



Race Track Industry Program

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Safety and Welfare Part 1, Racing Injuries — Reporting and Prevention

Moderator:

Kristin Hix, Legal Assistant, The Jockey Club

Speakers:

Dr. Rick M. Arthur, Equine Medical Director, California Horse Racing Board

Dr. C. Wayne McIlwraith, ACVS Barbara Cox Anthony University Chair, Colorado State University

Dr. Sue Stover, Vice Professor, University of California-Davis

MR. STEVE BARHAM: We kind of have a full day for our last day today. This morning we were talking, it seemed like, a whole lot about wagering and law and regulation. This afternoon we're going to move to safety and welfare which, all of you know, has been a hot topic for quite a while. Our moderator, we've had a switch and this is not James, this is Kristin Hix. Because you don't have her bio in the back of your program, since she's pinch hitting and came up to the plate after the program, I'm going to read a little more of her bio than I usually do.

Kristin graduated from the University of Kentucky with a degree in political science and sociology in 2002 and from the University of Kentucky law school in 2005. After serving as a legal and administrative coordinator for two and a half years, Kristin moved to her current role of legal associate in January of 2008. In this role with The Jockey Club, she works with other members of their legal team as well as The Jockey Club's for-profit subsidiary companies and not-for-profit organizations on a wide variety of contracts, legal issues and industry initiatives. She has been a part-time employee of The Jockey Club all through college and law school and has been employed with the company since 1999. She is a member of

the Kentucky Bar Association, The American College of Equine Attorneys, and is involved in numerous industry committees. With that, Kristin.

MS. KRISTIN HIX: Good afternoon, everyone, and thank you all for being here today. I'd like to commend Doug Reed, his staff and students not only for their time they put into producing the Symposium, but also for including two full panels on equine health and safety today. High profile injuries to Barbaro, George Washington and Eight Belles served as a wake-up call to this industry, but I think that we have responded in a positive and dramatic fashion. Hopefully, after hearing the presentations today, you will agree with this assessment.

We are fortunate to have with us today three prominent members of the equine veterinary community. In fact, considering their busy schedules and travel commitments, it's hard to believe we could get Dr. Wayne McIlwraith, Dr. Rick Arthur and Dr. Sue Stover in the same room at the same time. That speaks volumes to the diligence of the RTIP staff and also to our panelists' collective commitment to equine safety. All three of them have worked together with The Jockey Club and Grayson-Jockey Club Research Foundation through the years. Dr. McIlwraith and Dr. Stover have conducted very important research funded by Grayson. Both of them, as well as Dr. Arthur, have been very active participants at both of our welfare and safety of the racehorse summits. Today we will hear individual presentations from each of them, followed by a very brief recap from me on The Jockey Club's new equine injury database. We'll then open it up to questions from the audience. Today we'll start with Dr. Sue Stover of the University of California-Davis. She's a professor at the J.D. Wheat Veterinary Orthopedic Research Lab at UC Davis, which specializes in studies of musculoskeletal disorders of animals. Dr. Sue Stover is going to explain how useful necropsy programs are and how they help her with research. She'll also talk about the multi-factorial nature of equine injuries.

Dr. Stover.

DR. SUSAN STOVER: I want to thank you very much for the invitation to be here and to share our experiences with the California Horse Racing Board Postmortem Program. The California Horse Racing Board Postmortem Program is a collaborative effort, highly dependent on the collaboration with the racetracks themselves. In addition, the horses that come to the Postmortem Program undergo a systematic necropsy at the University of California's diagnostic laboratory system. In collaboration with many resources that university environments provide, allow for the advances that we feel we've made through the program. I'm from the Veterinary Orthopedic Research Laboratory and this is a research arm associated with this collaborative effort and the activities that I perform are actually funded

through grants and private donations. The goals of this postmortem program in California are to determine the nature of injuries occurring in racehorses, to determine the reasons for those injuries, and to develop injury prevention strategies.

The first benefit is our ability to monitor injuries. For example, since February of 1991, we've necropsied over, a very sobering number, over 4,000 racehorses. This number is probably over 4,300 at the moment. Approximately 80 percent of those horses die from musculoskeletal injuries, and we see injuries that cause fatalities occurring in both racing and training. So we think it's important, particularly because we see different types of injuries in racing than we do training, as well as some overlapping, but this program actually covers all horses that die at a racetrack, not just those that die during a race. We can track the number of injuries, fatalities that occur over a year.

Unfortunately, this number has been rising despite our efforts and the new information that we've gained. We've recognized where those injuries occur. For example, we know that the vast majority of our injuries occur in the metacarpal and fetlock region, between 34 and 52 percent depending on the injury that we're categorizing. But you can see also that injuries occur, fatalities occur as a result of injuries to bones throughout the body. Not only knowing where they occur but identifying exactly what happens to them is very important.

I'm going to share with you one of the earlier findings that we know a little more about and that's fractures that occur to the humerus, which is the bone between the shoulder and the elbow joints of the horse. We recognized early on that these fractures have a characteristic configuration, so if we expected a horse would just get a fracture as a result of a bad step on a racetrack in one instance and hitting the rail in another instance, we would expect these configurations to be different. The first thing we noticed was that they're the same over and over and over again. We also noticed that when we removed the soft tissues from the bones, that we saw this rough, woven bone on the surface, in association with the fracture, which is this line down here. And this bone is actually new bone; the normal bone material is this material down here. The importance of this discovery is that it means that this horse was having problems with the bone material before it incurred this complete fracture. So in essence, for the humerus, we see that we have a very characteristic fracture over and over, and where these hatch lines occur is where this new bone occurs. We recognized where this new bone occurs in addition which allows us to monitor and detect these injuries early. So the fact that there was a consistent pattern, consistent fracture configuration, there was evidence of new bone formation indicative of underlying pathology that preexisted the fracture, that in the case of the humerus, these horses usually fracture this

bone at sometimes a slow gallop and even a jog, so it doesn't take abusing, so to speak, or pushing the horse to an extreme to get this fracture. It indicates that preexisting injury predisposes to complete fracture. And this, for us, is very important because what it means is that we have an opportunity to intervene and prevent fatality if we understand how these develop.

So, it turns out, when we went from bone to bone to bone with different subsequent studies, that of all the major long bones in the body we found the same thing, whether it's the canon bone or the pelvis or the tibia, we've got evidence of preexisting disease.

What about joint injuries? We look at the same type of thing, this is the end of the canon bone, and we have a typical sort of lateral collar fracture. Many of these are not fatal as well, with a characteristic divot in the bottom. We have injuries to the joint cartilage that end up causing arthritis; do we see the same thing? If we look down at the end of the canon bone, where lateral collar fractures occur, and we radiograph the bone from front to back. Here we see the end of the canon bone and here we see a typical lateral collar fracture. Now, some of these have this fragmentation at the bottom. This is what we see in the necropsy specimen, with the fragment missing, in this case. If we take and open those fragments up like a book, what we find is an area of what we call sclerotic bone, dense bone formation, but in the center of that we see an area that's reddened, it's inflamed, it's hyperemic. If we look at that a little closer with electro microscopy we see that it looks like an area of Carlsbad Caverns where we just have a bunch of caves. We've had bone material excavated from that region, and so we believe these fractures result, much like the stress riser on a peanut bag that you might see on an airplane where that allows you to tear the bag in a predictable manner and very easily. So we have lesions that probably preexist and predispose horses to this type of fracture. Similarly, if we look at bones from other horses, the end of the canon bone here turned upside down, we see similar changes in the bone. This subsequently allows collapse of cartilage and development of arthritis in this joint.

So what about joint injuries? Similar to long bone fractures, they develop over time and mild injury precedes severe injury. So let's try to determine the reasons for these injuries, because if we understand how they develop then we can find some opportunities to intervene. Looking at our friend the humeral fracture here, we're going to look with electro microscopy at the area of bone where the cortical shell, which forms the dense outside portion of the bone, intersects with the medullary cavity where we have these trabeculae coming off the center. That looks to me similar to a tree trunk which is this cortex and a branch which is the trabecula that somebody's been bouncing up and down on, you know, on the end of a tree we bounce, bounce and we expect the branch to buckle on the bottom and

split on the top. Same sort of things are happening inside the bones of these racehorses, and we know that they've been there for a while because we see this bridging bone material so the animal has been dealing with these cracks and trying to repair them but unsuccessfully. So what happens in the body is that we all incur injury to our bones throughout life and ultimately our bones would gain enough cracks that they would fracture, except that our body keeps taking them out and replacing them with new bone. So we have cells that come in, much like tearing down an old building where you have a crane with a big ball on the end of it, and it removes this damaged tissue with cracks in it. But if that happens within a short period of time, we get an area of osteoporosis. That happens, just like this ball breaking down a building, in a very short period of time, and we take advantage of the fact that because the horse is racing he has both forelimbs the same process is occurring but one gives away and fractures first, so we look at the other one so that we don't have the complicating effects of the fatal fracture.

Here we see these cracks within the bone, new bone formation in the fresh specimen is highly vascular and looks red, and that's simply the same porosity, the body's attempt to remove the damaged material, however, without time to repair it. When we look at the strength of that bone material by testing it in our laboratory, we find that, with a progression of these stress fracture disease, we get areas where the strength is lowered. So, the horse is actually setting themselves up for, even when jogging on the racetrack, to have weak bone material that acts as a stress riser and, in some cases, is less than half as strong as the normal bone tissue and gives way under otherwise normal training and racing circumstances. However, if the horse is not allowed to repair this damage but has continued to train, such as we have here, this porosity skyrockets and makes this very dangerous circumstance where this porosity acts like the perforations on a postage stamp, very easy to tear in a predictable manner, and we get bone fracture.

Repair takes time. Instead of taking a couple weeks to remove it, like building a new building, it requires a long period of time, so we have two competing rates and it's that time factor that's important. However, when given enough time, so that the training intensity is not too high, they can recover. When that happens, these bones adapt and then, as in this circumstance here, they have new bone material and are resistant to further injury for the most part. So, knowing this information, how do we develop injury prevention strategies. The first is through early detection. We recognize that with the time when these bones are at risk for fracture, that this disease is very early in the process, this new bone material on the surface is very minor in density compared to the parent bone, and on radiographs we cannot see it. Routine, clinical radiographs. So this is, for example, one of the motivating factors for putting a bone scan unit or scintigraphy at Santa Anita Racetrack, which allows us to pick up these lesions early in stages

even though radiographs can't pick them up. Subsequently, we have similar stories for other bones of the body where we discovered where stress fractures occur in the pelvis. Subsequently, we developed bone scan techniques that allow us to pick up those lesions. We have ultrasound techniques that allow us to see discontinuity in the bone's surface. So knowing where these lesions occur allows us to find them because it's a needle in the haystack if you're hunting through the whole horse trying to figure out what is going on, but knowing where these things are has allowed us to detect them in a live horse. Similarly, with the advances in magnetic resonance imaging, I think it will not be too long before we'll find these lesions in the end of the metacarpus and more recently we feel that we have elucidated the idiopathogenesis or the events that lead up to proximal sesamoid bone fracture, which is one of those bones in the fetlock, one of the most common causes of injury. Now we've given our imaging people the task of, well, okay now we know what we're looking for so let's figure out how we can find it.

So for injury prevention, I think we have lots of opportunities. The first is recognizing that we have a race between injury, damage, crack development and the ability of the body to repair it which are two different time, rate processes. If we look at how that translates to horses in their racing career, with each time they have a timed work or a race we add the number of furlongs, we get a plot over time of their exercise. Here we're comparing an animal that had a breakdown with that that did not, continued training. And if we look at these curves, we can see that the one that ends up getting a breakdown has a steeper slope to this curve, which means they're training more intensely than those that don't. In fact, we can show that there's very distinct differences, on average, between horses that end up with a fatal injury and those that don't relative to training intensity. Not only does it affect fatalities, but it affects larger proportions of horses that just get milder injuries in the form of layups. So if we look at both the horse that ultimately had a breakdown and the horse that did not, notice that when their training intensities got steep, they both were laid up from high-speed activities for a period of time, probably related to a milder injury.

We're taking that a little bit further now in that we recognize that with humeral fractures, that very characteristically they get this fracture right after a layup. So we can collaborate with our engineering people, we model, use models that are used in engineers for building bridges, for example, and we make models of the bone and we simulate, in simulations, exercise histories with these models which helps us understand how different training regimes may promote or prevent fracture. In this particular graph, we are comparing short layup damage with longer layup damage and we see that once a horse is laid up, and this is not to be taken generically, but in a circumstance as an example, that we have much higher damage with particular training regimens than others and we need to do more work

to figure out how specifically this applies to horses at the racetrack. We also recognize that most of our injuries occur to the fetlock region and that this region undergoes severe hyperextension during racing and race training and that the bones of the limb are simply a system of levers connected by joints and suspended by tendons and ligaments and moved by muscles. The major ligament of structure that suspends the fetlock joint is the suspensory ligament, which is right here, proximal sesamoid bones right here, and distal sesamoidean ligaments right here. When we followed racehorses at the racetrack in epidemiologic studies we recognize that there is a very high prevalence of mild injuries to this structure, and for horses that have those mild injuries, if we follow them out throughout racing again, we lose, starting with 100 percent of the horses up here in training, we lose about 45 percent of them in three months. That's a huge detrition rate compared to horses that did not have a mild injury that we lost only about 10 percent after three months. So these milder injuries make a huge impact, not only on fatalities, but on the ability of horses to continue racing and training.

Now, we recognize that we can affect the loads that are on these structures by looking at this system of lever arms. In essence, this lever from the hoof to the fetlock has to counteract the lever from the fetlock to these tendons. So here we see one lever and another lever. And if we change the hoof lever, then that means we have more force in the tendons. It's principles such as those that had us look at appliances that are attached to the hoof like toe grabs, hoof conformations, long toe, under-run heel, sort of conformations, and recognize that they do several things, but one of the things they have an effect on is this lever arm, and we recognized in studies, at least in California at our racetracks, that the presence of a toe grab increased risk for this fetlock breaking down by over 15 times. We recognize that we can change the forces through those tendons and bones at the back of the limb in another way, and that is by the magnitude of the forces that are transmitted between the surface and the hoof. This is the reason that we're looking at race surfaces and how that affects loads on the limb.

We completed a study in which we developed an instrumented horseshoe that we put on the horse's foot and did a comparison of surfaces, initially when three different surfaces were at Keeneland racecourse, a synthetic training surface, a dirt race surface and a turf race surface, that we could measure the forces between the hoof and the limb. And here, looking at the dirt, the synthetic and the turf, we're looking at the forces, all on the same axis; we can see the peaks for the dirt and the turf are higher than that of the synthetic surface. In fact, horses transmitted the surface and the limb are higher for dirt and turf than this particular synthetic surface which, of course, can be different from a variety of other synthetic surfaces because they can be manufactured to different specifications. Similarly, we measured the acceleration of the horse's hoof and similarly we've got lower

accelerations on a synthetic surface in comparison to dirt and turf surfaces. We're very interested also, and I failed to put these slides in, but interested in the interaction of the hoof with the surface and are pursuing studies where we're looking at how the difference in traction, hoof rotation, the ability of the hoof to stay in the surface and interact with it, with these different surfaces.

We're also pursuing computer modeling of a simulation, taking information from both the postmortem program and other research studies so that we can simulate how a variety of surfaces that have never been built, so an infinite number essentially, effect the loads and the limb. For example, we can simulate the effect of a soft surface compared to a more characteristic surface on loads in the suspensory apparatus. When we do this, looking at limb going through stride, we can track, for example, at mid-stance, where on the soft surface, which is in the green line, that the strains on that suspensory apparatus and so propensity for injury are lower on this surface than on the routine surface.

In summary, I think the California Horse Racing Board Postmortem Program and the collaboration between the industry, the university, the diagnostic laboratory system has allowed us to learn a lot about what's happening with horses on the racetrack. I happen to be personally extremely optimistic that despite the injuries that we've seen, that we have opportunities for prevention of injury.

I'd like to acknowledge the research funding that goes into the efforts that I've been able to share with you today, recognizing that many, many people participate in accomplishing these feats and that our postmortem program has truly served as a springboard and the foundation for which we've been able to do these things. Thank you for your attention.

MS. HIX: Thank you, Dr. Stover. We've heard a lot about track surfaces in recent years and about ways to improve them, to reduce equine injuries and fatalities. Dr. Wayne McIlwraith is a professor at the Equine Orthopedic Research Center at Colorado State University. He and Dr. Mick Peterson, a professor of mechanical engineering at the University of Maine, have spent a good deal of time with practicing vets around the country in recent months. Dr. McIlwraith is going to update us on their work right now.

Dr. McIlwraith.

DR. C. WAYNE MCILWRAITH: Thank you, Kristin, and thanks to the organizers for the invitation to speak here. I sort of changed the title slightly after I read the review to scientific approaches to prevent injuries, but the main topic today is the track surface research that we have done, or that Mick Peterson has done and I

have sort of got credit for it, but he's done the majority of the work. It's an interesting relationship because it started off with a bioengineer who had worked in soil and knew nothing about horses and an equine surgeon, me, who knew nothing about soil or engineering, but it has worked out really well.

As Dr. Stover has really nicely introduced, the big issue is catastrophic injury, but non-fatal injury is also important and I'm going to mention that as well. I think most people are aware of the welfare and safety summit that's been sponsored by The Jockey Club. There's been two of those, one in October of 2006 and the most recent one in March of 2008. These were data that Dr. Scollay presented, Dr. Stover has previously presented some very, as she said, very striking figures on catastrophic injury. This presentation, I'm going to talk about the track surface research that has been done, and it has very practical connotations, some efforts at injury data acquisition as well as introduce you to prediction of injury or some of the things we're trying to do there.

So as far as surfaces go, standardized tests, engineering support and the aim is a national laboratory which is well on the way to being developed. Mick Peterson, as Kristin introduced, is a PhD bioengineer. We've been working together, we started working together on track surface about 10 years ago, and have developed machinery from there. Many of these slides have been taken from a presentation that Mick recently gave to The Jockey Club safety committee, but it stemmed from the recommendations, various recommendations came out of the welfare and safety of the racehorse summit in Kentucky in March. Recommendation number one was track surfaces, with a primary objective to promote consistency and safe surface condition.

So what is needed? Well, ultimately what we need is a clearinghouse for surfaces data, and we've got to acquire real data so that track superintendents can make adjustments and maintain the track according to some objective data. Actually, Mick and I started working together based on my sitting in, I do most of my surgery in Southern California, and having trainers come over from Los Alamitos and not picking on any trainer there, because there's a lot of good trainers, but blaming the racetrack whenever I was doing surgery on one of their horses. And, more particularly, blaming the racetrack, and so this was before synthetic tracks had come to be and we wanted to try and make a way of validating the tracks so that we could ensure and provide that ensurement to the horsemen that we did have the best track possible.

So we needed reliable and consistent testing and, of course, correlating that with risk assessment data – obviously, if you're doing a certain program of maintenance and you're not reducing the injury rate, something's wrong—

understand regional needs and create a culture of data. This was the important thing. And it's really been gratifying to me and to Mick to see track superintendents really wanting this objective information rather than want to continue on and do it subjectively or based on their experience, which is considerable, wanting this data to do it. Of course we wanted to look at both synthetic and natural tracks, I think the acquisition of synthetic racetracks and perhaps some of the suppositions that were made as to what problems they were going to solve required us looking at those as well. I won't bore you with all these details, and I don't know enough about them to bore you anyway. I think there's no easier standard tests, and that was really the main emphasis of this program.

So, consistent test methods and development of new methods if necessary and the work that Mick has done concentrates on that, then a database of the results of research, and having it open to all users, non-proprietary methods, a single reliable lab for the industry was what we're aiming at and it's coming to be.

So there's many tests for dirt. Basically, in the old days most of the objective tests revolved around measuring vertical impact, and as you'll see we need to look at some other things. Looking at clay mineralogy, do the particles stick together, and this is now being done using x-ray defraction, fiber weight percentage, so this algorithm on the right sort of covers it. You can see here that I talked about dirt, particle size, clay mineralogy, organic content, moisture content, what does that do to the nature. Obviously, we've got to correlate that with the mechanical properties. Synthetics, we introduced the issues of wax composition and of course that's achieved quite a lot of publicity, temperature sensitivity to that wax. One of the studies that we have done was a study at Del Mar last year, looking at the effect of track surface temperature on the way the track went and particularly on racing times.

Quality control of materials, sand matters even in synthetic tracks, and this picture here is looking at the particles at two different racetracks that have been tested. And there's quite a difference in these particles under microscopy. The relevance of that is, that makes a difference to the surface and so this is not simple and the synthetic tracks are not simple because particle size is an issue with drainage, and there's certainly been an issue at some of the racetracks.

This is an example of different waxes. Wax at the top, a newer, modified wax, less variation with temperature because we've certainly noticed issues with track temperature.

So there's been two main focuses that we've been aiming for in this whole effort and that's laboratory for the analysis of track materials, and the track

superintendents want this information because it effects how they can maintain the track and how the track can stand up to racing, a central lab to compare between tracks. This is being set up in Maine, in Mick's hometown, and the idea is to get consistent data. And then, of course, ultimately we will link to the injury database, and I'll come back to that in a minute. Developing new tests and materials and coordinating the high cost of specialized testing so we can get down to a practical, cost-effective method of providing the information back to the racetrack. The central track surfaces lab would be modeled on drug testing labs, but obviously we're at the ground floor level. It would be a national facility with regional duplication only if we need to. It's far better to have consistency and we think that we can do it from a central facility.

Initial seed money has been discussed and Dan Fick at The Jockey Club, with Kristin, has already put forward a lot of effort into this and we are getting people enrolled. So the initial seed money is going to work for some capital costs, for some equipment, as well as initial labor, training and certification. Continuing funding, we've got initial investors that have made a commitment, forms part of the board to determine the research priorities, and then the tracks will subscribe with the package. The vision for the future is they'll pay per test on added materials as needed.

Maintenance matters, different tracks do things differently. A lot of the time these reasons are justified, depending on the weather conditions, the design of that particular track and the way it's used. But we want to develop best practices in this overall slide. The first thing is a reporting system where research leads to expertise and so we want on-track data. This doesn't show up very well, I apologize, at the bottom, but this is part of a track surface data package that has been developed. Three tracks, for instance, that have used it are Keeneland and Del Mar and Santa Anita. I think this is certainly accepted by the track superintendents that are on the track surface subcommittee that I happen to chair and is run by The Jockey Club. People are starting to participate in this uniform reporting. This will be correlated to track surface data as well.

Weather data logging is important, as far as temperature, humidity, precipitation, UV is a big issue. Mick has done a separate project in his lab in Maine on the effect on synthetic track deterioration with UV light. We mentioned temperature before, but UV light is another component that's important. This is linked to the maintenance reporting data, a segment of the form of which I showed you before.

Handicapping has a question mark, but we do envisage that handicappers will want that information. In other words, ultimately we will have track surface

information obviously presented in a clear and simple format that a lot of people will want to know. Then of course the performance testing in this case refers to the relative value of the surface. The perfect surface obviously needs to perform in the real world. A lot of the data that we've already harnessed as far as variability with tracks has been gathered in the field by Dr. Peterson.

Now, there's two things that are particularly important when we want to talk about performance. We want to talk about shear strength and stiffness. Here's the overall slide that we look at. We look at shear strength, we look at vertical modulus, vertical modulus being the vertical force of the hoof coming down, and that was the only thing tested objectively for a long time. The aspect that Dr. Peterson introduced was measuring shear strength, that's going to affect how the hoof slides into the track or into the surface and it's also going to affect how it breaks over and whether it cuts out or not, how, the way a horse can get hold of a racetrack, for want of a better term, and research must show that the measures relate to safety of the horse. Daily measurement of performance, periodic measurement of composition. So this slide just shows the vertical impact concept, which is important, but equally important is the horizontal impact or the shear strength, that horizontal arrow. Anyway, you can see that horizontal arrow near the bottom giving you the shear strength, as an indicator of the shear strength. The biomechanical hoof tester is one of the two components that has been developed and this is going to measure the shear strength as well as your vertical strength during breaks, take about 40 minutes. The point here is that this machine was developed to see the racetrack the way the horse does, so the hoof comes in at an eight degree angle, has a component of slide to it, measures that shear strength of the surface, and then secondly, we also developed a technique for using Doppler radar to measure the base. And when I say measure the base, you can evaluate the slope of the base and also irregularities in the base. For instance, when we started working with this in Southern California, testing these tracks, that was pre-synthetic tracks, we had slope to the racetrack all the way around the track in general because that was the method of drainage. So that has changed with the advent of synthetic tracks because we have horizontal surfaces with drainage underneath.

There's a very important necessity for data. And then we can relate back to the maintenance methods, the performance testing and the track composition, and the data needs to be tied to outcomes and that's where the epidemiology and the horse data comes in, which I'm going to come back to soon. One other important thing to note here is that Mick has done studies to assess previous methods of assessing the track objectively. There's agreement now that this is the only way, the use of his machine that I showed you before, is the only way to get these parameters in an objective fashion. The old drop-hammer techniques and just

measuring vertical modulus has no correlation to some of the other important parameters. This is based on a study that was done at Del Mar last year.

So the funding to get to this stage has been, initial funding was from AOHA racing, when Dan Fick was there, and then second year of funding was provided by Oak Tree, Del Mar, Fairplex, we got good cooperation from the tracks and we subsequently got funding from Dolly Green, Southern California Equine Foundation and Oak Tree. There's been a pay for services for Mick's testing since 2005, and really pleasing to us was we acquired a Grayson-Jockey Club grant this year that also got the second Elastikon Award signifying the significance to the industry to ongoing pursuit of this work. Now we need a mechanism to implement the research. This is what has already happened through the racetrack surface task force, and the hoof task force has also been involved because we needed to get funding to carry this into practicality and availability. So, there's two parts, the laboratory that we talked about before, we don't expect it to be self-supporting until the fourth year, depending on the number of tracks these are the capital costs, we have developed a business model for it, but we have got good buy-in from groups like NTRA, The Jockey Club, and all the racetracks that we've been involved with. So the more important thing, probably, is that we need the track testing machine at the tracks, available so that these data can be made. We've got enough data, we've published two papers, one in an engineering journal, two scientific peer-reviewed papers, one in a veterinary journal, that was a little bit difficult, translating it into language for veterinarians, but it is well-tested now and the next phase is getting it available at each of the tracks and there's been considerable discussion over the monthly conference calls on this and Dan Fick has really been driving the bus here as far as getting this to eventuality. The philosophy is we need to provide a common set of measures based on biomechanics, procedures, consistent track material, what surfaces are safe, when are they unsafe, climate, composition, provide tools and support to evaluate these materials.

So these, I've mentioned the funders before, this is another acknowledgement slide.

I have one related topic and two other topics to discuss. That is epidemiology. The proof of the pudding is ultimately going to be how much are we reducing injury with this objective analysis of the tracks, as well as taking notice of those figures and providing the maintenance? As long as we have the machines at the track and the Doppler radar at the track, we have no question that the racing superintendents, the track managers will look after it. There's total buy-in, the enthusiasm in March when we met together in a breakout session at Lexington was huge. But ultimately what matters is how many horses get injured, and so this is

an important part of the solution. It only matters if we help horses and riders, so we need the correlative epidemiologic data.

As far as fatal injury, the work started by Dr. Mary Scollay and others, we can get catastrophic injury data, the California Postmortem Program that Sue talked about is the model, I think, for the way these data have been acquired. The information that's come out of Sue's lab, come out of Davis, based on the California Postmortem Program, which she showed some of, is huge for leading us into identifying predisposing factors for injury. But non-fatal musculoskeletal injury is important for a number of reasons. Obviously, there's a spectrum from that early micro-damage that Dr. Stover talked about through subclinical injury, injury that's just annoying or requires surgery or requires layup, to obviously, the fatal injury. There's a porosity of such data and so this is a proposed epidemiologic study on non-catastrophic injuries that involves Jeff Blea, one of the partners in one of the big practices, Dr. Arthur who's speaking next, as well as Ashley Hill, who was on one of Dr. Stover's slides. We are a little incestuous in this business, we're not very big and we cross-pollinate quite a lot and that's good. Dr. Hill trained and got her PhD in epidemiology at Davis, working with Dr. Stover as you saw from one of those papers, and now we have her and she's providing the epidemiologic expertise, and Mick as well. But this will require a lot more names, we've already enrolled veterinarians at the racetrack to get this data. At the moment, the injury reporting system is limited, and I don't mean limited negatively, but it's basically been restricted to regulatory veterinarians and regulatory veterinarians don't have it in their time or job description to carry through to get all the information regarding that injury. So what our plan is here is to have treating veterinarians, the veterinarians that look after these horses day to day, that can follow through to the end and have a similar reporting system but with certain details that are missing currently so that we know how we're doing with the track.

I mentioned how those subclinical and non-fatal injuries are important to document because they can lead to a bigger injury, but equally importantly, they're an important factor in wastage at the racetrack, lost days, lost races, lost fields, and obviously the critical thing is the welfare of those horses if those injuries are not recognized.

This is a summary of a pilot study that Dr. Blea and I did and was presented by Jeff at the March summit in 2008, so we got kind of a window into what are our injuries looking like? There have been accusations with synthetic tracks that, okay, maybe we decrease bone injuries but there's a lot more soft tissue injuries. There was some reporting of newer type injuries. So we did these series, I haven't got time to detail them all, but bottom line, we looked at surgery data, we looked at radiographic and scintigraphy data and what we found was, there was no increase

in soft tissue injury on synthetic tracks but we did have a decreased number of bone injuries. We certainly have the number of bone scans that were done in the time period since the synthetic tracks went in, so it is cause for some optimism.

So the plan is we will have the veterinarians doing it and the information will go onto a database. We've been discussing modification of the InCompass system or an alternative system for reporting that can be linked up with InCompass, but it is going to happen hopefully in the future. We have submitted grants for this, of course, they depend on being peer-reviewed and appropriate but one way or the other we plan on getting this done soon.

We need to consider other factors, just finishing up, and don't get worried, I'm not going to talk about all these, but these are all important. I just want to speak to a couple of the bullets here.

Fragility and durability, there's been quite a lot of talk about these factors, some people have made more than talk, they've made quite strong pontifications. We don't know too much, but what are we doing in that area? Well, we've got a study going at the moment that's looking at conformation and geometry of the fetlock joint as a potential predisposing factor to injury. This is a collaborative project that's between the UK and Colorado, Dr. Chris Kawcak and myself at our lab, but Tim Parkin and Kenton Morgan in Liverpool as well as Christian Puttlitz, who is a bioengineer in our lab. The idea is that there may be some conformational changes that predispose to injury and we can identify those. Medication, of course, not a subject of discussion today or at least in my talk, but obviously an important one that is being discussed, and the AAEP have commissioned a task force that's been very active this year that both Rick and I are on and has had a lot of time put into it.

The last thing I want to do is lameness, obviously, diagnostics. Dr. Stover was being modest when she talked about the humeral fracture study at the early part of her talk and identifying stress fractures or preexisting disease before the fracture. That led to the whole mentality, that paper of hers, led to the whole mentality of preexisting disease leading to catastrophic injury. It also changed diagnostics and certainly, I don't know how many horses in Southern California have had their lives saved by having a lameness that's vague, going into a bone scan, having one of those predisposing fractures that Sue showed identified and then with layup the horse can heal rather than getting a catastrophic injury to the humerus.

Now, here's the problem. We have all these gradations, we have catastrophic injury, we have the day-to-day injury that we talked about that we're

about to investigate or get real data on, and then we have the pre-clinical injury, the injury that you don't see, the horse that's not lame but that micro-damage is there and can predispose to that fracture. So, obviously, you've got to be able to screen. Now, we can diagnose some of these things with MRI and CT, but we're not exactly going to get every horse at the track through that. So we've done a lot of work, and we're not the only ones, there's been a lot of work done in England on biomarkers, but we did do a study, again funded by the Grayson-Jockey Club Foundation in Southern California with collaboration with the vets down there, and we showed that we're up to 70 percent predictability of seeing a change in these biomarkers which I've got diagrammed on the right. The idea is that early on in this disease process that Sue talked about, we get breakdown, degradation products released, which then go into the blood and we can pick them up with antibody-based tests. What we showed in the study, it's not yet published, but was done on Southern California tracks, what we did is we enrolled 200 horses, we took blood samples every month and when a horse got injured, we compared their biomarkers with two age-match, sex-match controls, because they vary with age and they vary with sex. We showed that six weeks before a fracture or around about that period we could get a change in the biomarkers. So we've still got to get more accurate predictability and we're working on this with a commercial company to get a test that will be readily available, but the long-term idea is we can identify a horse at risk then put it into imaging from there.

So I'll stop there, but that's some of the efforts we have done. Thank you.

MS. HIX: Thank you, Dr. McIlwraith. Dr. Rick Arthur has more than 30 years of experience in the thoroughbred racing industry and he knows medication and regulatory issues inside and out. He is currently the equine medical director at the School of Veterinary Medicine at UC Davis where he serves as a consultant to the California Horse Racing Board. Today he is going to provide an overview of the industry's injury-related efforts including the Equine Injury Database, pre-race exams, his work with other regulatory veterinarians and statistics on different types of injuries.

Dr. Arthur.

DR. RICK ARTHUR: Thank you, Kristin. I'm trying something a little bit different here, so hopefully it will log up here pretty quick. Anyway, while this is getting started, it looks like I'm going to have to re-log on for some reason, but anyway, while this is getting started, I think it's interesting to note that I read in the paper the other day that Charlie Hayward said that NYRA is not going to look at synthetic tracks because it causes soft tissue injuries. Well, we have actual, objective data from Southern California that indicates it doesn't, even though trainers will tell you

that. Charlie may be right, it possibly is associated with more soft tissue injuries, but I'll tell you our data doesn't indicate that and that's why it's so important for us to get some of the practitioner information that we're talking about.

I don't know what our problem is here. Is that my computer or yours?

Oh, great.

Well, this is going to take a minute.

Let me just get started here, for some reason my screen has gone blank. I'll tell you what, do you still have my PowerPoint slides? We'll just go this way, it'll be easier.

I'll tell you what you're going to be seeing if we would have gotten this to work. If there's a take-home message here, I think it's the fact that 90 percent of all catastrophic injuries, musculoskeletal injuries in racing and training have preexisting pathology at the injury site. To be fair, that doesn't mean that these are necessarily diagnosable with today's technology. Some of it may be microdamage that we can't see even with MRI, CT scan or nuclear scintigraphy, but it does mean that there is pathology there. Remember, our patients can't talk to us, they can't give us their symptoms, we have to look for signs and that's why it's so important for us to be vigilant as to exactly what's going on. We can't really do that until we really understand the problem. I think The Jockey Club and InCompass have done the industry a real service with the Equine Injury Database and the pre-race exam module, and I'll explain both of these in a little bit more detail.

Kristin had talked about this, and you heard it before, and the way this works is that it is part of InCompass, all the racetracks, it's a free service for any track that's on the RTO system, InCompass system, and basically what it does is it is a module for the official veterinarians and racing veterinarians to go on and to actually log on to the InCompass system, you have the race, all the horses in the race that day, if there's a horse that needs to be identified, you click on it and then you go through all these different parameters where you edit as to where it was in the race, where it was on the track, what severity of the injury it is, you go in and you can actually put specific data on it as to where the injury is, what kind of injury, right front fetlock, left front fetlock, right tendon, and you can continue to collect all this data and you can actually go on the last part of it and add things like whether there were specific incidents in the race, how the horse was shod, and there's other things as well on this.

Is that working at all or do I have to sign in again? I'm just going to assume that's not going to work.

But anyway, the advantage of all this is that there's actually a database that ties all of these observations to the race, to the horse, to the pedigree, and all the other data that's already in InCompass, and there's a way that you can go, and I was going to demonstrate it to you, maybe we still will, you can actually print out the history of the horse or everything that's gone on at a particular period of time on that particular track and get all that information and analyze it. You can actually see how many people have colics that draw the inside rail on a six-furlong race at Santa Anita. It's amazing how the incidence of colics associated with the inside post.

That's a joke, by the way.

There's another aspect of it for non-race-related injury data that is particularly important for us in California because we necropsy all horses that die in the enclosure, including the horses that are training.

Again, this is a regulatory vet module. Let's see if we can get this to work, we'll give it one more shot. For some reason it doesn't want to do it right, so I'm not going to do it.

Anyway, again, it goes through the same process as the Equine Injury Database for racing injuries, but this is for the training injuries. The reporting protocols are available, you can download reports, you have quality control process by which we know that data has been double-checked by the regulatory veterinarian. The pre-race exam module, which I'm not going to be able to show you, basically you have, let's say, the program of the race or the same sort of list of all the horses in. You can highlight that horse, you can organize it by trainer, by barn number, however you want to do it, and what you do is you actually put the examination history of that particular horse on that horse's history and it's in the database and the entire InCompass system, and again, that can be correlated back to any subsequent injuries. The advantage of this is when a horse moves from jurisdiction to jurisdiction or from state to state, eventually we will be able to move that information back and forth. In California, in particular, we have problems with horses going from the fairs to Los Alamitos to Northern California tracks, they seldom come back to Santa Anita and Hollywood Park, but anyway those are the sorts of things that we have to look at.

The thing to remember is that the type of injuries that the Equine Injury Database is collecting are the high-profile events, the tip of the iceberg, most

injuries are not catastrophic, fatal injuries, the ones that cause the horses to leave the racetrack, fortunately. But they are issues that we have to deal with because it affects the inventory of horses and our field size as well. Very important characteristic data to collect, and that's what we're trying to do.

I don't want to try to switch computers again, it's not going to work – so what basically we've done is we have developed a program very similar to the Equine Injury Database that is Web-based in the Southern California equine hospitals where we can put that same type of information on Equine Injury Database, it's confidential. The issue of trying to work this out is the confidentiality of the information of the private veterinarians, and what we'll do is we'll take that information and correlate it to the track surface information that Dr. McIlwraith and Dr. Peterson are collecting and we can also look at the Equine Injury Database as well. We'll put a common identifier in them so we can merge that data when it comes to analysis.

California has collected – we necropsy every horse that dies within the enclosure. We even had a horse come in from the freeway, down in a van, pulled in the back gate and died about an hour later and that horse was sent for necropsy. Doesn't matter why they die, they are all necropsied, and we typically, in the last several years, we've been getting over 300 horses a year. Of those, over 75 percent are racing and training, the others include colics and those sorts of things.

In fact, this is how the fatalities are distributed based on the organ system: Over 80 percent are musculoskeletal, gastrointestinal, colics, diarrheas, or next, cardiovascular and respiratory, and then a few odds and ends. Almost all of them, the racing and training fatalities, are thoroughbreds. Standardbreds are pretty darn hardy, quarter horses are certainly subject to the same type of injuries as horses and pretty much have the same injury profile except they certainly have more catastrophic carpal injuries.

California has maintained database for a long period of time, and you probably can't read this but we used to report by track as to how many fatalities were during that particular meet, but in, I think this is 2002, this is 37 at Santa Anita at their spring meet, of those 37, the only ones you know were at Santa Anita were the 18, and you don't know what surface they were on. What we've done is we've changed the reporting system so we actually know what surface, whether it's training, whether it's other, and we can do the same thing for the entire state.

We can actually take this to a different level. It's very easy for trainers to blame track surfaces. This is actually a little bit, turning the picture around quite dramatically. I've taken the names of the trainers off here because we haven't

officially released this, but these are the fatalities by trainer for all the trainers that have over four fatalities in California either racing, training or other. You can see that overall the fatality rate in California is about two and a half per thousand starts and you will see some of these, some very top trainers that have 10 per thousand starts, there's one up here that has almost 40 per thousand starts. That's the type of information I think we have to start looking at, and we're trying to make sure we can release this information to the public and I think we definitely should. Bottom line is we collect statistics on all aspects of horseracing and this is one that we really have to pay more attention to.

Let me see if I can actually get this one up on the screen.

I'm not going to be able to show you what I wanted to demonstrate, but California has actually been having InCompass monitor our California veterinarians' list and if you go to the Oak Tree Web site and download veterinarians' list, you'll actually see a way that vet's list can now be searched by the public.

There we go.

Actually, I was told not to try to do this and I guess they were right. We can actually look at all the horses, for example, at Santa Anita that were shock-waved during the particular meet. The public can actually go in and do this, you can do it for any list because the veterinarians' list is a public list, at least it is in California.

You can't really see this, it's downloaded as a PDF file, but the public can look at this and I think it's really a very powerful tool. This is all tied to the InCompass system as well, and you can actually see whether a horse was shock-waved and whether they sustained a subsequent catastrophic injury. There's a real advantage for us to tie the data we have together in terms to evaluate what's going on on our track's surface. We get the track surface data, we have the necropsy data, we have our preexam data, we have all this information we can tie together, because until we have some information to make a decision, whether synthetic tracks are associated with soft tissue injuries, we're just going to be guessing. There's a difference between what you think you know and what you actually know.

I apologize for the confusion with the audio/visual but hopefully you understood what I was trying to get across here.

Thank you.

MS. HIX: Thank you, Dr. Arthur, for your report. Before we open up for questions I'll give you guys a little bit more information on the Equine Injury Database that

Dr. Arthur showed you in the slides there. Following Barbaro's injury in the 2006 Preakness Stakes, veterinarians and racing industry personnel across the country were asked numerous questions about the frequency, type and outcome of horseracing injuries. The answers, or lack thereof as the case was, starkly identified the industry's inability to account for its equine athletes.

One of the primary recommendations that came out of the first welfare and safety summit held in October of 2006, just a few months after Barbaro's injury, was to develop an equine injury database reporting system for horses. The following spring it was announced that more than 30 racetracks had agreed to participate in a pilot project to collect uniform data of equine injuries that were suffered during live racing. The pilot project was spearheaded by Dr. Mary Scollay who at the time was the track veterinarian at Calder and Gulfstream and who had been developing a uniform form that all track vets could use to collect standardized and comprehensive set of injury data.

Working closely with Dr. Scollay on the pilot project, The Jockey Club, through its commercial, for-profit subsidiaries, made the decision to fund the development and design of an Equine Injury Database. It was an obvious choice to use InCompass's racetrack operation system as the system is in place at virtually every racetrack across the country, in the United States and Canada. In June of 2007, a working group from InCompass and the Jockey Club Technology Services and subject matter experts led by Dr. Scollay and Dr. Arthur began the design and business process phase of the project. Using the injury reporting form as a blueprint, the project moved into the software development phase in the fourth quarter of 2007. After 1,000 hours of software development and design, the first version of the Equine Injury Database was used to enter the nearly 3,000 injury reports that were received during the pilot project. This spring the application moved into field testing under the watchful eye of Dr. Arthur in California, and on July 22, The Jockey Club officially launched the Equine Injury Database. The three objectives of the Database are to identify the frequency, type and outcome of racing injuries using a standardized format that will allow us to generate valid statistics, to identify markers for horses at increased risk of injury and to serve as a data source for research directed at improving safety and preventing injuries. We continue to improve the system and have now completed software enhancements that permit the collection of data for non-thoroughbred horses and injuries which occur during training and in the barn area.

We've also added a quality control feature that was built into the database to ensure that racetrack veterinarians are completely and accurately reporting their injuries. Dr. Scollay discussed the Equine Injury Database at our Round Table Conference in Saratoga Springs this past August, and I think her evaluation of the

project can be summed up in one sentence that she uttered, The value of the information we are collecting is priceless. And she means this not only literally but figuratively.

There is no cost for any racetrack to participate in the Equine Injury Database. When we have collected a statistically significant amount of data, composite national statistics will be published. We anticipate that the first set of statistics will be published in 2009. This system is, by design, intended to be a standing program. There is no projected endpoint for data collection. At this point we have 74 racetracks representing 80 percent of flat racing days in the United States and Canada signed up to participate in the Equine Injury Database. As of December 1, we have more than 6,000 injury reports in the Database and that represents injuries that occurred between January 1, 2007, and December 1, 2008. The EID now records injury and incident information for racing thoroughbreds, quarter horses, appaloosas, paints, mules, and Arabians. These injuries can occur not only at racetracks but also at training centers. This system was designed by veterinarians to be a comprehensive tool for regulatory vets and racetrack management to record and analyze injuries occurring at the racetrack.

I strongly urge any racetrack that hasn't yet signed up to participate in the Equine Injury Database to do so. My contact information is here, if you would like more information about the database please feel free to contact me with any inquiries at any time about the database or see me after the panel concludes. In closing, I just wanted to give you another quote from Dr. Scollay from this year's Round Table, The Equine Injury Database is a giant step forward for this industry in improving the health and safety of our racehorses.

Thank you all for your attention and we will now take any questions that you all have.

A VOICE: I have a question for Dr. Arthur. Do you envision a time when injury statistics on trainers will be as public as their winning percentages?

DR. ARTHUR: Certainly the fatality data is – it will be a policy decision by the California Horse Racing Board. I don't know where they are going to go on it. As far as I'm concerned, it's public data and frankly, if you file a PRA you could do your calculations yourself. Knowing our board, they are a full disclosure board, so very likely we will go forward and start publishing that data. Interestingly, and I'm sure they don't want to upset trainers, but if the Equine Injury Database is maintained by each racing jurisdiction, that information would be a very simple report. I don't know if it would be simple but it certainly would be very doable across the country.

DR. MCILWRAITH: Can I ask a technical question related to that to Rick? So when you presented data with, say, up to 40 injuries per thousand starts, was that thousand starts by that trainer or just going back to the overall data, because there is a difference, obviously.

DR. ARTHUR: Yes there is. Most racing fatalities are now, and I think the international standard is to report fatalities per thousand starts, and obviously if somebody only has, as one individual did, 96 starts and 4 fatalities, that is a rate of over 40, but he didn't have a thousand starts. One individual did, so his statistics are pretty darn solid. So that's basically how I interpret it.

DR. MCILWRAITH: But that's okay. If it's 96 starts, if it's his or her 96 starts then that's the important thing.

DR. ARTHUR: Yeah, it's 96 starts for that trainer in California's fiscal year, which is July 1 to June 30, 2007.

A VOICE: Is anything being done to fully capitalize on all these fine efforts to change public opinion like say a TV campaign leading up to the Triple Crown races or anything like that?

DR. ARTHUR: Well, I know Bob Curran should be in the audience someplace. I think a lot of people have tried to do that, we were going to try to get a video before the Breeders' Cup but things always fall apart that way. We do do a lot. Bob, do you have any comments?

MR. BOB CURRAN: I don't know of a specific TV campaign, it might be something that the NTRA might get involved in. I do know that at the Round Table next August, I'm sure we'll be providing another update on many of the health and safety initiatives of The Jockey Club and the thoroughbred safety committee and other groups. Beyond that though I couldn't say.

DR. MCILWRAITH: Here's a comment. We get opportunities all the time because reporters do, in addition to the ones calling on stories as to why Eight Belles broke down, we also get a lot of people wanting to know what's being done that's different. So you get individual reviews, you have to make the most of your opportunities but I think the strategic plan, what Bob has just said, is really critical. We need to keep people reminding. But sometimes, if you haven't got the right audience it's pretty tough. They don't want to hear about the good news.

A VOICE: Wondering also if your research has looked into the effect, if any, of race-day medication on musculoskeletal injuries. I understand there's some data that indicates that lasix has a leaching effect on calcium.

DR. ARTHUR: I can't specifically – you know, lasix would be an easy thing to analyze with this Database but since almost all horses are on it, that makes it more difficult. One of the reasons the welfare and safety summit did not address that issue is we don't have data. We really don't know how these horses are treated, we obviously know whether they have non-steroidal anti-inflammatories or not, we know whether they have lasix or not but we don't know a lot of the other treatments. I think, in the not too distant future, there's a real opportunity to look at that. In California, all veterinary treatments on the racetrack have to be reported, they're reported hard copy, virtually illegible, there's no way you can do the data search on them and it's really sad that we can't look at that issue in that particular way. Just like the soft tissues with the synthetic tracks, you get the dueling opinions and nobody really knows what the right answer is. But I am very, very interested in that particular issue and I think it will be a multi-year battle.

DR. MCILWRAITH: I would like to address that issue because the only place I've seen it come up, what was just cited regarding lasix and bone strength, was an article by Amy Gill, PhD nutritionist in the Thoroughbred Times earlier this year. I actually communicated with her over that because the data was all in humans and it's based on chronic administration of diuretics, so it's quite a different situation than the short-term use of diuretics as in the horse. That doesn't mean it's not an issue, but it has never been looked at in the horse and so it was sort of a hypothesis that hasn't been looked at.

Back to the general question, we've always looked at certain medications as much as we can. Actually, 20 years ago the dogma on corticosteroids was so strong that some people would report that a horse had to have intra-articular corticosteroids when it had a catastrophic injury. We've disproven that, when I say we, not just us, work we've done at CSU as well as work that was done by Rachel Murray who is at the Animal Health Trust in Newmarket, have looked at each corticosteroid as far as their effect on bone. Often the extrapolation comes from humans, where if you get rheumatoid arthritis patients that are on heavy doses of corticosteroids parenternally, in other words, throughout the whole body, yes, they get ischemic necrosis. So, we have to look at all those things, but we've found no evidence that they affect bone. Do they affect cartilage? One of them does, the other two commonly used ones don't. We pick away at it. We've addressed the non-steroidal anti-inflammatories as well because there's been accusations of that, but if we have scientific evidence that we've got harm from a medication the rules are going to be

changed to counteract that because our ultimate aim is — you know, we say the safety and the welfare all the time, but that's the critical factor.

DR. STOVER: We actually have some unreported data yet that, if a horse is exercising intensely and they have had anabolic steroids that their potential for fatal injury is increased. We also tried to do, and this was a number of years ago before the level of sophistication that we have for analyzing drug levels, but at that point in time we attempted to do a study of fatal injuries relative to non-steroidal anti-inflammatory medication. We actually did the study but we didn't have any controls because all of the horses, essentially, were on non-steroidal anti-inflammatory medication. I do have some concerns, without any substantiation at all, however, that we have horses that have preexisting injuries, and I think we need to think about whether allowing horses to race and train with musculoskeletal inflammation that we're treating with non-steroidal anti-inflammatory drugs is really helping our horses at all.

DR. ARTHUR: Interestingly, along that very same line is that the regulatory veterinarians have a group and, whether they will do it officially or not, there is certainly discussion as to whether they're going to make a recommendation to prohibit the use of non-steroidal anti-inflammatories within 48 to 72 hours of race time. Specifically because the examining veterinarians think it compromises their ability to properly examine that horse, and I think there's a legitimate argument for that because even the practicing veterinarians certainly don't want to do a pre-purchase exam on a horse that's loaded up with bute. Yet, we're asking our regulatory veterinarians to look at them when they look as good as they possibly can. They've been in ice all morning, they have bute, they've been injected with cortisone many times, not all of them obviously. So it's a very, very difficult time to examine a horse to try to identify preexisting injury. The fact of the matter is, I truly believe that breakdowns, and I said this 20 years ago I think at this conference, that breakdowns on the racetrack are an Achilles' heel. Thirty-eight percent of the public thinks horseracing should go the way of dog racing in Massachusetts, and the difference between 38 percent and 51 percent is not very great. Just think about if Big Brown would have run in the Breeders' Cup and something would have happened to him, that could have been the difference and our future would have been in the hands of Ricky Dutrow, whether you like him or not, it's a little bit of a worrisome thought.

MS. HIX: Does anyone else have any questions?

A VOICE: I'd just like to make a response to your gentleman's question. Certainly we can build the database to collect the information on the horse's medication records. Obviously, they have to be accurate medication records and we can't

really input race-day medication, we need to know what that race-day medication was. The other aspect of it is, I'm surprised to find out that in a lot of jurisdictions, when a horse does go down on a racetrack and is vanned off, samples aren't collected from that horse, and I think that ought to be a regulatory requirement in all jurisdictions. It's not easy, but the effort ought to be made.

A VOICE: Just as a follow up to that, it would be very difficult to develop controls of the racing population that are not on bute. How would you propose to do that, to develop a control population?

DR. STOVER: Well, that is the problem. That at least, and this was a number of years ago on the study we conducted, almost all, in fact literally almost all of the horses in the study were on non-steroidal anti-inflammatory medication, and because even though catastrophic injuries are such a huge problem, in general, the incidence is low it would take a very extensive and a very expensive study with a huge number of horses to be able to do that experimentally. So, you essentially need to have trainers and veterinarians who are not administering them to some horses on the racetrack.

A VOICE: Excuse me, with regard to lasix alone, there is a study that has been conducted in South Africa. It was funded partially by the Grayson-Jockey Club Foundation and RMTTC, and Gary Player helped raise some funds. It had the advantage of working with a population of horses that had never had lasix and so there were controls available, there were actual races, they put up purses, the authorities were willing to put up purses for races although there was no betting, so that there was the motivation to run an actual race and, of course, like all things, we're anxious to get those results.

DR. ARTHUR: I will say that if this study shows that lasix is not efficacious, and I'm actually a co-author of, I think, the only study that really ever examined that in a racetrack specifically designed to look at lasix efficacy, and our study showed it was efficacious. But the design of this particular study, if lasix does not reduce bleeding, then I think we're going to have to totally reexamine our medication policies.

There's one issue with lasix, and this is totally different from injury maintenance that we're talking about here, but one issue with lasix that I'm amazed that many people in this industry just don't understand is that lasix is a performance enhancer. There are a number of papers that prove that. The question is, because it reduces EIPH, like practitioners like myself thought for many years, whether it's the weight loss of about 20 pounds, which many physiologists have hypothesized, whether it's the increase in TCO₂, which actually increases performance, or some

other factor, but horses run faster with lasix. The data is absolutely out there. We have a performance-enhancing drug.

DR. STOVER: I think that one of the other things that we need to think about is, even beyond that, a little bit out of the black box, but, you know, why are horses bleeding? Why do our horses get gastric ulcers? Why do they get mild injuries? So, fundamentally, and these questions I don't know the answers to and we won't know for a while, but we really need to figure out how to prevent all of these things that we're trying to treat.

DR. ARTHUR: Just think about it, the data in California, where we keep necropsies on every horse, and I will tell you, I don't believe data in a lot of states, I'm just going to tell you this, we keep the data as a California Horse Racing Board mandate, it's not a racetrack trying to make themselves look good, and we lose over 300 horses a year. That's almost a horse a day. Now, you try to explain that to the public. That's pretty hard to do and I think it's something that we're going to have to come to grips with and we're going to have to get everybody in this industry behind us on this effort. Toe grabs, whether you like them or not, you're going to have to face reality, we have to do what we have to do to protect the welfare of the horse.

MS. HIX: Okay, well let's give our panelists one more thank you for coming. Thank you all for your attention.



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