THE SCIENCE OF HORSE WELFARE

THE ONTARIO VETERINARY COLLEGE AT GUELPH

By Karen Briggs

Imagine you're looking down on planet Earth as from a satellite. The camera focuses in past layers of clouds at the vast continent of North America, and its northernmost landmass, Canada, the second-largest country in the world.

Now the focus zooms in a little closer – at southern Ontario, a densely populated peninsula sandwiched between the majestic Great Lakes, just to the east of the country's centre. Toronto, the provincial capital, is of course its largest urban metropolis, but dozens of other cities and towns also dot the landscape – a landscape which represents some of the richest and most fertile farmland on the continent.

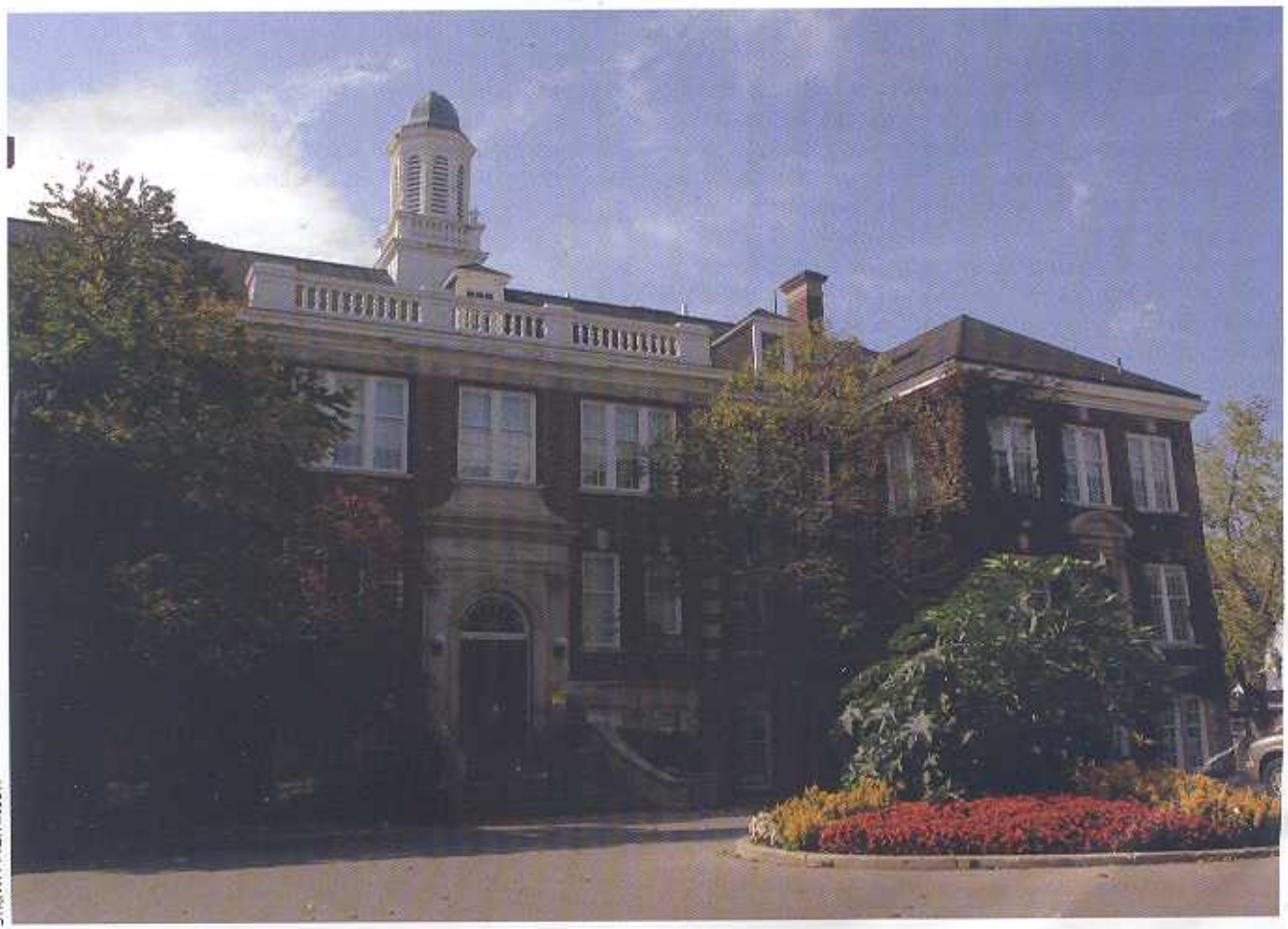
Zoom in closer still, and you might get a birds' eye view of the city of Guelph, about 45 minutes' drive west of Toronto. Founded in 1827 with the ceremonial felling of a spreading maple tree, Guelph today is a vibrant little city of 100,000 souls, where timelessly gracious limestone buildings line the banks of the meandering Speed River. Its thriving arts community and funky sensibility speak to its status as a university town. And not just any university, but the University of Guelph, renowned for its agricultural emphasis, and for the Ontario Veterinary College.

OVC, as it's generally known, is North America's oldest veterinary college. Founded in 1862 in Toronto by Scottish-trained veterinarian Andrew Smith, it relocated to the agricultural centre of Guelph in 1922, and became a founding college of the University of Guelph in 1964. Its alumni span the globe, working in areas as diverse as clinical veterinary practice, food safety, and ecosystem health. But although veterinary study at OVC encompasses avian, reptile, and exotic animal medicine, horses remain a primary focus for the College – and that's only natural, considering the strength of both the Standardbred and Thoroughbred racing industries in southern Ontario. Racing is a multi-billion dollar business here, with more race dates than any other jurisdiction in North America. There is also a thriving performance horse industry, with most of Canada's top jumper, dressage, eventing, and driving competitors calling Ontario home, as well as a number of its most prominent breeders. It's estimated there are nearly 350,000 horses in the province – so it's little wonder that of the admissions to the Ontario Veterinary College's Large Animal Hospital, located on the University of Guelph campus, 90% are equine cases.

PLAYING TO ITS STRENGTHS

Henry Staempfli Dr. Med. Vet., Dipl. ACVIM, who hails originally from Switzerland, is the current head of the large animal hospital, overseeing a faculty of surgeons, diagnosticians, and clinicians from around the globe, as well as a busy student population.

The Ontario Veterinary College offers a four-year Doctor of Veterinary Medicine (DVM) program which accepts 110 students a year, as well as graduate programs for veterinarians who wish to further specialize in anaesthesiology, theriogenology (reproductive medicine), ophthalmology, cardiology, or any number of other fields. Competition is fierce, the pace of study grueling, but OVC's reputation is such that it attracts students from all over the world. Says Staempfli, "Students get very structured training here. The final year of the DVM program is clinical teaching, in which students choose a stream – small animal medicine, food animal, or equine, for example – and are assigned internships so they can get out of the



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The Ontario Veterinary College at Guelph.

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OVC's new dean, Dr. Elizabeth Stone, and graduate student Dr. Kim McGunin.

classroom and work in the field. It's very intensive.

"I think one of the strengths of North American (veterinary) schools in general is that students get to work hands-on with cases right from the first year. By third year, they are being assigned cases which come into the hospital and are working with them, under supervision. It's a problem-oriented medical approach for the students, so they learn to perform a differential diagnosis and follow a case right through to its post-mortem or recovery. This approach sets OVC apart from many of the European veterinary schools."

For a student keen on focusing his or her veterinary practice on horses, there are few places better to learn than the University of Guelph. Staempfli estimates that between 1500 and 2000 horses are admitted to the large animal hospital each year. "We see up to 200 surgical colic cases a year," he says, "as well as up to 80 foals who come in with problems such as septicaemia, failure of passive transfer, umbilical hernias, and ruptured bladders. Many of these foals need round-the-clock care in the ICU (intensive care unit), and are overseen by the teaching residents.

"We're a centre of excellence for respiratory problems, as well," Staempfli says. "We have long had the capability to assess VO2 Max (the highest volume of oxygen a horse can take in during exercise), fluid balance, and respiratory physiology in performance horses, largely through the use of endoscopy in combination with treadmill exercise."

Though lower airway diseases are a particular interest of University of Guelph researcher Laurent Viel DVM, MSc, PhD, OVC clinicians are also adept at assessing upper airway problems such as "flipped" palates and paralyzed laryngeal flaps, which can compromise the oxygen intake of a high-performance horse. "We do video endoscopy of the upper airway while the horse is exercising," Staempfli explains, "then review the video in slow motion to identify the problems and suggest possible treatments."

Viel also pioneered a technique for bronchial endoscopy, adapted from human medicine. "It's an excellent way to differentiate the respiratory conditions that might affect a horse at different ages," Staempfli explains. "You can recover fluid from the lungs and then culture it in the lab for a more definitive diagnosis." As with many techniques initiated at OVC, it is now making its way out into the field. "Students who've gotten this training can now do it on-farm and send the samples back here for cytology," say Staempfli. "We can almost judge the success of a technique by how quickly we put ourselves out of business doing it!"

On the diagnostic level, OVC's most impressive new toy is its state-of-the-art, $5 million Magnetic Resonance Imaging (MRI) facility, which opened in November, 2004. It's one of only two units of this advanced level of sensitivity dedicated to animal use in the world (the other being at the Animal Health Trust in Newmarket, England). Unlike 'standing' MRI units which can only scan a horse's lower leg, the massive MRI suite adjacent to the large animal hospital in Guelph is capable of producing images of equine upper legs, heads, and necks, and of whole-body scans of foals and smaller animals.

The high level of precision in an MRI scan makes it the most sensitive tool to date for picking up subtle changes in both hard and soft tissues, with no radiation exposure or pain to the animal. Since its installation, the MRI has been in nearly constant use, with patients coming from all over North America and researchers lining up to avail themselves of its capabilities as well.

Another of OVC's strengths is the field of equine cardiology. "We are a primary referral centre for heart cases, and are equipped for cardiac ultrasonography," says Staempfli. "OVC has been a leader in small animal cardiology, and that in turn has contributed to advances in the large animal field."

Staempfli's own research interest is the causes of colitis X and acute diarrhea in horses. "We can now diagnose about 40% of the cases, which is up from 20%," he says. "The 'X' in colitis X is still an X, but we're narrowing it down!" In particular, he and his graduate students are focusing on ways to rapidly diagnose infections of the anaerobic organism, *Clostridium difficile*. "We're one of the few (hospitals) who can do this differential diagnosis," he notes.

Infectious diseases are also a research focus for J. Scott Weese DVM DVSc Dipl. ACVIM, especially zoonotic infections – diseases which can be passed from horses to humans or vice versa. Meanwhile his colleague John Prescott MA VetMB PhD, of Guelph's Department of Pathobiology, has been recognized world-wide for his work on infections of *Rhodococcus equi* in foals – a particularly nasty form of pneumonia which is often fatal. Though 20 years of diligent research have, so far, failed to yield an effective and safe vaccine for *R. equi*, Prescott has pioneered effective treatment regimes, and in collaboration with Japanese researchers, has sequenced the genetics of the bacterium to gain a better understanding of how it works in the equine body.

ANSWERING TO THE INDUSTRY

"One of the Ontario Veterinary College's great strengths is the collaboration between research and what's going on in the field. Our researchers are interested in answering questions of direct value to the industry," Elizabeth Stone DVM, MS, MPP, Dipl.

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Dr. Henry Staempli, head of the Large Animal Hospital.

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OVC's large animal hospital uses its high-speed treadmill for diagnostic purposes and also for research. Here, a horse's respiratory capacity is analyzed as part of Dr. Laurent Viel's long-term study on heaves and lower airway disease.

ACVS, dean of the College since January 2005.

"One of the advantages of equine research," she says, "is that horses can be a good model for human medicine. They're athletes, they live a long time, and their joints and eyes, for example, are large enough for study, unlike most lab animals." Researchers like the Department of Clinical Studies' Mark Hurtig DVM, MVSc, Dipl. ACVS, who studies osteoarthritis in both humans and horses, have been able to take advantage of research grant dollars from both avenues to fund their projects.

Though Stone "doesn't claim to be a horseperson", she recognizes that research, even that focuses on racing, has a trickle-down effect even for backyard horses. "OVC doesn't have a stake in any particular view," she says. "We're trying to achieve consensus to benefit the entire industry."

Still, funding for much of OVC's equine research comes from well-heeled racing industry organizations such as the Ontario Horse Racing Industry Association (OHRIA), the Ontario Racing Commission, the E.P. Taylor Equine Research Fund (Taylor was the breeder of famed Thoroughbred Northern Dancer), and the Ontario Harness Horse Association (OHHA). Additional funds are sourced from private donors and from the Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA). And much of it is doled out by Equine Guelph, a facility created in 2003 with a threefold mandate of research, education and industry communication.

REAPING AND SOWING

"Equine Guelph is an umbrella for all things equine at the university, explains EG chair Gayle Ecker MSc. "It's a campus-wide equine initiative.

"The industry has come to the table and created Equine Guelph with the specific idea of addressing industry needs, both racing and non-racing," she elaborates. "That's one of the beautiful things about this – we respond directly to the industry and send the information back out there for it to use."

Equine Guelph oversees an equine research program through a research committee chaired by Laurent Viel. "Basically, the industry puts money on the table, we send out calls for submissions, both within and beyond the borders of the University of Guelph campus, and then we review the submissions, send them out for peer reviews throughout Canada, the United States, and Europe, assess them according to current industry priorities ... and then match funds to the researchers as best we can," Ecker says. "On completion, the researchers submit their reports to Dr. Viel, who forwards them to the funding partners, and finally we re-invest those results into our communication and education initiatives." In 2006/07, Equine Guelph's industry partners contributed over CAN$370,000 to support 19 separate equine-related research projects.

It's Equine Guelph's educational mandate that is nearest and dearest to Ecker's heart, however. A former teacher, she has been the driving force behind the Equine Science Certificate, a series of on-line learning courses offered through the University of Guelph's Office of Open Learning, and designed to expand the knowledge base of adult horse-owners, whether employed in the industry or just involved at a hobbyist level. Now in its fourth year, the courses in equine nutrition, exercise physiology, growth and development, pasture and stable management, functional anatomy, health and disease prevention, and business management are enhanced by high-profile guest lecturers from the OVC faculty and beyond. They have proven so popular that there is often a waiting list.

The educational initiative doesn't stop there. With the assistance

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Drs. Dan Kenney, Kim McGurrin, and Peter Physick-Sheard, the team who pioneered the shock treatment for atrial fibrillation which is now becoming the preferred treatment worldwide.

of its racing partners, Equine Guelph has been instrumental in putting together an "industry skills program" for those aspiring to be racetrack grooms – a combination of on-line learning and hands-on experience, apprenticing with trainers across Ontario. There are periodic one-day workshops and educational seminars as well. And finally, there is Equine Guelph's effort to reach out to an increasingly urbanized population of children: Equi-Mania, a fun educational initiative (and interactive website) for kids who want to learn about horses. Ecker hopes to eventually expand Equi-Mania to bring equine-related teaching materials to educators in classrooms across the province.

"Our goal is to develop a pathway of lifelong learning," she says. "We see the kid's program, Equi-Mania, as the first stepping stone. It raises awareness about horses. The next step up is the industry skills program, which is designed for those new to the industry. And the level after that is the Equine Science Certificate, for adult learners." A number of ESC graduates, she adds, have gone on to pursue DVM degrees at the Ontario Veterinary College.

NEW DIRECTIONS

With the Ontario Veterinary College's 150th anniversary looming in 2012, plans are underway for an unprecedented redevelopment of its facilities and expansion of its programs. At the same time, OVC faculty, administration, staff and students have been asked to "think big" while learning to do more with less at a time of University-wide fiscal restraint.

The provincial government has promised $25 million from its budget to OVC to support the construction of a new Animal Health Laboratory and research and classroom facilities for the Department of Pathobiology, beginning in 2008. When complete, the new building will free up badly needed space to redevelop the veterinary teaching hospital and expand its programs. High-priority areas for

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A close-up of the sensors attached to a horse's hoof in preparation for one of Dr. Jeff Thomason's studies of forces acting on the hoof wall.

the hospital include a new centre for cancer in small animals and new clinical facilities for OVC's equine patients, including a high-tech isolation unit for contagious disease.

Plans are also in the works for an Equine Performance Centre, a diagnostic facility to rival those at American universities such as Cornell or the University of California/Davis – but finding the perfect location is problematic, with the University of Guelph campus already running out of space in the centre of downtown Guelph. At least two off-campus sites have been proposed, with suitability assessments on-going.

No matter which direction the future takes the Ontario Veterinary College, one thing remains certain: the horse industry will continue to be a critical factor in its direction and development. And that can only be good for the welfare of horses across Ontario, and beyond. |

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Equine Guelph chair Gail Ecker, MCS. "We respond directly to the industry and send the information back out there for its use."