Volume 3 Issue 1

dvm business essentials

Aurora Pharmaceutical, Inc.
Innovative Products Backed
by Exceptional Service

Business Essentials Inside

aurora PHARMACEUTICAL®

Women in Animal Health … Leaders, Legends and Rising Stars

Bob Rehurek,
Director of Sales and Marketing
Aurora Pharmaceutical, Inc.

Since Aurora started business, we have been fully vested in promoting and supporting women in our profession. Our first technical hire was renowned swine veterinarian and biologist, Peggy Hawkins, DVM. And like so many companies, Aurora continues to support female veterinarians, veterinary technicians, distributor reps and academia in our industry.

Women in animal health have a powerful story to tell – one of stewardship, resilience and leadership – from the diagnostic lab to on-phone technical services and sales, to the front lines dealing with the most expensive swine genetics and thoroughbreds in the world, and overseeing multi-person practices and industry boardrooms.

But before moving forward, let's take a look back in time at how determined women grew to be respected veterinarians and industry role models. Here is a brief history of women in veterinary medicine:

- The first U.S. woman to attend and graduate from veterinary school, Mignon Nicholson, DVM (1903 McKillip Veterinary College, Chicago).
- Elinor McGrath, DVM (1910 Chicago Veterinary College), and Florence Kimball, DVM (1910 Cornell University College of Veterinary Medicine). Both women chose a type of veterinary practice that was uncommon at the time – they were small animal veterinarians. The nation was still heavily based on a farming economy; building a veterinary practice around pets was highly unusual.
- 1933 Patricia O'Connor Halloran, graduates from Cornell University College of Veterinary Medicine and becomes the first female zoo veterinarian, working at the Staten Island Zoo.
- In 1938 there are 21 female veterinarian graduates in the country, and in 1939 another 10 join their ranks. There are approximately 5,000 male veterinarians belonging to the AVMA in 1939.
- 1957 Phyllis Lose, DVM (1957 U of Penn) becomes the first female equine veterinarian.
- In 1964 there are 277 female veterinary graduates in the United States. The Civil Rights Act is passed, barring job discrimination based on gender.
- Jump forward to 2009 and the numbers have all changed. The AVMA reports female veterinarians outnumbered their male counterparts for the first time: 44,802 to 43,196. That number grew to 55% female (54,846 vs. 44,874) in 2013 and in 2017 women represent the vast majority -- more than 80% of enrolled veterinary students.
- According to the AVMA, the current ratio is 55% female to 45% male in the veterinary market (private and public). As to the gender among faculty at U.S. veterinary schools, the biggest change was in the field of administration. In 2017, 42% of school administrators were women compared with only 28% five years ago. For the first time, the AAVMC collected data on the certified veterinary technician workforce. Nearly 90% of those jobs are held by women.

> "The TOW is a corridor for women in our industry to tell their stories and experiences and celebrate the growth and successes made by women."

Recognizing the Role of Women in Animal Health

As the industry has made a remarkable shift, Aurora continues to support that change with the launch of **Through Our Work**, *a Woman's Initiative* (TOW). The TOW is a corridor for women in our industry to tell their stories and experiences and celebrate the growth and successes made by women. Our ultimate goal is to showcase the leadership of women, not only on the front lines of veterinary medicine, but also in every aspect of animal health. **Through Our Work** will help lead mentoring programs for veterinary students, work with cutting-edge, animal health research at universities across the country, help to advance veterinary technician studies and tap into the leaders in the boardrooms of global corporations. Aurora supports the next generation of women as they graduate and work to empower one another to take on the challenges of the growing and changing industry.

Initiative Elements

With the assistance of the all-women advisory board leading the **Through Our Work** Initiative, we will work together to develop veterinary and animal health-specific scholarships, help with veterinary school debt relief programs, provide educational mentoring programs and help to fund student costs to attend industry meetings and events. We will also use our industry publication, *DVM Business Essentials*, to highlight some of these movers and shakers in the industry. This is just the start. It will be an initiative that we hope to grow, earmark sales money in support of and engage our industry to join.

In the meantime, there are many opportunities to contribute your voice and experience to the conversation. Share with us someone you respect, admire or work with that upholds these values, so we can share their story by contacting me at brehurek@aurorapharmaceutical.com.

Silent Estrus Concerns
Remain an Issue in Swine Breeding

By Grant Weaver, DVM, Technical Services, Aurora Pharmaceutical, Inc.

Good gilt developer management and achieving replacement gilt breeding targets is a part of sustaining profitability in any pork production system.[1] Providing the targeted number of pregnant replacement gilts to the system promotes more efficient feed utilization, better herd health and higher quality groups of offspring for grow-out in the nursery and finish phases.[2] Recently there have been cases of a higher than normal number of developed gilts that, after being added to the breeding area, are not showing normal estrus behavior.[3]

This has led in affected herds to varying and sometimes dramatic decreases in percentages of gilts that are successfully mated and able to conceive.

The syndrome is being categorized as a silent estrus problem for the following reasons:

- Diagnostics and evaluation of the uterus and ovaries from affected animals and normal animals from effected herds didn't find evidence of inflammation but found apparently normal ovaries and *corpus lutea* which indicated normal cycling activity.
- The effected gilts failed to show normal cycling behavior. They may show varying combinations of several estrus signs-vulval swelling, mucus discharge, interest in boar, behavioral changes-but generally don't show immobilization or the standing response.

An accepted case definition of the problem is when a herd sees three consecutive weeks of less than 80% of selected gilts expressing normal estrus behavior after six weeks of boar exposure.

Generally, the issues being reported in effected herds are:

- 70% of selected gilts showing obvious standing estrus compared to the normal of 95%+
- Higher mortality in the gilt pool (up to 9-10%)
- An increase in meningitis-associated clinical CNS symptoms in offspring (diagnosed mostly as *Strep sp.*)
- Conjunctivitis in growing gilts
- An increase in gilts culled prior to farrow which can be as high as 40%+ in some groups and ranges from 15-40%+

Other findings associated with the problem are that there can be a large variation in the percentage of effected gilts even between weekly groups added to the system or between sow farms receiving gilts from the same source. These variations have made investigation more difficult from the standpoint of not being able to pinpoint a consistent source.

Especially with batch farrowing systems, big issues can develop in terms of an increase in non-productive days in gilt development, inability to achieve breeding targets, decreased pig flow and ultimately less efficient finishing barn utilization.

So far, the cause has not been determined and a review of the data has not identified a link to genetics or association with any particular boar lines. An investigation of the problem at a couple of affected farms initiated by several interested entities and led by Dr. Robert Knox at the University of Illinois has had a few interesting findings.

The study assigned gilts to three treatment groups based on results of both clinical observation and ultrasound examination. One group received injectable gonadotropin therapy, one group received injectable prostaglandin, and one received altrenogest orally all from commercially-sourced products.

Some findings related to the above study:

- No estrus gilts were able to grow and ovulate follicles following gonadotropin therapy or from their own hormones after altrenogest therapy
- No estrus or weak estrus gilts that contained a CL responded to prostaglandin treatment
- Gonadotropin released from the hypothalamus is not occurring in 40% of prepubertal gilts like it does in normal animals
- Post-treatment, even though gilts were able to grow follicles and ovulate, normal estrus behavior was absent or poor in 60% of gilts

Therefore, when using SwineMate® (altrenogest) as part of a gilt breeding synchronization program, it is important to follow rules related to gilt-breeding management:

- Gilts must show a normal estrus prior to treatment with the product. Swollen vulvas alone are not indicative of a normal heat period. Gilts need to exhibit all of the outward signs of estrus including the standing response. Normal hormonal activity must be present in the animal for the product to work.
- Make sure gilts are of the proper age at selection. Most commercial breeding stock companies recommend selection at 20-24 weeks of age, boar exposure at 24 weeks and beginning breeding at 30 weeks.
- Follow SwineMate® (altrenogest) label instructions on dosing and administration.
- Limit bad stresses such as crowding and multiple mixes.
- Improve quality of boar exposure by considering twice daily exposure which includes actual physical boar-gilt contact.
- Use interval verses continual contact to avoid habituation and refractory behaviors.
- Use high libido/pheromone boars.
- At the time of breeding use more human contact and give them more time.

Recommended Age/Weight at First Service

Time Period	Weight	Age
Late 1980's	260-265#	180 days
Late 1990's	268-275#	200 days
2007	275-285#	210 days
2020	300-320#	210 days

1 Stadler, *et al.* Financial Impact of average parity of culled females in a breed-to-wean swine operation using replacement gilt net present value analysis. JSHAP. 2003; March and April:69-74.
2 Scheidt, *et al.* The effect of all-in all-out growing-finishing on the health of pigs. SHP. 1995; September and October:202-205.
3 Cano, Jean Paul. Silent estrus in gilts-what have we learned? Allen D. Leman Swine Conference: September 14-17; St. Paul, Minnesota.

Stanley Heads New Lab to Help Monitor Anti-Doping and Identify New Equine Drugs

In light of the recent indictments of 27 trainers, veterinarians and others in the massive doping scheme that involved the 2019 Kentucky Derby winner, there has never been a more appropriate time for Scott Stanley, PhD, Professor of Equine Pharmacology and Toxicology and Director of the UK Equine Analytical Chemistry Laboratory, to take over the reins of helping the industry define and expand its anti-doping protocols.

In a new position funded by the University of Kentucky and the Keenland Association, Dr. Stanley and his staff will look at equine pharmacology and toxicology research directed mainly at the detection of pharmacokinetics of new drugs or unfamiliar drugs they don't have good information about. "We're focused right now on bisphosphonates, growth hormones and growth-related compounds," says Dr. Stanley. "The largest segment of that research will focus on the Equine Biological Passport (EBP) program.

"We know doping agents can disappear from equine blood quickly, making their use undetectable by traditional testing methods within a matter of hours," Dr. Stanley outlines. "The horse's DNA, though, harbors substance abuse secrets deep within its gene expression system, and it does so for days after the substance is gone. Getting that geneteic material to tell its secrets, however, has been a challenge. Working with whole, undamaged RNA (the part of the DNA involved in gene expression) is a delicate task requiring immediate, complex, high-tech laboratory conditions. Our laboratory has aquired some of the most high-tech equipment in the industry and will allow us to conduct small molecule and proteomic analyses.

"Our new TSQ-Altis triple quadrupole mass spectrometers," he continues, "can detect small levels of drugs and measure them accurately. Through an agreement with Thermo Scientific, we will also receive Orbitrap-Tribrid mass spectrometers that will allow us to do some unique research, i.e., metabolite identification and new compound discovery capabilities. This is the first analytical chemistry lab dedicated to equine drug monitoring and research since the University's chemistry lab closed in 1990."

Dr. Stanley assures this research and testing will be an ongoing, multi-year project where they will be using proteins and peptides derived from horse biological samples to better determine if a horse has been given a performance enhancing drug.

"Biomarkers have been around a long time; and they are good indicators of change – be it health disease status, maybe an expression of a new protein or an enhanced expression because of the administration of a specific drug, or they could be used as an early indicator of injury," the researcher notes.

"I'll direct our research efforts with direct interface with the Kentucky Racing Commission, Equine Drug Research Council, Racing Medication Testing Consortium and with direct input from our stakeholders; Keeneland Association, The Jockey Club, Breeders Cup Inc., Fasig-Tipton and others," Dr. Stanley states.

"For example we will continue to work with the equine sales companies to expand the testing for their yearlings and two-year-old thoroughbreds being sold at auctions."

In conclusion Dr. Stanley notes, "Coming back to Kentucky was an excellent opportunity for me to reconnect with a lot of people I have been working with for a lot of years while heading the chemistry laboratory at UC-Davis. While our research at the Gluck Center will focus mainly on anti-doping, we are also looking at potential new drugs. We want to see what new drugs are out there, what are the clearances from a pharmacokinetic/pharmacodynamic standpoint, how long the detection windows are, what information we need to supply regarding withdrawal timelines, but also interested in new drugs that can benefit the industry. We would like to work more closely with pharmaceutical companies as they develop novel therapeutics, as well as bring back older drugs with new label applications. This new lab will hopefully allow us to be a great partner in promoting equine drug research."

> Our new TSQ-Altis triple quadrupole mass spectrometers can detect small levels of drugs and measure them accurately.

Scott Stanley, PhD
Professor of Equine Pharmacology and Toxicology and Director of the UK Equine Analytical Chemistry Laboratory

Coronavirus Cross-Species Transmission Study

The Ohio State University – The first animal study of a pig virus' potential to jump to another species shows that the virus, once introduced to a select group of birds, is easily transmitted to healthy chickens and turkeys.

The researchers who led this work were part of a team that previously found in a lab setting that the virus could infect cells from multiple species, including chickens and humans.

In this study, birds that were given the virus developed diarrhea in two days after infection. Healthy birds housed with infected chickens and turkeys also developed diarrhea two days after exposure.

This virus, porcine deltacoronavirus, was first detected in pigs in Asia in 2009 and caused a swine diarrhea outbreak in the United States — involving Ohio pigs — in 2014. It is part of the family of pathogens that cause respiratory and gastrointestinal diseases in the species they infect. There are four types of coronaviruses. Two illnesses known for life-threatening regional outbreaks, severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS), were caused by betacoronaviruses. The current respiratory disease outbreak associated with a live animal market in China is also attributed to a betacoronavirus. Deltacoronaviruses historically have been linked to birds, and scientists suspect that this porcine virus originated in an avian species.

"We weren't even sure the virus would transmit from bird to bird. That's a significant finding," said senior author Scott Kenney, assistant professor of veterinary preventive medicine based in Ohio State's Food Animal Health Research Program at the Ohio Agricultural Research and Development Center in Wooster. "It looks like it's pretty readily able to spread between birds. It's a little concerning because if the virus gets into one or two animals in a large layer or broiler house, it would probably permeate through the entire house pretty quickly," Kenney says. "If the human cell culture model is as predictive as it was with the chickens, then humans are definitely susceptible to having virus-related disease," he says. The study is published in the online journal *Emerging Infectious Diseases*.

"We want to figure out why the virus is enteric versus respiratory, and how the hosts respond differently," Kenney said. "With piglets we see mortality. We don't have chickens dying, but we have piglets dying from the virus, so what makes the chickens different in their response to the virus? Maybe we can learn something from chickens and apply it to the pigs, so they get less sick from the virus."

Journal Reference:

Patricia A. Boley, Moyasar A. Alhamo, Geoffrey Lossie, Kush Kumar Yadav, Marcia Vasquez-Lee, Linda J. Saif, Scott P. Kenney. Porcine Deltacoronavirus Infection and Transmission in Poultry, United States[1]. Emerging Infectious Diseases, 2020; 26

Nocardioform placentitis

University of Kentucky – The 2019-2020 foaling season has seen an increase in reports of Nocardioform placentitis, both in cases submitted to the University of Kentucky's Veterinary Diagnostic Laboratory and in reports from equine practitioners in the field. Nocardioform placentitis is an equine placental disease affecting pregnant mares and their foals during pregnancy.

"Obviously, those of us who are private equine practitioners have been working closely on a daily basis with area horseman in Central Kentucky and have been extremely engaged in sharing our experiences of Nocardioform placentitis cases from these most recent occurrences, as well as our experiences observed in previous years," said Stuart Brown, DVM, Gluck Equine Research Foundation Board Chair and equine veterinarian from Lexington-based Hagyard Equine Medical Institute.

"These conversations with the research team at the Gluck Center, along with specialists at the UK VDL, provide all of us a unique opportunity to collaborate on our observations to understand the presentation of these cases," he adds.

The disease, a complex and relatively rare condition caused by bacteria, primarily *Crossiella equi* and *Amycolatopsis* spp., affects the placenta of the pregnant mare and can cause foal losses from late-term abortions, stillbirths, prematurity or early neonatal deaths due to placental insufficiency.

Nocardioform placentitis abortions typically occur between November and June, with a peak incidence in January and February. The majority of affected pregnancies occur in the last trimester of gestation, and the identification of Nocardioform lesions on the placenta of term pregnancies is a common presentation.

It is generally accepted that this is an extremely complicated disease, primarily because there does not seem to be a simple causative relationship between the pathogen(s) and the condition. Another complicating factor is that identification of affected mares is difficult and often delayed, meaning harm to the placenta-fetal environment may already have occurred by the time cases are identified.

Additionally, diagnosing affected mares before an abortion diagnosis remains difficult. While Nocardioform placentitis diagnoses can be made following pathological examination of the placenta, pre-partum/abortion diagnosis relies on abdominal ultrasonographic examination of the uterus, where changes may only be noted once the disease has progressed significantly.

It appears highly likely that the disease development of Nocardioform placentitis is multifactorial and may involve environmental conditions (hot, dry periods in late summer) and possibly effects related to host susceptibility. Pregnancy in many species, including the mare, involves some degree of immunosuppression, and many of these bacteria may be more pathogenic in immunocompromised hosts. More research is needed to better unravel this complex disease process in the mare.

PEDv Occurrence and Spatial Distribution

University of Minnesota -- Porcine Epidemic Diarrhea Virus (PEDv) is an enteric pathogen of swine that has been circulating in other continents for quite a few decades before it suddenly emerged in the United States in 2013. The virus spread rapidly throughout the country, disrupting the industry's sow herd throughput as hundreds of sow herds were infected in a short period of time, leading to millions of piglets succumbing to the virus, generating important losses.

Currently, this pathogen continues to be present in our industry and unfortunately continues to reach sow and growing pig barns. After the 2013 epidemic, the number of sow farms becoming infected with PEDv has decreased significantly. However, there continues to be a low-level incidence below 10% based on Morrison Swine Health Monitoring Project (MSHMP) data. For instance, PEDv incidence for the current 2019-20 year is 2.5%, which is around the same low incidence trend as the 2018-19 year. This is certainly good news for the industry; however, MSHMP is only assessing breaks at the breeding herd level and the situation at the growing pig herd is still uncertain.

Most of the farms that reported a PEDv break have had a previous infection in recent years. When assessing the spatial distribution of these breaks between 2013 and 2019, at least one outbreak has been reported in 138 of the 3,141 counties in the United States. In 2013, there were 43 counties that had reported at least one break, whereas in 2014 this number increased to 97 counties.

The rapid intervention and effort by producers and practitioners allowed this number to drop to 31 counties in 2015. In 2016, outbreaks of the virus were reported again in 31 counties, which were not necessarily the same counties as in previous years. However, in 2019 there were breaks reported in only 17 counties in seven states throughout the U.S. One important message from the data collected is that the cases reported in 2019 are scattered throughout the United States and are not limited to high-dense regions.

In addition, production systems continue to work toward elimination while prevention is in place. Unfortunately, this virus continues to be present in our barns as there are reports of growing pigs becoming infected toward the end of the finishing period, indicating that the risk is still present, and we are continuing to give this virus opportunities to reach naïve populations.

Still, more work needs to be done, especially at the growing pig level to further understand the epidemiology of PEDv in this population together with the role of this population on the occurrence of PEDv at the sow herd level. Presently, the industry has moved to raising pigs in large populations and growing pig sites are not the exception, therefore these populations can become efficient virus generators even if it's for one or two days either at the barn or slaughter plant. The more viral particles being generated, the higher the probability of these particles contaminating surfaces (e.g. fomites) that can travel several miles and reach other pigs.

Trends in Diagnostics & Research

What We Know About Avian Coronavirus Infectious Bronchitis Virus (IBV) In Poultry — And How That Knowledge Relates to The Virus Causing COVID-19 In Humans

By: Mark W. Jackwood, MS, Ph.D., Department of Population Health, Poultry Diagnostic and Research Center, College of Veterinary Medicine, 953 College Station Road, University of Georgia, Athens, GA 30602, USA

To better understand the challenges associated with the COVID-19 disease in humans, poultry health professionals can draw on their many years of experience attempting to control avian coronavirus infectious bronchitis (IBV) in poultry.

It's important to emphasize that the COVID-19 virus (SARS-CoV-2) is not associated with poultry or poultry products. Coronaviruses are divided into Alpha-, Beta-, Gamma- and Delta- coronavirus groups. Coronaviruses are responsible for a wide variety of existing and emerging diseases in humans and other mammals (including food animals) as well as in birds (including poultry). Diseases associated with coronavirus infections cover a wide range including respiratory, enteric, neurological, renal and hepatic.

The coronavirus that affects poultry (IBV) and causes respiratory disease in chickens is in the avian Gammacoronavirus group. Avian viruses in the Gammacoronavirus group do not infect or cause disease in humans.

The COVID-19 virus is in the Betacoronavirus group along with SARS-CoV and MERS-CoV. It was previously shown that SARS-CoV does not infect or cause disease in poultry (Swayne *et al*. Emerging Infectious Diseases Vol. 10, No 5, May 2004). Because the COVID-19 virus belongs to the same group as SARS-CoV and uses the same ACE-2 host cell receptor, it is highly unlikely that the COVID-19 virus will infect or cause disease in poultry, but it remains to be scientifically proven.

Based on the knowledge at hand, and the current lack of any evidence of bird infections with the COVID-19 virus, poultry and poultry products are not considered to be a source of COVID-19 infection for humans. The COVID-19 virus is primarily spread among people via respiratory droplets that contain the virus, with infections occurring via the nose, eyes and mouth. Although highly infectious, it is an enveloped virus — one that is easily killed by soap and common disinfectants. Below are some frequently asked questions regarding coronaviruses.

Where do coronaviruses come from?

Bats are widely accepted as the reservoir for mammalian (Alpha- and Beta-) coronaviruses. There are about 1,240 different bat species harboring as many or more different coronavirus types. SARS-CoV and MERS-CoV came from a bat reservoir, infected an intermediate host then jumped to humans. It is likely that the COVID-19 virus originated from bats, Furthermore, preliminary data show some viruses isolated from bats to be close relatives. An intermediate host for the COVID-19 virus has not been identified yet.

The reservoir for avian coronaviruses, including IBV, is not clear. There are some closely related viruses in wild and domestic birds – pheasants, ducks, geese and pigeons, to name a few – but unequivocal evidence of a true reservoir is lacking.

Why is it difficult to produce a vaccine against coronaviruses?

Protective immunity against a respiratory disease like infectious bronchitis (IB) in poultry or COVID-19 in humans requires a strong local immune response.

In poultry, we achieve this by using live attenuated vaccines, but live coronavirus vaccines are difficult to produce because attenuation often renders them unable to produce a strong local immune response. Attenuation is accomplished by passage of the virus in a laboratory host system (embryonating chicken eggs or cell culture), but there is a fine line between attenuation and maintaining the virus's ability to infect and induce an immune response. Over attenuation renders the vaccine safe but not immunogenic, whereas under attenuation will create a vaccine capable of inducing a strong immune response, but may cause a severe vaccine reaction. Then there is the problem of back passage of the vaccine in the host leading to a pathogenic virus.

Based on our knowledge of producing vaccines against IBV, production of a live attenuated vaccine against COVID-19 with acceptable safety and efficacy may prove to be very difficult.

Are there treatments for coronaviruses?

For humans, we have antiviral drugs like oseltamivir (Tamiflu) for Influenza, but there have not been any successful drugs developed specifically for coronaviruses. Drugs against the viral-encoded proteases have been tried, as well as drugs that interfere with entry and egress of the virus from the host cell. These and many other potential antivirals are presently being tested by several companies.

Two drugs currently in the news, chloroquine and hydroxychloroquine are being examined for their ability to ameliorate COVID-19 infections. These drugs have been used against malaria, lupus and rheumatoid arthritis for many years. Preliminary data out of China indicate that the drugs stop the spread of the COVID-19 virus in cell culture and are somewhat effective in treating humans. But, until controlled clinical trials are conducted, their effectiveness against COVID-19 remains a question.

It is likely that this pandemic will not be over anytime soon. In the meantime, follow the Centers for Disease Control and World Health Organization recommendations to protect yourself and your family. Poultry flocks do not appear to be at risk.

Web sites for additional information on COVID-19:
https://www.cdc.gov/coronavirus/2019-ncov/index.html
https://www.who.int/emergencies/diseases/novel-coronavirus-2019

Measuring Intraocular Pressure in Horses

Source: British Equine Veterinary Association (3/2020)

Does applanation or rebound tonometry have the lowest inter- and intra-user variation when measuring intraocular pressure in horses? The article "Inter-user and intra-user variation of two tonometers in horses" was authored by A.C. Lewin; C. Liu; P. Camacho-Luna; C. Alling; and R.T. Carter.

This randomized, masked, cross-over trial aimed to determine whether applanation or rebound tonometry has the lowest inter- and intra-user variation when measuring intraocular pressure (IOP) in horses.

Four examiners used rebound and applanation tonometers to measure the IOP in triplicate in 10 normal horses before and after sedation with xylazine. The order of examiners, eye examined first, and instrument used first were determined randomly and varied between horses. Coefficient of variation (CV) values were calculated from the mean of each examiner for each condition combination to determine inter-user variation.

For intra-user variation, CV values were calculated from the individual measurements of each examiner for each condition combination. CV values were also assessed in relation to other variables using ANOVA.

The rebound tonometer was found to have significantly ($P<0.01$) lower inter-user (15.4% vs 21.7%) and intra-user (9.1% vs 16.1%) variation in un-sedated horses and lower intra-user (8.4% vs 14.7%,) variation in sedated horses than the applanation tonometer. Both instruments had similar inter-user variation in sedated horses. For the rebound tonometer, sedation did not affect inter-user or intra-user variation, but for the applanation tonometer, inter-user variation was lowest while horses were sedated (16.0% vs 21.7%, $P = 0.03$). No other variable assessed was found to have an effect on IOP.

Bottom line: Rebound tonometry might be the preferred instrument to minimize intra-user and inter-user variation for IOP measurement in un-sedated horses.

TIME TO LET THE YOUNG HAVE THEIR TURN

"The secret to a successful business of 40+ years is customer appreciation," insists Joseph Rudolphi, DVM (U of IL '77), owner of Rudolphi Veterinary Service, LTD, in Noble, IL. "We as veterinarians oftentimes overlook the importance of good communication with our clients. It is, and always has been, the cornerstone to driving business and staying relevant in the client's eyes. I oftentimes ask myself, 'how can I help my customers compete and stay relevant?' The answer is always, talk to them. Learn what's important to them. What are their overall goals? What issues are they deliberating on? What concerns them most? Then, within your power, work with them to answer their questions and help them achieve their goals."

When Dr. Rudolphi and wife Linda, started the practice in 1978, they were focused on pigs and beef cattle with the majority of their time dealing with family farms. That focus has never waned as they start working with the fourth generation of families and owners.

Now Dr. Rudolphi has expanded his business to include his daughter, Olivia Rudolphi-Kauflin (TX A&M 2010) whose focus is on equine – a new and growing business opportunity.

"Our mission statement – developed when we opened the clinic – has been sustaining the profitability of the family farm through veterinary services," says Dr. Rudolphi. "Our clients will maintain a high level of competitiveness and viability as long as we can integrate good health with good marketing in conjunction with good nutrition and focused facility and labor management."

Dr. Rudolphi says they have tried to integrate themselves into many of those aspects by teaming up with respected suppliers, managers and consultants that specialize in these areas when needed on the farm.

"While we take the lead on health and biosecurity procedures, we know there are experts in other areas that can be highly beneficial to our customers. We help them integrate these types of experts into their systems. The results have been phenomenal with high health pigs being fed the best ingredients at the best prices. The results are premium market prices and best-cost inputs."

After 40+ years in the swine health business, one would think that a veteran like Dr. Rudolphi would have "seen it all" and started "coasting towards the retirement line."

In Dr. Rudolphi's case, nothing could be further from the truth. "Our customers are demanding that we stay focused on the industry more than ever. Foreign animal diseases, PRRS, genetic issues, etc., keep us a viable source of information. That means we as practitioners – regardless of our years on the line – owe it to our paying customers to stay ahead of the curve. If our customers come to us with updates on trends, medicines, genetics, etc., we are no longer viable. It's a matter of time before you're replaced with someone who can bring value to them."

Dr. Rudolphi notes they are starting to work with the fourth generation of farmers that have relied on their services and advice.

"They just need to know that they can count on us to keep their herds productive, and that begins and ends with good health," he stresses. "So, we stay on top of the trends in health, latest genetic values, best feed ingredient information and, of course, the diseases that can wreck a herd overnight like PRRS, PED, and foodborne diseases like *salmonella* and *Lawsonia*."

The best way, according to Dr. Rudolphi, to help stay current is to rely on the new generation of veterinarians coming into animal agriculture – like his daughter, Dr. Rudolphi-Kauflin. Linda, and avid rider, grew up on horses, and when she started in the practice, focused on the athletic horse population in the area.

"A lot of the horses in our area are confined in group housing (large barns, pastures), but the herd dynamics for health are the same as what we practice in pigs," relates Dr. Rudolphi. "We have added on a sport horse medicine division with up-to-date digital radiography,

Joseph Rudolphi, DVM

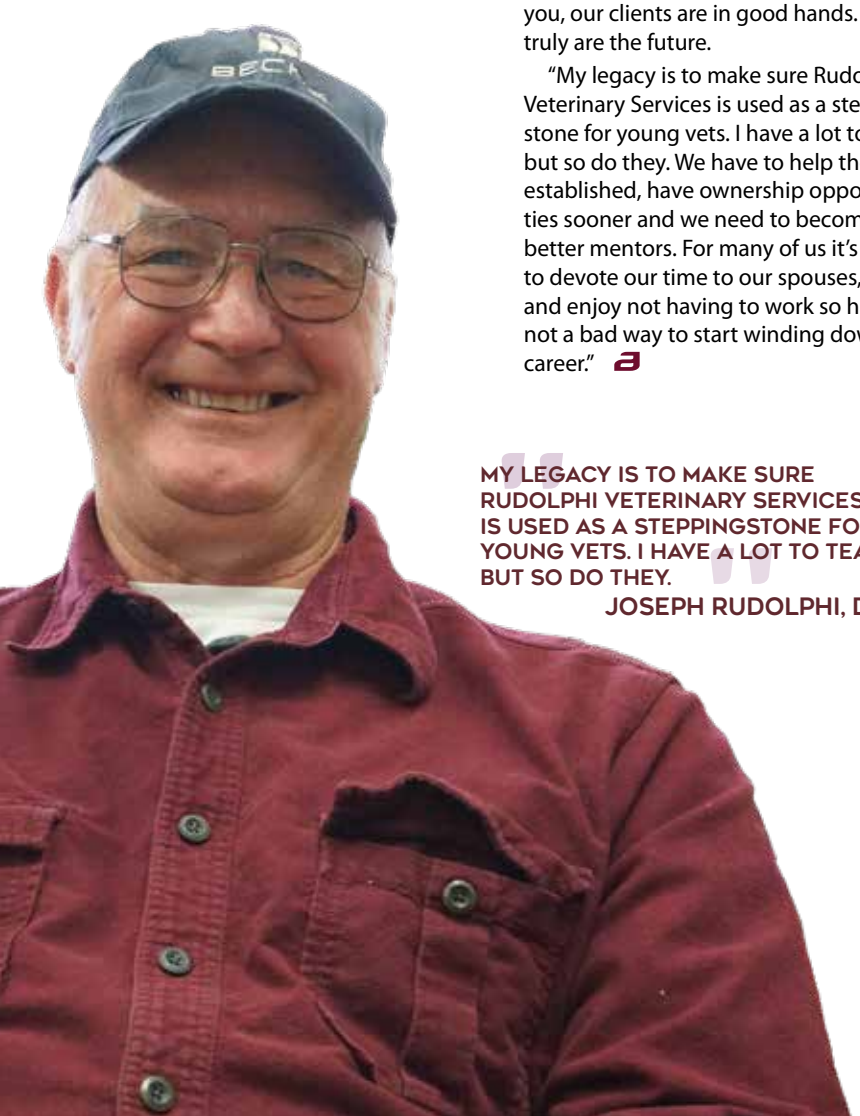
endoscope, shockwave and ultrasound. It's amazing how many local equine athletes are gravitating towards the clinic now that there is an equine specialist on staff."

Dr. Rudolphi adds, "Having Dr. Rudolphi-Kauflin (current President of the Illinois VMA and member of the veterinary commission for the U.S.A. Endurance Equine Team) on staff has also allowed Dr. Rudolphi to translate a lot of the issues he sees in pig lameness to equine lameness as well.

"It's remarkable how similar these species are," he notes. "We see the same types of lameness issues and structural unsoundness. Equine lameness is a long-term event; however, the clinical signs and treatment protocols can be similar. I've enjoyed the feedback I receive from Dr. Rudolphi-Kauflin. It's part mentoring, part student relationship. She brings in such energy, knowledge and clinical expertise, I feel it makes me focus on being a better practitioner."

In conclusion Dr. Rudolphi states, "I know this is not a popular statement, however, it's time for some of the older veterinarians in our industry (food animal and equine) to move over and let the new veterinarians start to take over. They have some great ideas that are being squelched, because they are just entering the business and don't have a voice in the practice yet. However, based on experience of being around young vets in my practice over the past decade, I assure you, our clients are in good hands. They truly are the future.

"My legacy is to make sure Rudolphi Veterinary Services is used as a stepping-stone for young vets. I have a lot to teach, but so do they. We have to help them get established, have ownership opportunities sooner and we need to become better mentors. For many of us it's time to devote our time to our spouses, travel and enjoy not having to work so hard. It's not a bad way to start winding down a career."



> "MY LEGACY IS TO MAKE SURE RUDOLPHI VETERINARY SERVICES IS USED AS A STEPPINGSTONE FOR YOUNG VETS. I HAVE A LOT TO TEACH, BUT SO DO THEY."
>
> JOSEPH RUDOLPHI, DVM

NEW VENTED DRAW-OFF CAP PRODUCTS ARE READY FOR USE

Aurora Pharmaceutical, Inc. has received FDA approval on the new Vented Draw-Off caps for their Altren® (altrenogest) and SwineMate® (altrenogest) packaging.

According to Bob Rehurek, Director of Marketing for Aurora Pharmaceutical, the 150 mL and 1,000 mL versions of Altren and the 1,000 mL version of SwineMate will now include the new Vented Draw-Off caps. "Simply remove the cap, peel off the inner seal and place the new Vented Draw-Off cap on the bottle.

"This new packaging will be shipping to your animal health supplier's warehouses this month. Beginning immediately, Aurora will discontinue sending non-Vented Draw-Off caps with product orders," he adds.

The product reorder codes will remain the same on all products with and without the new Vented Draw-Off caps.

CORRECTION: Susan Gates, DVM, is the resident veterinarian at Lindy Farms in Connecticut. We apologize for the mistake in our January 2020 edition of *DVM Business Essentials*.

Perspectives

on the Future of Veterinary Medicine

By: Matt Klotz, DVM
Technical Services Veterinarian
Aurora Pharmaceutical, Inc.

In my current role as a Technical Services Veterinarian for Aurora, I travel the nation regularly and interact with practitioners of all age groups. I discuss the view from people of my age group and older that are trying to figure out how to retire someday and get back what we have put into our practices.

And I interact with the latest generation of veterinarians where I hear their perspective on the future and their current concerns. It makes for an interesting mix, but a few principles remain constant in both groups and somewhere in the middle, we must work together to find solutions for all.

From the perspective of the older practitioner that has been in it 20+ years, we are concerned with how to plan for retirement, who is going to carry the standards of client service we have established, and how will we meet the financial needs of young associates. Unfortunately, I think veterinarians of my generation and older have been poor planners of our retirements.

We have worked hard for many years, building our clientele and practices with the belief that someday, someone will see the value in what we have built, and buy it from us to finance our retirement.

Thirty years ago, this was a sound principle, but times change and today fewer young veterinarians want to shoulder the burden of practice ownership. Luckily, we have seen the modern rise of large corporate conglomerates that will buy many practices and afford the original owners a nice nest egg for retirement. But not all practices are suitable for this type of sale.

Secondly, we are concerned about how our clients, many of which are dear friends, will be cared for in the future. We train our clients that they can rely on us to be there in times of need, but we hear the newest members of our profession being very vocal about the importance of work-life balance and not wanting to work after hours and on weekends.

In small animal practices in metropolitan areas, it's easy to refer after hours cases to the local emergency clinic, but what about in rural areas and what about the large animals that don't have an emergency clinic?

And last but not least, we feel the financial hurt of young veterinarians that apply for jobs with us. Our young associates have a tremendous financial burden that they need to be able to pay off; however, we as practice owners must balance their salaries against what business they will generate.

From the perspective of the new or recent graduate, all they know is that they have been promised a rewarding career, but nobody told them about the hours, the debt burden and the health burdens.

Young people look up to those of us that are well established and see what we have accomplished for professional and financial rewards, but what they don't realize is that we all worked many 80-hour weeks for peanut pay to develop our clientele and busy practice. I think a great deal of the blame for young veterinarians' disappointment lies with the very institutions that award their diplomas.

No vet school wants students to understand that while tuition has risen exponentially over the last 30 years, private practice salaries and more importantly, the profit margin of veterinary services, has not increased proportionally. So how do you make more money when the profit margin is small? You have to sell more volume! Which in this case means you have to work more hours and see more cases because the veterinarian's time is our ultimate commodity in this profession.

The next conundrum of modern veterinary medicine is how to strike that "work-life balance." I think a large part of the problem lies with technology. Today, we never get to unplug and escape our clients. In the past, my drives between farms were spent reflecting on the cases I had seen, or making plans for a coveted weekend off.

Today, my drive time is filled with a never-ending stream of text messages, emails and phone calls from clients. Also, as technology has evolved, we are more and more removed from the bond between vet and client which is one of the greatest rewards this profession has to offer. As a prior practice owner, the only way I see to give someone more time off is to hire two people to do the job of one, which means neither will reach their financial potential.

I'm proud to say that Aurora has stepped up their commitment to both new (and well-established) practices with FREE technical services education in the form of CE-approved programs established to update all veterinarians on critical issues affecting our industry today (i.e., compounding laboratory overviews, proper prescribing of antibiotics, estrus management issues and answers, and sulfonamides overview).

Aurora also introduced a new financial incentive program called the "New Veterinary Practice Program," that allows clinics just starting (or those already established or have opened new satellite practices as well as those new to Aurora product use) to purchase $2,500 worth of Aurora Pharmaceutical products on one order and receive an equal amount at no charge. This is a huge savings and our way of helping clinics grow.

I wish I knew an answer to everyone's dilemmas. I feel the pain of older generations and empathize with the newest generation trying to figure out how to have a life outside of work, while managing to still make their loan payments.

The only thing I know for sure is that we are all colleagues in this together, and we must find solutions to these problems together. In the words of a dear friend and mentor of mine, "They ain't going away, so we better figure out how to work with 'em."

"Problems ain't going away, so we better figure out how to work with 'em."

Alicia Lindholm, DVM

Owner and Veterinarian Team up To Make Bandalero Ranch An Oasis of Breeding, Training and Health Care in the Arizona Dessert

Donald and Suzanne Rogers have been a mainstay in the Quarter Horse industry since the early 2000s. Located in Tucson, AZ, they are accustomed to the monsoon season that frequently lasts from mid-June through September. What they were not willing to accommodate, though, was stopping their Quarter Horse training due to the monsoons.

As Suzanne tells it, "We were constantly loading horses up and hauling them to places, so they could continue training. The entire process was taxing, expensive and most of all, didn't allow us the time we required to continue our training schedules to maintain our competitive edge."

That's when they decided to build their own facility, so they could train and breed year 'round. **Rogers Bandalero Ranch** was built in 2016 and is now one of the Southwest's premier training and breeding facilities. "It is currently about 70% of what we originally wanted to build," says Rogers. "Our number one goal was to build an elite training facility in the southwest – something that would provide a competition-ready arena for us (and clients), so we could adequately train year-round. Now the facility is designed to be a high-end equine sports facility, surpassing any facility in the southwest; offering equestrian services to our community and beyond that are state-of-the-art for both Western, English and Dressage performance horses."

However, it wasn't until Alicia Lindholm, DVM, DACT (2008 WSU) joined the Bandalero Ranch team as resident veterinarian in 2012 that the breeding program took a huge step forward. But what Dr. Lindholm didn't bargain for was the level of owner commitment to the health and breeding at Bandalero.

Bandalero Ranch owner Suzanne Rogers

"I believe that in a former life, Suzanne must have been a veterinarian, because it is a passion that she practices every day. As a matter of fact, it's difficult to find a time when Suzanne isn't by my side doing everything from elaborate diagnostic testing to routine exams, handling elaborate breeding situations, and repairing cuts.

"Working with a lot of different horses undergoing extensive training, we decided to purchase the Interleukin-1 Receptor Antagonist Protein (IRAP), so we could better stimulate the horses' own white blood cells to produce anti-inflammatory mediators and enzymes, specifically Interleukin-1 receptor antagonist protein, which can reduce the inflammation present as a result of degenerative joint disease. Treatment with IRAP utilizes progressive gene therapy to combat osteoarthritis in horses and our clients have fallen in love with its many uses."

Rogers adds, "The veterinarian we were working with prior to Dr. Lindholm joining us, told me that if I really wanted to be good

Continued on page 12

Continued from page 11

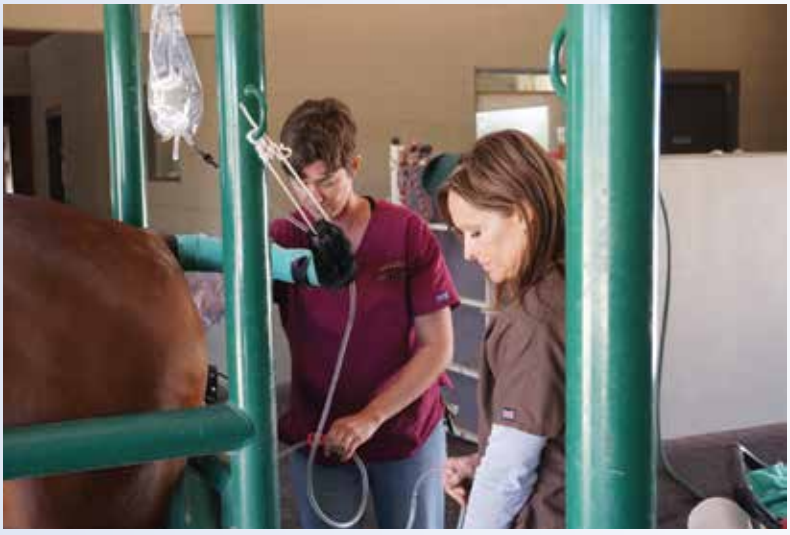
Breeding season keeps Dr. Lindholm busy

at managing horses, I needed to learn everything I could about health. I enrolled in classes at Colorado State and was able to work with breeding horses.

"She took me under her wing and taught me a lot about breeding, disease, cuts, infections, etc. After she left, Dr. Lindholm came on and continued with my veterinary education. She has been a fantastic asset to our breeding programs and overall health plans here at Bandalero. She is truly an expert in her field and never minds taking the time to teach me what she knows."

Rogers is so committed to the veterinary side of the business, that when they built Bandalero Ranch, they built a veterinary hospital complete with a diagnostic laboratory, work stalls, breeding facility and office.

"We have a Shock Wave machine for tendon and ligament issues, stimulate healing in chronic wounds, ability to process IRAP, most all the bloodwork is done in-house, all CBC, chemistry and we just got a serum amyloid A analysis machine so we can get immediate diagnostic answers to treat things fast and effectively. We work closely with other vets to help them get answers quickly as well," Rogers outlines.



Every day is a teaching day at Bandalero Ranch

Working closely with Dr. Lindholm, Rogers and the Bandalero Ranch team have steadily started to refine their own breeding program. "We have a high-end standing stallion, and we have some very good mares. We mainly breed to the top studs in the industry, as we are always trying to better the breed and competition," notes Rogers.

"I love the breeding part of my job," states Dr. Lindholm. "Sometimes the job is extremely hard because I'm a solo vet here and try to stay connected with my two children (ages 3 and 6). However, it's great to know I can lean on Suzanne for assistance where needed, as she has become proficient in almost all the areas I need help with. It's always worth the time when you see the new babies foaled because of our ET efforts and care. It makes the job highly rewarding."

According to Dr. Lindholm, she has been at Bandalero Ranch long enough to get to know the horses and the owners, which she says makes work much easier. And like most equine veterinarians, Dr. Lindholm enjoys the challenges of working with problem mares. "I see a lot of older mares (some 16-20 years old) that owners want to breed. The mare's body simply doesn't know how to breed by then. Managing all the circumstances, like cervixes that don't relax, fluid management post breeding, and those occasional ones that have infections that are hiding and we can't quite figure out what's going on, and of course, pulling marbles out of mares because people still do that, yet they want her bred. Finding out these types of issues and how to successfully breed her is a challenge and I enjoy it."

Vet hospital holding pens (above) and Bandalero Ranch main arena (below)

Dr. Lindholm adds, "In most of the cases where infection becomes an issue – even deep-seeded infections that we can't seem to identify, I like to rely on Equisul-SDT® (sulfadiazine / trimethoprim). Most of the time I rely on a sensitivity that indicates a product like Equisul-SDT. We've done some cleanup in the uterus and use it to not only get rid of the bacteria, but also to truly clear up the uterus. It does a fantastic job, especially being so broad spectrum in nature. It has become a reliable go-to in many mare infection issues."

Of the three areas at Bandalero, the main arena is 200 x 350 feet, covered, lighted and air cooled with eight 27-foot fans. All disciplines and boarders can ride in this arena. The second arena is lighted and offers daily space specifically for the continual training of western performance horses. This arena is designed to train reining, cutting, roping and reined-cow horses. Only by strategically placing the holding pens for the cattle used in each of these techniques, is this possible. The third arena is for the training and use of English Hunter/Jumper performance horses. This arena is equipped with jumps needed for daily training; thus, allowing for adequate English and Western training without conflict.

In conclusion Rogers notes, "We are dedicated to improving the horse industry by having the best training programs, state-of-the-art reproductive facility, breeding programs, fine stallions at stud and rehabilitation services. We are fully committed to strengthening our ties with our customers in helping them achieve their personal goals. We will continue to advance with cutting-edge technology, sound business, horsemanship and superior bloodlines as we strive to be a leader in the industry."

FIRST WOMAN DIRECTOR OF PSEP RUNS TOWARDS CHALLENGES

THROUGH OUR WORK
WOMAN'S INITIATIVE

Jamie Farmer, Director, Peterson & Smith Equine Reproduction Center

Raised in a military family, Jamie Farmer has always been driven to serve. So, when she chose to pursue nursing, it was a natural decision. However, while answering an ad to be a barn attendant at renown equine practice Peterson and Smith in Ocala, FL, she found her true calling to serve ... it just happened to be horses, not humans. Now she is regarded as one of the preeminent Intracytoplasmic sperm injection (ICSI) technicians in the country.

Farmer is the first female Director of Peterson & Smith Equine Reproduction Center (PSEP) in Ocala. She's also in charge of all breedings that utilize the ICSI system – a highly complicated, precision breeding method and procedure that leaves no room for error.

"The ICSI procedure involves micro-injection of a single sperm cell into the cytoplasm of a mature oocyte, which physically causes fertilization. The fertilized oocyte is returned to an incubator and allowed to develop into an embryo, which usually occurs within 6-8 days. Because the preservation of semen is essential in many situations, we can talk about options for maximizing the use of semen. These options include refreezing sperm in small numbers in straws specifically designed for ICSI or cutting a small portion of a straw under liquid nitrogen," outlines Farmer.

"Because ICSI utilizes a single sperm cell for each oocyte, this procedure holds tremendous potential for the production of foals using semen from stallions with low numbers of sperm or poor sperm quality," she adds.

Under the watchful eyes of Reproduction Center resident veterinarian and breeding expert Philip Matthews, DVM ('81, CSU), Farmer oversees all aspects of assisted reproduction at its 100-acre facility in Summerfield, FL. Since its inception in 1999, the center has solidified a reputation of providing the most current services the industry has to offer to their clientele. When famed European reproductive specialist, Professor Cesare Galli, a founding member and Managing Director of Avantea, the European leader in the field of assisted reproduction of equine and farm animals, contacted P&S to form a partnership utilizing its ICSI mediums and technology, Farmer was tagged as the representative to go to Italy and learn the process and procedures.

"I was intimidated at first to be in the position to learn and bring the technology back to the clinic, but I knew I was up to the task and had the desire to learn the new technique," recalls Farmer. "After a month of intense training, I came back to the Reproduction Center and started working with our own recip herd refining the procedures. Not until I felt comfortable with

Continued on page 14

Farmer spends hours of time behind the microscope to assure single sperm prodedure is successful

Continued from page 13

According to Farmer, the number of frozen semen tanks keep growing as technology increases

Being a woman around horses that are over 1,200 lbs. isn't about strength. It's about relationships.

Jamie Farmer

all the processes and science, did we offer it to clients interested in the new breeding technique. It has been extremely beneficial to breeders and horse owners."

Farmer explains the ICSI process. "After Dr. Matthews harvests oocytes directly from the ovaries, I place them in a specific media overnight in a gas incubator to mature them. The eggs that successfully mature are then ready to be injected with a sperm cell (ICSI) to be fertilized. The injected egg is then introduced to another media, placed back in the incubator and the end result will hopefully (and often is) an embryo that is then available to transfer into a recipient mare."

Farmer adds, "The two specific circumstances make this process a viable option for breeders is **mare driven**. Mares that become unsuitable to carry their own foal may also become unsuitable for embryo transfer due to uterine or cervical issues. Because this process bypasses the uterus of the mare completely, it can work very favorably with these mares. The other reasons are **semen driven**. The semen may possess poor fertility due to motility of the sperm, but the sperm may still be capable of producing fertilization (and live foals) when utilizing sperm injection (ICSI). Or there may a limited amount of frozen semen from a deceased stallion that would be able to produce few, if any, pregnancies utilizing normal artificial insemination. However, " she adds, "using this technique, there is now enough semen to literally produce hundreds of pregnancies."

What makes Farmer one of the best in the industry is her calm and steady focus. "The work behind the microscope is highly tedious and your focus needs to be on the procedure, nowhere else," states Farmer. "I seem to have the ability to phase everything out and do the procedure – regardless of the time it takes. That's partly why we have had such a high success rate with ICSI. The success is in the details."

Jamie Farmer and Philip Matthews, DVM

She admits it's not always easy, especially with her responsibilities of two children (ages 12 and 18), her office duties, scheduling responsibilities, client questions, working with frozen semen, etc.

"It takes someone who can handle the controlled chaos on a daily basis during the busy breeding season," she says. "The joys of seeing a client's ICSI foal and knowing you had something to do with that life is certainly worth all the long hours. It gives you reason and purpose."

Optimizing Your Choice of Antimicrobials Based on Cultures and Antibiogram

Part 1

Peter Morresey
BVSc, MVM, MACVSc, DipACT, ACVIM, CVA
Rood & Riddle Equine Hospital
Lexington, KY

As practitioners we have all been in the position where our carefully thought out treatment plan has not achieved our desired goal. In these situations, it is prudent to reassess whether our understanding of the disease process at hand is complete, if we have in fact, chosen an appropriate therapeutic, and whether we fully appreciate the difficulties our chosen therapeutics may have in meeting our treatment goals.

As we likely use antimicrobials daily in situations where a positive outcome for the animal and client is both needed and expected, a better understanding of the factors governing success of antimicrobials is the first step in ensuring that success.

Consider the most likely organism(s) involved, if any

In the absence of culture or polymerase chain reaction (PCR) results history, clinical experience and local knowledge of likely pathogens can provide a preliminary identification of the organism likely present. Relevant history includes any potential exposure of the horse to infectious agents by contact with known or suspected infected horses.

For example, if a horse that is suffering a fever has been in an environment where strangles was present, you are probably well-served by considering presumptive treatment for strangles until it can be ruled out. The presentation of the horse, when compared to previous clinical experience and the findings of a thorough physical examination, will suggest an initial course of action most likely to be effective against the most likely causes. Signs present and the location, if any, of the disease process within the horse also suggest a likely cause.

With respect to the occurrence of high fever, a decision should be made whether a viral cause is most likely, as this may negate the need for antimicrobial usage. Knowledge of the pathogens most likely present in the geographical region where the affected horse is located, being gained through experience of treating other horses in the area, will improve the likelihood the initially suspected pathogen is responsible.

Begin appropriate empiric treatment before going to narrow spectrum

It may take between 24 and 72 hours (not including transportation time and non-working days), to obtain positive identification of the pathogen. In the interim, broad-spectrum combination therapy is the most likely starting point. In horses, the combination of a beta-lactam like penicillin or ampicillin with an aminoglycoside, whether it be amikacin in foals or gentamicin in adults, is widely practiced.

These combinations will likely cover most pathogens responsible for the most common bacterial infectious agents. During the period of empiric treatment, knowledge of regional sensitivity and resistance patterns, gained from previous culture results, is invaluable to minimize chances of delaying effective therapy.

Once identification and sensitivity patterns (which antimicrobials are effective in laboratory testing) of the organism are known, narrow-spectrum antimicrobials, when appropriate, can be initiated. Consideration should be given to cost, the potential for toxicity in the particular patient, and the potential to promote resistance in the population should be considered.

Optimize your chances of success with an accurate diagnosis

Appropriate sample taking and testing will provide information confirming the chosen treatment path or allow its correction. Collecting representative samples from the site of infection with good technique is the first step. Once obtained, sample handling must be appropriate to avoid degradation of the pathogens rendering the sample falsely negative for the causative agent. Poor sample handling allowing contamination with environmental organisms, inadequate storage conditions for preservation of the organism, and aging of the sample from any delay in submission reduce viable organisms further decreasing the value of any information obtained.

Have realistic expectations of the chosen agent

There is a higher chance of treatment succeeding in an otherwise healthy horse versus an immunocompromised horse or neonate. Antimicrobial treatment is no substitute for considering the horse as a whole and providing the supportive care necessary for the horse to better fight any infection in conjunction with the treatments given.

Some bacteria are inherently resistant to certain antimicrobials making those an ineffective choice. Identification of the organism allows it to be categorized as in Figure 1. Bacteria fall within one of these categories, and antimicrobials have a spectrum of action that may or may not be effective in any particular category. Often, antimicrobials will be effective in more than one of the categories.

Continued on page 20

Littleton Equine Medical Center Celebrates 70 Years of Equine and Practice Excellence

As history records it, Harry W. Johnson, DVM) established Littleton Large Animal Clinic (LLAC) in the southern Denver suburb of Littleton, CO, in 1950, treating horses, cattle, pigs, sheep and goats.

Noted equine veterinarians Marvin Beeman, DVM ('57 USU), Charles Vail, DVM ('60 CSU) and Terry Swanson, DVM ('67 CSU) partnered with Dr. Johnson to build a practice that was unmatched for dedication and quality of care.

However, the new veterinarians joining Dr. Johnson had a burning desire and passion to enhance the equine side of the practice, since they saw the growing need for specialized equine care coming from the Denver metro.

As time passed, local farms gave way to urbanization and farm animals moved from the area. Throughout this change, the horse community continued to grow, while the dedication of the veterinary staff to each horse and client remained steadfast.

Today, Littleton Large Animal Clinic is known as Littleton Equine Medical Center and treats exclusively horses. The staff has grown to over 50 people, including veterinarians, interns, technicians and support staff, to provide Colorado and the Rocky Mountain region with a referral center for specialized horse care. The clinic is also a Large Animal Internal Medicine (LAIM) regional primary care facility working side-by-side with clients' primary care veterinarians when the need arises for specialized surgery, unknown disease assessment, lameness and other treatments.

And Drs. Beeman, Vail and Swanson continue to report for their shifts on a daily basis. (Note: More on these three equine innovators in upcoming issues.)

"How absolutely blessed this practice is to have the equine and veterinary knowledge of these three experts," says Littleton Equine Medical Center (LEMC) President Kelley Tisher, DVM ('94 UMN). "While they remain extremely humble about what they've seen and done, they are regarded as some of the best equine veterinarians in the world. They're great mentors to our veterinary and support staff and have made working here an absolute pleasure. The core values they established some 70 years ago are still alive and well and practiced here every day."

Today LEMC is under the practice management tutelage of Dr. Tisher and his business partner, Scott Toppin, DVM, DABVP ('94 MSU), who moved to Colorado in 1994, and joined the practice as an Intern the same year as Dr. Tisher. "I immediately knew I had found my calling and my home working with the likes of Drs. Beeman, Vail and Swanson," recalls Dr. Tisher. "I knew this was the learning environment I wanted to be a part of, and that decision has never wavered."

After the internship, Dr. Toppin moved to Arizona and worked at Southwest Equine Hospital for four years. During that time, he developed an interest in internal medicine and emergency surgery and returned to LEMC in 1999. Dr. Toppin has the distinct honor of being the first veterinarian in Colorado to become certified in Equine Practice by the American Board of Veterinary Practitioners.

"Our commitment to innovation and technology has continued to keep Littleton Equine Medical Center in step with the evolving demands of the equine industry," says Dr. Toppin. "We have three Board Certified surgeons on staff that offer orthopedic arthroscopy and use laparoscopy and laser technology to be less invasive in soft tissue surgery. We also offer needle arthroscopy to visualize stifle abnormalities in the standing horse. From colic to bone chips, OCD to fracture repair, lacerations to castrations, we have the facility, knowledge, and equipment to make the experience successful and as pleasant as possible for the client and the patient."

Dr. Tisher adds, "Our clients demand that we stay on top of the latest technology and innovations in sport medicine, and especially lameness. We bring in a lot of experts on a regular basis to discuss issues that are affecting our industry, staff and clients (mental illness, new breeding techniques, lameness fixes, euthanasia, etc.). It's up to us to maintain our edge and continuing education is a huge part of that commitment," he adds.

According to the equine practitioners, one of their biggest obstacles remains educating clients to the fact that they're not just treating horses, but also managing their overall health and wellbeing.

"The great Denver metro loves their horses," says Dr. Tisher. "And we work diligently to assure clients that we are a valuable asset in the performance and well-being of their equine athlete and friend. We are constantly being chal-

Kelley Tisher, DVM

Scott Toppin, DVM, DABVP

1.

2.

3.

4.

1. Dr. Toppin conducting a visual lameness inspection 2. Dr. Toppin conducts physical lameness exam 3. Veterinary staff meetings are critical to practicing communication 4. Dr. Tisher conducts lameness exam

lenged by tech-savvy clients on a multitude of practices, fixes and medicines. We do a lot of self-regulated research to make sure the new products, remedies and procedures being reported are not fads.

"Our clients appreciate the extra mile we take to assure their equine athletes are being well taken care of. It's also why we have invested in two full-time Board-certified equine surgeons and a Board-certified internist on staff. We want to be the one-stop answer to our equine owners."

Another issue the partnering team says is always on their radar is hiring new veterinarians that have people skills. "One may not see this as an issue; however, our practice is built on client relationships," says Dr. Toppin.

"This is, and always will be, a people business. While we work on horses, we deal with people. Veterinarians that have all the right skills but do not have the social skills to deal with clients with passion and confidence still have a place in veterinary medicine, but probably not in this practice. Besides, without those good social skills, I can imagine the task and time commitment to be a good practitioner draining someone pretty quickly who doesn't have good people skills. This is a tough, demanding job. But it should be a job you enjoy, and that begins and ends with relationships. Our future clinic growth depends on these skills."

"Having a veterinary business partner like Dr. Toppin makes doing the management side of business much easier," says Dr. Tisher.

"We both enjoy our daily veterinary work and work with each other doing what's needed to lead this amazing team of vets and coworkers. The practice has grown to the size that we can't make every decision, so we count on all the support staff we have here to assist with this daily."

In conclusion both Drs. Tisher and Toppin agree, "We want to assure young veterinary students that they don't have to give up on the idea of practice ownership because they have large student debt. Veterinary medicine is still a solid ROI vocation – it's why corporate America is buying so many clinics. They see the value of good veterinarians. Young vets need to understand they can pay off their debt much quicker by working hard and being a good vet in a practice that preaches growth. Ownership should be a goal. Getting with the right practice that allows you to one day have an ownership position should be paramount."

STRAIGHT FROM THE HORSES' MOUTHS

By: Bess Darrow, DVM
Tune Ups Veterinary
Equine Dentistry
Williston, FL

What I've learned so far on my journey as an equine dentist

I didn't exactly start out as someone who wanted to become an equine dentist.

I hope telling a little story about my experiences might help up-and-coming fledgling equine dentists figure out their paths. Or perhaps it can assist established veterinarians, who have been curious about equine dentistry all along, understand more clearly what they are staring at when presented with the front end of a horse.

By choosing to study the field of equine dentistry exclusively for the past 25 years, I believe I am fortunate to have been able to positively impact the lives of thousands of horses. These horses have been my teachers, showing me so many important things. Life as a veterinarian is a long journey of learning, not a quick trip final destination.

My journey in the industry began 25 years ago. If you would have told me back then that I would eventually become an equine dentist, I would not have believed you. Funny the steps you need to take in order to find your passion!

I grew up as a horse-crazy girl and a super devoted member of the United States Pony Clubs. Eventually I attained an upper level rating in that organization and essentially considered myself quite adept at horse husbandry, horse teeth included.

Equine dentistry was just not a huge topic of conversation back then. In my quest to find a fulfilling job in the horse world, I worked as a vet tech, but then I quickly realized I didn't want to just work alongside veterinarians, I really wanted to be one.

Later, as I waited to finish my vet school prerequisites, I was employed as a riding instructor and farm manager. It was then that an equine dentist came through my barn and actually took the time to give a short lecture to the boarders and staff about dental anatomy and the theory behind how to properly balance and float a horse's mouth. As I would find out later, that lecture turned out to be an amazing and pivotal point in my life, that would steer me in a new and exciting direction.

It is so very strange to think about that, in retrospect, as things in the equine dentistry world have changed so much.

Then one day, a highly-trained lay dentist came through my barn with a veterinarian, (who provided appropriate, continuous sedation for the horses), and a huge trunk full of every type of dental instrument known to man – hand floats, power tools, a huge bright head lamp and a shiny silver speculum. I listened, learned and ate up every word. The addiction was born, and I couldn't get enough of it! It was exciting, as every horse I saw had an issue I could potentially either fix or at least improve almost instantly. I couldn't wait to see the next one and the next one and the next one, every mouth a "Pandora's Box" of dental problems to be analyzed.

What I began noticing was that times were changing. Better instruments were being made, excellent sedatives were being used and the field was wide open to people who wanted to pursue it. What was once a physically demanding and often times brutal job became one of finesse and precision, smart sedation and restraint. Brains not brawn. Something more appealing to a petite female such as myself!

A favorite professor told me one time, "You miss more by not looking than by not knowing." Important words I still live by.

I wanted to see every horse I could, so consequently I enrolled in equine dentistry school as a consolation prize after I did not get in to vet school on my first try. I worked as a lay dentist while I reapplied to vet schools, but personally found the obstacles to being successful as a lay dentist too numerous. I was immensely relieved when I eventually got accepted to vet school, which allowed me to continue as a late-in-life veterinarian with an equine dentistry practice.

I believe I have a unique perspective on the field of equine dentistry, having been on both sides of the fence, first as a lay dentist and next as an equine dental veterinarian.

I currently have a dentistry-specific practice and treat roughly 40-50 horses each week. By simply working on that number of mouths, I am able to see a great variety of issues and many variations on a theme. Most issues I can tackle, but some I refer to local clinics. Ironically, every time I think I might be seeing the same thing over and over, I just go to work another day, and sure enough, something new, novel and challenging will show up! It never gets boring.

I find equine dentistry to be a positive, rewarding profession, and by that, I mean most of the time you are able to provide some sort of instant relief for a horse. It's heartwarming knowing you are making such a physical difference for an animal, and let's not forget, happy horses make happy owners!

Sometimes I even tell the horses who have serious, but correctable issues, "Hey Buddy, these are the 20 seconds that are going to change your life!" Horses cannot, by any stretch of the imagination, take care of their dental problems by themselves. It is up to us to intervene and help them be as healthy as possible, with their mouths being a main focus, not just big, black holes.

Stay tuned for more articles about performing basic dental examinations, recognizing and diagnosing dental issues and talking to your clients about equine oral health.

BessDarrow@me.com
FB: Tune Ups Veterinary
Equine Dentistry

"You miss more by not looking than by not knowing." Important words I still live by.

Aurora Pharmaceutical, Inc.
Sales and Consulting Team

Rick Dawson
Eastern Region Manager
(MI, OH, IN, PA, VA, NC)
rdawson@aurorapharmaceutical.com
507-301-2649

Jim Murray
Western Region Manager (IA)
jmurray@aurorapharmaceutical.com
605-370-1739

Morgan Cooley (Northeast US)
mcooley@aurorapharmaceutical.com
508-783-0006

Patty Ross (Southern CA, AZ, NV)
pross@aurorapharmaceutical.com
480-388-0884

Holly Stormont (TX, OK)
hstormont@aurorapharmaceutical.com
760-468-6157

Tom Stover (SD, ND, NE, KS, MO)
tstover@aurorapharmaceutical.com
402-960-9938

Casey Ulve (MN, WI, IL)
culve@aurorapharmaceutical.com
507-301-2372

Mike Duvall (TN, KY, LA, FL)
mduvall@aurorapharmaceutical.com
865-207-7563

Gerri Brown, PhD (Northern CA, OR, WA)
gabrown@aurorapharmaceutical.com
530-867-2066

Gary Jacques (NM, CO, UT, ID, MT)
gjacques@aurorapharmaceutical.com
303-888-1306

Cecilia Mink (Equine Support)
cmink@aurorapharmaceutical.com
406-291-7507

Donna DuRant (FL)
ddurant@aurorapharmaceutical.com
352-804-2275

Technical Services

Matt Klotz, DVM
Equine Technical Services
mklotz@aurorapharmaceutical.com
817-608-6979

Grant Weaver, DVM
Swine Technical Services
gweaver@aurorapharmaceutical.com
712-305-8890

Email: info@aurorapharmaceutical.com
www.aurorapharmaceutical.com
Phone: 1-888-215-1256

FINAL THOUGHTS

MAKING PRODUCT & HELPING OUR COMMUNITY IN THE NEW ENVIRONMENT OF COVID-19

By: Mike Strobel, DVM, MS,
President/CEO
Aurora Pharmaceutical, Inc.

Aurora Pharmaceutical continues to manufacture product on a normal schedule despite the current restrictions many of us are dealing with daily. We have good stocks of raw materials and do not anticipate any manufacturing disruptions currently. We constantly plan for supply chain challenges for a variety of reasons. Covid-19 is just another reason why we always maintain up to a year of raw materials in house.

For this reason, there is no need to stock up on Aurora products. We ask that you purchase them and use them as needed. I appreciate all the support you give us. We will continue to deliver products that you can depend on.

In addition to our regular manufacturing, Aurora is temporarily manufacturing FDA-approved, OTC alcohol-based hand sanitizer in order to help fill regional needs and supplement the needs in your veterinary clinics and hospitals. Our staff was able to get this done in three weeks. We are proud to be part of the solution in the near term.

Aurora is donating this product locally, and we hope to have product in limited distribution in the next few weeks. I believe it is important to support all the emergency personnel and front-line health care providers.

For our part we have donated Personnel protective equipment locally and will continue to offer whatever support we can. The veterinary community is doing a phenomenal job in this regard. Keep up the great work everyone.

I have always had the philosophy that we do not want to load up distributors or practices with product you don't need today. In this challenging time, this policy makes more sense then ever. It helps you maintain cash flow and operate your businesses more efficiently. I will make sure we make it as easy as possible for you to use Aurora Pharmaceutical products without having to worry about price or availability.

Stay safe and healthy in this challenging time.

DVM Business Essentials
Aurora Pharmaceutical, Inc.
1196 Highway 3 South
Northfield, MN 55057

Dr. Morresey continued from page 15

Figure 1:

Gram (+) aerobes	**Gram (+) anaerobes**
Gram (–) aerobes	**Gram (–) anaerobes**
Atypical bacteris, e.g. *Mycoplasma, Rickettsia, Chlamydia*	

Any chosen antimicrobial, even if considered likely effective, must be present at the site of infection at a sufficient concentration for a sufficient time to be successful. Consideration must be given to whether the antimicrobial can penetrate to the site of infection, and if conditions exist there that allow it to work.

For example, if pneumonia is diagnosed but fluid is also present in the pleural space (pleuritis), there is a high probability that a very low oxygen environment exists within that fluid. This presents two problems: not all antimicrobials will be able to penetrate the fluid, and conditions may not be favorable for their action even if they do. If an aminoglycoside is used, requiring oxygen, it should be paired with a beta-lactam more likely to work in that environment as this will increase the range of organisms covered.

What are the ways antimicrobials work and what affects how are they most effectively dosed?

Antimicrobials have several mechanisms of action. They work by affecting protein synthesis, disrupting the bacterial cell wall, disrupting the bacteria's DNA or RNA, or halting the bacteria's normal metabolism.

Two broad categories of dependency also exist, being time and concentration. Time-dependent antimicrobials must stay above the minimum inhibitory concentration (MIC, more on that later) throughout the dosing interval, necessitating repeated dosing. Examples are the beta-lactams, tetracyclines, potentiated sulfonamides, chloramphenicol and most macrolides. Concentration-dependent antimicrobials must achieve a certain plasma concentration (being a multiple of the MIC) to be effective, meaning higher doses with extended treatment intervals are possible.

These include the aminoglycosides, metronidazole, azithromycin and the fluoroquinolones. These antimicrobials also have a prolonged post-antimicrobial effect, whereby the growth of bacteria is inhibited for a period of time following usage, extending their effectiveness.

About the author

Dr. Morresey began his veterinary career in New Zealand as a mixed animal practitioner following graduation from Massey University in 1988. From 1996 to 2001 he attended the University of Florida in Gainesville, where he undertook residencies in both Theriogenology and Large Animal Internal Medicine.

In 2001 he accepted a clinical faculty position at New Bolton Center, the large animal hospital of the School of Veterinary Medicine at the University of Pennsylvania, where he was part of the ambulatory equine service.

In 2005 he joined the staff at Rood & Riddle where he is involved in many clinical collaborative research studies seeking to better understand and improve the health of the neonate. Dr. Morresey is a member by examination of the Australian and New Zealand College of Veterinary Scientists and holds Diplomate status in both the American College of Theriogenologists and the American College of Veterinary Internal Medicine.

He has also studied at the Chi Institute of Traditional Chinese Veterinary Medicine allowing an appreciation of complementary techniques which he has found useful to improve the health of his patients.

Recently he gained a Master's degree with a dissertation investigating the use of stem cell therapies in canine spinal cord injuries. He has spoken nationally and internationally on a wide variety of subjects important to the practice and science of equine veterinary medicine.