



EFTBA

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Veterinary Newsletter



Horse Breeding
Past, Present and Future

Welcome to EFTBA's Veterinary Newsletter

Dear EFTBA members and fellow European thoroughbred breeders,

This, the latest edition of the EFTBA Veterinary Newsletter heralds in a Changing of the Guards. Following the stepping down by Dr Hanspeter Meier, Dr James Crowhurst, Veterinary Consultant with the TBA, very kindly took up the mantle to produce the 41st edition of our newsletter.



Dr James Crowhurst graduated in the late 1970's from the School of Veterinary Medicine, University of Cambridge. Having worked in Queensland, Kentucky and New South Wales, he returned to the UK to work with Professor 'Twink' Allen at ARC before joining Greenwood Ellis & Partners in 1981. He became a partner in 1984. James's principal interest is stud medicine having been Chairman of the Newmarket Stud Farmers Association (NSFA) between 2001 and 2006.

In this edition, Dr James Crowhurst brings us on a very interesting whistlestop tour of the close relationship between humans and horses, which goes back 8,000 years. Through the many intervening centuries; we have developed a close and inseparable connection with the horse. The more we learnt about the horse the more we were in a position to bring out the best in them, that being through best practice horsemanship and the many developments in veterinary practices and technology advances.

EFTBA continues to represent and work for approx. 23,000 thoroughbred breeders right across Europe, who in turn sustain over 150,000 jobs in the European breeding and racing industry.

As we hurtle towards the end of 2022, I hope the remaining sales season bear fruit for all European breeders. All the best

A handwritten signature in dark ink, appearing to read 'Joe Hernon'.

Joe Hernon
EFTBA Chairman

Horse Breeding - Past, Present and Future

Many EFTBA Members, and colleagues breeding horses of all types worldwide, will acknowledge that we have and are living in a time of massive discovery, improvement and change with regard to reproduction in horses, as in many other things. I count myself as being very lucky to have watched, and been part of, some of these events and have hugely enjoyed the involvement. Many of these discoveries originated in England due to international pioneers living here, but also major contributions by colleagues in Europe and beyond fuelled the revolution. I would like to summarise some of the major breakthroughs up to the present, and consider what we might look forward to.

Man's history and culture has been interwoven with horses in most of the world since horses were first domesticated around 8000 years ago, seemingly originating in Western Eurasia, rather later than dogs and then farm animals. Interestingly, mules were being used for transport around 5000 years ago, and preferred in some areas for their hardiness and stronger feet. The Romans named them Royal Beasts in the time of King David. Mules must have bred in the wild where donkeys and horses overlapped, before man intervened.

The Arab horse was contained geographically for generations to keep the breed "pure", but by the 7th century began to spread to other parts of the world including Europe, the Americas and Australia. Their descendants include the Thoroughbred, Quarter Horse and Appaloosa. The Romans preferred "stupid" and larger horses for their purposes, and it is probable that the Przewalski horse is an offshoot, proving very difficult to ride. The Bering land bridge allowed horse migration into the Americas, but when this finally submerged permanently around 11000 years ago, horses became extinct there.

Actual breeding records did not appear until 1300 AD, when records were kept of breeding Arab horses for military purposes. By then,

it was recognised that the females, both camels and horses, were the "major" contributors, consequently only changed hands as gifts, whereas the males could be sold.

Racing horses existed in many countries long before King James I and VI of Scotland began to spend summer time in Newmarket for sporting purposes. Match Racing was the most common event, the first recorded one taking place in 1622, with a £100 wager. King Charles II firmly established the town as a racing centre, and thus brought considerable investment and development.

Breeding of horses for racing purposes developed rapidly in the mid 17th century – prior to that it had been based mainly in the Vale of York in England. After 1680, importation of Arab, Barb and Turkish Stallions for mating with a few imported mares and the cream of resident mares. By 1750, 150 stallions had been imported from the middle east and all thoroughbreds can be traced back to the three founding stallions, Byerley Turk [foaled 1680], Darley Arabian [1700] and Godolphin Arabian [1724].

During this time, horses were treated by farriers, often passing knowledge down from father to sons. Remedies were kept secret, and some were violent [regular "purgers"]. It took the death [from colic] of Eclipse in February 1789 to summon Charles Vial de Saint Bel, a graduate of the Lyons Vet School [first in Europe] to perform an autopsy. He may have been influential in founding the Royal Vet School in London in 1791, but for some time Vets were not able to make a living in Newmarket due to the embedded farriers and similar practitioners. Eventually, Trainers took horses to be treated away from Newmarket to be treated "in secret", so as not to upset the "in house" arrangements.

Much of the breeding was accomplished by Stallions touring the areas where mares were to be found, and some mares were



Charles Vial de Saint Bel

walked long distances for covering by resident stallions. Anecdotal evidence relates that multiple fees were taken by the stallion managers – up to 18 in a single day, but the number conceiving is not recorded! Stud managers soon worked out that mares that remained in oestrous for 2 days after covering required another cover, and if they failed to return to oestrous 2 weeks later, were believed to be pregnant, and this routine persisted more or less unchanged until the end of World War 2.

Real Progress

Fred Day, descended from a strong Newmarket racing family, qualified as a Vet in 1935, and after spending time with Sir John Hammond at the ARC Unit in Cambridge working on equine fertility, joined Brayley Reynolds and Bob Crowhurst [who had worked at Claiborne Stud in Kentucky with Caslick and Dimock] in Newmarket. Fred pioneered the rectal examination of mares, palpating the genital tract and refining the “every 2 days” covering schedule. The arrival of the subfertile Alycidon at Lord Derby’s Woodlands Stud revealed the significance of covering close to ovulation. Simultaneously, control of uterine infection was greatly improved as antibiotic use became widespread, together with the Caslick procedure to prevent pneumovagina, still used [and abused] today. The “20 day check” was introduced whereby mares that did not return to oestrous [by teasing] were presented to the Vet. Her cervix was viewed by speculum and uterus palpated for “tone”, indicating pregnancy. The palpation extended to pregnancy diagnosis, and twin recognition. The convention upon twin pregnancy diagnosis [separate horns] was to inform the mare’s owner only, and not the manager. This gave the [less ethical] owner the opportunity to sell the mare if so wished without compromising the stud or its managers reputation.

By the 1970s, reasonable fertility efficiency was achieved, but problems with twins, seasonality, short cycling the oestrous cycle, pregnancy loss and stallion infertility remained. The Thoroughbred Breeders Association was concerned with a possible threat to the industry by Artificial Insemination, which had been developed in horses in Russia at the end of the 19 century. After World War 1, attention turned to cattle and sheep. The TBA appointed W R “Twink” Allen, a New Zealand graduate badly injured in a car crash and unable to practice, who had completed a PhD at Cambridge to look into AI.

Allen Era

Twink’s PhD was on Equine Gonadotrophins, hormones secreted by the hypothalamus part of the brain to control genital organs. One of these, Pregnant Mare Serum Gonadotrophin [PMSG] is unique to horses during pregnancy. The Equine Fertility Unit



Fred Day FRCVS



Recipient pony mares at the EFU with their transferred donkey, zebra and Przewalski horse foals.

(formally opened by H M The Queen 1989) began by trying to freeze stallion sperm, to provide reserves in the event of a pandemic. It also carried out early embryo transfer, including both horse and donkey embryos. Later, Sandra Wilsher developed the non-surgical method for embryo transfer, greatly refining the process.

One of the unique properties of equine pregnancy is the invasion of foetal “girdle” cells on the circumference of 30 day conceptuses to invade the mares endometrium, creating Endometrial Cups. The mares recognises these as “foreign, and rejects them via an immune response. Transfer of other equine embryo species such as donkeys varied this process, and lead to much greater understanding. Other significant breakthroughs include the use of a synthetic prostaglandin, being developed by Imperial Chemical Industries [ICI] for use in cattle. At the time, the only [unreliable] way of “short cycling” mares oestrous cycles was to flush the uterus with saline, which [unknowingly] released low levels of natural prostaglandin. ICI subsequently produced an Equine version, a better drug as it had fewer side effects, the main one being profuse sweating. As this drug was licensed for horses, it was far more expensive and in single dose vials. The horse world soon realised that the cattle drug did the same job at much lower cost, and was “seen to be working”!

At the same time, in the late 1970s, the arrival of a new venereal disease was detected in Newmarket, and then revealed in other parts of Europe, Australia and USA. Named Contagious Equine Metritis, it brought about a revolution in hygiene, screening and awareness of venereal pathogens, as well as the founding of the Code Of Practice, now rechristened “International”, and accepted as the go to manual for all horse infectious scenarios. I was privileged to be working for the Equine Fertility Unit at this time, a very exciting time to be involved with equine reproduction.

Following this, the problem of getting mares to cycle earlier in the year to suit the TB season was looked at. The current solution was to artificially increase the “daylight” for 2 months, starting around Christmas, by leaving the lights on in mares stables in the evening. The development of a synthetic Progestagen, Regumate, and field trials in Newmarket led to its widespread use worldwide, including supplementation in mares with low levels of natural progesterone in pregnancy.

Scanning

The next great breakthrough came in the 1980s, from Dr Eric Palmer, Director of the INRA Research Station at Nouzilly in France. He had borrowed his well know Paris obstetrician father’s ultrasound scanner to help with his research mares, and found that it would work trans abdominally. Twink managed to get one machine sponsored and started wider use in practice. After modifications to the probe, it transformed the rectal examination of mares, then abdomens, limbs and all soft tissues. Finally, the thorny issue of twin pregnancies could be managed successfully, and Vets became adept at squeezing early embryos from 15 days post conception. Clear images of the rest of the mares genital tract



Dr Eric Palmer

gave huge understanding of the workings of the ovaries and uterus, recognition of uterine fluid, cysts and other, at the time, unknown phenomena. Revelations all round and many more long standing problems solved.

The pioneer work achieved by EFU and colleagues during this time intrigued Twink with regard to other species, and his energy, inquisitiveness and brilliance got him invited to study elephants, camels and other mammals whose reproductive systems were less understood. Another triumph was his idea of a Millennium Statue for Newmarket, for which he raised the funds and commissioned 2 sculptors to produce the dramatic Stallion and Groom by our National Stud. Very sadly, Twink died last year



Newmarket’s Millennium Statue of Stallion and Groom commissioned by Twink Allen

Oviduct Problems

One remaining problem mare was the “fail to conceive but none of the known causes” mare. Twink's embryo studies demanded “younger” embryos, and the ability of Prostaglandin E₂, another naturally occurring prostaglandin used to help induction of birth in humans, to stimulate the oviduct, was utilised.

Huw Neal, of Newmarket Equine Hospital was skilled laparoscopy, and applied this gel to oviducts in the standing sedated mare, with good results. This led to treatment of chronic non conceiving mares, with oviducts restricted by old follicular fluid, to great effect, and is now a routine treatment, somewhat refined by intra uterine application. Many other research projects continued at the EFU before its closure in 2007.



Application for PGE-2 gel to mare oviduct via laparoscope

Post EFU

During these frontier times, much progress and innovation had been taking place for breeders. The industry was changing, as it was realised that many stallions were capable of covering many more than the traditional 45 mares per season, and shuttling to the southern hemisphere to repeat the exercise in the same year. Much research into stallion fertility was carried out in USA and advanced breeding practices developed from human techniques such as better freezing of semen, ova and embryos, Intracellular Cytoplasmic Sperm Injection [ICSI – a very difficult microscopic technique pioneered for human infertility] and cloning, none of which are allowed for Thoroughbreds.

Meanwhile, research and progress is continuing throughout the world, as we continue to follow advances in human reproduction. One example is the ability to detect foetal DNA in maternal blood during pregnancy - opening up the possibility to screen a foetus in a non invasive and safe manner.

There is no doubt that horses can now be produced from what would have been viewed in the past as unlikely sources, mares and stallions of low fertility, geldings, frozen sperm, ova and embryos, and even possibly extinct species, together with the abilities to sample, select and alter germ plasm in all its forms.

Genetic Era

The sequencing of the equine genome in 2007 ushered in a new era for the future of understanding and reproductive possibilities. As costs of sequencing have fallen, it may soon be possible to sequence an individual for \$100, well within the budget of TB and other horse breeders. Recent claims of the possibilities individual sequencing of humans may give to disease recognition, prophylaxis and treatment are astounding. We are now benefitting from early genetic studies, identifying inherited conditions such as Fragile Foal Syndrome, markers for fracture and others detriments. We are also identifying inbreeding trends after useful research in some rare horse breeds, which have been able to reverse near extinction by targeted breeding using genetic screening. We should be embracing these technologies as they have proved beneficial in other species, and hope that the multifaceted nature of horse performance escapes single markers which could annihilate horse sports as we know them. At the same time, there has always been individuals in Racing that seek an edge, not always legally, and some of these advances could be used. Gene doping, whereby some genes or their actions are modified chemically to change physical or performance parameters, is possible in humans, and the racing authorities are busy researching methods to detect such scenarios.

Conclusions

This has been a very polarised and personal reflection of the journey so far, in the hope that younger breeders and vets may occasionally wonder how we all managed without the benefit of pioneering work of giants like Twink and others. I have been helped by The History of Veterinary Practice in Newmarket [Editors Peter Rosedale, Peter Jackson and Timothy Cox] and Twink's own [privately published] History of the EFU – 1970 to 2007 [a tremendous read if you want the uncensored version]. There is still much work to be done, systems to understand and answers to be found, but we and our horses are in a much better place now than a generation ago.



Sandra Wilsher, Twink Allen, Debbie Willis & Louise Hawkins after closure of the EFU 2007