News has emerged that scientists have successfully grown cells containing the DNA of Eclipse, the most famous racehorse of all time. This is the first, and most difficult step to producing a live cloned foal.

Eclipse, born two hundred and fifty years ago, is widely considered to be the greatest Thoroughbred racehorse ever. Unbeaten throughout his racing career from 1769-1770, Eclipse was in a different league to his contemporaries and won eight of his races by default – "walk overs" - as no-one would put up a horse to run against him. His skeleton currently adorns the teaching block named after him at the Royal Veterinary College, London.

A team from the University of London's Department of Veterinary Embryology have been able to transfer DNA from Eclipse into the cytoplasm of cells from the subcutaneous connective tissue of a donor horse. These fibroblasts have then been proliferated in the lab and have been shown to have remained viable and to contain the replicated Eclipse DNA.

The next stage in the cloning process, which is due to start this month, will be the implantation of the chromosomal tissue into an egg from a donor mare and then the chemical signalling to trigger the egg to start the development into an embryo. After the recombined oocyte has been activated, it is transferred surgically to the oviduct of a recipient mare, which carries the foal to birth. It is possible therefore that a cloned Eclipse foal could be born in early 2015.

Italy’s Laboratory of Reproductive Technology created the world’s first successful horse clone in 2003 by fusing a skin cell from an adult mare with an empty egg but science has developed significantly since then and the commercial opportunities have been close behind. However, the process is not cheap: a syndicate of investors were reported to have spent £104,000 on producing the clone of William Fox-Pitt’s Badminton and Burghley winner, Tamarillo.

After retiring from racing he became a very successful sire. It is likely that there are very few Thoroughbred horses alive today that do not contain a reference to Eclipse somewhere in their bloodlines.

Attempts to recover DNA from his much studied skeleton proved fruitless, but samples of his tail hair which had been woven into the tassel of “The Whip”, the prize of victory in the self-named race, were found to contain sufficient undamaged genetic material for the scientists to work with.

But some in the equestrian community are uneasy, and the RSPCA has stated that it is against cloning. “There's huge potential for some of the animals involved to suffer unnecessary pain and distress,” said a senior scientific officer at the charity.

A spokesman for the British Equine Veterinary Association said “Science is progressing at an astonishing rate in equine veterinary medicine and the fact that an Eclipse clone could be born next year, albeit that the rules of racing wouldn't allow it to compete, is almost unbelievable.”
In a European first, scientists at the French Institute of the Horse and Equitation (IFCE) and the French National Institute for Agricultural Research (INRA) have announced the births of four foals from the transfer of genotyped and cryopreserved embryos.

They explain that the goal of this work is to better understand embryonic development, control livestock reproduction, and maintain breed genetic diversity. Furthermore, the researchers claim advantages for the horse industry in being able to determine the traits of a future foal.

The technology to maintain embryo viability following genotyping and cryopreservation was developed at the INRA Loire Valley centre at Nouzilly. Seven days after fertilization, embryos were collected from Welsh ponies from INRA’s resident herd. The embryos were genotyped: scientists sampled some of the embryos’ cells to analyse their genomes. In this experiment, embryos were selected based on sex, the idea being to use sex-based selection to test the technique’s feasibility. The embryos were then cryopreserved in liquid nitrogen (at -196°C).

Then in summer 2013, several embryos were transferred into saddled mares at the IFCE Haras du Pin centre. Eleven months later the foals were born in May 2014. They were of the expected sex: two females and two males.

This is the first time that such an event has taken place in Europe, and it is the product of more than 10 years of various types of embryonic research carried out by INRA and IFCE scientists.

Although embryo preservation techniques are already well developed for cattle, small ruminant species, and even humans, preserving horse embryos is a very complex process. For instance, horse embryos vary greatly in size: 7-day-old embryos range in diameter from 200 to 700 micrometers. It is very difficult to cryopreserve the largest embryos because the liquid inside them forms ice crystals when the embryos are frozen at very cold temperatures. What’s more, horse embryos are surrounded by a capsule that interferes with successful cryopreservation.

The scientists say that being able to cryopreserve embryos will allow us to maintain breed genetic diversity, particularly that of breeds with small population sizes, such as the Landais or the Poitevin Mulassier. Furthermore, the factor that currently limits the use of embryo transfer is its cost: the transfer centre has to maintain a team of recipient mares that are reproductively synchronized with the donor mares. Cryopreservation means that the transfer doesn’t have to take place immediately; it can wait until a recipient mare becomes available to receive the embryo. Finally, it may now be possible to directly repopulate horse herds that have experienced losses as a result of various issues, such as disease-related problems, instead of having to use the indirect technique of crossbreeding.

Why genotype the embryos? The scientists explain that genotyping allows them to choose the embryos they want to use based on different criteria: sex, as in this experiment, the absence of known genetic disorders, or, perhaps in the future, other traits that are tied to behaviour, such as emotivity or sociability. “It is advantageous for the horse industry to be able to determine the traits of a future foal. We will next aim to simplify the process—to make this technology more accessible and user friendly for those in the horse industry.”

Equine Management Survey

The University of Sydney and the International Society for Equitation Science (ISES) wants to find out the answers to these questions. They have developed a seven language online survey that gives horse owners worldwide the chance to contribute information about how they care for their horses.

The survey covers housing and feeding, behaviour, equipment and the information sources owners use to learn about caring for their horses. It is easy and fun to complete.

“The global horse industry is hugely varied” said PhD candidate Georgie Caspar, “so we’re really interested to identify the differences and similarities in horse care across countries”.

The findings of the survey will be used to gain an understanding of how horses are cared for and managed as well as how owners access information about horse care across the globe. These findings will help researchers, horse trainers and educators develop relevant and informative programs to assist horse owners to improve the health and welfare of their horses.

Do horse owners in Sweden stable their horses more often than horse owners in New Zealand? What do horse owners in France and Holland feed their horses? Do riders in England use the same bits and saddles as riders in Australia? Do horse owners in the United States or Spain use the internet the most to find out about horse care? Are Italian horses more likely to wear shoes or go barefoot?

The survey takes approximately 20 minutes to complete and is online at:


Participants need to select the flag in their chosen language and tell us about their horse. Upon completion you can enter a prize draw to win a year’s membership of ISES. The results of the survey will be published towards the end of 2014.

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Following the successful completion of a Grass Sickness vaccine pilot trial last year, a full-scale trial is due to start shortly throughout Great Britain.

Equine grass sickness (EGS) affects grazing horses, ponies and donkeys, and is nearly always fatal. Britain has the highest incidence worldwide. The current theory is that EGS is a toxico-infection involving Clostridium botulinum type C. Several studies have shown horses with natural immunity to Clostridium botulinum type C are less likely to get the disease.

Other equine clostridial diseases are successfully prevented by vaccination, so it should be possible to prevent EGS by vaccination.

The main purpose of last year’s pilot study was to assess whether a larger-scale trial would be possible. So it was designed to test the methods and systems used rather than the vaccine itself.

A total of 48 horses and ponies were randomly assigned to the vaccine group and 47 were assigned to the placebo treatment group. All horses in the study completed the primary treatment course of three injections given 21 days part.

Throughout the pilot trial, owners provided information to the researchers via telephone questionnaires, and they recorded details of preventive healthcare treatments, including wormers and vaccinations, administered for each horse or pony involved in the trial.

All animals received a thorough veterinary clinical examination before each injection. Participating owners undertook daily post-treatment observations for seven days after each injection. This included inspection of the injection site for signs of reactions and assessment of appetite and demeanour.

The researchers report that the pilot field vaccine trial was a huge success, meeting all of the study objectives. The findings have already been used to revise sample size calculations and trial methodology for the full-scale nationwide randomised placebo-controlled field vaccine trial.

Both the C. botulinum type C toxoid vaccine and placebo injection were shown to be safe.

No systemic adverse reactions (where the entire body may be affected and the horse or pony may become unwell) were reported following any injections administered during the pilot vaccine trial. Minor local injection site abnormalities (such as localised heat, pain or swelling at the injection site) were reported in 19 of a total of 372 injections administered during the study. None of them required treatment or veterinary attention.

There was no significant difference in the number of minor injection site abnormalities between the vaccine or placebo treatment groups.

The researchers report that the response to the vaccine varied, as they expected it would. Some horses showed an increase in antibody levels of up to eight times, but others showed a less marked response. This is in fact what tends to occur with other vaccines, such as influenza. However, it does mean that not all horses would be fully protected by the vaccination.

The researchers have provided a summary of the findings of the pilot study to the Equine Insurance Forum, which they hope will reduce any problems regarding insurance cover in recruiting animals for the forthcoming field vaccine trial.

This ground-breaking EGS vaccine trial aims to determine the efficacy of Clostridium botulinum type C vaccination in preventing EGS by comparing EGS incidence between groups of horses receiving vaccination or a placebo.

The plan is to recruit 1100 horses for a two year period from premises that have previously had a high incidence of EGS. Demonstration of reduced disease incidence in vaccinated horses would provide a major breakthrough in the prevention of EGS.

For more details see: http://www.equinegrasssickness.co.uk/
The world’s most extensive study into the effect of surfaces on the health of horses has been published by the International Equestrian Federation (FEI).

The Equine Surfaces white paper is the result of a four-year collaboration between equine experts from six universities, three equine and racing-specific research and testing centres, and two horse charities in Sweden, the UK and United States.

It brings together the latest data and published scientific papers on arena surfaces, and the effects these have on horses in training and in competition.

Key properties of footing, and the effects of footing on horses’ physiological and biomechanical responses, are described, as well as the optimal composition, construction and maintenance of arenas for maximising performance of horses while minimising the risk of injury.

Current methods of measuring the physical properties of surfaces, and the essential surface preparation and maintenance techniques, are also discussed, in order to guide future progress in building suitable competition and training surfaces for sport horses.

Alison Northrop, senior lecturer in zoology at Anglia Ruskin University, is one of the co-authors of the white paper. She said: “The opportunity to collaborate as an international group has allowed us to develop our understanding in a more meaningful and effective way.

“The white paper is an important step toward improving welfare for the ridden horse.

“The result of this work is that equestrian surfaces can be prepared and maintained in a way that helps us to minimise risk of injury whilst supporting optimal performance.”

Highlights of the white paper were presented at the FEI Sports Forum in Lausanne, Switzerland, on April 28, 2014, by Lars Roepstorff (SWE), professor of functional anatomy of domestic animals at the Swedish University of Agricultural Sciences. He said: “We now have the latest scientific knowledge on equine surfaces contained in one place, thanks to an intensive global effort over several years.

“The Equine Surfaces white paper is a living document, and we will continue to update this as we develop our knowledge on surfaces and their influence on horse performance and soundness with new scientific studies and surface data, which is all key as horse sport continues to grow around the world.”

The Equine Surfaces White Paper has been funded by the FEI, World Horse Welfare, the Swedish Foundation for Equine Research and the British Equestrian Federation.

What makes horse people tick?

What sort of people are attracted to riding, working in the horses industry or watching equestrian sports? A team of scientists have launched a short online survey to investigate.

The team is lead by Dr David Marlin and comprises Dr Inga Wolframm (an expert in sports psychology) who has been studying personality in riders for a number of years, and Dr Jane Williams (an epidemiologist).

They are looking for people involved in any way with horses or the horse industry (e.g. riding horses, working in the industry, etc), people who have no involvement with horses but have friends who are and people who have nothing to do with horses at all to complete the short online survey.

Dr Wolframm said “We suspect that certain types of people are drawn towards the horse industry, whether for business or pleasure. For example, people who like to take risks might be more attracted to sports perceived as being more dangerous, such as eventing”.

Dr Williams is excited by the potential for improving horse-rider performance. “Once we know what motivates riders, we can help them make the most out of the partnership with their horse.”

Dr Marlin added “understanding more about personality can have important implications for how equestrian sports are marketed, talent selection and how riders are coached”.

The online survey takes around 5 minutes and can be completed entirely anonymously. Participants do not even need to give their names. Anyone wishing to receive a summary of the results can choose to leave an email address.

The survey can be found here: https://www.surveymonkey.com/s/sport_and_equestrian_survey

Equine Science Update e-news is now available.
Receive monthly news by e-mail
See: www.equinescienceupdate.com for details.
Hair analysis to monitor excess selenium intake

Analysis of tail and mane hair could be used to identify horses that have been exposed to high levels of selenium in their diet, according to recent research.

Selenium is an essential mineral, required in small amounts to allow the body to function properly. It works as an antioxidant, especially when combined with vitamin E. It plays a role in thyroid function and in the immune system.

But you can have too much of a good thing. And excessive amounts of selenium in the diet can lead to chronic selenium toxicosis (selenosis).

Typically this is the result of grazing selenium rich pasture. Most plants can take up selenium from the soil. Some plants, known as obligate selenium accumulators, need selenium to grow. They are usually unpalatable, and so are usually only eaten in the spring before other more palatable plants start to grow, or in hay. Their presence on the pasture indicates that the soil contains a high level of selenium. Examples include some Astragalus spp. (milk vetch), Stanleya pinnata (prince’s plume), and Oxytropis lambertii (purple locoweed).

Another possible source of excessive selenium is over zealous feeding of selenium-containing dietary supplements.

Typical signs of horses with chronic selenium poisoning include weight loss, hair loss (especially affecting the mane and tail), and lameness in all four limbs. The hoof may separate at the coronary band and in severe cases the hoof wall may slough off.

Serum samples can be used to detect current high blood selenium levels.

Now scientists, led by Dr T. Zane Davis, at the U.S. Department of Agriculture’s Poisonous Plant Research Laboratory, in Logan, Utah, have demonstrated that mane and tail hair analysis can be used to identify previous periods of excessive selenium intake.

They analysed the mane and tail hairs of horses exposed to high levels of selenium in their diet. The pasture on which these horses had been grazed, over the previous three summer grazing periods, had a high content of seleniferous plants. The water also contained high levels of selenium.

Analysis was performed using a technique of inductively coupled plasma mass spectrometry. By looking at sequential segments of hair, the scientists were able to correlate changes in the selenium content with the grazing history.

Selenium is incorporated into the tail hair as it grows and remains more or less unchanged thereafter. So by measuring the selenium content of sequential segments of the hair, the scientists were able to demonstrate the fluctuations in selenium content over time. They identified an increase in selenium content that coincided with the turnout onto pasture and a decline in selenium concentration as the horses came off the pasture later in the year.

In one case they were able to demonstrate the pattern of fluctuating selenium concentration in the tail hair extending back for three years. They conclude that in some cases hair samples can be used to determine Selenium exposure in horses for up to 3 years post-exposure.

For more details see: Analysis in Horse Hair as a Means of Evaluating Selenium Toxicoses and Long-Term Exposures. Davis TZ, Stegelmeier BL, Hall JO. J Agric Food Chem. 2014 Jun 2. DOI: 10.1021/jf500861p
Researchers in Canada have launched an interactive map designed to track infectious diseases in dogs, cats, and horses around the world.

The "Worms and Germs Map" can be accessed online, and is free to use. It is a companion to the educational site WormsAndGermsBlog, a useful source of information on infectious diseases in companion animals and zoonotic diseases (those that can also affect people). Both sites were developed by Scott Weese DVM DVSc DipACVIM of the University of Guelph and Maureen Anderson DVM DVSc PhD DipACVIM from the Ontario Ministry of Agriculture and Food.

Dr Weese explains: "This disease mapping site was developed because we perceived a need for real time tracking of companion animal infectious diseases and a need to foster more knowledge about infectious diseases amongst vets, animal owners and people in human medicine and public health. It may also help track emerging diseases, diseases that have a changing range and allow for more rapid identification of outbreaks."

For horses, the map will show reported incidents of anthrax, Eastern equine encephalomyelitis (EEE), equine herpesvirus-1 (EHV-1) abortion, EHV-1 myeloencephalopathy, equine infectious anemia (EIA), influenza, rabies, and strangles. There is also scope for recording information such as how, and when, the disease was confirmed, whether the horse had travelled recently, and details of the horse affected, such as age, breed and sex.

Clearly, to be most useful the map requires cases of infectious disease to be reported.

Some information will be gleaned from surveillance programmes and reputable news sources. But it is hoped that much of the data will be provided by veterinarians and veterinary technicians, who are dealing with the cases in the field. Weese and Anderson have made it as easy as possible for cases to be reported.

"Vets and techs can register to get a password, and then they can enter cases in a matter of seconds. We have case definitions for each disease to try to make sure that we are tracking true disease, not just animals that have been exposed and have antibodies."

"Getting participation of vets and techs is critical, and the more people put in the more they'll get out," he added.

For more details, and to see what has been reported in your area, go to... wormsandgermsmap.com

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The paralytic form of equine herpes infection (EHV-1 myeloencephalopathy) seems to be occurring more commonly, leading to speculation that viruses with increased neurovirulence are circulating.

What can we learn from recent outbreaks? A free webcast, presented by Dr Nic Pusterla of UC Davis, promises to review the problem and highlight the latest developments in epidemiology, therapy and prevention.

For more details see: http://www.myhorseuniversity.com/node/755
Equine Guelph, the horse owner’s Centre at the University of Guelph, has launched a new service that aims to bring updates on the latest equine research carried out by scientists at the Ontario Veterinary College and the University of Guelph.

Research Radio, an online podcast, promises to highlight the cutting edge discoveries being made, and explain what they mean for equine health and welfare.

The first two podcasts are now available. The first features Dr. Thomas Koch discussing his work on stem cell therapy. In the second, Dr. Jeff Thomason discusses the relationship between track surface and injury in the performance horse.

For more details go to: http://www.equineguelph.ca/research/radio.php

An international group of researchers are looking for owners of normal healthy horses as well as owners of horses that headshake to complete a short online survey to help understand headshaking. They are trying to understand why some horses develop headshaking behaviour and others do not. With a better understanding it is hoped that more effective treatments can be developed.

To date the group have over 300 completed surveys from owners of horses that headshake and from over 400 that don’t. The group urgently need more surveys, especially from owners of horses that DO NOT HEADSHAKE. (Please note that at this time the survey is limited to horses in the UK)

The survey takes around 10 minutes to complete and can be found here: https://www.surveymonkey.com/s/HEADSHAKING2014

Back issues of Equine Science Update from 2005 -2009 are now available. As PDF files they can be downloaded direct to your computer and are fully searchable.

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Updated Foaling Guide now available.

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Know what to expect, what can go wrong and what to do about it.

For more details go to: www.TheFoalingGuide.com
Equine Oncology Resource

Neoplasia is relatively uncommon in horses compared with other species. Melanoma, squamous cell carcinoma and lymphoma are the usual culprits.

Many veterinarians will spend their whole career without identifying any other type. But others do occur.

And the new Oncology Virtual Issue from Equine Veterinary Education (EVE), the sister publication to the Equine Veterinary Journal, provides a useful resource of information about many different neoplastic conditions.

The first part consists of case reports and clinical commentaries. These are available free online.

For more details see:
- Oncology Virtual Issue Part I: Case Reports and Clinical Commentaries
- Oncology Virtual Issue Part II: Equine Oncology Resource

Horse owners views sought on dental care, hoof care and musculoskeletal therapy

British horse owners have been asked to participate in a quick online survey to find out more about their attitudes to dental care, hoof care and musculoskeletal therapy for horses.

The results of the survey will provide the basis for discussions on how equine healthcare services undertaken by non-vets should be managed in order to best protect the health and welfare of horses in the UK.

The Survey closes on Sunday 15th June 2014.

It should take no more than five minutes of your time to complete and all submissions remain anonymous.

See: https://www.surveymonkey.com/s/RMPRHorseOwner

2014 National Equine Health Survey

British horse owners have been encouraged to spare a few minutes to take part in the online National Equine Health Survey (NEHS).

The survey looked at the general health of horses, ponies, donkeys and mules in the UK and aims to identify the main problems affecting them.

Previous surveys have revealed the importance of problems such as skin conditions, lameness, weight issues and colic. The results are shared across the equine industry to help establish benchmarks for equine health and disease in the UK, and help identify priorities for future research, training and education.

The 2014 National Equine Health Survey ran between May 18-24. We will publish the results once they are available.

For more information go to: www.bluecross.org.uk/NEHS

See: https://www.surveymonkey.com/s/RMPRHorseOwner
Recurrent airway obstruction (RAO) or “heaves”, the equine equivalent of human asthma, is a common cause of poor performance and a significant welfare concern.

Severely affected animals show signs such as dilated nostrils, nasal discharge, and excessive chest movement. A "heave" line may be present. They may be incapable of any athletic activity. Mild cases may appear to breathe normally and require further investigation to confirm the diagnosis. However, most cases fall somewhere between the two extremes.

The signs are caused by a combination of increased mucus production in the respiratory tract and spasm of the muscles surrounding the airways. This results in narrowing of the airways, making it more difficult for the horse to breathe.

Recent research, funded by the Horserace Betting Levy Board, has been looking at the properties of mucus and the sites of its production in the lungs of horses with RAO.

An essential component of mucus is the mucins – high molecular weight proteins, produced by specialised cells such as those lining the respiratory tract. Their most important characteristic is that they can form gels, and so provide lubrication, transport and a physical barrier.

It was these mucins that formed the subject of this study. A summary of the work, carried out by Adele Williams as part of her PhD studies at the University of Manchester, has been published online.

Dr Williams found no difference in composition of the mucus between healthy and RAO-affected horses; the RAO cases just had more of it. Neither did she find any difference in mucin properties between horses housed inside or maintained at pasture.

The research showed that mucins were produced in cells lining the airways and in deeper glands. There was great variation in the size and number of these cells in both normal and RAO-affected horses. However, the mucin-producing cells in the deeper glands were larger in horses with RAO than in healthy control animals.

In the future it may be possible to use cell cultures to study mucus production in the laboratory, and to investigate ways of modifying mucus production. As part of the current project, mucin-producing cells were grown successfully in the laboratory for a short time. However there were problems with bacterial and fungal overgrowth. The technique needs to be refined before it can be used for analysing and modifying mucus production in the search for a treatment for mucus overproduction in horses with recurrent airway obstruction.

For more information see:

Warning of multiple anthelmintic resistance


The study, involving scientists in Edinburgh, Bristol and Liverpool, looked at the efficacy of anthelmintics against worms in horses on 16 stud farms.

To assess the efficacy against strongyles, faecal worm egg count reduction (FECR) tests were carried out on samples from 429 horses. Faecal egg counts were performed before and 14-17 days after treatment with one of the four available broad-spectrum anthelmintics: ivermectin; moxidectin; pyrantel or fenbendazole.

Moxidectin was efficacious in all tests, resulting in mean faecal egg count reduction in the range of 99.8-100%. Ivermectin showed reduced efficacy (FECR 85.7% -100%) in one group of yearlings. Five groups of yearlings showed reduced efficacy of pyrantel (FECR ranging from 0-13%). However, pyrantel was still efficacious when administered to mares. Fenbendazole always had low efficacy (FECR 0.4 – 42%).

A different pattern of efficacy was found against the large roundworm Parascaris equorum. Tests carried out on four farms showed reduced efficacy of ivermectin (FECR 25.5% – 91.2%). However fenbendazole had acceptable efficacy (FECR 97.5% – 99.9%).

The research team also performed faecal egg counts at about 2 week intervals after anthelmintic treatment for up to 12 weeks to determine the strongyle egg reappearance period for moxidectin, ivermectin and pyrantel. They found that the egg reappearance period for all three anthelmintics was shorter than had been observed previously. This is considered to be an early indicator of developing resistance.

“Overall,” they conclude, “our results indicate that ivermectin and moxidectin administration provided acceptable efficacy at 14 days; however, egg reappearance period results suggest that these products are working less effectively than measured previously. As shortened egg reappearance period is believed to be an early indicator of resistance, this highlights the issue of impending multi-drug resistance in strongyles on stud farms.”

For more details see:


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