

Pathology in focus

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Bovine adenovirus in young cattle

Alice Fraser

Bovine adenovirus raises its ugly head each autumn and winter in young cattle, 6 to 12 months of age (predominantly rising one year olds/R1s). Clinical presentation is usually acute scours (watery to haemorrhagic) and rapid death, or sudden death without preceding signs noticed. Occasionally, respiratory signs are noted. Usually a few animals in a mob are affected.

Awanui Veterinary laboratories saw several cases of this disease during the recent season, both in the North and South Islands.

Case 1

A group of thirty R1s, three animals died following an acute bout of severe scours. Post mortem tissues from one animal were submitted to the laboratory, including abomasum, small intestine, liver and kidney. Histologic evaluation of the abomasum revealed a haemorrhagic necrotising abomasitis. In addition, multifocal mucosal blood vessels revealed endothelial basophilic intranuclear inclusions (Figures 1, 2 and 3). Significant submucosal oedema results from the vascular pathology. These changes, notably with the evidence of intranuclear inclusion bodies, are characteristic of the

disease.

Case 2

Following a spell of inclement weather, two out of a group of R1 dairy heifer grazers, which had previously shown their expected liveweight gain, were found recumbent and moribund with evidence of acute scours. Post mortem tissues were harvested and formalin-fixed, including abomasum, intestines, kidney and liver. Histologic evaluation revealed large basophilic intranuclear adenoviral inclusions within the vascular endothelial cells in the kidney, abomasum, small and large intestines. Figure 4 shows these prominent inclusion bodies present in the renal vascular endothelial cells. In addition, there was a mild multifocal lymphoplasmacytic/neutrophilic interstitial nephritis. Other changes included acute haemorrhagic abomasitis (similar to the above case) and acute haemorrhagic enterocolitis. In this case, a PCR test for Bovine Adenovirus on faeces was carried out simultaneously giving a positive result.

Outbreaks

Bovine adenovirus infections typically cause small

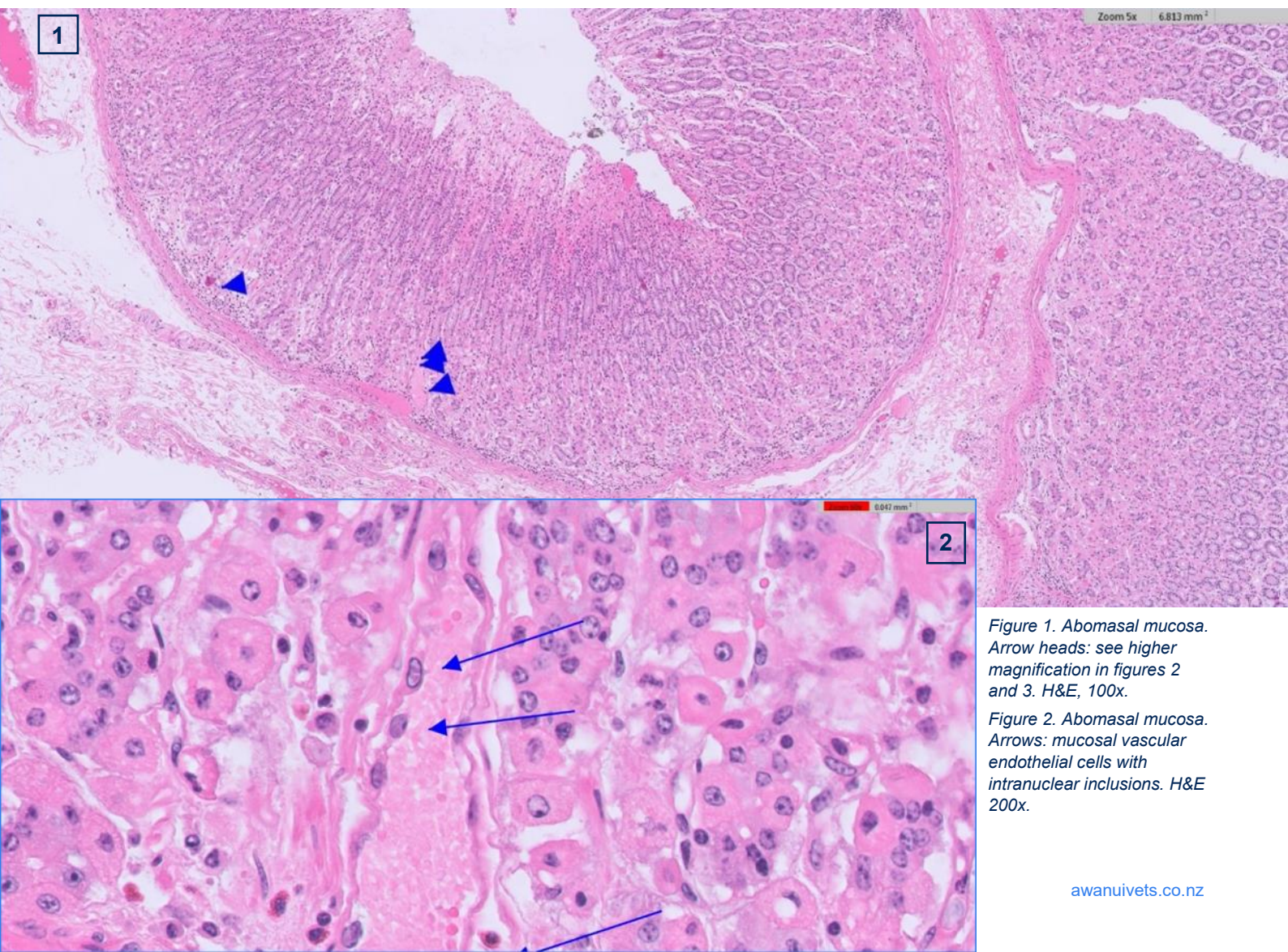


Figure 1. Abomasal mucosa. Arrow heads: see higher magnification in figures 2 and 3. H&E, 100x.

Figure 2. Abomasal mucosa. Arrows: mucosal vascular endothelial cells with intranuclear inclusions. H&E 200x.

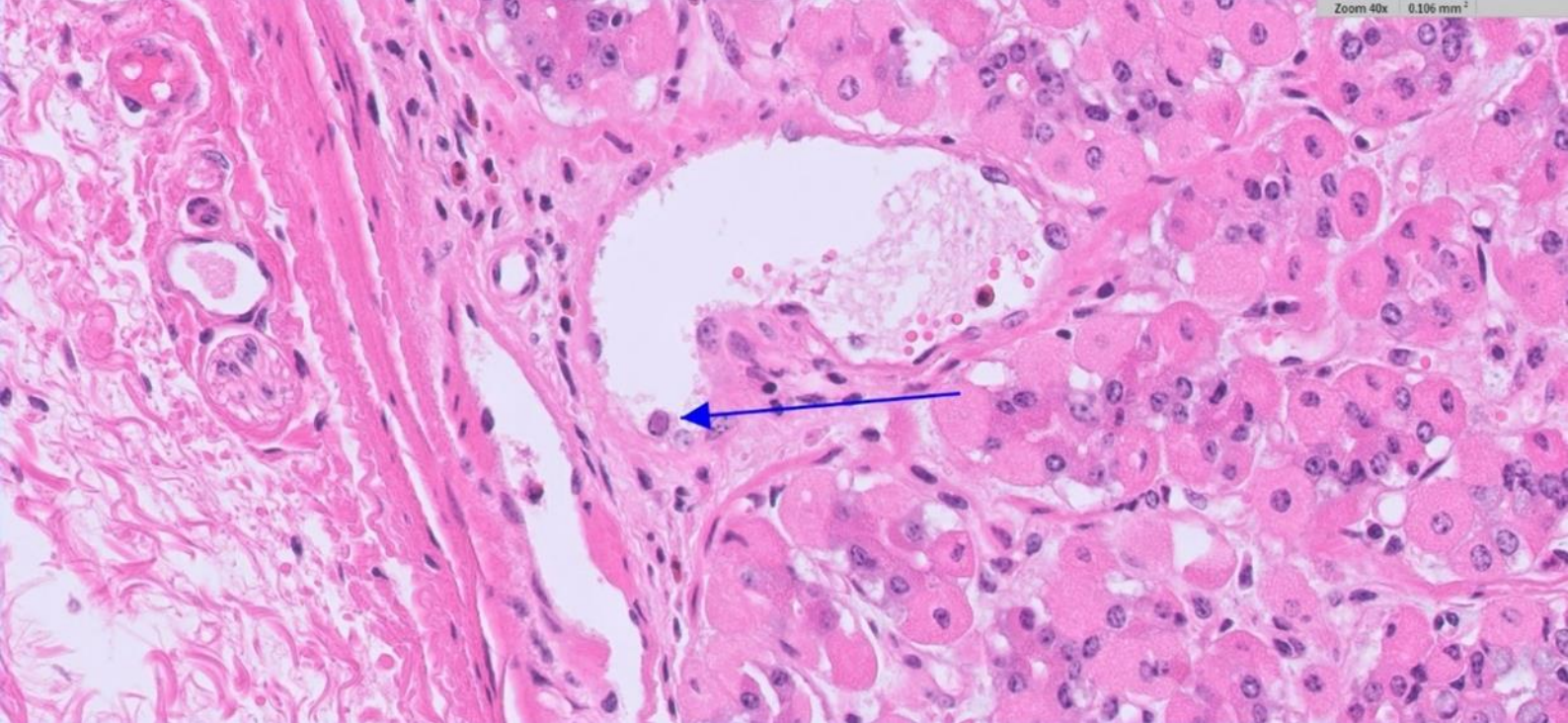
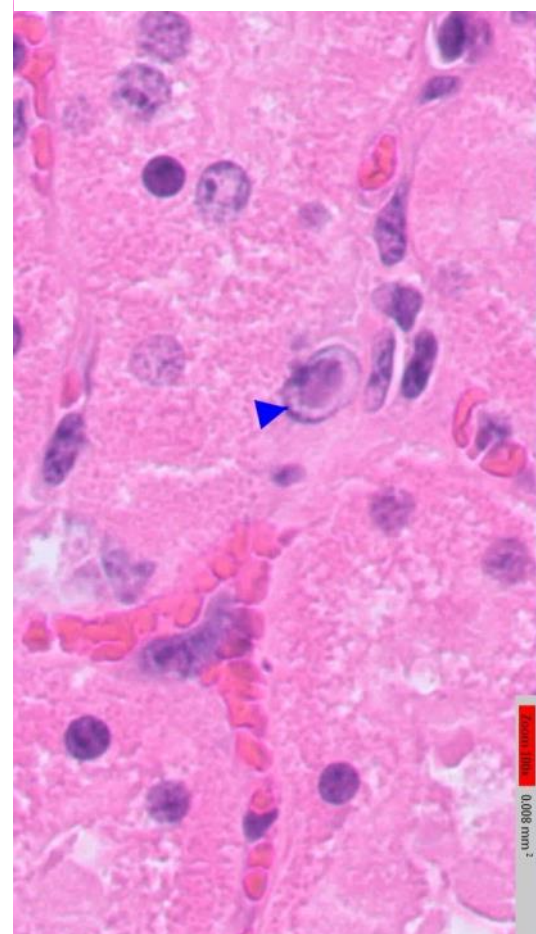


Figure 3 (above). Abomasal mucosa. Arrow: Vascular endothelial cell with intranuclear inclusion body. H&E x200.

Figure 4 (right). Kidney. Arrow head: Renal cortical vascular endothelial cell with large basophilic intranuclear inclusion body and margination of chromatin, H&E x400.



outbreaks of acute enteric disease and deaths in young cattle during autumn and winter (sometimes into spring depending on the season). Occasionally respiratory signs are a feature. Outbreaks are usually preceded by a stress factor or factors, including inclement weather, feed shortages, recent transport, concomitant parasitic burdens or infections.

Previous serologic surveys show widespread seroconversion to adenovirus in cattle populations throughout New Zealand; it is as yet unclear why some animals develop severe systemic infections. Several different adenovirus types have been detected in cattle, although BAAdV-10 is implicated in nearly all clinical cases where qPCR confirmation is undertaken (Vaatstra et al, 2016). The PCR test is predominantly carried out on a faecal sample. Differential diagnoses for acute severe enteric disease/sudden death in this age group of calves includes Salmonellosis, Yersiniosis, mucosal disease, gastroenteric parasites, toxicosis (e.g. plant nitrates, arsenic), clostridial deaths.

Reference:

Vaatstra BL, Tisdall DJ, Blackwood M and Fairley RA. Clinicopathological features of 11 suspected outbreaks of Bovine Adenovirus infection and development of a real-time quantitative PCR to detect Bovine Adenovirus type 10. *NZVJ*. 64:308-313, 2016.

Pathologist spotlight

Alice Fraser completed a Bachelor of Veterinary Medicine and Surgery from the Royal (Dick) School of Veterinary, Edinburgh University and completed her pathology residency at the Faculty of Veterinary Medicine, Liverpool University. She is a fellow of the Royal College of Pathologists.

Alice has many years of veterinary pathology experience here in New Zealand. Her interests include production animal pathology and herd health monitoring (particularly dairy and sheep/beef).



Disseminated canine protothecosis

Lisa Hulme-Moir

A four-year old male neutered Cavoodle was presented to a referral clinic with a three-month history of haemorrhagic colitis that had not responded to treatment with antiparasitics, antibiotics or dietary modification. He had been started on corticosteroids but over the weekend had developed acute blindness in one eye due to exudative retinal detachment and glaucoma (figure 1) with emerging changes in the other eye. Enucleation of eye was performed and was submitted to the laboratory along with vitreous humour collected pre-fixation, fresh and fixed colonic biopsies and rectal smears for cytology.



Figure 1. Acute exudative retinal detachment due to disseminated protothecosis in a dog with chronic diarrhoea. Photo credit: Tamara Elsmore, Veterinary Specialists Aotearoa.

Laboratory testing

Cytology performed on cytocentrifuged preparations of the vitreous humour revealed mixed inflammation with numerous organisms consistent with *Prototheca* sp. (figure 2).

Examination of tissue sections of the enucleated eye and colon also detected numerous algae (figure 3) and culture of the colonic biopsies yielded a heavy growth of *Prototheca* sp. further confirming the diagnosis of protothecosis. *Prototheca* were not detected in the rectal smears.

Discussion

Prototheca are achlorophylic algae that are found widely

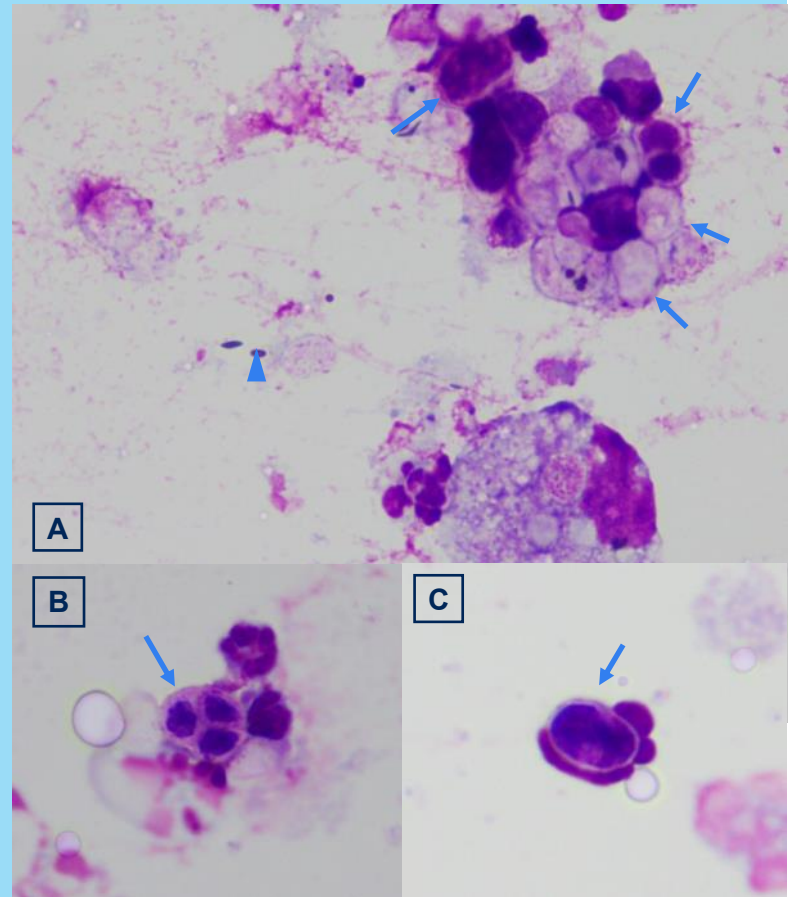


Figure 2. Cytology of vitreous humour collected from eye post-enucleation. (A) Many large oval to round organisms consistent with *Prototheca* algae (arrows), some with dark basophilic internal structure and thin walls and others as empty casings, are present extracellularly and ingested within macrophages. The dark brown-black rod-shaped structures are melanin granules (arrowhead). (B) An example of a *Prototheca* organism undergoing characteristic internal cleavage or endosporulation. (C) *Prototheca* organism ingested within a neutrophil.

in the environment, particularly damp habitats rich in organic material. As they lack chloroplasts, they are unable to photosynthesize and thus rely on external sources for their nutrients. Although an infrequent cause of disease, protothecosis is most commonly diagnosed in cattle where they can cause sporadic cases and outbreaks of mastitis in herds and occasionally skin infections. They are also capable of causing skin and systemic infections in humans and other animal species.

In dogs, infection typically starts in the large intestine and cases very commonly have a history of chronic large bowel diarrhoea followed by sudden clinical signs attributable to disseminated disease. This most commonly manifests as acute blindness and retinal detachment due to ocular involvement, but neurologic signs and urinary tract signs can also occur and on postmortem, there is typically evidence of infection in multiple organs (Stenner et al. 2007). Cutaneous infection has also been reported in dogs, which may be

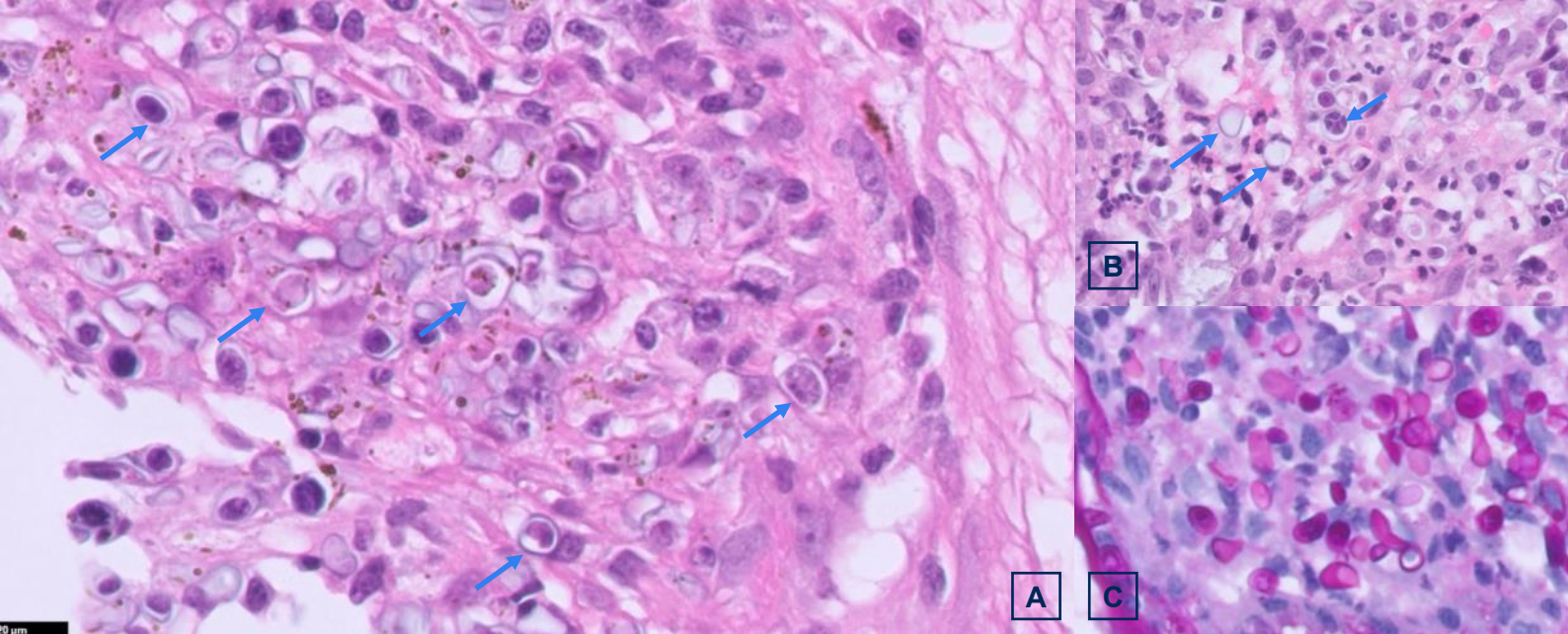


Figure 3. Histopathology of the enucleated eye and colon. (A) Numerous *Prototheca* (arrows) are present throughout the retina and posterior chamber. Algae are also observed within the lamina propria of the colon (B), the likely site of entry for the infection. The algae stain intensely pink on PAS staining of the histopathology sections of the colon (C).

due to haematogenous spread or local inoculation of the organism.

In New Zealand, there have been several recent case reports of protothecosis in dogs (Walker et al 2022, Price et al 2023) and this disease should be considered as a differential diagnosis for any dogs with a history of chronic diarrhoea presenting with acute ocular or neurologic signs.

References

- Price et al. Protothecosis in four dogs in New Zealand. *New Zealand Veterinary Journal*. 71:321-328, 2023.
- Stenner et al. Protothecosis in 17 Australian dogs and a review of the canine literature. *Medical Mycology*. 45:249-266, 2007.
- Walker et al. Disseminated protothecosis with central nervous system involvement in a dog in New Zealand. *New Zealand Veterinary Journal*. 70:238-243, 2022.

What's your diagnosis?

A monthly spot quiz

Test your skills with these gross photos:

A sixteen-year-old Domestic Short Hair cat presented with a two-week history of severely crusted, erythematous and painful skin around the nail beds of both forelimbs and the caudolateral aspects of the pinnae.

What's your diagnosis? (Answer on last page).



Winter wellness checks

August is the coldest month of the year, but at least it means spring is just around the corner. It is also a great time to get animals checked over - a pet warrant of fitness! Does your clinic offer clients wellness checks over the winter months for older or overweight pets?

Health screening plays an essential role in disease prevention and general wellness assessments promote the overall wellbeing of our pets. Early detection of disease and other health conditions facilitates more effective management, leading to a happier and healthier life for our pets.

Awanui Veterinary offers a range of specific wellness testing aimed at senior pets, overweight pets and pets requiring anaesthesia. We have information about [wellness testing on our website](#) which you can provide to your clients. It covers the why, when and what, so your clients understand the benefits of testing and what is involved.

To compliment this wellness information, we have discounted biochemistry panels for general wellness checking, senior animals, pre-anaesthetic testing and more. Check out the Companion Animal section of your price book for details, or if you prefer, we can create custom panels for your clinic.

If you'd like more information or would like to organise custom panels for your clinic, simply visit our website or give us a call today.



CADET BRAF

- sample containers

We've had great interest in the CADET® BRAF testing since introducing it in June ([read more about it here](#)).

Sample containers can now be [found on our website](#) but are not available to purchase. Instead you will be directed to contact our Palmerston North laboratory to order them (they are free of charge).

- **Specimen:** 40 mL free-catch urine collected in CADET BRAF container
- **Collection protocol:** Urine must be placed in BRAF container within 15 minutes of collection and can be collected over multiple days.
- **Special handling/shipping requirements:** Do not freeze, store urine in BRAF container at room temperature

Please note: These containers only have a short shelf life and should only be ordered when required, they are not suitable to have sitting on the shelf in clinic.

Bulk milk portal - are you using it?

Does your clinic help organise bulk milk BVD testing for multiple clients? Do you struggle keeping track of which farm needs testing when? Are you looking for the perfect testing options that can be adapted depending on your client?

Our [BVD bulk milk Lab-Portal](#) helps reduce the administration work load when carrying out bulk milk testing for your farmers. You can order bulk milk BVD, ostertagia and liver fluke testing, as well as our economical [Herd Guardian packages](#) through the Lab-Portal. The testing is all performed on dairy company sourced samples, so no on-farm sampling is required.

This system also provides visibility of all your clinic's orders booked for the upcoming season; which farmers

are about to be tested in the coming weeks; and whether the sample has been received at the laboratory.

"Your BVD portal is just wonderful to use and so easy to navigate. With over 60 farms to co-ordinate, it's great the Awanui BVD portal is so user friendly and not at all complicated to use."

Celeste Broad, Franklin Vets

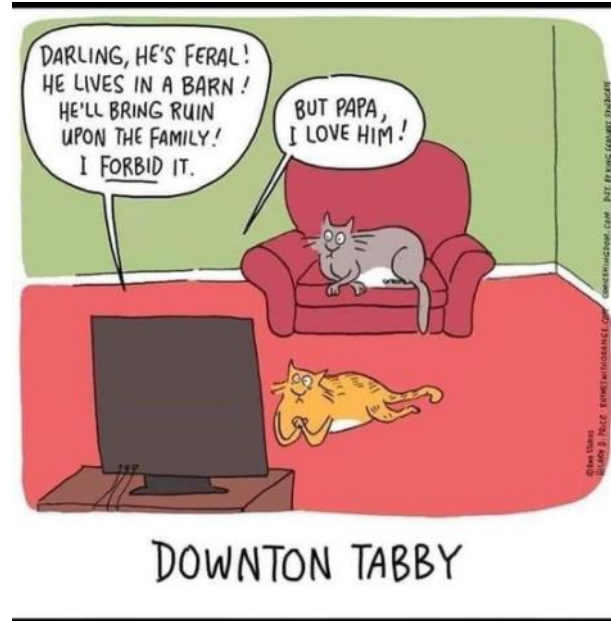
We have received such great feedback about the Lab-Portal, we don't want you missing out on the action. You can access the portal directly from our [website](#), find user instructions [here](#) or contact your local laboratory for more information.



For a bit of a laugh!

If you follow us on Facebook, you'll be familiar with our regular Friday post. Here's the most popular one from the past couple of months

. . . and if you don't follow us, [head over and hit the LIKE button](#) now and never miss an update again.



In brief

- Need a copy of our most recent electronic price book? Simply flick us an [email](#) or click the link on our website consumables page to request one at any time. Updates will not be available in hard-copy.
- Having trouble logging on to our website? The #1 issue clients have is misspelling their email address or user name when logging in! [Check out the FAQs](#) provided for more helpful tips if you get stuck.

From page 3: What's your diagnosis?

Pemphigus foliaceus. Skin crusting and inflammation including acantholytic cells apparently arising from subcorneal pustules, is consistent with pemphigus foliaceus, a disease characterised by immune-mediated attack on epithelial adhesion molecules. The main differential diagnosis is a severe superficial infection (by bacteria or dermatophytes), which is difficult to completely rule out without intact pustules to check for microbes, since the sterile pustules of pemphigus can be invaded by microbes once ruptured. However, infectious acantholysis is considered rare and may be less severe than that in pemphigus. Pemphigus foliaceus tends to be seen on the muzzle, planum nasale, perioral region, ear pinnae, nipples and distal extremities of cats. The pinnae and nail beds are the most frequently affected sites, with some cats presenting only with nail bed lesions. Sex or breed predilections have not been reported in cats. Most cats are middle-aged, although it can affect a wide age range. Methimazole and other drugs have been associated with pemphigus foliaceus-like disease as a drug reaction, and it has been associated with underlying thymoma in two cats, but in many cases of pemphigus the cause is unknown. The prognosis for this disease in cats is quite good, with successful treatment options including prednisolone, chlorambucil or triamcinolone.

Contact us

- contacting Awanui Veterinary couldn't be easier.

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