits get a raw deal - 4th - 12nd May 2013  
<http://tinyurl.com/pa5ennx>
- 5.7. PDSA/RWA Rabbit Nutrition leaflet. <http://tinyurl.com/pf6m72n>
- 5.8. FEDIAF Rabbit Nutritional Guidelines (adopted May 2013). <http://tinyurl.com/nc5422k>