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## Corporate Danger

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The fact that the veterinary world is becoming more and more corporatized is definitely not news to anyone and it mainly is a matter of getting on with the fact and living with it. However there are some little pitfalls to be wary of and one did spring up in the news this month concerning the corporatization of another health field, the dentists.

There have been cases of people being recommended extremely expensive dental work only to have those recommendations absolutely refuted by another dentist. It appears that the expensive work is being recom-

mended by dentists employed in corporate practices where the culture is increased sales.

Corporates in any field are driven by sales targets and, when targets are met they are expected to be exceeded in the next review period.

Hence staff are under pressure to sell more and more benefits. It is not peculiar to the dentists but is part of banking, insurance, etc. It certainly is common in large pharmaceutical companies.

This is not necessarily a bad thing in itself, as companies are responsible to their shareholders.

What the dentists in corporate companies, and other health professionals such as our veterinarians, need to balance is the drive for increased income against the requirement to maintain professional standards and also patient care.

Working for a corporate is not a stigma and most can easily handle that balance, just as being a sole practitioner is no guarantee that patient care is more important than clinic profit.

However the rise of corporatization, as the dentists have shown, means veterinarians need to be aware of their standards.

## Features

A pot pourri this month with an interesting story about endurance riders dosing with Nano-E during competition, is it a fad or is there science behind it?

We also have new and disturbing data about

the mechanism of horizontal gene transfer in antimicrobial resistance.

There is data on why the double analogue of Vitamin B<sub>12</sub> is important and an article on the correct way to use Bioworma<sup>®</sup>.



## Dosing During Competition

Reports have come in of Australian riders at a recent endurance event dosing horses with 20 ml of Nano-E at the vet holds (Note: the Nano-E was clearly identifiable thanks to the bright new livery documented in our December newsletter). People have asked EA what the rationale is behind this procedure.

The short answer given was that it seems to be a current fad and there is no direct scientific logic behind this.

Contact was made with Kentucky Equine Research for some enlightenment. The following response came from top nutritionist Peter Huntington, "We would recommend 4000 IU additional Vitamin E from Nano-E for a couple of days before and after a big ride to improve antioxidant capacity, and aid recovery. I wouldn't give it at each vet hold but would give it each morning or evening – the same goes for long distance travel such as NI to SI or long distance flights. I attach the data we have showing increase plasma levels after TB were given 5000 IU – I've reduced the dose for the Arabs."

So it is clear that dosing at the vet hold is a fad that really is treating only the rider's peace of mind, a

"Contact was made with Kentucky Equine Research for some enlightenment."

common practice amongst horse people.

However the word from the expert is that Nano-E is highly indicated just prior to and just after competition or travel.

Research has revealed that vitamin E varies in its potency, based on whether it is natural or synthetic. The chemical structures of synthetic and natural vitamin E differ. Natural vitamin E is recognized as d-alpha-tocopherol, and is made up of a single isomer.

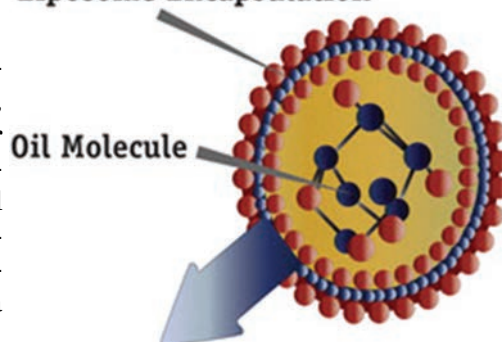
Synthetic vitamin E, termed dl-alpha tocopherol, contains a mixture of eight different isomers, four tocopherols and four tocotrienols. Of these eight, only one is molecularly equivalent to natural vitamin E. Sources of natural vitamin E, especially Nano-E, more effectively raise serum levels when compared to synthetic, as shown above.

To make alpha-tocopherol stable for use in most supplements, it must be chemically joined with an

acid during manufacture, a process called esterification.

The acid, in this case acetate, acts as a padlock or protective cap that shields alpha-tocopherol from the damages caused by exposure to oxidative forces. Without esterification, alpha-tocopherol can quickly denature, losing its antioxidant

### Liposome Encapsulation



properties and rendering it ineffective.

In the GI tract esterases are required to unlock the padlock created through esterification for the vitamin E to be absorbed.

Because it is not mixed with other ingredients, the vitamin E in Nano-E does not need to be protected by esterification, but it must become water-soluble or dispersible in liquid.

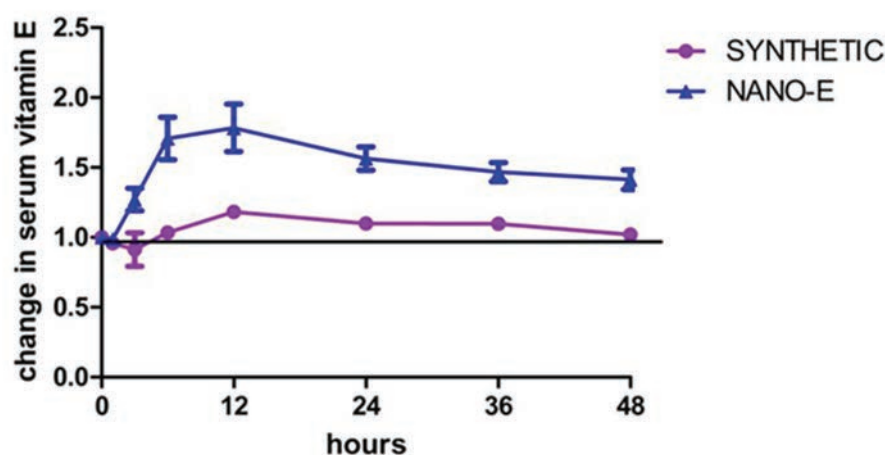
Researchers at KER use proprietary technology to encapsulate the vitamin E in nanoparticles and then surround each nanoparticle with a hydrophilic (water-loving) outer layer.

The greatest benefit of this unique delivery system is an increase in the bioavailability of vitamin E.

Vitamin E, both synthetic and natural preparations, are promoted for their role as antioxidants and use in convalescence/recovery, fertility programs, to boost immune function, muscle health and pre-

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### 5000 IU dose

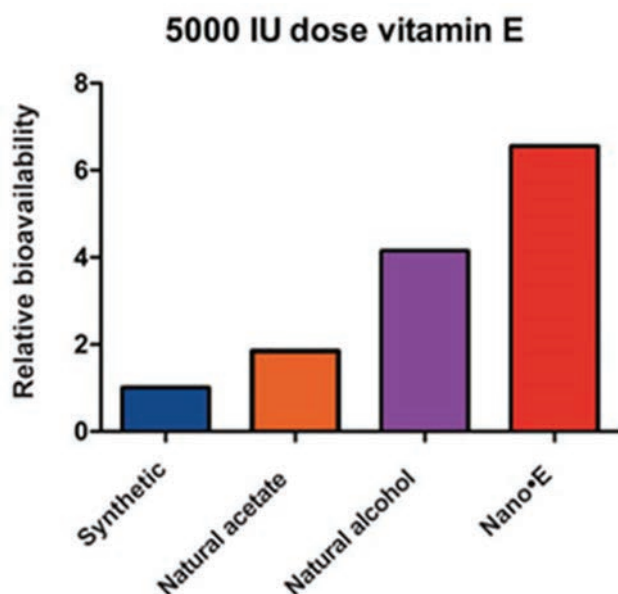


## Dosing During Competition

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vention of “tie up” in horses.

syndrome, laminitis and some neurological problems.



In addition to those indications Nano-E, due to its extremely high bioavailability is used as an adjunct in PPID, equine metabolic

This unique delivery system, ensuring much more effective absorption, plus the high concentration meaning less cost per dose makes Nano-E the ideal vitamin E supplement for a rapid response and that is what probably inspired the Aussie riders to use it during competition.

However the word from above is, as suspected, that use during actual competition is not indicated

but certainly immediately prior and immediately after competition or travelling gives enormous benefits.



## Lemon Pickers

“Lemon Pickers Needed” read the ad in the newspaper.

Ms. Sally Mulligan of Coral Springs, Florida, read it, and decided to apply for one of the jobs that most Americans are not willing to do.

She submitted her application for a job in a Florida lemon grove, but seemed far too qualified for the job.

She has a liberal arts degree from the University of Michigan, and a master’s degree from Michigan State University.

For a number of years, she had worked as a social worker, and also as a school teacher.

The foreman studied her application, frowned, and said, “I see that you are well educated, and have an impressive resume.

However, I have to ask you, have you had any actual experience in picking lemons?”

“Well, as a matter of fact, I have,” she said “I’ve been divorced three times, owned two Chryslers, voted for Trump, and once for Hillary.”

She started work yesterday

## The Flag

Nagy went down his local shopping mall to buy a New Zealand flag.

He asked for a green one.

“Sorry,” said the storeowner, “but

New Zealand flags are red, white and blue.”

“In that case,” said Nagy, “I’ll have a blue one.”





## The Double Analogue

Since it was discovered in the middle of the 20th Century that hydroxocobalamin has a much more lasting effect in the body than cyanocobalamin this molecule has been the only one used in almost all vitamin B12 injections for live-stock.

There is however a very strong case to be made for incorporating cyanocobalamin, not in place of but alongside hydroxocobalamin, with the latter still being the predominant molecule. The reason for this is that there is anecdotal evidence that cyanocobalamin has a stronger appetite stimulant effect than hydroxocobalamin, and this makes a lot of sense considering the kinetics of the two molecules.

It was once supposed that hydroxocobalamin had to be transported to the liver and thence converted to cyanocobalamin in order to generate its effect but this is not the case. The real reason cyanocobalamin has a more rapid effect on the body is much more straightforward and is scientifically sound.

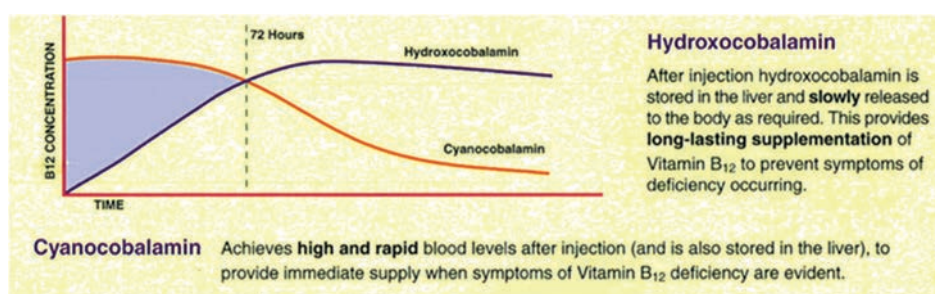
more sustained action than cyanocobalamin and so makes hydroxocobalamin the most important ingredient.

However the rapid onset of activity of cyanocobalamin makes its inclusion in the mix also beneficial. It is the famous “heads down bums up” effect of immediate appetite stimulation and a growing lamb or calf can eat a lot in the 72 hours it takes for the hydroxocobalamin effect to kick in.

**Farmers do like to see their stock “eating off the end of the needle”**

This rapid onset effect is of course the reason why cyanocobalamin is the form of B12 utilized in all the preparations and tonics aimed at recovery and recuperation in ailing animals of all species.

Cyanocobalamin for treatment, hydroxocobalamin for maintenance, hence the use of the double analogue in Vijec B12.



It is simply a case of cyanocobalamin being much less protein bound than hydroxocobalamin.

Because of this not only is there more free cobalamin available during transport in the blood stream but also binding to tissue protein of hydroxocobalamin means slower release from the injection site.

This protein binding is the reason hydroxocobalamin has a much

Considering that there is 200 µg/ml of cyanocobalamin and 1800 µg/ml hydroxocobalamin in the Vijec B12 formulations, and that the standard dose for adult cattle is 2 ml, then there is 3600 µg of total vitamin B12 (400 µg/ml of cyanocobalamin for instant effect and 3200 µg/ml of hydroxocobalamin for prolonged effect) per dose.

This is well above the recommended dose for treatment of cobalt defi-



ciency in cattle, which is intramuscular administration of vitamin B12 at 500 to 3,000 µg per head (Reference: Graham, Trace Element Deficiencies in Cattle, Veterinary Clinics of North America Food Animal Practice. 1991 Mar;7 (1):153-215).

There is sufficient hydroxocobalamin alone so that the cyanocobalamin is really an added bonus.

Farmers do like to see their stock “eating off the end of the needle” and Vijec B12 gives them that opportunity.

Considering that Vijec B12 is only available from veterinary practices and that farm shops do sell straight hydroxocobalamin preparations then the veterinarians have available an important point of difference that they can market to their clients.

## Scientific Curve Balls

Just when you think you know it all, science throws up curve balls, two in particular recently. One concerned global warming and the other antimicrobial resistance.

On the global warming front an argument has come out recently that the colonisation of the American continents in the 17th and 18th centuries led to a dramatic reduction of global warming.

The theory goes that there were 60 million indigenous people in the two continents before the European invasion and these people suffered enormous death rates from both warfare and introduced diseases, to which they had no immunity, so that the population shrank to six million.

The upshot of this was that farmlands disappeared and forests regenerated to such an extent that carbon dioxide levels in the atmosphere plummeted and global cooling ensued.

It is a fact that there was a mini ice age in the late 18th century but this has never been considered to be androgenic before now. If one accepts, as most people do, that the current global warming crisis does have an androgenic element to it then it seems to drawing a long bow to say that the mini ice age was due entirely to the genocide of some American tribes and the resultant increase in foliage.

After all we have had an industrial revolution, the rise of fossil fuels

and a skyrocketing population explosion to all lift the global temperature by a couple of degrees.

On the other hand the latest news on the antimicrobial front concerning the mechanism of horizontal transfer of resistance genes is disturbingly much more scientifically based and can be considered more than mere opinion.

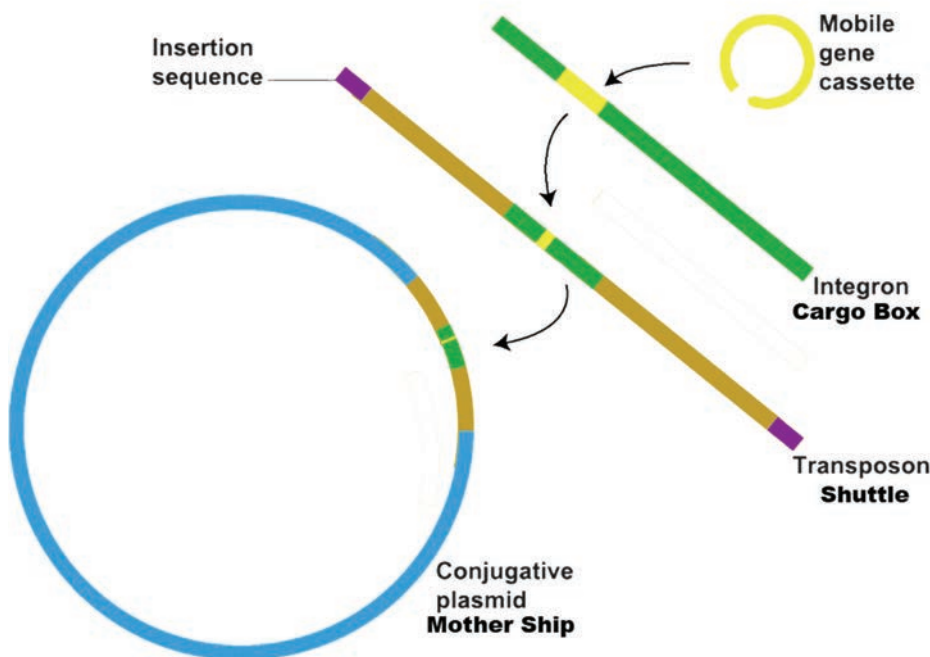
It seemed to be such a neat and compact story, how genetic material was passed from one bacterium to another via conjugation.

We have the three basic elements, integrons, transposons and plasmids. Plasmids are the mother ships that transport material from organism to organism, transposons are the shuttle that take data from integrons to the plasmids and also from the plasmids to the nucleus in the recipient cell, and lastly the integrons are the cargo boxes, non-mobile packages of genetic material that start the whole process. Simple analogies made it easy to understand.

Added to the mix now are ICEs. Integrative and conjugative elements (ICEs) are a diverse group of mobile genetic elements found in both Gram-positive and Gram-negative bacteria.

These elements primarily reside in a host chromosome but retain the ability to excise and to transfer by conjugation. ICEs are self-

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## Homeless

I talked with a homeless man this morning and asked him how he ended up this way.

He said, "Up until last week, I still had it all. I had plenty to eat, my clothes were washed and pressed, I

had a roof over my head, I had HDTV and Internet, and I went to the gym, the pool, and the library.

"I was working on my MBA online. I had no bills and no debt. I even had full medical coverage."

I felt sorry for him, so I asked, "What happened? Drugs? Alcohol? Divorce?"

"Oh no, nothing like that," he said. "No, no.... I was paroled."

## It's About the Environment

Equine parasitologists can look to other branches of the profession for guidance. The take home message is look to the environment. At any one time only 10% of internal parasites are inside the animal, with 90% or more on pasture.

Farm animal practitioners have come up with the concept of refugia which is all about the environment and ensuring that the larvae in the environment remain susceptible to available anthelmintics. This is a difficult concept for horse owners, many of whom set stock and over rely on chemical drenches with drench resistance being the inevitable result.

Clearly the first step in reducing resistance is to reduce the overall reliance on chemicals by altering regimes. This is the concept of refugia but refugia is only one way to achieve the goal.

The greatest example comes from small animal medicine and the combatting of the ubiquitous flea. Fleas have survived almost unchanged for thousands of years because, like internal parasites, they spend the greater part of their life cycle off the animal.

Small animal practitioners have for years espoused the idea of

**"a bit like eating fast food all the time and drinking diet soft drinks to try and lose weight"**

treating the environment as well as the animal. Vacuuming households, setting off flea bombs and spraying under furniture are all part of the process to rid the environment of these pests. This has proved successful in reducing the incidence of flea storms and thus reduced the reliance on dosing the animal itself.

This approach can now be taken in the equine market with the strategic use of BioWorma®.

The trick is not 'instead of' but 'in conjunction' with. BioWorma® is not supposed to replace drenching with anthelmintics altogether but is designed to be another tool in the armoury to help make drench programs more effective.

BioWorma® uses a natural strain of the fungus *Duddingtonia flagrans* that seeks out and 'traps' the larvae of many of the parasites that are common in horses and other grazing animals, including strongyles.

Since BioWorma® works through interrupting the crucial re-infestation stage, reducing the amount of re-infection from contaminated pasture, it works best when the livestock are moved onto fresh pasture.

Therefore it works particularly well within a rotational grazing system. The fungus does not consume 100% of the larvae but 70-90% so pasture rotation still important. Crucially this

also gives a small refugia.

This is the crux of the matter. At sell in BioWorma® attracted a lot of attention, too much in fact, as a means of replacing anthelmintics themselves when its role is really to aid and abet strategic use.

If we look at our fleas in small animals again, treating the environment does not eliminate the need to treat the animal, but it does make that treatment much more effective and ultimately reduces the number of treatments required.



This is also the role of BioWorma®. The strategic goal is to reduce the worm burden in the animals, part of the strategy being to reduce the load in the environment. Hence tactics are to treat both animal and environment.

This may be difficult when horses are set stocked at high density levels, not an uncommon experience.

However the normal regime of four drenches a year is only paying lip service to these animals and many



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## It's About the Environment

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dose their animals far more often than that, with the resultant dramatically increased risk of resistance.

Expecting success in such a scenario is a bit like eating fast food all the time and drinking diet soft drinks to try and lose weight; the odds are just stacked too much against. It is a great example of not only not using the environment but actually of abusing it.

Well run concerns rotate grazing paddocks but still need to dose

**"The trick is not 'instead of' but 'in conjunction' with."**

with anthelmintics four times per year, ideally rotating the animals on to clean pasture.

It is this latter requirement

that is the most difficult and this is where Bio-worma® comes in.

By using Bio-worma® the pasture build-up of larvae is dramatically decreased so rotation can be

lengthened and so can the time between doses. Dosing can be twice a year instead of four times.

There is a saving of drench costs but this is offset by the cost of the Bio-worma® program. The real benefit is in the lower chemical use resulting in less resistance build-up.

The trick is not being lulled into constant drenching nor thinking that Bio-worma® is an alternative option but in utilizing the two systems in tandem to achieve a greater, or symbiotic, result.

## Scientific Curve Balls

*(Continued from page 5)*

transmissible mobile genetic elements (MGEs) that encode the machinery for conjugation as well as intricate regulatory systems to control their excision from the chromosome and their conjugative transfer. They integrate into and replicate as part of the host chromosome.

Thus, these elements combine features of other classes of MGEs, such as phages (which often integrate into and excise from the host chromosome but are not transmit-

ted by conjugation), transposons (which integrate into and excise from the chromosome but are not transferred horizontally) and plasmids (which sometimes transfer from cell to cell by conjugation but replicate autonomously).

ICEs, unlike plasmids, cannot be maintained in an extrachromosomal state, as they seem to be incapable of autonomous replication, although this is still under investigation.

If it seems a little more complicated it is because it is. We now have

rogue traders competing with our shuttles and mother ships.

The scary thing is that although we considered horizontal gene transfer a rapid and widespread process it is clearly even more rapid than imagined.

Reference: Wozniak and Waldor, Integrative and conjugative elements: mosaic mobile genetic elements enabling dynamic lateral gene flow, Article in Nature Reviews Microbiology Volume 8 August 2010

## The Legacy

Back in the day a well-known and wealthy man died in this little village and left an Austin 7 car to the religious community there.

His widow, not knowing to which religion the car was meant to be given decided to give it to all three at the handing over, which was attended by the Catholic priest, the Anglican minister and the Jewish rabbi.

The Anglican minister was the first to acknowledge the gift. He stepped forward, laid his hands on the bonnet and proclaimed, "Our Father which are in Heaven we thank you for this Austin 7" Then he blessed it.

The Catholic priest came forward to do his bit and intoned, "O Father, Son and Holy Ghost I hope use to this car the most."

Then he sprinkled it with holy water.

The Jewish rabbi thinking he had better do something significant too but being at a bit of a loss, came forward and announced, "O Christian men I have no prayer, but a Jewish car with me you'll share."

Then he proceeded to cut two inches of the exhaust pipe.



## Punishment

An Irishman, an Englishman and a German are caught in Saudi Arabia drinking.

"Under Saudi law you are sentenced to 30 lashes then deported. Before you begin you are entitled to have something on your back. What would you like?" said the prison guard to the Englishman just before lashing him.

The Englishman, being a bit of a cricket fan, asked for linseed oil. They lashed him on a post and he groaned with pain.

Next came the German. "Under Saudi law you are sentenced to 30 lashes then deported. Before you

begin you are entitled to something on you back, what would you like?" said the prison guard.

"Nothing" said the German and, after receiving his lashes spat on the ground, called the prison guards Schisers and winced in agony.

The guards then came to Paddy the Irishman. "Under Saudi law you are sentenced to 30 lashes then deported. Before you begin you are entitled to something on you back, what would you like?"

"Oh", replied Paddy, "I'll have the Englishman."

## The Rabbi

A man tells a rabbi, "I have a strong desire to live for eternity. What shall I do?"

"Get married," replies the rabbi.

"It's that simple? Will that allow me to live forever?"

"No, but it will get rid of the desire!"