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Advances in Equine Veterinary Medicine

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BY JANE SIMONE

Veterinary medicine's history is fascinating. And equine veterinary medicine especially so, since the horse was key to humankind's advancement. As English poet Ronald Duncan eloquently put it, "Our past has been borne on his back. All our history is his industry. We are his heirs, he our inheritance." The horse allowed transport to evolve; he carried warriors into battle, pulled produce-laden barges along canals, hauled coal from mines to heat homes and fuel industry, ploughed fields and carried mail. And of course, he ran races and chased the fox and brought excitement, beauty and a very special human-animal bond into being.

As critical as horses have been through the millennia to human beings, for centuries equine medical care, treatment and therapy chiefly lurked in an abyss of ignorance. There were occasional enlightened voices, but they were few and far between. In the fifth century BC, the Greek general Xenophon admonished, "Never act with anger toward a horse," advice as wise now as it was then.

Xenophon knew how important the horse's foot was to its welfare and that clean stabling and good pasture helped keep a horse healthy. The same is true today, but after centuries of treatments and remedies that ranged from the most appalling cruelty to ridiculous wishful thinking (with a few lucky breaks in between) today's equine veterinary medicine offers sophisticated diagnostics, safe, successful surgical techniques and drugs and anesthesia that bring relief and recovery.

Looking back over Penn Vet's 125-year history is like opening a time-capsule on equine veterinary medicine. On September 1, 1885, the Veterinary Hospital (including a farrier shop) then located on Pine Street, began receiving patients — primarily horses. This was just 20 years after the end of the American Civil War, a conflict that threw into sharp relief the dire need for improved medical treatment of horses. It is estimated that approximately 1.5 million horses (cavalry mounts and animals that pulled supply wagons, field ambulances, artillery, etc.) died during the war, an appalling loss.

Penn Vet's primary focus would be on horses and food-and-fiber animals during its first half-century of existence, but it was only after New Bolton Center opened in 1952 that the school made significant advances in equine veterinary medicine.

But Penn's reputation as a place where rigorous intellectual curiosity was encouraged resulted in a fortuitous gathering of some of the most outstanding veterinary minds of the time. The collective intellects of Penn Vet clinicians such as **Dr. Mark Allam, Dr. Charles Raker, Dr. Jacques Jenny, Dr. David Nunamaker** and others too numerous to mention created a climate of enthusiasm to meet challenges in equine surgery and medicine shunned until then. In addition, the role of the horse in every day life had changed dramatically. Once predominantly indispensable work animals, horses became partners in a variety of elite equestrian sports, as well as fox-hunting and pleasure riding. Owners were willing to support and encourage improved veterinary care for their horses as well as research into their afflictions.

For the horse, there have always been two great enemies of good health: foot and leg soundness and gastro-intestinal problems. Horse owners rightly fear a diagnosis of laminitis or colic. Surgery of any sort carried tremendous risk. Dr. Charles Raker, professor emeritus, recalled that nearly 80 per cent of colic surgery patients died in the early days of those procedures.

In more than 50 years of work at New Bolton Center, that statistic has changed dramatically. Today, more than 80 per cent of horses having colic surgery that are recovered from general anesthesia survive — a complete reversal from the early days.

The creation of a Section for Emergency, Critical Care and Anesthesia at New Bolton Center has led to research projects that are investigating certain growth factors (proteins) important to the healing of all body tissues. **Dr. Louise Southwood** states that these proteins may have a critical role in helping enhance intestinal healing in horses with severe GI injury. Her initial research results are encouraging. The ultimate objective is to use gene therapy to deliver these growth factors to colic patients' intestines to help healing. Another study is looking at the survival and complication rates of geriatric horses with colic, particularly those having surgery, compared with non-geriatric (mature) horses and again, initial findings are very encouraging.

The rigid endoscope, developed by **Dr. Frank Kral** in the early 1950s, and its 1970s replacement, the flexible endoscope, significantly improved equine upper respiratory

evaluations. In conjunction with New Bolton Center's high-speed treadmill these tools revolutionized the diagnosing and treatment of the equine airway.

Dr. David Nunamaker, who recently retired from New Bolton Center's faculty as the Jacques Jenny Professor of Orthopaedic Surgery, tirelessly pursued greater understanding of the mechanics of bone modeling and remodeling in horses, based on various types of exercise surfaces, and designed a now widely used external fixation device for horses suffering catastrophic leg fractures. In the Richard S. Reynolds Comparative Orthopaedic Research Laboratory, Nunamaker conducted in-depth research into many conditions affecting Thoroughbred and Standardbred race horses, such as bucked shins, fatigue fractures and bone and fracture treatments. His work offered the racing industry enlightened alternatives to traditional training methods that would benefit the horse.

Arthroscopic surgery (led by **Dr. Dean W. Richardson**, chief of New Bolton Center's Section of Surgery), laser surgery (pioneered by the late **Dr. Eric Tulleners** and evolving under **Dr. Eric Parente's** leadership) and highly sophisticated imaging modalities (digital radiology, MRI, nuclear scintigraphy, ultrasound) are critical factors in diagnosing and treating today's horse. Cardiology as an equine specialty has reached undreamed of levels of accuracy and sophistication under the guidance and expertise of **Dr. Virginia Reef**.

In the forefront of New Bolton Center's services and work is its excellence in treating orthopaedic patients. **Dr. Jacques Jenny**, a noted Swiss orthopedic surgeon defied convention in the 1950s and 1960s by attempting to repair fractures in horses' legs. Jenny's pioneering work on equine joint surgery went well, but post-operative recovery often led to the horse panicking as it emerged from anesthesia, either re-injuring the damaged leg or breaking a different limb. Jenny's frustration over these failures inspired him to conceptualize an anesthesia recovery method that has proved a tremendous boon to patient and surgeon alike. He developed the famous "pool recovery system," which to this day, according to Richardson, gives surgeons the confidence to attempt the most difficult types of orthopaedic repairs — repairs that would have been unheard of 40 or 50 years ago.

Horses are awoken from anesthesia in a specially designed and constructed rubber raft in a large, heated pool that allows them to kick freely without risk of injury. Once fully awake, the patient is lifted from the raft and pool secure in a sling and allowed to stand up calmly, or is transported by monorail to the Widener Hospital's Intensive Care Unit to the safety of a well-bedded stall. One of only four such recovery systems in the US, the pool at New Bolton Center

remains unique in its scope and is a dramatic illustration of how far equine veterinary medicine has come since the days when horses were routinely euthanized for catastrophic (and not so catastrophic) orthopaedic injuries.

These surgical triumphs would have been impossible without advances in large animal general anesthesia. Anesthesia for large animal patients had been used, but it was fraught with danger. Both the drugs and equipment used contributed to those dangers, but in the late 1950s and early 1960s, spurred on by educational and research opportunities offered through Penn Vet's close proximity to Penn's School of Medicine, the veterinary school made great progress in both small and large animal anesthesiology. Significant pioneers of successful equine anesthesia are New Bolton Center's **Dr. Lawrence Soma** and **Dr. Lin Klein**, whose work in this field has led to remarkable achievements.

Soma highlighted the introduction of improved inhalational anesthesia as the "great leap forward" that increased positive outcomes for equine surgery. Before this, local anesthesia, sedatives, ether and intravenous medications provided insufficient muscle relaxation and analgesic relief (not to mention, in the case of ether, danger to patient and clinician alike); the ability to deliver anesthesia safely and in adequate quantities through inhalation to ensure adequate muscle relaxation and pain-free procedures significantly enhanced the chances of a favorable outcome for the patient.

But with these advances came the need for improved anesthesia equipment and medications for large animals. Through innovation and creativity Soma and his colleagues pushed those boundaries until today there are companies willing and able to manufacture the equipment that complex large animal surgery techniques demand.

Many individuals at Penn Vet contributed to the discoveries and innovations that have changed equine surgery from barbarous procedures in days long past to the sophisticated, safe and relatively routine procedures performed now. The history of the horse is stained with intentional and unintentional cruelties masquerading as treatment. In today's enlightened era we continue to strive for even better remedies for one of mankind's most beloved animal partners, but much will depend on the veterinary profession's ability to invest time, energy and resources to advance its knowledge. As an example, Penn Vet's implementation of a special initiative to investigate the causes and find a cure for the horse's most stubborn and elusive foe, laminitis, will require more than \$15 million to adequately fund. Nevertheless, true to its mission the school is pressing forward with this initiative and with the help of people everywhere who care about the horse and its well being we look to the future with optimism and hope. 🍎