EA NEWS

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MERRY XMAS

FROM THE TEAM @ EA TO ALL OUR CLIENTS

Herbicides and AMR

Recent items on the news showing the choking pollution in Delhi, and our already being aware of similar problems in Beijing, tend to be disheartening when we think of climate change and what we can or cannot do as a country.

It is a similar problem with antimicrobial resistance, a problem that parallels climate change in so many ways. What is so disconcerting in both fields is that forces greater than what we can muster have such a huge effect on proceedings.

No matter how swimmable we get our rivers, so greenies can urinate in them instead of cattle, no matter how much methane our farmers can reduce, the overall effect on global warming is minimal when we look at the pollution generated in Europe, Asia and North America.

In such vein clichés such as pushing excrement up hill, flatulence against thunder and urinating into the wind seem entirely appropriate.

There is a similar problem arising with the prevention of antimicrobial resistance. Unfortunately, antibiotic resistance may increase even if total antibiotic use is reduced, and new ones are invented, unless other environmental exposures are also controlled.

Neither reducing the use of antibiotics nor discovery of new ones may be sufficient strategies to avoid the post-antibiotic era. This is because bacteria may be exposed to other non-antibiotic chemicals that predispose them to evolve resistance to antibiotics more quickly.

Herbicides are examples of some of the most common non-antibiotic chemicals in frequent global use.

Recent ground breaking research at Canterbury University has shown commercial herbicide formulations, active ingredients and surfactants, induce an antibiotic response in medically relevant bacteria. The effect is caused above MRL but well below application rate. The effect is large enough (2-6x MIC) to theoretically significantly undermine therapy. The effect always favours evolution of the genotypically resistant strains with the highest MIC in any competition.

Antibiotic resistant E. coli were routinely isolated from the Avon River, and frequencies of multi drug resistance from the Avon River were as high as 98%.

The bottom line is that microbes employ several mechanisms to tolerate, resist and degrade pesticides. Microbial responses to pesticides may include antimicrobial resistance. Pesticide-degraders with antimicrobial resistance are of global concern and pesticides are routinely stored inappropriately, and often applied indiscriminately.

The eternal whipping boy, glyphosate, is incriminated, 635,029,318 kg of glyphosate was used worldwide last year, but also dicamba and 2-4 D were part of the research. We do live in a chemically intensive world, 80-100,000 different chemicals being used in commerce.

New words are entering the lexicon; we already have had words such as the microbiome and now becoming fashionable is the chemical exposome, as in antibiotic stewardship requires an integrated approach to minimising the chemical exposome.

Before alternative lifestylers take up their cudgels it is important to remember that this paper follows an emerging suite of papers suggesting that even seemingly benign modifications of the soil environment, including 'organic' fertilizers, can possibly affect the microbiome in such a way. Changing the chemistry of the soil affects the selection pressure experienced by untold billions of microbes. The bacteria will evolve in response to these environmental changes, particularly if they are continuous.

'No matter how swimmable we get our rivers, so greenies can urinate in them instead of cattle'

Contamination of soil with certain metal ions, such as copper ions, can promote antimicrobial resistance in soil bacteria. Bacteria harbouring genes conferring resistance to certain metal ions (and in some cases to certain biocides) are more likely to also carry antimicrobial resistant genes than those without such metal ion resistance traits.

At present, while this research has drawn attention to the risk, insufficient evidence is available to identify biocide use in food production as a driver of antimicrobial resistance according to the Joint FAO/WHO Expert Meeting. However, the identified association between biocide tolerance and resistance to one or more classes of antimicrobials underscores the need for increased awareness and prudent use of these products.

The wide range of biocide applications and targeted bacteria makes it difficult to establish relevant, standardized procedures for biocide susceptibility testing. Nevertheless, harmonized protocols are critically needed for biocide susceptibility testing.

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Herbicides and AMR

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Monitoring the occurrence of biocide tolerance, and cross- and co-resistance in the food production and processing environments should be undertaken. Such monitoring may complement ongoing hygiene and sanitation monitoring programmes for antimicrobial resistance.

There is also clear scientific evidence that foods of plant origin may serve as vehicles of foodborne exposure to antimicrobial-resistant bacteria. Fruits, vegetables and other foods of plant origin can become contaminated with antimicrobial-resistant bacteria and antibiotic resistance genes anywhere along the food chain, from primary production to consumption.

Conventionally and organically grown vegetables to be consumed raw may be vehicles for dissemination of antimicrobial resistant bacteria and their resistance genes to humans.

But what can the veterinary profession do about all of this? Not a lot except focus on what we can do. It is not a situation like the old cliché of shuffling the deck chairs on the Titanic but of worrying less about the things we cannot control, such as third world pollution and agricultural pesticides and more about the things we can control, our own environmental effects and, as veterinarians, our own prudent use of antimicrobials.

"It's like arguing whether or not climate change is anthropogenic."

No matter how dirty Delhi gets we would like to keep our own backyard clean and tidy. No matter how much glyphosate is used in agriculture we do not wish to be the primary drivers of antimicrobial resistance.

We cannot point the finger at others unless we have our own house in order, every time you point your finger three are pointing back at you.

Probably the best analogy for clinicians is the much loved animal with a poor prognosis. Outside forces such as a compromised immune system may make successful therapy less likely but there is a chance that your clinical efforts may have a positive effect. You do what you can for the animal and trust that that is enough.

Similarly with prudent antimicrobial use, the task may seem difficult but the veterinary profession can have an effect and do not want to let the side down.

It's like arguing whether or not climate change is anthropogenic.

That really is irrelevant, we should keep our backyard tidy and not risk adding to it.

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The Note

Fred was always coming home from the pub in the early hours of the morning.

He eventually found this note from his wife.

"The day before yesterday you came home yesterday morning. Yesterday you came home this morning. So if today you come home tomorrow you will find that I left you yesterday."

Funeral

The graveside service just barely finished, when there was a massive clap of thunder, followed by a tremendous bolt of lightning, accompanied by even more thunder rumbling in the distance…

The little old man looked at the pastor and calmly said, 'Well, she's there.'

Coenzyme Q10

Coenzyme Q10 sounds more like some secret ingredient marketeers have dreamt up for a cosmetic product rather than a nutritional aid. Nothing could be further from the truth as there are a myriad of peer reviewed scientific studies regarding this substance.

So just what is Coenzyme Q10 or CoQ10 as it is more commonly known? Co Q10 is a naturally occurring substance in the body that can enhance both aerobic metabolism and antioxidant activity.

Coenzyme Q10 is also known as ubiquinone, they are one and the same. When the compound was identified in the late 1950s, it was coined coenzyme Q10, due to its chemical structure. Its official name, ubiquinone, was bestowed upon it in 1975 by the commission that governs biochemical nomenclature.

The name ubiquinone was derived from the adjective ubiquitous, a reference to the compound's widespread distribution in nature.

Co Q10 acts like a vitamin but by definition, it is not actually a vitamin; vitamins must be consumed, even if only in minute amounts, to sustain life. Co Q10 is synthesized in all body tissues and therefore cannot be considered a genuine vitamin.

It is a key vitamin-like, fat soluble nutrient present in mitochondria in every cell in the body where its function is to carry protons and electrons, an essential process in the generation of adenosine triphosphate (ATP). ATP is the main energy currency used by all cells, including muscle cells. Mitochondria are the energy factories of all cells in the body.

Cells which require more energy (cardiac cells, skeletal muscle cells, liver cells) have higher concentrations of CoQ10.

"horses suited to exercise requiring stamina had significantly lower cellular levels of CoQ10 than horses suited to sprint exercise'

CoQ10 supplementation has been used to treat many human clinical conditions such as heart problems, muscular dystrophy and myopathies.

Co Q10 is also found in cell membranes, where it boosts cell integrity. Co Q10 is a powerful antioxidant, protecting cells from highly reactive free radicals that can damage cells and their DNA.

Besides providing direct antioxidant protection, it also improves the antioxidant potential of other antioxidants in the body, like vitamins C and E.

Thus CoQ10 has two important functions within the body:

1. energy generation through aerobic metabolism within mitochondria and in this function is extremely important for sustained energy during intense, endurance type exercise
2. anti-oxidant properties within the mitochondria and at other locations within the body (e.g. in the blood stream).

Benefits from an increase in CoQ10 include:

- More efficient energy production
- Delayed onset of fatigue
- Improved response to training
- Enhanced recovery following intense exercise

Ubiquinone crystals have poor solubility as CoQ10 is fat soluble and they clump together in an aqueous environment leading to low bioavailability of crude ubiquinone. Powdered forms of CoQ10 can be problematic in this regard.

However, based on the results of ongoing studies into CoQ10 at its Thoroughbred Performance Centre in Ocala, Florida, Kentucky Equine Research has developed Nano -Q10, a highly bioavailable form of CoQ10. Nano-Q10 is a stable liquid form of CoQ10 that has overcome these drawbacks.

The graph on the next page compares bioavailability of Nano-Q10 with ubiquinone powder and raw ubiquinone showing significantly higher blood levels at 30 days.

KER research, in collaboration with Dr. Stephanie Valberg from Michigan State University, demonstrated that Nano-Q10 supplementation promotes oxidative metabolism in skeletal muscle by increasing mitochondrial oxidative enzymes in conjunction with decreasing glycolytic enzymes. Proteomic analysis of muscle from 13 Thoroughbreds supplemented with Nano-Q10 showed upregulation of 13 mitochondrial proteins and downregulation of 9 glycolytic enzyme proteins.

There's an issue in Thoroughbred racehorses associated with high levels of gamma-glutamyl transferase (GGT) in the blood. GGT is elevated in the blood in most diseases that cause damage to the liver or bile ducts.

This may be related to oxidative stress, and it seems Nano-Q10 may be effective in reducing some of the problems.

Preliminary research with racehorses in Florida suggests that

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Coenzyme Q10

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horses with higher serum CoQ10 have lower GGT.

Rooney et al found that horses suited to exercise requiring stamina had significantly lower cellular levels of CoQ10 than horses suited to sprint exercise. Increased levels of CoQ10 in muscle cells is particularly important for horses requiring increased aerobic energy production so supplementation is imperative for peak performance.

Other research teams have proposed reproductive benefits of CoQ10 supplementation, including better sperm motility in cooled semen and improved cryopreservation of semen from stallions with poor freezing ability. Researchers have identified the potential benefits of CoQ10 during the storage of stallion sperm at ambient temperatures.

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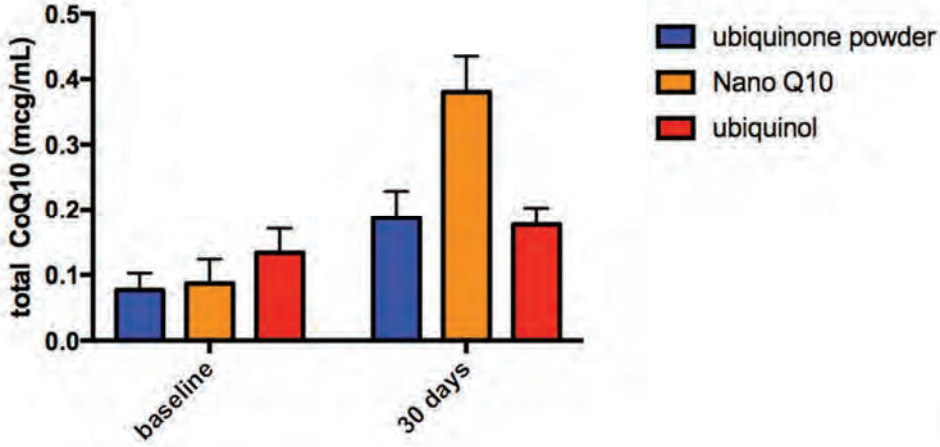

Ethics

A young fellow was learning about economics and asked his father about the ethics of business.

'Ethics?" repeated his father, 'you ask me about ethics? Well my boy let me put it this way. A lady comes in and buys a garment for $90 and pays with a $100 note.

She is very excited about the garment and as she leaves with the parcel under her arm I notice she has left the $10 change on the counter.

Now here my son comes the big question of ethics. Do I tell my partner or not?"

CoQ10, Vitamin E or both?

Antioxidants protect cell membranes and support overall health. Specifically, antioxidants counter the effects of "reactive oxygen species," also known as free radicals, which damage cell membranes. Free radicals may increase due to environmental factors, lack of antioxidants, or even as a natural response to exercise.

It is an ongoing process similar to rust in a motor car and the same adage applies, "rust never sleeps."

The question is which of CoQ10 or vitamin E should be fed as an antioxidant or are there benefits in feeding both?

It is tempting to assume that, as CoQ10 has both antioxidant properties in addition to energy generation due to its effect on aerobic metabolism that it would be the one to use. However there are several articles in the literature, over several different species, attesting to the fact that there are synergistic effects in feeding vitamin E and the vitamin like substance CoQ 10 in tandem.

There is direct evidence for an interactive effect between exogenously administered vitamin E and CoQ10 in terms of tissue uptake and retention, and for a sparing effect of CoQ10 on vitamin E. Data also suggest that dietary vitamin E plays a key role in determining tissue retention of exogenous CoQ10.

Nano Q 10 from Kentucky Equine Research has, in its liquid form, overcome the problems of bioavailability of CoQ10 and Nano E, from the same stable is a highly concentrated readily available form of natural vitamin E.

Therefore these two products are the ideal presentations to supplement CoQ10 and vitamin E in the equine athlete.

High performance animals require top of the line nutrition and this can be gained by using these supplements at a cost effective price per dose.

Prior to the last decade it was very fashionable to inject preparations with the ability to generate energy production via ATP generation plus contain antioxidants, now the same effect can be had in simple oral liquid form: simpler more convenient and clearly more economical.

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Thomas et al Dietary Cosupplementation With Vitamin E and Coenzyme Q10 Inhibits Atherosclerosis in Apolipoprotein E Gene Knockout Mice Arterioscler Thromb Vasc Biol. 2001;21:585-593.

Said Hamlet to Ophelia, "I'll do a sketch of thee.
What kind of pencil shall I use - 2B or not 2B?" *Spike Milligan*

The Bribe

A bloke due to appear in court was talking about his case in the bar and was advised by a drinking mate, "If you want to get off just send the judge a case of whisky."

The defendant discussed this with his solicitor the next morning who quickly said, "On no account do that, we've got a thin argument already without complicating it with a bribe".

To the solicitor's astonishment our bloke won his case.

"We would have lost if you sent that case of whisky,' said the solicitor.

"Oh but I did," said our bloke. "I just put the other party's name on the card!"

Trust in Quality

Sutures and climbing ropes have a lot in common. They are basically fibres used expressly for security and binding.

There is another feature that should be common to both. For a mountaineer the one single piece of equipment they will not compromise on quality with is the safety rope, life depends upon it.

The same should be true of the suture material. Like the climbing rope it is essential for life and also like the climbing rope not the most expensive part of the exercise.

In fact the suture material in any operation is one of the least expensive factors, yet is so crucial to success.

The top of the line surgeons in human medicine will not take short cuts with suture material and neither should they.

Mountaineering requires huge trust in the quality of the rope, but no more so than the trust of a surgeon in a suture line.

Websites abound with recommendations for rope climbers with price mentioned but not a major factor.

There are two reasons for this, the most obvious being that it is not the first prerequisite and the second is that there is little difference in price between the brands.

It is the same with sutures, top of the line brands such as Serag Wiessner, the worlds oldest and foremost suture maker, are little different in price from the supposedly cheap alternatives - but there is a vast difference in quality.

High quality PGA, polydioxinone or nylon sutures and 300 series steel used in all needles, means Serag Wiessner is second to none in suture quality.

Like with the mountaineers and their ropes, lives can, and do, depend on it.

There is no room for shortcuts.

SERAG WIESSNER

The Fur Coat

A woman snuck away for a weekend with her rich lover who bought her a fur coat worth $100,000 and the problem was how to bring it home.

After lengthy thought she pawned it. She then told her husband that while driving to the airport, on a trip to see her mother, a woman hailed her cab and begged a ride. She said the young woman had only minutes to catch a plane which would take her to a betrothed wedding overseas which would make her rich. She had no money except for a pawn ticket which she insisted as payment for the ride. With this tale the wife urged her husband to redeem the ticket for her.

He did so and presented his wife with a pair of binoculars, which were ideal for viewing the new fur coat her husband's secretary was wearing at the races the next day.

Murphy's Real Laws

1. Everyone has a photographic memory. Some don't have film.

2. He who laughs last, thinks slowest.

3. A day without sunshine is like, well, night.

4. Change is inevitable, except from a vending machine.

5. I just got lost in thought. It was unfamiliar territory.

6. Seen it all, done it all. Can't remember most of it.

7. I feel like I'm diagonally parked in a parallel universe.

8. He's not dead. He's electroencephalographically challenged.

9. You have the right to remain silent. Anything you say will be misquoted and used against you.

10. Despite the cost of living, have you noticed how it remains so popular?

11. Nothing is foolproof to a sufficiently talented fool.

12. It is hard to understand how a cemetery can raise its burial costs and blame it on the higher cost of living.

13. The 50-50-90 rule: Anytime you have a 50-50 chance of getting something right, there's a 90% probability you'll get it wrong.

14. It is said that if you line up all the cars in the world end to end, someone would be stupid enough to try and pass them.

15. You can't have everything. Where would you put it ?

16. The things that come to those that wait may be the things left by those who got there first.

17. Give a man a fish and he will eat for a day. Teach a man to fish and he will sit in a boat all day drinking beer.

18. A fine is a tax for doing wrong. A tax is a fine for doing well.

19. Everybody lies, but it doesn't matter since nobody listens.

20. I started out with nothing, and I still have most of it.

21. When you go into court, you are putting yourself in the hands of 12 people who weren't smart enough to get out of jury duty.