EA NEWS

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Springtime

Inside this issue:

Special points of interest:

* Lining up the AM traffic light with latest ACVM wishes
* Packaging and the environment
* Do horses emit as much methane as cattle?
* Another problem with obesity - the leaky gut

It is "In the spring a young man's fancy lightly turns to thoughts of love" according to Alfred, Lord Tennyson in the poem Locksley Hall.

For all its promise spring also is the season that portends the onset of the summer itches as well having as its own seasonal bugbears.

Allergies, sunburn and photosensitivity are among the annoyances to beset our pets at this time of year.

Economically priced soothing creams are the most efficient means to keep on hand for these often chronic conditions.

Ethical Agents Veterinary Marketing has two such products which dominate this niche market, being the two major such products currently available.

For those pesky allergies there is the tried and true Neosoothe, with neomycin sulphate as antimicrobial cover, a potent anti-inflammatory in hydrocortisone with the clincher being the local anaesthetic lignocaine hydrochloride, which breaks the itch/scratch cycle.

It really is the market leader as it provides such an efficient affordable solution for frustrated pet owners.

And of course the other top of the line product in this field is Vetsep Antiseptic Sunblock, with cetrimide and chlorhexidine for antiseptic effect in a sunblock cream containing zinc oxide and titanium dioxide for their sunblock effect.

Not only is Vetsep Antiseptic Sunblock a smooth soothing cream it also does not 'cake' on the animal and is easily rinsed off before reapplication if necessary - and it too is very economical.

The Longest Running Veterinary Newsletter in NZ

Starting 1n 1995, EA News is officially the longest running current newsletter in the New Zealand veterinary scene.

While clearly a part of the marketing arm its continuing success is due to not being overly commercial and we hope you enjoy the articles of scientific interest inside.

If not there are always the ever popular funnies!

Running the Lights

Individual driving habits show a variation in approach to traffic lights. For the vast majority it is simple; go on green, stop if safe to do so on yellow and stop on red. What could be easier than that?

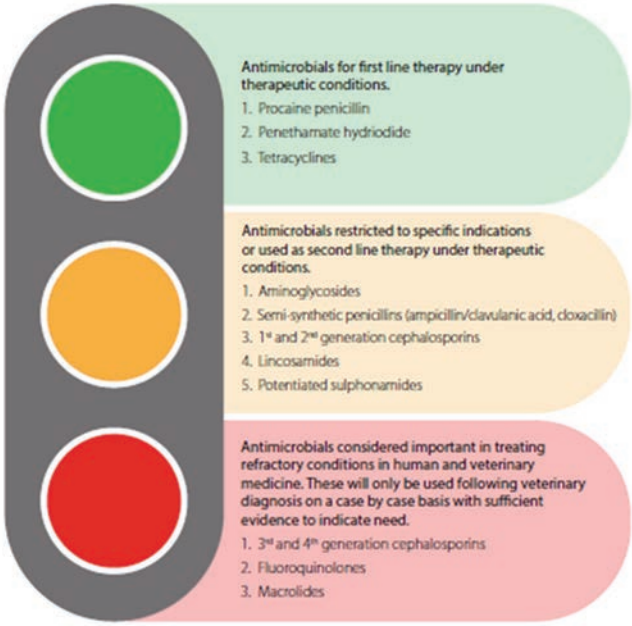
There are some however, the impatient hard core, who think red means stop, green means go and yellow means go faster! Intent governs interpretation.

Similarly with the traffic light system designed by NZVA for the antimicrobial guidelines it is important to recognise, and thus follow, the intent of the recommendations. (Unlike the traffic lights of LTSA these traffic lights are recommendations not regulations).

This traffic light classification system is based on, but differs from, the World Health Organisation (WHO) classification, being less restrictive and intended to suit practical guidelines for veterinary practice in New Zealand. The system takes in the World Organization for Animal Health (OIE) recommendations as well as those of WHO.

The two classification systems agree on the red category. All other antimicrobials veterinary clinicians use are either critically or highly important to human medicine.

Since the traffic lights system, so highly effective in its simplicity, has come into being WHO thrown on a curve ball by listing penicillin, green light in the NZVA system, as highly important with ACVM now devising their own recommendations and potentially shifting penicillin from a first line product to further down the line of options.



However because the traffic light also incorporates OIE recommendations, which highlight antimicrobials vital to veterinary medicine, penicillin stays at the top of the tree for first line treatments.

This should not be confusing as it is important to realise that the green category does not represent "safe" antimicrobials classes or that red means do not use.

The front line or first choice antimicrobials principle in veterinary medicine limits the classes of antimicrobials used and in theory mechanisms of resistance that are selected for, and it also delivers a first line tool kit of antimicrobials likely to be effective in most cases.

If a "red light" antimicrobial is deemed the most appropriate after culture and sensitivity testing then it should be used in preference to a first or second line antimicrobial that has limited efficacy.

Regardless of colour, use of an antimicrobial that is not effective is increasing risk with no benefit. It is total antimicrobial use that is the major driver for antimicrobial resistance

In the end any decision to use antimicrobials must be a clinical judgement incorporating, where possible, the following principles:

1) Consideration should always be given to pharmacokinetic and pharmacodynamic properties to ensure enough of the appropriate antibiotic is available at the biophase

2) Culture and susceptibility should be utilised, when clinically relevant, to aid in the selection of antimicrobials.

3) Narrow-spectrum antimicrobials should be used in preference to broad-spectrum antimicrobials whenever appropriate.

Cross Examination

ATTORNEY: Doctor, before you performed the autopsy, did you check for a pulse?

WITNESS: No

ATTORNEY: Did you check for blood pressure?

WITNESS: No.

ATTORNEY: Did you check for breathing?

WITNESS: No.

ATTORNEY: So, then it is possible that the patient was alive when you began the autopsy?

WITNESS: No.

ATTORNEY: How can you be so sure, Doctor?

WITNESS: Because his brain was sitting on my desk in a jar.

ATTORNEY: I see, but could the patient have still been alive, nevertheless?

WITNESS: Yes, it is possible that he could have been alive, and practicing law.

Responsible Packaging

Is climate change anthropogenic or a result of natural cycles? When discussing protecting the environment the answer to this question is really of little consequence. While most firm science is in the anthropogenic camp there is enough alternative science to fuel the climate change deniers.

Nevertheless, even if one does not accept that climate change is anthropogenic there surely can be no argument that it is good practice to keep the planet tidy and reduce waste and emissions just in case. Hence we see a strong push for reducing plastic use that has resulted in the single use plastic bag ban being not only brought into law but also rapidly accepted by the population.

However bandwagons can often be misleading especially when a crusading spirit takes hold. What can be popularly viewed as an environmentally friendly process could possibly turn out to be either not as effective as hoped, ineffective or even detrimental.

A topical example is the extremely populist movement towards electric vehicles; public groundswell and vested interests have thrust EVs to the forefront of public consciousness yet recent science shows that their CO_2 emission profiles are little different from conventional vehicles, especially when the environmental impact of lithium batteries are taken into consideration (lithium has a heavy manufacturing footprint - it takes a whole lot of energy to mine lithium and then process it); so much so that the share prices of companies looking to move into this business are already starting to fall.

Similarly with packaging. What may seem at first glance a little excessive may in fact be more environmentally friendly than the alternative of less packaging.

A case in point occurred recently when a practice queried the increased packaging of Vetamox. Originally the product was presented as a plastic bottle with the tablets loose inside. It now has had an upgrade to tablets being blister packed and placed inside a foil wrapper. The foil wrapped pouches are then placed in a cardboard outer box.

The change to packaging of Vetamox was not done lightly. It is not packaging for packaging's sake nor is it an attempt to look 'flashy'.

It may not seem like it but it is actually environmentally a better option. The blister packs protect the tablets from moisture and ensure a much more secure shelf life. This means that there is less overall wastage and a better guarantee that the clavulanic acid, a labile substance, is as effective as the amoxicillin. This is incredibly important from an antimicrobial resistance point of view.

It is a more professional product and although the packaging is extra the cost remains the same as larger batch sizes can be produced, keeping not only prices down but also fewer batch runs hence better environmental impact.

Why then the foil pouches, is that not extra packaging for no benefit?

The reason is quite simple. Vetamox is a human medical product which EAVM has been able to register with ACVM for use in animals. As such it comes pre-packaged for dispensing as a common dose for humans, one tablet/day for 7 days. This is how it is received in the EAVM warehouse.

The foil is not extra packaging but the secondary packaging. It is laminated aluminium that is 100% recyclable.

The extra packaging is actually the totally biodegradable cardboard box which EAVM is required by law to produce as ACVM deem the product should be in an outer with a package leaflet inside the box. It is also not economically feasible, nor environmentally sound, for EAVM to freight individual seven tablet foil pouches around the country.

"bandwagons can often be misleading especially when a crusading spirit takes hold"

So, despite the wholly understandable paranoia about plastic packaging, Vetamox tablets in the new packaging actually have a better environmental footprint than tablets loosely packed in HDPE containers. As stated above the ability to manufacture larger batch sizes with this method means that, due to the economies of scale, there is no increase in end user price.

Reference: Kaiser, Schmid and Schlummer, Recycling of Polymer-Based Multilayer Packaging: Recycling 2018, 3, 1; doi:10.3390/recycling3010001

The Tip

The waiter brought the bill to the table. The diner studied it for a minute then said, "Gee, I have got the exact amount on me, but I am afraid I do not have enough for the tip."

"Let me add that bill up again, sir," said the waiter.

Methane Emissions in Horses

A big issue facing dairy farmers in the current climate change debate is methane gas emissions. The question then arises as to other animals, in particular other herbivores such as horses. The equine industry is being scrutinised for animal welfare issues as much as the farming industry and, since the environment is being used as a weapon by the anti-farming lobby the question arises as to whether it could be an issue for the equine industry as well.

The only way to address such issues is to face them and confront the debate with science.

All animals produce methane in some amount when digesting food, herbivores more so than omnivores or carnivores due to the bacterial digestion required for the plant fibres. Methane is a by-product of microbial breakdown of carbohydrates (mainly cellulose) in the digestive tracts of herbivores.

Interestingly enough there is some literature on the subject and it is not all new.

Are all herbivores the same? Cattle and other ruminants are foregut fermenters with bacterial fermentation taking place in the reticulo/rumen and hence excess methane produced is eliminated by eructation, hence the infamous 'fart tax' proposed by politicians some years ago was a massive misnomer.

It would actually have applied more appropriately to horses and other herbivores such as elephants which are hind gut fermenters, i.e. the fermentation vat in their case is the caecum and also the colon. In the case of horses eructation is almost impossible but flatulence is common and is the way excess methane is eliminated.

The big question is whether flatulence from a hindgut fermenter produces more, less or the same amount of methane per animal as eructation from a foregut fermenter.

In the rumen, anaerobic organisms, including methanogens, digest cellulose into forms nutritious to the animal. Without these microorganisms, animals such as cattle would not be able to consume grasses.

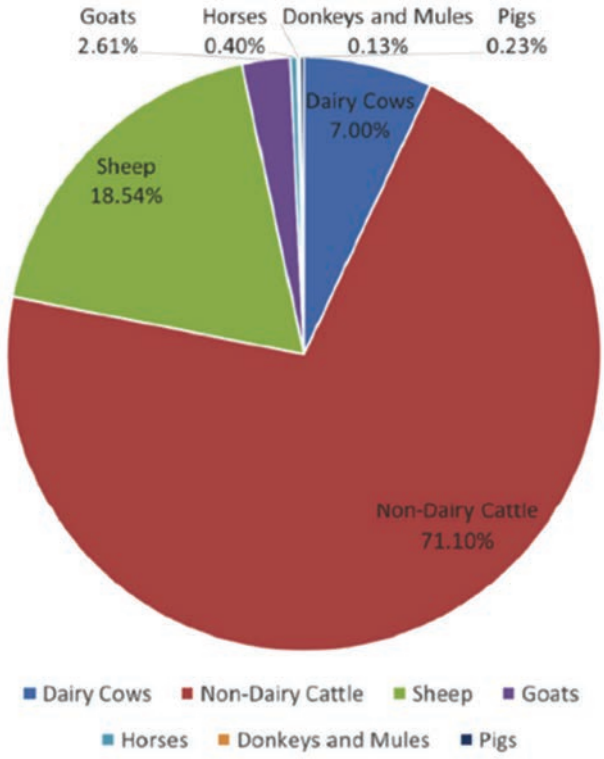


Fig. 2. Methane emission (kg CH_4 animal−1 y) from livestock [52].

Methane is produced be methanogenic bacteria who combine carbon dioxide with hydrogen to release methane and water.

$$CO_2 + H_2 \rightarrow CH_4 + H_2O$$

Methanogenesis is a strictly anaerobic process performed by bacteria termed Archaebacteria, known simply as methanogens. Such a process, to tie up hydrogen ions is known as an H_2 sink.

In 1932, organisms were discovered that could convert hydrogen gas and carbon dioxide into acetic acid.

$$2\ CO_2 + 4\ H_2 \rightarrow CH_3COOH + 2H_2O$$

This is another form of an H_2 sink and the process is known as acetogenesis.

The digestive tract of the horse, and some other hind gut fermenters, has a shorter retention time than that of ruminants which may also mean a smaller increase in the methogenic Archaebacteria population. It is also postulated that there is an alternative H_2 sink, which may well be the process of acetogenesis, in the equine. This may be peculiar to the hindgut fermenter. (Elghandour *et al*. 2019)

Basically this means that the amount of methane produced in the digestive tract of the individual hindgut fermenter such as a horse is less than what is produced by a ruminant such as a cow. This is in agreement with the comment that highest methane losses (to the atmosphere) are reported for ruminants, which host large populations of bacteria and protozoans in their rumens (Crutzen *et al* 1983).

There is also the question of diet. Evidence shows that quality of diet is a factor, with higher roughage diets producing higher levels of methane in the digestive tract. Horses consume pasture mostly so it can be assumed that with increasing population of horses in the world methane emissions from

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Methane Emissions in Horses

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horses may be increasing (Elghandour *et al*. 2019)

Also an issue is the total number of animals on the planet. Figures from the Food and Agriculture Organization (FAO) of the United Nations reveal that there are approximately 58.5 million horses in the world but far, outweighing all animals, is the 1.426 billion cattle in the world, followed by 1.093 billion sheep, 967 million pigs, and 924 million goats.

This is also reflected by New Zealand figures which show approximately 65, 000 horses in the country 6 million dairy cows, approximately 3.5 million beef cattle and 30 million sheep.

Intensive farming has seen ruminant numbers dramatically increase over the years, the methane emissions for large herbivores was estimated to be 45 Tg/year in the 1940s and that had increased to 100 Tg/year in the 1970s, which constituted 20-35% of the total input of methane to the atmosphere (Crutzen *et al* 1983).

"The only way to address such issues is to face them and confront the debate with science."

Presently horses worldwide contribute 1.2 to 1.7 Tg/year. (Elghandour *et al.* 2019)

So not only do we have less methane emitted per horse, but also the much lower numbers of animals in total means that the carbon footprint for the equine industry is much lower than that for cattle and other ruminants.

This is shown graphically in the accompanying pie chart from Elghandour *et al*. 2019.

References:

1. Alexandratos and Bruinsma, World agriculture towards 2030/2050: the 2012 revision, ESA Working Paper No. 12-03 June 2012 Agricultural Development Economics Division Food and Agriculture Organization of the United Nations
2. Elghandour, Adegbeye, Barbarosa-Pilego, Perez, Hernandez and Zaragoza-Bastida, Equine Contribution in Methane Emission and Its Mitigation Strategies, Journal of Equine Veterinary Science, 72, 56-93, 2019
3. World Cattle Inventory By Year (USDA)
4. Yusuf, Noor, Abba, Hassan and Din, Greenhouse Gas Emissions: Quantifying Methane Emissions from Livestock, American J. of Engineering and Applied Sciences 5 (1): 1-8, 2012

Railway Economics

A group of people on the train were discussing why the railway was losing money.

"Hopeless management"' said one old gent.

"Too many lazy employees said the woman sitting by the window.

"It's the union," said another.

A fourth was about to give his opinion when the train stopped at a station and an inspector got on board, and they all jumped out.

The Census

Nagy was sitting on his front porch when the census taker arrived. "What are you selling sonny?" asked Nagy.

"I am not selling anything sir," said the census taker, "We are trying to find out how many people live in New Zealand."

"Well you've wasted your time coming here," said Nagy, "I haven't got the faintest idea."

Obesity and Leaky Gut Syndrome

Some in the medical profession do not believe in the "leaky gut" syndrome, believing it to be something dreamt up by purveyors of complementary medicine in order to sell more product. The theory is that increased permeability allows toxins and bacteria to pass from the inside of the gastrointestinal tract and across the wall of the intestine to the bloodstream. Once in circulation, those toxins and bacteria can cause inflammation. This can lead to systemic inflammatory response and disseminated sepsis.

While there is no evidence that there is a syndrome that can be treated with nutrients and probiotics, the phenomenon of a leaky gut in itself is well recognised.

The intestine normally exhibits some permeability, which allows nutrients to pass through the gut, while also maintaining a barrier function to keep potentially harmful substances (such as antigens) from leaving the intestine and migrating to the body more widely. Paracellular permeability depends on transport through the spaces that exist between epithelial cells. It is regulated by cellular junctions that are localized in the laminal membranes of the cells. This is the main route of passive flow of water and solutes across the intestinal epithelium. Regulation depends on the intercellular tight junctions which have the most influence on paracellular transport.

Disruption of the tight junction barrier can be a trigger for the development of intestinal diseases. This increased intestinal permeability is often referred to as a leaky gut.

Research in both humans and animals shows that such a syndrome is more prevalent in obese individuals.

Kopper *et al* tested this theory in seven lean and seven obese horses and found that obese horses had increased permeability in some regions of the intestinal tract, specifically the jejunum.

They concluded that obese horses may have had greater paracellular mucosal permeability of jejunal mucosa to LPS, compared with that for lean horses. This finding was consistent with data for the gastrointestinal mucosa of humans and mice and supported the hypothesis that obese horses may be at higher risk from chronic exposure to increased amounts of LPS, compared with the risk for lean horses.

"while there may not be any magic potions to take to reduce or correct leaky gut, it is what you do not take that can help"

One theory to explain the link between obesity and leaky guts was provided by Kopper and colleagues. They postulated that fat tissue secretes pro-inflammatory molecules, such as tumour necrosis factor-α. This molecule stimulates other cells in the area to also secrete pro-inflammatory molecules. Together, those inflammatory mediators then disrupt the integrity of the intestinal wall, breaking down the tight junctions between individual intestinal cells that usually create a leak-proof wall, thereby allowing the abnormal passage of toxins and bacteria.

In humans increased intestinal permeability is believed to be a

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Talk About a Coincidence

A chicken farmer went to a local bar, sat next to a woman and ordered a glass of champagne!

The woman perked up and said, "How about that? I just ordered a glass of champagne, too!"

"What a coincidence," the farmer said. "This is a special day for me; I am celebrating."

"This is a special day for me too, I am also celebrating," said the woman.

"What a coincidence!" said the farmer. As they clinked glasses, he added, "What are you celebrating?"

"My husband and I have been trying to have a child, and today my gynaecologist told me that I am pregnant!"

"What a coincidence!" said the man. "I'm a chicken farmer, and for years all of my hens were infertile, but today they are all laying fertilized eggs."

"That's great!" said the woman, "How did your chickens become fertile?"

"I used a different rooster," he replied.

The woman smiled, clinked his glass and said, "What a coincidence!

Obesity and Leaky Gut Syndrome

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factor in several diseases, such as Crohn's disease, celiac disease, type 1 diabetes, type 2 diabetes, rheumatoid arthritis, spondyloarthropathies, inflammatory bowel disease, irritable bowel syndrome, schizophrenia, certain types of cancer, obesity] fatty liver, atopy and allergic diseases, among others.

In the majority of cases, increased permeability develops prior to disease, but the cause–effect relationship between increased intestinal permeability in most of these diseases is not clear.

In horses laminitis is a clear and obvious risk.

So, while there may not be any magic potions to take to reduce or correct leaky gut, it is what you do not take that can help prevent a predisposition, i.e. reduce food intake so that obesity is not a factor.

While the research has mostly been done in humans and horses quite clearly the principles will apply to other species.

We have discussed in the August issue of this newsletter the effect of weight reduction on arthritis pain score in both humans and dogs and it seems we have yet another good reason to prevent obesity in our domestic animals, no matter what the species.

Reference: Kopper, J.J., J.L. Travers, H.C. Schott, et al. 2019. Effect of body condition on intestinal permeability in horses. American Journal of Veterinary Research. 80(8):792-798.

Union Benefits

When Harry Bloggs arrived at the building site he was told, “No ticket, no start,” but Harry said it was against his principles to join the union.

They argued with him, the union organiser was called, even the boss who did not want trouble on site tried to cajole him into joining the union. Harry wouldn’t have it.

He was working on scaffolding on the 52nd level high above Queen Street when big Norm, the union delegate, arrived.

“I will tell you only once Harry, if you do not join the union I will pick up that piece of timber over there, wrap it around your neck, and throw you off this platform on to the sidewalk below.”

Later, when they asked Harry why he had joined he replied, “I have never had it explained to me so succinctly before.”

Mother Knows

Giuseppe excitedly tells his mother he's fallen in love and that he is going to get married.

He says, "Just for fun, Mama, I'm going to bring over three women and you try and guess which one I'm going to marry."

His mother agrees

The next day, he brings three beautiful women into the house, sits them down on the couch & they chat for a while.

He then says, "Okay, Mama, guess which one I'm going to marry?"

Mama says immediately, "The one on the right."

"That's amazing, Mama. You're right. How did you know?"

Mama replies: "I don't like her."

Two Tough Questions

Question 1:

If you knew a woman who was pregnant,

Who had 8 kids already, 3 who were deaf, 2 who were blind, 1 mentally ill, and she had syphilis,

Would you recommend that she have an abortion?

Question 2:

It is time to elect a new world leader, and only your vote counts.

Here are the facts about the three candidates.

Candidate A:

Associates with crooked politicians, and consults with astrologists,

He's had two mistresses,

He also chain smokes

And drinks 8 to 10 martinis a day.

Candidate B:

He was kicked out of office twice,

Sleeps until noon,

Used opium in college,

And drinks a quart of whiskey every evening.

Candidate C:

He is a decorated war hero.

He's a vegetarian,

Doesn't smoke,

Drinks an occasional beer and never committed adultery.

Which of these candidates would be your choice?

Candidate A is Franklin D. Roosevelt.

Candidate B is Winston Churchill.

Candidate C is Adolph Hitler.

And, by the way, on your answer to the abortion question:

If you said YES, you just killed Beethoven.

Makes a person think before judging someone.

Remember:

Amateurs ... Built the ark.

Professionals .. Built the Titanic