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## Inside this issue

|                                  |   |
|----------------------------------|---|
| Sophistry and<br>Pharmaceuticals | 2 |
| Digestive<br>Health              | 3 |
| 3 is Not Better<br>Than 1        | 4 |
| An mRNA<br>Vaccine for<br>FMD    | 5 |
| AMR the Good<br>News             | 6 |
| AMR the Not<br>So Good News      | 7 |

## What Kills Bird Flu?

The current paranoia about the bird flu H5N1 virus is entirely justified. Although not as threatening to humans as the Covid virus was, it is still a major danger to both wildlife and farmed poultry.

There has been excellent advice from NZVA over the last few weeks and really needs no repetition here. However, the one subject not addressed by many is simple prevention, i.e. disinfection.

What disinfectants are effective against bird flu?

We know that the virus can survive for long periods in water and at low temperatures and can be spread from one farm to another on farm equipment.

Just as with Canine Parvovirus, freezing is protective of the virus so, what actually kills the micro-organism?

The short answer is just about everything. Canine Parvovirus is a

small non-enveloped virus that is highly resistant to many disinfectants, but bird flu is an enveloped virus.

It belongs to the Influenza A genus within the family Orthomyxoviridae, so that it possesses an outer lipid membrane.

The lipid envelope helps the virus fuse with and enter host cells.

Enveloped viruses are generally sensitive to soap, disinfectants, and heat, which disrupt the outer fat layer.

Disinfectants kill enveloped viruses by physically dissolving or breaking apart their outer lipid (fat) membrane.

Once this envelope is destroyed, the virus loses its surface proteins, making it completely unable to attach to and infect host cells.

Without an intact envelope, bird flu cannot survive long on surfaces.

In contrast, non-enveloped viruses (like Canine Parvovirus) have a tough, protective protein shell instead of a fat membrane, making them much harder for standard disinfectants to destroy.

**The short answer is just about everything.**

Therefore, simple hygiene techniques such as soap and water or alcohol sanitisers will work just as well for bird flu as they did for Covid.

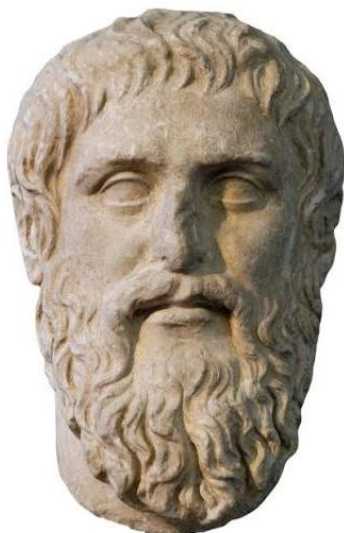
However, to be sure, to be sure, regular washing with a high-level disinfectant is always gold standard practice.

For this there is nothing better than SteriGENE, which is friendly to the environment and also is highly effective against all virus families, including the hard to kill Canine Parvovirus.



# Sophistry and Pharmaceuticals

Ancient Greek philosopher Plato first drew attention to the big drawback in democracy, the tendency for people to elect leaders based on appearance rather than capability.



Over the centuries most have noted that taller, attractive and confident figures gain office at the expense of more knowledgeable technocrats.

This is seen as a system that makes intelligent people choose poorly because our brains evolved for a completely different world. Humans developed in small tribal systems that rely on a single strong leader but now live in large populations that require actual expertise in governance.

In ancient Greek philosophy, *doxa* means common belief, popular opinion, or unverified judgment.

By contrast, *episteme* means true, justified, and systematic knowledge that is backed by reason, evidence, and universal principles.

The fundamental distinction between them forms the basis of epistemology in Western thought, famously explored by philosophers like Plato and Aristotle.

A sophist is a person who uses clever, deceptive, or fallacious reasoning to win an argument or persuade others, often unconcerned with objective truth. Historically, the word refers to itinerant fifth- and fourth-century BCE Greek teachers who charged fees to instruct young statesmen in rhetoric, philosophy, and virtue. Sophistry prioritizes winning a debate or persuading an audience over finding the actual truth.

The supreme example in ancient times was when a charismatic leader talked Athens into a disastrous war against Sicily (sound familiar?).

So, democracy has major dangers in the form of sophistry, but what has this got to do with veterinary pharmaceuticals?

Quite a lot actually. Just like we tend to put the mind into neutral at election time and generally take the easy, shiniest option, there is an

understandable tendency to look for magic potions rather than examine the raw science when choosing treatment options.

Elsewhere in this issue we discuss the relief of hindgut acidosis in horses. Kentucky Equine Research have available graphs of pH changes after using Equishure, while a major opposition product has a video of a young attractive female veterinarian espousing how their product makes her horse look great, with zero scientific reasoning. It may be good marketing to general public but one would hope a trained professional can see the way through the maze.

Similarly for treating milk fever in cattle.

Probably the most scientifically tested product on the market is Calol, which has been market leader for over 30 years. However, it is perennially challenged by bandwagon jumpers peddling products that are not registered and which contain insoluble calcium salts as an 'easy fix'.

Again, in an ideal world one would hope that a trained veterinary professional would act on the science, and be more effective than the trained economists advising the sophists in government,

## Spelling

The teacher asks Tony if he can spell 'before.'

He stands up and says, "Before, B-E-P-H-O-R."

The teacher says, "No, that's wrong. Can anyone else spell before?"

Another little boy stands up and says, "Before, B-E-F-O-O-R."

Again, the teacher says, "No, that's wrong." The teacher asks, "Nagy, can you spell 'before'?"

Nagy stands up and says, "Before, B-E-F-O-R-E."

"Excellent Nagy, now can you use it in a sentence?"

Nagy says, "That's easy. Two plus two be fore."

## Digestive Health

From time immemorial the equine industry has been a slave of fashion, particularly in the field of nutrition. This is often quite fine, except when fashion gets in the way of hard science. Currently heavy advertising has made 'digestive' supplements highly fashionable. While useful, digestive supplements are not panaceas. The classic case in point involves supplements that have some claim to altering gut pH being utilised for treating hindgut acidosis.

Hindgut acidosis is a specific syndrome requiring a rather specific feed additive. The symptoms are remarkably similar to gastric ulcers but normal ulcer treatments and preventatives, for example sucralfate, omeprazole, and antacids, such as sodium bicarbonate are not effective simply because they do not survive the passage through the stomach and the small intestine.

'Digestive' supplements may have some pH raising capabilities but never enough to be effective against true hindgut acidosis. An analogy would be green lipped mussel being useful for joint health but with clinical arthritis more specific therapy, such as anti-inflammatories, would be necessary.

This is why the KER range has three different products for

digestive health rather than one product claiming to be a jack of all trades but being master of none.

Neigh-Lox® is designed to protect the digestive tract against excess gastric acid and provide a physical protective lining in the stomach and small intestine.

Triacton® is a triple-action supplement designed to improve bone density and support digestive health in horses. The pelleted supplement contains an array of highly bioavailable minerals and vitamins essential for sound skeletal development and maintenance, as well as optimal function of the gastrointestinal tract.

However, for actual hindgut acidosis EquiShure® is the only answer. EquiShure® is the ONLY hindgut buffer available for horses. Patented encapsulation technology ensures the delivery of EquiShure® to the hindgut for long-term buffering of the cecum and colon, where pH is critical to the efficient function of the microbiota responsible for fermentation as well as for preservation of the selective permeability mechanism within the gut.

EquiShure® is designed to stabilize hindgut pH. It utilizes patented encapsulation technology to ensure targeted release of sodium bicarbonate

directly in the hindgut. Thus, it is the only digestive health supplement of its kind. Other buffers on the market are easily inactivated in the stomach and small intestine (foregut) so they are not effective at buffering the hindgut.

Aimed at horses on high grain diets, such as racing horses, EquiShure® enhances buffering capacity in the hindgut, thus providing some compensation for reduced endogenous production of bicarbonate by horses receiving NSAIDs such as phenylbutazone.

So, in summary, for simple gastric irritation Neigh-Lox® contains slow and rapid-acting antacids to effectively support the maintenance of a normal gastric environment plus it contains coating agents designed to protect the sensitive lining of the stomach.

Studies conducted at Kentucky Equine Research have demonstrated the positive effects Triacton® has on bone density and buffering capacity of the stomach and hindgut.

However, if hindgut acidosis is suspected, EquiShure® is still the only effective option.

There is no one size fits all but, whatever the situation, KER will provide the solution. Research separates the Innovator from the Imitator.

## Post-Op Care

A lawyer who had just undergone surgery emerges from anaesthesia and notices that the room is dark.

"Nurse, why are all the blinds drawn?"

And the nurse says,

"There's a big fire across the street and we didn't want you to wake up and think the operation was a failure."



## 3 is NOT Better Than 1

Along with the increased professionalism of veterinary practice there is less of the old backyard manufacturing of pharmaceuticals, resulting in higher quality products that are under the auspices of regulatory authorities.

Back in the day it was common practice to include two or three different sulphonamides in veterinary powders, not to increase efficacy but reduce overall toxicity. The advent of trimethoprim in the mid-20th century obviated the need for that, resulting in highly efficacious and safe therapy. An historic case of three not being better than one.

We now see unregistered calcium supplements flooding the veterinary market with the same false premise, that three is better than one; not so, especially when the purported calcium salts are almost totally insoluble.

The salt tricalcium phosphate ( $\text{Ca}_3(\text{PO}_4)_2$ ) is a versatile calcium salt primarily used as an anti-caking agent, and texturizer. Naturally present in human bones and teeth, it is practically insoluble in water and insoluble in ethanol. Calcium carbonate ( $\text{CaCO}_3$ ), or chalk, is also practically insoluble in pure water.

Although widely used in supplements neither of these salts is soluble enough to be of value in treating a cow with clinical hypocalcaemia.

The only salt of any therapeutic value is calcium chloride, which is highly soluble and it is absorbed by passive diffusion.

Paradoxically it is the chloride ion, not the calcium that is responsible for the rapid therapeutic effect.

By being more rapidly absorbed than the much larger calcium ion it drags through a similarly small hydrogen ion to maintain electrostatic balance, hence altering the DCAD of the cow and mobilising body calcium. Insoluble calcium salts will have zero effect on DCAD. They may be cheap, but they are not cheap if they do not work.

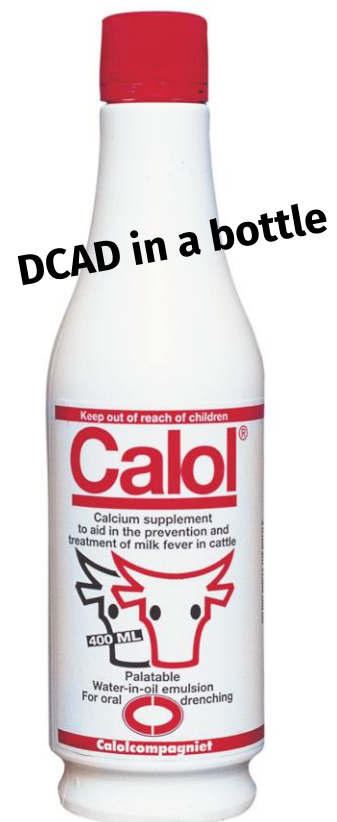
The major issue with calcium chloride is that, in common with most calcium salts, it is highly irritant to mucosa. This is negated by the salt in Calol being emulsified in oils allowing a highly effective 45% concentration to be made available.

Backyard preparations attempt to reduce irritation by having a low, ineffective amount of 5%

with insoluble salts taking up much of the slack.

There is also a propensity for 'shotgun' therapy, trying to be all things to all men. This is done by throwing in a token amount of magnesium, propylene glycol and 'electrolytes', for marketing purposes, so that the result is more like an obsolete blunderbuss rather than a shotgun.

There is a reason why Calol is a registered animal remedy rather than just another backyard production, that is because its claims have been evaluated by regulatory authorities in several countries and justified by sound science.



## The Cooks

Lost on a rainy night, a nun stumbles across a monastery and requests shelter there.

Fortunately, she's just in time for dinner and was treated to the best fish and chips she had ever tasted.

After dinner, she went into the kitchen to thank the chefs. She was met by two of them.

The first one says, "Hello, I am Brother Michael, and this is Brother Charles."

"I'm very pleased to meet you," replies the nun. "I just wanted to thank you for a wonderful dinner."

The fish and chips were the best I've ever had. Out of curiosity, who cooked what?"

Brother Charles replied, "Well, I'm the fish friar."

She turned to the other Brother and said, "Then you must be....?"

"Yes, I'm afraid so.... I am the chip monk."

# An mRNA Vaccine for FMD

One of the more interesting lectures at Science Week on the Gold Coast this year was from research scientist Peter Kirkland the subject being FMD and an mRNA vaccine. At the moment disease free countries do not vaccinate against FMD for very good reason.

There are 7 serotypes (strains) of FMD virus, each with many sub-types. Protection against each sub-type requires a different vaccine and only lasts for a short time (months rather than years). To prevent an outbreak, all susceptible animals in a country would need 6-monthly to yearly vaccinations for each sub-type, making this an inefficient and expensive option. It's appropriate and more cost-effective to focus on keeping FMD out of the country.

In addition, vaccinated animals can become asymptomatic carriers.

However, since the February 2001 UK outbreak, resulting in over 2,000 cases and the slaughter of more than 6 million cattle and sheep across Britain before being eradicated, there is a feeling that the public of today would find such wholesale slaughter unacceptable. Hence, there does seem a need to have vaccine on hand to defend in the face of an actual outbreak.

New Zealand already has an emergency contract to manufacture supply with a 'vaccine bank' in the United Kingdom to hold FMD vaccine components in a ready state for our exclusive use. This does have drawbacks, however.

Vaccines take time to manufacture and distribute, and they are expensive for industry and government. In addition, although live attenuated vaccines are generally more effective and provide a much longer-lasting immunity than inactivated (killed) vaccines because they closely mimic a real natural infection, for FMD only killed vaccines are utilised ensure safety and prevent outbreaks of this highly virulent virus.

mRNA or messenger ribonucleic acid copies instructions from DNA and brings them to ribosomes. Ribosomes use the instructions on mRNA to create proteins that make the body work.

mRNA vaccines use a genetic recipe to teach cells how to make a harmless protein from a virus, triggering an immune defence. The body responds to the protein by recognizing it as an invader. Then the immune system can fight an infection off more quickly the next time it sees the same protein.

The difference between mRNA vaccines and traditional vaccines is how they get the immune system to recognize a virus. Other vaccines use a deactivated ("killed") virus, a weakened virus, or parts of the virus (protein subunit). mRNA vaccines don't use any parts of a virus but instead give the body instructions to make a recognizable part of the virus. Safety is assured because the genetic material never enters the cell nucleus and cannot alter DNA, despite what tinfoil hat wearers say.

To protect against multiple serotypes, scientists are able to design multivalent mRNA vaccines. These combine several different mRNA sequences into a single lipid nanoparticle injection, so the body learns to fight all target serotypes at once.

This could be a game changer as mRNA vaccines are as safe as killed vaccines from a biosecurity outlook but give a much more effective immunity.

The challenge would be having enough on hand to rapidly respond in an outbreak. At \$A10 a shot it would take many millions of dollars to do the national herd but, considering the negatives for the country would be in the billions, it would be a 'no brainer'.



## Trapped

Tony and Nagy booked in to a hotel for the conference. The next morning as the team was setting up the stand, Tony noticed Nagy was missing.

He knew which room he was in at the hotel and called him up wondering what happened

to him. Nagy answered the phone saying he couldn't get out of his room.

"You can't get out of your room?" Tony asked, "Why not?"

Nagy replied, "There are only

three doors in here, one is the bathroom, one is the closet, and one has a sign on it that says, 'Do Not Disturb'!

## AMR – The Good News

Over one thousand years ago they brought us paper, porcelain and gunpowder. More recently, after a long period of decline and colonial rule they have not only re-emerged as a world power but have become world leaders in technology, including electric vehicles and environmental management.

Paper was invented in ancient China during the Han Dynasty around 105 CE.

Court official Cai Lun is traditionally credited with refining the process, utilizing a revolutionary, lightweight pulp mixture of mulberry bark, hemp, old rags, and fishing nets.

Porcelain was perfected in China during the Tang and Ming dynasties using specific local clays like kaolin.

Europeans spent centuries trying to replicate the material before finally decoding the process in 18th-century Germany and England.

Gunpowder was accidentally discovered in 9th-century China by Taoist alchemists searching for an "elixir of life" to achieve immortality. By experimenting with charcoal, sulfur, and naturally occurring saltpeter (potassium nitrate), they stumbled upon a highly volatile mixture that caused explosive flames.

Now the Chinese seem responsible for a monumental breakthrough in the area of antimicrobial resistance.

$\beta$ -lactam antibiotics such as penicillins have been widely used for over 80 years, presently accounting for around 65% of all prescribed antibacterial drugs. The  $\beta$ -lactam ring binds to bacteria, blocking the synthesis of their

cell walls. Bacteria have developed resistance to these antibiotics, most commonly by synthesising  $\beta$ -lactamase enzymes, which hydrolyse the ring.

Chemical biologists at East China University of Science and Technology in Shanghai developed a very clever method to specifically target bacteria that express  $\beta$ -lactamase enzymes. They synthesised a molecule comprising a beta lactamase recognition unit, an iodine near-infrared photosensitizer and hydrophilic substituents. The complete molecule was unable to penetrate cell walls and was not photoactive.

When the molecule encountered a bacterium that expressed beta-lactamase, however, the hydrophilic groups were cleaved off. This simultaneously made the molecule lipophilic – and thus able to enter the bacterium – and photoactive, producing reactive oxygen species when exposed to infrared light. The combined effect made cells expressing beta lactamase photosensitive.

In other words, they designed a compound that remains harmless until it encounters  $\beta$ -lactamase, the very enzyme that causes bacterial resistance. Once activated, it accumulates inside these resistant cells significantly (>2,000-fold over incubation medium) through a hydrophilic-hydrophobic transition and covalent immobilization and, when exposed to light, selectively destroys them while leaving adjacent susceptible bacteria untouched. This strategy not only treats resistant infections but actively alleviates the evolutionary pressure that

drives resistance, offering an approach to curb one of today's most urgent public health threats.

Basically, it turns the bacteria's defence system on itself, being especially effective against MRSA, offering a promising strategy to combat multidrug-resistant infections and alleviate the selection pressure that drives the enrichment of resistant strains.

It was also effective against the gram-negative bacterium *Enterobacter cloacae*, but less so. The researchers believe this is because gram-negative bacteria, which have more complex, multi-layered cell walls, are simply more resistant to photodynamic therapy.

The biologists stated that this is their next challenge. ' $\beta$ -lactamase is actually more common in gram-negative bacteria. Our study was about using  $\beta$ -lactamase to activate the compound and using the mechanism to have it accumulate within the resistant bacteria. We're now working on use of something beyond a photosensitizer to kill the bacteria.'

One doesn't need to be a Sinophile to appreciate the groundbreaking technology coming out of this highly innovative country.

Reference: Fangfang Chen, Yan Peng, Yifan Zhu, and Hexin Xie, Counterselection against  $\beta$ -lactamase-expressing bacteria via an activatable photosensitizer that accumulates in resistant pathogens. Proceedings of the National Academy of Sciences of the United States of America.

## AMR – The Not So Good News

It seems that the complex subject of antibiotic waste could be even more of a minefield than first thought. While it is well known that drugs present in our waterways can drive AMR in bacteria, less is known about their transformation products – the chemicals antibiotics generate when they break down.

Once antibiotics enter our waterways, they are very difficult to remove. Metabolites of antibiotic drugs have been shown to drive antibiotic resistance in bacteria, in some cases to the same degree as the antibiotic itself.

To investigate this, a team from the University of Queensland in Australia collected samples from a wastewater treatment plant in Brisbane and another in Falmouth, UK. They exposed these samples to three different classes of antibiotics and their transformation products in the lab and analysed how strongly

resistant the bacteria in each sample became.

The drugs that they tested included fluoroquinolones and the MLS group (macrolides, Lincosamides and streptogramins), which are used widely in humans, and the sulphonamides, an antibiotic used primarily in agriculture and veterinary applications.

In total, 15 different metabolites were tested across these three classes. In every metabolite tested, the team found some level of potential for AMR.

A growth-based assay showed that several metabolites had lowest observed effect concentrations only twofold higher than their parents, with moxifloxacin sulfate and descladinose roxithromycin even exhibiting stronger growth inhibition compared with their respective parent antibiotics.

Studies such as these highlight another layer of complexity, suggesting that

simply monitoring the parent antibiotic may not give us the whole picture. This reinforces the idea that we're likely underestimating pressures of environmental AMR selection. Despite persistence in the environment, mobility and potential residual bioactivity, metabolites are routinely excluded from environmental risk assessment and AMR surveillance frameworks.

These findings show that metabolites constitute a substantial yet overlooked component of total selective pressure in wastewater systems and should be incorporated into surveillance of AMR, treatment evaluation and also environmental risk assessment frameworks.

Reference: Lakhey, Hayes, Murray, Jinglong, Thomas, Gaze & O'Brien, Antibiotic transformation products exert selective pressure for antimicrobial resistance comparable to parent compounds. *Nature Water*, June 2026

## Winning Tactics

A thriving baseball club is one of the features of a boy's organization connected with a prominent church.

The team was recently challenged by a rival club.

The pastor gave a special contribution of one hundred dollars to the captain, with the direction that the money should be used to buy bats, balls, gloves, or anything else that might help to win the game.

On the day of the game, the pastor was somewhat surprised to observe nothing

new in the club's paraphernalia. He called the captain to him. "I don't see any new bats, or balls, or gloves," he said.

"We haven't anything like that," the captain admitted.

"But I gave you a hundred dollars to buy them," the pastor exclaimed.

"Well, you see," came the explanation, "you told us to spend it for bats, or balls, or gloves, or anything that we thought might help to win the game, so we gave it to the umpire."





Animal welfare is our business



### 3 Little Pigs

Three Little Pigs went out to dinner one night ...

The waiter came to take their drink orders.

"I will have a Sprite," said the first little piggy.

"I will take a Coke," said the second.

"I want water, lots and lots of water" said the third piggy.

The waiter brought; the drinks and asked for their dinner orders,

"A big juicy steak, • said the first piggy.

"Just a salad for me," said the second.

"Water. lots and lots of water", said the third again.

After the meal. the waiter returned for dessert orders.

"Banana split,"• said the first

"Root beer float" said the second.

"Water, lots and lots of water!" shouted the third.

The waiter, now curious. finally asked,

"Sir. why are you only drinking water?"

The third piggy grinned and said ... "Well. someone's gotta go wee. wee. wee, all the way home!"

