



VET notes

YOUR TOTALLY VETS NEWSLETTER ALL ABOUT ANIMALS ON YOUR FARM

SEPTEMBER 2010

It's not about give-aways!

Paul Wiseman

The plethora of animal health products to choose from could seem like a virtual Pandora's Box. Which of the many available products is most suitable to your need?

There are questions within that question that may explain why vets often ask so many questions! Firstly, are drugs needed? Specifically, are the animals deficient, diseased, or depressed? Secondly, could the same outcome be achieved with a simple management change? And thirdly, which product will best fit your production system?

Knowing your production system only comes with familiarity. This grows with time. The vet who regularly services your property is the one most likely to make informed product recommendations.

There are a wide range of presumed 'givens'. These 'givens' include:

- The product does what it claims to do
- The product does not pose a risk to public health
- The product does not pose a risk to trade in primary produce

When Totally Vets decides which products to stock, we apply the principles of evidence-based veterinary medicine. Surprisingly, the quality of evidence underpinning some veterinary medicines can be quite variable.

Examining the strength and quality of evidence follows an accepted hierarchy from randomised controlled experimental studies, through to systematic reviews of these studies, to addressing patient outcomes and clinical observations. For veterinary products used in non-food producing animals, information may be fairly scarce compared to, for example, the amount of information available on drugs used in humans.

If choosing animal health products was as simple as accepting the best give-away, life would be a lot easier! Here at Totally Vets, it is an integral value that we are fair, systematic and unbiased in our evaluation of the products we stock. As in all trading businesses, our supplier companies put a lot of effort into ensuring that we choose 'their' product over a competitor's. Be assured that we select and recommend products based on the quality of the information and back-up behind them - looking for 'deals' is not part of what we do.



Above Rising 2s as they should be

Ill-thrift rampant

An uncharacteristic season with low feed levels and high parasite challenge has led to lots of ill-thrift and dying R1 and R2 cattle and sheep. With mating just around the corner and the continued need to be frugal, it is important to address the correct issues.

Although the primary cause of this ill-thrift is nutritional, we still must attend to the secondary problems of parasites and mineral deficiencies.

White and clear drenches are unlikely to be suitable in this class of animal given the lower efficacy of these drenches against *Ostertagia* and the high levels of known resistance to these drenches.

Take care with dose rates when using clear drenches and macro-cyclic lactones in light animals. Use actual live weight to calculate the dose to avoid toxicity.





Totally Vets current stock health

Dairy

Calf-scour cases increase once past the mid-point of calving. This reflects a decline in colostrum quality and intake, failing hygiene measures and multiplying bug populations. It's imperative that any scouring calf be given oral rehydration treatments quickly, frequently and effectively.

It's not too late to fertility-test bulls before mating. Remember, last year's bulls need to be re-tested - they're most likely to be the bulls to have been damaged!

Eyeball your yearling heifers. Are they ready for mating? Allow no hungry moments and ensure the parasite challenge is met and mineral gaps filled.



HA HA The bathtub test

In case you were wondering:

During a visit to my doctor, I asked him, 'How do you determine whether or not an older person should be put in an old age home?'

'Well', he said, 'we fill up a bathtub, then we offer a teaspoon, a teacup and a bucket to the person to empty the bathtub.'

'Oh, I understand', I said. 'A normal person would use the bucket because it is bigger than the spoon or the teacup.'

'No', he said. 'A normal person would pull the plug. Do you want a bed near the window?'

ARE YOU GOING TO PASS THIS ON... OR DO YOU WANT THE BED NEXT TO MINE?

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Feeding little lambs

Greta Baynes

It's spring, there are lambs gamboling in the paddock, but over in the corner you spy one a little slow - mum has three lambs and cannot feed them all. Or the kids need a lamb for pet day!

To set a lamb up for a healthy life, it requires colostrum within the first 12 hours. Lambs require at least three to four feeds of 100-200ml of colostrum during this time. Ewe colostrum is best but suitable alternatives are frozen colostrum from ewes that had a single lamb, or colostrum from a goat or cow. Do not microwave frozen colostrum as it destroys the goodies that provide protection to the lamb.

Begin feeding a lamb milk replacer at 24-96 hours. It is best to maintain the same volume you have been feeding and mix a small amount of replacer in with the colostrum. Then slowly decrease the amount of colostrum and increase the amount of

replacer over a day or two. The guidelines for mixing milk replacer and amounts to feed are outlined on the bags. A general guide is 100-200ml 4-6 times each day for the first four days. Increase this gradually to 400-600ml twice a day for the next three to six weeks.

Pet lambs are often affected by a bug called *Sarcinia* that affects the fourth stomach (abomasum). Lambs get a gas-filled stomach that can twist and these lambs often die.

To prevent this happening, feed a maximum of 600ml per feed, allow the lamb onto grass, and most importantly, consider using a yoghurtised milk. The 'good' bugs in the yoghurt compete with the 'bad' bug *Sarcinia* and reduce the chances of abomasal bloat occurring. Instructions for the yoghurt-milk recipe are available from Totally Vets.

If you have concerns, please call. One of our friendly vets will be able to talk through feeding little lambs with you.





A number of herds are suffering more retained foetal membranes (RFM). This is possibly a reflection of lighter cows and low calcium levels. These herds should be planning to be Metricekchecked because more dirty cows will follow more RFMs.

An assessment of milking technique in New Zealand found that teat spray was applied correctly in only 12% of herds. Make sure you're getting the full benefit of teat spraying with the paper towel test.

Sheep & Beef

Plan now for docking. Sharpen the taggers and check the docking iron.

Add acidophilus yoghurt to milk for hand-reared lambs to prevent gastric bloat and sudden death.

Plan for weaning lambs and manage your pasture accordingly. Sell excess hoggets before teeth erupt and identify and manage wet-dry ewes.

Survival of scouring lambs will be improved with early recognition and treatment. Oral rehydration solutions are the key to successful scours treatment.

Maintain a careful watch on calving beef cows. Early assistance may be the difference between a profit and a loss.

Ensure the cows are getting a magnesium supplement. On hay, dusting pasture, in water if no other access to water, or magnesium bullets are options.



Cryptosporidiosis

Paul Wiseman

One of the most common problems that occur in young dairy calves in the first month of life is enteric infection with *Cryptosporidium parvum*. Crypto is a common parasite that infects most dairy farms.

Crypto is easily transferred to people and can cause severe and prolonged diarrhoea accompanied by painful stomach cramps. Children are particularly at risk.

Crypto is found in normal healthy calves but can cause overwhelming disease in calves that are immunosuppressed or in the process of developing an immune response. The clinical picture is similar to rotavirus infection in calves.

Diagnostic data from veterinary pathology laboratories suggest that calf scour problems associated with crypto are on the increase. This protozoan parasite is now as common a cause of calf diarrhoea as rotavirus.

Rotavirus and crypto have always been identified as the two main pathogens implicated in infectious scour problems.

The latest data and feedback from our vets in the field suggest crypto incidence is on an upward trend.

Scours caused by crypto are not always confined to calves kept indoors.

Cryptosporidiosis can be as much of a problem on pasture, especially for late spring-born calves born outside. Calves at pasture can be very susceptible to infection, particularly if conditions underfoot are muddy around feeders. This parasite thrives in damp conditions and wet paddocks.

The major source of crypto is thought to be either adult cows (which act as carriers without showing signs of disease) or infected scouring calves passing the parasite in their faeces.

The infectious dose of the organism is very low. If feeders are not moved regularly, the disease threat that builds up can be very similar to the level associated with calves kept indoors.

Faecal contamination of feed and water troughs can be reduced by raising and covering them.

Crypto in calves is often seen in combination with other diseases, particularly rotavirus. So vaccinating cows with Rotavec® Corona pre-calving, as well as a sound colostrum feeding regime and maintaining high hygiene standards, can often tip the balance in your favour.

If crypto is diagnosed as the problem, parasite replication and excretion can be reduced with Halocur®. This is the only product licensed to treat and prevent cryptosporidiosis. Administered orally to calves after feeding (daily for seven days), it can reduce the severity of diarrhoea and prevent the infection spreading to other calves. Treated calves have also been shown to require fewer antibiotic treatments, as well as less rehydration therapy.

The basic principles of good calf rearing are: ensure adequate colostrum intake in the first 24 hours; feed to promote an immune response; maintain high hygiene standards for calves and people; avoid damp muddy conditions; and eradicate immune-suppressing diseases such as bovine virus diarrhoea (BVD).

A diagnosis is critical before a product such as Halocur® can be prescribed.



Preparing for weaning

Lindsay Rowe

The replacement heifer calf is the most genetically valuable animal on your farm and as such, it needs the full attention of management to ensure it survives, grows, reaches puberty, conceives early in the mating period and enters the adult herd ready to produce to its full potential.

Not surprisingly, the birth-to-weaning period is critical if this is to be achieved. Many trials have shown that poor feeding management that leads to a poor weaner will result in a poor heifer replacement; the damage done prior to weaning is seldom, if ever, recovered during the subsequent growing phases.

It is calculated that the cost of producing a replacement heifer to the point where she enters the milking herd is close to \$1200 and that at least 25% of this cost is incurred in the first ten weeks of life. Not only is this a significant cost but it is the same cost regardless of whether you rear a good heifer or a poor one, further highlighting the need for the full attention of management through this critical period.

The goal in preparing for weaning is to efficiently produce a calf that is ready to be weaned by eight weeks of age, that will continue to grow unchecked once the weaning process is complete. To achieve this goal, the calf will need to have been growing at an average of 0.75kg per day over the entire milk feeding period, with a Friesian calf reaching 85kg liveweight and a Jersey reaching at least 70kg.

A critical aspect of this process is to develop the young calf's rumen to the point where it is capable of supplying all the calf's energy and nutrient requirements by the time the

milk food source is stopped. The rumen is very small at birth, just 1-2 litres in capacity and is largely non-functional. It needs to grow to 25-30 litres by the time the calf is ready to wean, as well as develop the ability to digest forage and absorb energy and nutrients. This is best achieved by ensuring the calf is provided with adequate roughage e.g. quality hay which will help stretch and strengthen the rumen; more importantly the calf needs to be provided with a high-quality cereal meal that contains 18-20% protein. It is this grain-feeding that stimulates the growth of the papillae on the rumen wall and it is through these papillae where much of the absorption of the energy and nutrients occurs.

The final assessment then of whether the calf is ready to wean can be determined by the shape of the abdomen - a calf with a well developed rumen will have a distinct 'pear-shaped' profile when looked at from behind and will be consuming at least 1.0kg of meal per day.

What's the goss?

Congratulations **Varsity**, the best team over the course of 2010, who won the Hankin Shield in a final every bit as nail-biting as the semi-finals. Congratulations also to the **STAGS** - all of them - the **Totally Vets 'A's**,

Griffin Ag -Air 'B's, **Farmlands Senior Reserve** and **Allan McNeill Colts** for all participating in a memorable and successful season that saw top three outcomes for all teams. Not a bad effort in only the second season of competition!

Greg has returned from his six-month stint in Vietnam and is chaffing at the bit to get back into harness. **Craig Tanner** replaces Greg to attend to the calving down of 2000

heifers and the arrival of more heifers to add to the rapidly increasing Vietnam herd. **Craig Dickson** joins his namesake for a month to provide assistance during an intense calving.

A long-standing client rang and asked **Pauline**, 'I want two sausage rolls please'. Pauline said 'Do you realise you have called the Vets?' Client - 'Yes I do! I want two of those sausage roll things; you know it has meat in the middle'. Realising the client meant dog roll, Pauline



Why wait? Plan for success!

Paul Wiseman

Many farmers have a great opportunity to drive profitability and job satisfaction through a focus on getting more cows in calf, earlier. There is plenty of scope to increase profit on most farms - the industry target is to achieve 78% in-calf at six weeks of mating.

For every one percent your herd is below 78%, the cost to you is \$10-\$15/ha/yr. Seventy-five percent of farmers are not achieving this target, and with the national average at around 68%, there is a lot of money on the table.

InCalf identifies eight areas that support high reproductive performance. Of these eight areas, five of them can be acted upon right now! They are heifer management (page 4), heat detection (page 7), dealing with non-cyclers, bull management and cow health.

COW HEALTH

Many aspects of cow health adversely affect reproductive performance. One of these is endometritis. Endometritis is relatively simple to check for and responds well to treatment.

Metrichecking your herd identifies dirty cows. The earlier this check is carried out, the more accurate the diagnosis, the earlier treatment can be given and the greater the response.

BULL MANAGEMENT

In many herds, bulls fail to get as many cows in calf in the weeks after AB as they should. Herds have achieved the target six-week in-calf rate of 78%, only to find the bulls add just another 8% to that over the next four weeks (a 14% empty rate).

A common cause is too few bulls for the number of cows still to get in calf. The InCalf programme contains three management areas to consider in bull management: sourcing and fertility testing, managing and bull power/rotation.

DEALING WITH NON-CYCLING COWS

Pre-mating heat detection can be used to assess the herd's level of non-cycling and determine the cause first, then consider the need to treat.

A higher rate of non-cycling cows could result from not achieving body-condition score targets at calving.

The non-cycling animals in your herd one week before mating start date (MSD) are less likely to be inseminated, to conceive and survive another year. At what level of non-cycling do you start to think you may get away without using CIDRs to improve your reproductive performance? Is it 10%, 20% or 30% of non-cycling animals a week out from MSD?

There is ample evidence supporting early intervention with non-cycling cows. Treatment of non-cycling cows before MSD is more cost-effective than no treatment. The benefits are higher six-week pregnancy rates in treated animals. The outcome of this is an earlier mean calving date by three to four days next season and more days in milk. There are also more AB-bred calves and the number of non-cyclers to treat next year is also reduced. There is no benefit in lifting submission rate, conception rate or pregnancy rate.

WHY WAIT?

Herds that manage to have 90% of cows cycling before the MSD may choose to consider the benefits of a managed Why Wait Programme. What is a WWP? Cows that are in season in the 11 day lead-up to MSD wouldn't be expected to be mated until the second half of the first round of AB. If these cows are identified and injected with PGF2-alpha on day six of mating, 80% will short-cycle and be mated by day 12 of mating. Those cows that would have been mated in 21 days are put up to AB in 12 days. Effectively, nine days have just been cut off the breeding season.

Furthermore, cows mated on a heat induced by PGF2-alpha have a 8% higher conception rate. This just adds to the days in milk next season and the 150% return on investment.

Why wait until you have started mating? Achieve the maximum benefit from the reproductive tools available by discussing your options with Totally Vets and planning with your team for optimal results.

finished the order, thanked the client and hung up. The client phoned back a few days later and asked, 'Where are my sausage rolls? I asked for them to be couriered!' Pauline, our dedicated accounts manager, personally delivered the rolls and just about got eaten by the dog.

Totally Vets were finalists in four categories at the Feilding Business Awards this year - Best Rural Business, Best Employer, Best Long-Serving Employee, **Chrissy**, and Outstanding

Employee, **Jackie**. This year no one rang in the next morning with a "tummy bug". Now that's a bonus!!!

Tara's fiancée, **Quayne**, has been putting poor **Selena** to the test since she has started with TVL. Every couple of months he rings up with strange requests! So far he's had a lame duck, a horse with the 'trots', and grass with facial eczema. And who said our jobs aren't interesting!!



Kayla's "Leo", a drop-out from Totally Vets puppy preschool



Wishnowsky Monitor Farm - bring on the beef cows!

Ginny Dodunski

The afternoon of the last community group day at Simon and Dennis Wishnowsky's was dedicated solely to beef cow performance.

The beef cow is unmatched in her ability to clean up excess summer feed, store it on her back, then live off some of it for the winter. The value of cows in a pasture-grooming role has been estimated at as much as \$10/ewe/year.

In addition to this, in many herds exists great scope for improved profitability of the cows themselves, just by doing some simple things better. Why?

Reproductive efficiency is far more important than sire choice

- Reproductive efficiency is the number one driver of cow herd profitability

- Number of calves weaned/100 cows mated has AT LEAST TWICE the impact on profit as carcass and growth characteristics
- So it's worth spending a couple of hours putting time into a plan to maximize calves on the ground at weaning

Reproductive efficiency targets

- 12-month calving interval, from an...
- Absolute maximum of 3 cycle mating (63 days)
- 95% of cows in calf
- 45-day heifer mating with 85% in calf
- 60% of cows calve in the first 21 days - early scanning can identify these cows to enable more flexible management later
- 3% maximum cow death rate per year
- 95% calf survival rate

What can I do between now and Christmas to improve reproductive efficiency?

Four weeks of good feeding pre-calving - feed for no condition loss in this time. Substantially reduces cow death rates, improves milk production and calf survival.

Ditto for 4 weeks post calving - shortens interval to first heat; improves number of

cows pregnant in first cycle. Aim for residual pasture covers of 1500kgDM/ha.

If your current calving date makes achieving the above targets difficult, consider putting the bulls out later this year.

Protect skinny cows - target condition score is 3 (1-5 scale) at calving, no cow should be less than 2.5 if humanly possible. Separate, treat for worms and preferentially feed thin cows ASAP.

Knowing early and later-calving cows enables most efficient use of pre-calving feed - did you get this information at scanning last year? Plan to do it this year.

Get your bulls fertility tested. 13% of yearling bulls are not sufficiently fertile. 20% of mixed age bulls develop serious fertility problems between seasons. Talk to us about our new highly competitive bull-testing service!

All bulls should be 5-in-1 vaccinated, and vaccinated and tested for BVD. Confused? Talk to your vet!

Tick off the trace element boxes - copper and selenium. Again, your vet can help.

Ditto with addressing the question 'Do I need to do anything about BVD in my herd?'

Have a plan; know what needs to be done when. Get advice. Totally Vets can help!

Caring for your pregnant bitch

Greta Baynes

Optimise the chances of healthy pups. Follow these few simple guidelines:

For the last part of the 63 days of pregnancy, increase feed allowance using a high energy, low-bulk food (e.g. puppy food). A bitch with a belly full of puppies needs a more concentrated feed, preferably given in several meals, to ensure she meets feed requirements for herself and her pups. After whelping, feed ad lib to support lactation.

The bitch should have been boosted for her vaccinations during the last year. If not, she will need vaccinating during pregnancy to

ensure she passes immunity to her pups (via the important colostrum).

Ensure the bitch has been wormed during pregnancy. Some worms can be transferred through the placenta and the milk. Continue regular worming of the bitch and pups from three weeks of age.

For information on our farm-dog vaccination and worming programme, contact us at Totally Vets.

Is she on heat?

Hamish Pike

Good reproduction management focuses on key fertility areas, one of these areas being heat detection. InCalf research has found that on about 25% of farms, heat detection errors are likely to be limiting reproductive performance.

Heat-detection errors occur when either heats are missed, or heats are invented through mis-identification (e.g. wrong ear tag recorded) or misdiagnosis.

Heat-detection accuracy is dependent on the heat-detection skills of the farmer, and which heat-detection aids (tail paint or heat mount detectors) he/she uses.

Everyone working with the cows on the farm should know the signs of a cow on heat (even without the use of heat-detection aids).

Is she standing to be mounted? Is the tail paint removed or heat-mount detector triggered? She is most likely to be on heat in these instances.



(a)



(b)



(c)

Signs that show a cow is on heat:

- The cow that is standing to be mounted is on heat
- Tail paint is removed and mud marks on the flank
- The heat-mount detector has been activated

Does she attempt to mount other cows? Is she restless or bellowing? Does she have poor milk let-down? Does she have mucus around the vulva or mud marks on the flanks? Is the tail paint rubbed but not removed? Is the heat mount detector lost? She may be on heat in these instances.



(d)



(e)

Signs that a cow may be on heat:

- Part of a restless group of cows
- Trying to mount other cows

Cows with at least two of these "may be" signs are possibly on heat showing only weak signs. Some of these will not be on heat. If these cows are mated, they should be recorded with a question mark (?) for future reference.

Interpreting heat detection aids like tail painting and heat mount detectors i.e. pressure or rub-activated patches, can lead to heat detection errors also. Incorrect placement of heat detection aids can also lead to detection errors. If using tail paint, remember to touch up the paint at least weekly.

Correct placement of tail paint. Apply a strip:

- No more than 20cm long
- No more than 5cm wide over the rear segment of the backbone
- Sufficiently thick cover the skin with some hair fibres still visible

InCalf research has shown that heat detection rates are higher in herds using heat mount detectors than tail paint.

Best results are achieved when heat mount detectors are combined with twice a day paddock checks for heat. Paddock checks are best conducted two hours after the morning milking and again in the early afternoon. For those of you who are really keen, consider evening checks two hours after the night milking (during daylight saving!).

The reason twice-a-day paddock checks achieve better results than heat detection aids alone is because the average duration of a cow on heat is about 14 hours, as long as the weather conditions are normal. Heats can however be as short as two hours in inclement weather.

Most of the factors that cause anoestrus have already occurred by calving. They include late calving, poor conditioned cows (especially three year olds), and undergrown heifers. Once calving begins, these primary causes of non-cycling cows are already locked in. Great heat detection efficiency will mean you at least don't "miss" those cows that are cycling.

Totally Vets moving timetable

Totally Vets will begin physically shifting into new premises on the corner of Eyre and

Manchester Street (opposite the sale yards) on the weekend of September 25th, 2010.

All business will be conducted from these new premises from Monday 27th September.

Totally Vets will be officially opening our new premises to clients and members of the public during the week 11th to 15th of October.

We have been led to believe that a change of address can be as stressing as a marriage break up. Add this onto what is traditionally an extremely busy time for veterinarians anyway and we have potential for mayhem. Consequently we beg for some forgiveness while we settle in and get things up and running.



Where we've come from

Paul Wiseman

Samuel George Cockroft (b1864) was among the veterinarians sent from New Zealand to take care of the 5000 horses shipped to the South African War (1889-1902). On his return, "Cocky" set up a vet practice in Feilding.

In 1946, the government set up the Veterinary Services Council (VSC) to promote a nationwide veterinary service for livestock owners. The VSC encouraged farmers to set up practices (known as clubs) throughout the country and employ vets. It offered grants for clinics and houses for accommodation, loaned equipment, and initially even subsidised vets' salaries. Veterinary clubs were also helped along by debentures from farmers, and loans from banks and dairy factories. Committees of local farmers managed the clubs, with input from the senior veterinarian.

It was during this era that the Feilding and Districts Vet Club, based in Kimbolton, and the Rongotea Vet Club were established.

Totally Vets' parentage consists of two of the three possible types of club:

- Clubs set up in association with dairy factories but with voluntary membership

- Clubs in dairying or meat and wool farming areas, with voluntary membership and no dairy-factory involvement

As farmers became more aware of the value of rural veterinary services and the advantage of working with a veterinarian, private and contract practices developed. In 1963, the VSC approved the formation of contract practices from existing veterinary clubs. Senior veterinarians owned and managed the practices and leased assets from the club. The Feilding and Districts Vet Club contracted **Manawatu Vet Services** to provide veterinary services to its members in 1988.

The Feilding Vet Club was relocated to Feilding, employing a growing number of vets. In the 1950s, *"Feilding vet Geoff Somerville was called by the local vicar to help his wife. She was about to give birth, and the local doctor was clearly not going to get there in time. Geoff obliged, and all went well. But it was a revelation for Geoff, who had never realised that human babies were born head first - unlike cows and sheep, whose forelegs came first. Overall Geoff preferred cows, which were easier to assist!"*

In 1962 the Faculty of Veterinary Science was set up at Massey University; New Zealanders no longer needed to train in Australia. The Rongotea Vet Club was wound up; a third of its clients going to each of Southern Rangitikei Vet Services (Bulls), Manawatu Vet Services and Massey Farm Services. A "private practice" was established in Palmerston North by Jim Kelly, Sam Burgess and Gordon Cuming. KBC, as they became known, was the parent practice of Awapuni Vet Services.

In 2006, Manawatu and Awapuni Veterinary Services merged to form Totally Vets. The diversity of the veterinarian's role has expanded significantly since the days of our pioneering predecessors. It's this diversity and its continued growth that brought about the merger, which has now created a need for larger premises. But more on this in the next chapter of "Where we've ...".

As people adopted pets into their homes in urban areas and these animals assumed the status of family members, the role of the urban vet grew hugely. Nowadays, an urban vet may have 20 clients per day and contact another 10 or more to report lab tests or discuss follow-ups - house calls are much rarer than they used to be. Ninety percent of the animals they see each day are cats and dogs but may include guinea pigs, rabbits, caged birds, fish, reptiles, ferrets, rats and mice.

Rural vets do most of their work on the farm and may make just a few visits a day because of the long travel distances. They deal with large, commercially valuable animals such as sheep, cows or horses and may be called out at any hour of the day or night.

The veterinary world has changed. It is an intriguing reflection of our community. To be a part of the growth and development of our community and then become a prominent aspect of the landscape reflects on the amazing progress our community has made.

Reference: Hamish Mavor & Bob Gumbrell. 'Veterinary services - early vet services, Te Ara - the Encyclopedia of New Zealand, updated 1-Mar-09
URL: www.TeAra.govt.nz/en/veterinary-services

