

Equine Guelph

Update

Spring 2010



helping horses for life



World, Meet Equine Guelph!

EquiMania! Named the Official Youth Education Centre for the Alltech FEI World Equestrian Games 2010 in Kentucky

“We are heading to Kentucky,” exclaims Gayle Ecker, director of Equine Guelph. “And what an opportunity for us to introduce Equine Guelph to the world!”

The Alltech FEI World Equestrian Games has invited Equine Guelph’s EquiMania! to be the centre for youth equine education over the 16-day competition coming to Lexington, Kentucky next fall.

An invitation to this international stage is a remarkable feat given the tender age of Equine Guelph – a youthful six years. “We have worked diligently on building Equine Guelph’s programs including, EquiMania!, and I am so proud that we have earned this opportunity,” says Ecker.

EquiMania!, Equine Guelph’s interactive traveling education centre for youth, has been a popular exhibit in Canada – featured regularly at the Royal Agricultural Winter Fair, Can-Am All Breeds Equine Emporium, Royal Manitoba Winter Fair and rural agricultural fairs – but never before has the 5,500 lb. exhibit ever crossed international borders.

The Games, to be held at the Kentucky Horse Park in Lexington, Kentucky from September 25 – October 10, 2010, are the world championships of the eight equestrian disciplines recognized by the Fédération Equestre Internationale (FEI). Held outside of Europe for the first time, the competition involving 600 riding competitors and 700 horses from more than 60 countries is expected to be attended by as many as 600,000 spectators and viewed on television by an international audience exceeding 460 million.

EquiMania! will be located in the centre of the Park – in the Carriage House. The facility will be chock full of unique educational displays,



Photo by Henrietta Coole

EquiMania! will teach kids from all over the world about horses at the 2010 Alltech FEI World Equestrian Games.

activities and quizzes to engage youth about horse health care and safety. Kids of all ages will learn: how to braid a tail, about potential careers in the horse industry, to tell the age of a horse by its teeth, horse farm and rider safety, to identify horse bones, colours of equine competition ribbons, equine nutrition, how to wrap legs and what parasites look like.

Not only will young visitors learn new things about horses, but horse people from around the world will learn about Equine Guelph’s award-winning online education programs in equine science and business management.

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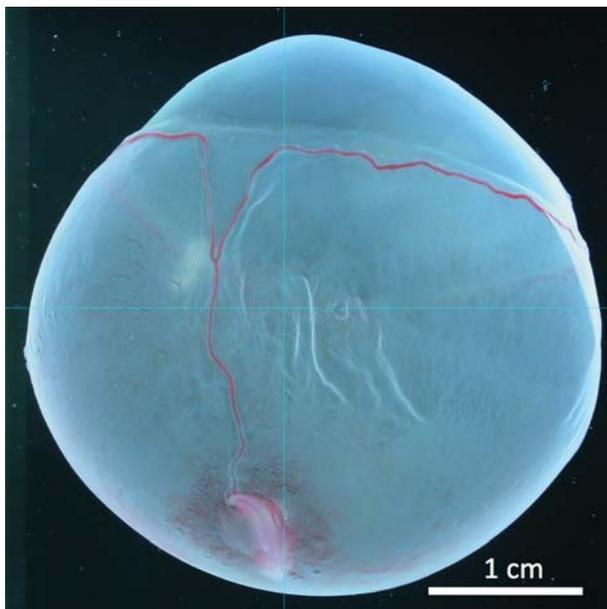
So what has research done for the horse breeder lately?

Highly fertile in the wild, horses are less so under management conditions that separate the sexes, remove mating choices and often call for foaling early in the year. Humans have been intervening in the breeding of horses for about 5500 years, but research has contributed to the interventions for less than a century. That is certainly “lately”; how has it helped breeders cope with fertility problems?

Coping does not always require “high tech” instruments, skills, or drugs. For example, putting mares under lights in winter to convince them to recommence their ovarian cycles as though spring had arrived is as simple as it is effective – the product of extensive research, mostly in France, during the late 1970s and early 1980s. Palpation per rectum is also simple but was instrumental in laying the foundations of modern knowledge of ovarian function and early pregnancy diagnosis in the 1930s.

Since the 1980s, reproductive management of the mare without ultrasonography has become unthinkable; assessments of ovarian function, embryonic development, and uterine physiology and pathology all depend upon it. While marvelling at the images on echograph screens, however, spare a thought for the research that went into working out what those images mean and where and when to look for them. Whereas rectal palpation is subjective, ultrasonography allows measurements to the millimeter, sometimes images in colour and/or three dimensions, and reveals subtle changes that help the clinician predict when ovulation is likely to occur and to time insemination accordingly, thereby maximizing the chances of fertilization.

To hasten ovulation the mare may be injected with human chorionic gonadotrophin (hCG), a hormone prepared from the urine of pregnant women. The use of hormones in reproduction became more rational after research during the 1960s and 1970s made it



An equine conceptus photographed in saline after recovery through the cervix from a mare three weeks after ovulation and breeding. The embryo itself is at the bottom of the picture, with prominent blood vessels spreading out over the wall of the fluid-filled yolk-sac.

Photo by
Keith Betteridge

possible to measure their concentrations in blood during the estrous cycle and early pregnancy.

Gonadotrophin releasing hormone (GnRH), which is released from the hypothalamus of the brain and stimulates the pituitary gland to release luteinizing hormone, is an essential link in the pathway to ovulation. The biological activity of GnRH was demonstrated in the 1960s; identifying its structure resulted in two Nobel Prizes for medicine in 1977. Structural modifications of GnRH have uses as varied as the treatment of prostate cancer in men, preparation for in-vitro fertilization in women, and the induction of ovulation in mares – an example of the truism that one never knows where products of use to horse reproduction will come from.

That truism also applies to the hormone prostaglandin, often used to bring mares into heat. If, in the late 1960s, researchers had applied for funding to work on a coral-like organism to help horse reproduction, they would have been laughed out of court. Yet it was the abundance of prostaglandins in the

sea-whip that enabled the Upjohn Company to produce the compounds more cheaply and to make their use widespread. I repeat: one never knows where products of use to horse reproduction will come from!

A complementary relationship between rectal palpation and ultrasonography shows up in relation to pregnancy diagnosis. It was sensitive fingers that first revealed that the equine conceptus (the embryo and its fluids and membranes; Figure) moves around in the uterus; ultrasonography substantiated that fact in the early 1980s and has enabled us to “see” conceptus movement until about Day 16 of pregnancy when it becomes fixed where the placenta will form. Some 17% of pregnancies detected by ultrasonography at about Day 15 do not result in a foal, and most (60%) of those losses are incurred before Day 35. Researchers at Guelph are paying special attention to that period, studying how the conceptus attaches to the endometrium (lining of the uterus).

Techniques for studying early pregnancy in horses have been revolutionized over the past three decades through efforts to produce and

manipulate embryos in the laboratory (in vitro) and the techniques of molecular biology – genomics and proteomics – that have culminated in the sequencing of the equine genome.

The production of embryos in vitro requires detailed knowledge of sperm and ova and how they interact at fertilization. Research on the stallion and his semen dates to the earliest days of artificial insemination and remains a major subject. The direct benefits to the horse breeder of being able to ship cooled or frozen semen over long distances and time intervals are already considerable and will undoubtedly expand – especially as the use of “sexed” semen becomes more routine.

On the female side, studies of normal ovulation have given researchers clues for achieving similar changes to the ovum in vitro during in-vitro maturation (IVM). IVM is an essential prelude to in-vitro fertilization (IVF), which, in its conventional form in horses, has lagged far behind IVF in other species, including humans. Paradoxically, success with embryo production by injection of a single sperm into an egg (intracytoplasmic sperm injection, ICSI), and with cloning by stimulating the mature ovum to “re-programme” adult cells, has been at least as good in horses as in other species. Although production of horse embryos in vitro seems likely to remain an expensive laboratory procedure for the foreseeable future, research into in-vitro procedures has already had spin-offs. Thus, the development of methods of retrieving oocytes from the living mare, handling them in a proper culture medium, and transferring them (either alone or with spermatozoa) to the oviducts of young, fertile mares has produced hundreds of foals from subfertile mares and stallions. Just as important is the revelation (mostly in cattle and sheep) that the environment experienced by an embryo in vitro can have effects that persist into later pregnancy, post-natally, and even into future generations. As research unravels the reasons for this, the implications for the nutrition and management of pregnant mares becomes significant indeed.

A sizeable industry has developed around the procedure of embryo transfer (ET). Argentinian polo pony breeders, for example, transferred more than 4,000 embryos at 11 centres during the 2007-2008 breeding season, allowing the elite donor mares to continue in their playing careers while recipients carried their offspring. Most ET techniques have been mastered but an important exception is that the cryopreservation (“freezing”) of horse embryos, which works well on embryos recovered from the uterus about 6 days after ovulation, cannot yet be used efficiently on older embryos.

The scope of the new molecular techniques that have become available for undertaking reproductive research deserves to be underlined because the methods are being applied to all aspects of equine research. They make it possible to determine which tissues are producing what proteins and other molecules, (and in what quantities), which tissues are producing receptors for those molecules, and which genes control these productions. Resultant interactions regulate the response of one tissue to another, including the response of a mare to her embryo and vice versa. The prospects for understanding the events of early pregnancy and pregnancy failure, and for developing tools for genetic selection of horses, have never been brighter.

Genetic selection in horse breeding has been practised for centuries, especially in Thoroughbreds, though not with the intensity and objective criteria of selection that have been used in cattle. However, analysis of the chromosomes themselves – cytogenetics – has enabled researchers to identify important abnormalities in chromosomal structure that can cause congenital abnormalities, embryonic loss, and infertility.

Reproductive research in horses does not end with a firmly established pregnancy; the pregnancy has to be maintained to term and followed by successful birth and development of the foal. An example of a reproductive problem that spans early and late pregnancy is Mare Reproductive Loss

Syndrome (MRLS) which caused losses estimated at \$500 million to the Kentucky horse breeding industry in 2001 and 2002. Though believed to be associated with the ingestion of massive numbers of caterpillars, the exact causes of abortion in this syndrome are still under investigation.

The economic impact of MRLS should remind us of the necessity to maintain scientific expertise capable of meeting unexpected disease challenges, either non-infectious (like MRLS), or infectious, like Contagious Equine Metritis (CEM) which is currently affecting the import and export of horses.

In summary, the efficiency of the horse breeding industry today depends on research of the past; its advance will depend on research of the present and future. By maintaining and expanding the symbiotic relationship between the industry and its supporting researchers, we have every prospect of keeping Canadian horse breeding abreast of the field.

For full version with references please visit: www.EquineGuelph.ca/research/betteridge.php



Photo by David Briggs

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Help Horses like Jacque



Pal's Beau Jacque (1973 – 2009) and his owner, Heather Heighes

This story is about remembering a special horse, Jacque, and how equine research enabled him to live a long and happy life.

At the peak of his career, Pal's Beau Jacque was a champion horse. Upon retirement, he enjoyed a wonderful 20 years of hacking and relaxing. Sadly, during this time, a recurring eye condition threatened to destroy his quality of life.

Thanks to the Ontario Veterinary College (OVC) at the University of Guelph, Jacque

received the surgical care he desperately needed and his eye was replaced with a prosthetic. Jacque enjoyed several more happy years before passing away this past summer at the age of 36.

"Mere words cannot convey how special he was," says Jacque's owner, Heather Heighes. "Thanks to everyone at Guelph, and the wonderful care he received, we had an extra 5-1/2 wonderful years together."

Because of advancements in research at the

Help fund Critical Research

Where do your funding dollars for equine research go? Here are some examples of ongoing research projects funded by generous donations to Equine Guelph:

- Transmission and diagnosis of infectious disease and biosecurity on horse farms
- Diagnostic and healing tools for injury care
- Stem cell research
- Cardiac treatment options
- Respiratory disease
- Early pregnancy loss
- Performance care for competitive horses
- Racetrack surfaces
- Drug resistance to dewormers

To donate to equine research, go to www.EquineGuelph.ca and click on 'Donations'.

OVC, Jacque received the care he deserved. And today, both pleasure and performance horses and their owners continue to benefit as a result of Equine Guelph's funding of many research programs.

Equine Guelph recently mailed our annual appeal to horsepeople, and wanted to remind you that your donation can truly make a difference in the lives of horses. Help us help horses for life.

World, Meet Equine Guelph

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"The hard-working team at Equine Guelph should be proud of this accomplishment," says Alastair Summerlee, president of the University of Guelph. "This is a wonderful opportunity to show the world how Equine Guelph, the Ontario Veterinary College and the University of Guelph can support the needs of the equine industry – both now and in the future – through research, performance and education."

Equine Guelph staff have put their heads together to prepare to present EquiMania! to the world. From bottom left; Susan Raymond (Communication & Education Programs), Gayle Ecker (Director), Diane Gibbard (Special Events), Jackie Bellamy (Reception), David Finlay (Learning Technology & Web) and Henrietta Coole (Corporate Sponsorship & Citizenship).



Photo by Rachael Needles



Photo by Brad Conrad

A breeding to Mister Big, winner of over \$4 million in career earnings, was recently donated to Equine Guelph's education program by Joe Muscara, owner of the harness racing star.

Mister Big Helps Big!

Breeding donated to Equine Guelph's education program

\$6,500 was raised for Equine Guelph through the generosity of Joe Muscara Jr. who donated a breeding to Mister Big, the Standardbred sensation standing at Tara Hills Stud in Port Perry. Funds were directed to the non-profit organization's education program.

"We are 150 years into a grand experiment of developing a horse that can pull a cart real fast. Most of that time, we did what our grandfathers did," says Muscara, owner of Mister Big. "Now, with the rapidly accelerating scientific discoveries in all facets of equine endeavours, that is not enough to excel – not even enough to survive."

Ted Smith, horse owner and president of Standardbred Canada, was the successful bidder of the breeding which was auctioned at the Standardbred Breeders of Ontario Association (SBOA) banquet and awards evening in January.

"It is so wonderful that Joe is helping us build the education and training program for the equine industry," says Gayle Ecker, director of Equine Guelph. "And we thank Ted for making the high bid and the SBOA for their assistance at their annual banquet."

To donate to Equine Guelph's education program or for more information on online courses, go to www.EquineGuelph.ca

"You need the tools to evaluate what is new; Use what is good and avoid what is not," continues Muscara. "Equine Guelph did not teach us how to train Mister Big, but it did give us the tools to evaluate what we were doing and the confidence to stick with the plan over three magical seasons."

Equi-Challenge:

Don't Miss the Horse Event of the Season

Riding on the overwhelming success of the inaugural 'Equi-Challenge '09', held at Greg and Irene Aziz's spectacular equestrian estate in Caledon, the Ontario Veterinary College is pleased to announce the plans for Equi-Challenge 2010 to be held at Halton Place, August 26.

While the venue has changed, the unique Equi-Challenge formula, which played to a sold-out crowd in its first year, will remain constant with the top riders from Olympic sports, racing, western and polo 'changing hats' for a great cause.

A one-of-a-kind multi-discipline team event, Equi-Challenge features the biggest names in sport switching 'hats' for the evening with show jumpers trying their hand at barrel racing, jockeys jumping hurdles, drivers playing polo and more...

Choreographed for good sport and entertainment, Equi-Challenge will flow between team competition at ringside to sumptuous gourmet food and music in the VIP tent.

Equi-Challenge will be an evening to celebrate the diversity of the horse and support the new Equine Sports Medicine and Reproduction Centre at the world leading Ontario Veterinary College.

For information or tickets, visit www.equichallenge.ca.



photo by Tracy Hanes

Hall of Fame Jockey Sandy Hawley barrel racing at the inaugural Equi-Challenge event

UPDATE ON EQUINE GUELPH'S WORK



Equine Guelph: Who we are & what we do

Equine Guelph is a non-profit organization funded by horsepeople to serve the horse and its industry through education, research and healthcare.

Educating Horsepeople: Equine Guelph offers horsepeople award-winning education programs that focus on lifelong learning:

- Starting with EquiMania! – interactive youth exhibit at shows and fairs
- Groom One Certificate – hands-on work experience and online education for new owners or caretakers
- Equine Science Certificate, Certificate in Equine Business Management and Diploma in Equine Studies – online courses to improve the management and welfare of horses and for those interested in a career in the equine industry
- Workshops – hands on sessions on a variety of topics (i.e. anatomy and first aid)

Funding Industry Research: Equine Guelph is the epicentre where academia, industry and government meet and decide on which research will help horses the most:

Research projects led by top UofG researchers opens doors to discoveries that help horses in the areas of prevention, diagnosis and treatment of life-altering diseases and injuries

Promoting Health & Performance: Equine Guelph helps to promote medical services available for horses at the University of Guelph and the Ontario Veterinary College (OVC):

- Health – Sick and injured horses receive advanced medical and surgical care through OVC's team of specialized veterinarians
- Performance – The OVC Teaching Hospital offers equipment and the latest diagnostic techniques to address sports medicine issues in equine athletes

EVENTS

Mark your calendar!

March 24, 31 & April 7, 14
Horses 101 Seminars, Erin

March 27 & April 10
Healthy Lands for Healthy Horses Workshop, Caledon

April 6, 13, 20 & 27
Horses 102 Seminars, Clinton

April 15 & 16
Groom One Workshop, Ajax

May 1 & 2
Equine Anatomy Workshops

May 10 to August 1
Equine Guelph's Online Courses (Summer Offerings)

August 26
Equi-Challenge

September 25 to October 10
EquiMania! at the Alltech FEI World Equestrian Games

*Anyone wishing to excerpt Equine Guelph should contact:
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educating horsepeople



funding industry research



promoting health & performance



EQUINE GUELPH
helping horses for life