The Continuation of Thoroughbred Racing: A Dual Mission

Isabella V. Williams

University of New Hampshire, Durham

Follow this and additional works at: https://scholars.unh.edu/honors

Part of the Other Animal Sciences Commons

Recommended Citation

Williams, Isabella V., "The Continuation of Thoroughbred Racing: A Dual Mission" (2024). Honors Theses and Capstones. 848.
https://scholars.unh.edu/honors/848

This Senior Honors Thesis is brought to you for free and open access by the Student Scholarship at University of New Hampshire Scholars' Repository. It has been accepted for inclusion in Honors Theses and Capstones by an authorized administrator of University of New Hampshire Scholars' Repository. For more information, please contact Scholarly.Communication@unh.edu.
THE CONTINUATION OF THOROUGHBRED RACING: A DUAL MISSION

By

Isabella Williams

Undergraduate Honors Thesis
Submitted to the Department of Agriculture, Nutrition, and Food Systems
University of New Hampshire
May 13th, 2024
Table of Contents

1. Abstract
2. Introduction
3. Social License to Operate
   a. Importance of Maintaining SLO
   b. Concern of Public
   c. Active Approach
   d. Lack of Governing Body
4. Recommended Practices
   a. Hoof & Shoes
   b. Turnout
   c. Pre-Existing Injuries
   d. Duration Between Races
   e. Training Regimes
   f. Age of the Horse
   g. Sex of the Horse
   h. Track Surface
   i. Regulations of Other Countries
5. Recommended Research
   a. Data Collection
   b. Genetics
6. Drug Use & Doping
7. Second Careers
8. Conclusion
9. Acknowledgements
10. References
ABSTRACT

Thoroughbred racing is the highest-profile segment of the equine industry in the United States and around the world, accounting for 50% of industry jobs and 25% of industry revenue. Public interest in the sport is rising thanks to social media and celebrity involvement at marquee events like the Kentucky Derby, leading to increased scrutiny of the sport, posing a high risk to human and equine participants alike. Public outcry at equine injuries in particular threatens the sport’s social license to operate (SLO), making it critical to protect the “whole-life welfare” of the animals involved in the sport to ensure its future. This study reviewed existing research on thoroughbred racing to create a list of best practices and future research directions recommended to protect the equines and the sport of racing itself.

INTRODUCTION

Thoroughbred racing has been a popular sporting event in the United States since its inception and continues to be a significant proportion of the equine industry, accounting for 25% of industry revenue annually, which translates to a direct annual impact of $30 billion on the US economy (Bull, 2024). It provides over 472,000 jobs directly and indirectly related to the industry, accounting for about 50% of total equine-related jobs (Heleski et al., 2020). As such, racing enjoys high visibility among the general public and thus has a significant effect on the overall equine industry’s social license to operate (SLO). The exponentially increasing access to social media gives millions of Americans the ability to watch, like, share, or comment on posts related to horse racing. Although this potentially allows the sport to build a broader base of fans and supporters, the increased visibility and heightened scrutiny also pose risks to the sport. Racing is a dangerous sport, as people are aware of, and there can be catastrophic accidents,
many of which can be avoided by changing practices and management strategies as reviewed in this study. However, Americans who are uneducated about the equine industry can make their own false conclusions about the races, which can be detrimental to thoroughbred racing as a competitive sport.

The ubiquitous nature of social media has also raised awareness of the actual extent of risks, injuries, breakdowns, and accidents in racing. Such incidents have always posed risks to the horses and riders involved in the sport, yet they now also pose a threat to the sport itself which could lead to the same fate as greyhound racing if concerns are unaddressed and allowed to persist in this new ecosystem of social media access. To preserve thoroughbred racing and prevent the economic collapse of the industry at large (a real risk if racing were banned), it is imperative that the industry take concrete steps to protect the welfare of horses and riders as well as to educate the social media public.

The industry must invite cultural and structural change in order to continue its social license to operate. This begins with emphasizing a “whole-life welfare” approach, meaning the industry must change its practices during a horse’s racing career not only to prevent catastrophic injury but to improve retirement outcomes for the animal. The industry must find ways to decrease injuries and fatalities due to racing, minimize the acquisition of subacute injuries and stereotypic behavior, which decreases the animal’s likelihood of post-retirement adoption, and to continue to support ex-racehorses in rehabilitation, adoption, and their second careers. To ensure its future, the industry must have a dual mission focused on animal welfare (injury prevention, retirement, etc.) and the continuation of the social license to operate. This requires the prioritization of risk management and accident prevention, because only through an honest and transparent prioritization of the welfare of the animals in the sport and a reduction of harm will
the public perception of the sport change. Risk management is a challenge because many factors influence equine injury in racing, including shoeing, track surface, training, and previous injury. Although some studies have been conducted, they have been limited due to confounding variables, an inadequate sample population to be statistically significant, lack of resources, or lack of an actual national governing body of the sport.

The purpose of this review is to analyze current research on Thoroughbred racing to provide recommendations for best practices, identify areas where research is lacking, as well as areas where further research would be beneficial to the dual mission, offer information on second careers for retired racehorses, and ultimately highlight the importance of change in the industry so that its social license to operate may be maintained.

Social License to Operate

Since Thoroughbred racing is the most well-known of all the equestrian sports, the entire fate of racing can negatively impact the fate of all equestrian sports and activities in the United States, due to its high profile and because many people categorize all equestrian sports as racing. If racing were to be banned in the United States, the entire equine industry could expect a decrease in veterinarians, grain stores, farriers, tack stores, etc. due to the decrease in demand. The social license to operate is an “implicit agreement between the public and an industry or group” (Douglas et al., 2022) in which the public allows an activity, that has an impact on the public interest or good, to operate. Social license extends beyond the regulations for industries provided by federal and state laws, depending on residents, stakeholders, and the public at large. What the public approves as being socially acceptable – or unacceptable – has the power to not only change those regulations but to force industries out of an area or out of business entirely.
The social license to operate plays a critical role in the continuation of Thoroughbred racing and other equestrian sports.

**Importance of Maintaining SLO**

Thoroughbred racing is roughly one-third of the equine industry, and the elimination of racing would reduce the number of veterinary clinics, farriers, feed companies, and rehabilitation centers, ultimately negatively impacting the rest of the equine industry (Bull, 2024). In New York, the economic impact of the sport was estimated to be around $3 billion in 2023 and employed 19,785 people (Thoroughbred Daily News, 2024). In Florida, the Thoroughbred industry brought in $3.24 billion and provided 33,500 jobs (AHC, 2024). In California, “racing continues to be the greatest contributor to the state in the industry, with a total economic impact of $2.5 billion” (California Horse Power Coalition, 2024).

**Concern of Public**

The public’s main concern regarding racing is “about catastrophic injuries—particularly as related to track surfaces, concern over the racing of two-year-olds, whip use by jockeys, drug/medication policies, and aftercare opportunities for retired Thoroughbred racehorses” although there are reasons why Thoroughbreds are raced this young (Heleski et al., 2020). The general concern for animal welfare stems from “the growing recognition that animals are sentient creatures for whom physical, mental, and social wellbeing are important and the growth of animal welfare as an established science” (Douglas et al., 2022). Age is a continued topic of discussion because Thoroughbreds are typically 2-3 years old when they begin racing and some of the highest-profile races in the country, including the Triple Crown, are for horses of this age.
group. The general public assumes that these animals are babies, but in reality, “horses enter puberty at 10–15 months of age; consequently, young racehorses starting high-speed exercise around 18–24 months of age are physiologically more analogous to a human in their mid-to-late teenage years. Interestingly, in some sports, this is an age where human athletes often start to reach top levels of performance and competition” (Helenski et al., 2020). This particular point shows the importance of educating the public. Understanding similarities and differences in anatomy and growth between equines and humans might influence public opinion.

**Active Approach**

Educating the public requires the responsibility of ensuring that they can access information that they will understand. Presenting the public with a scientific paper about complex veterinarian concepts would not be beneficial. Seeing statistics without understanding the data behind them can be detrimental to fully understanding the research. Instead, the public must be presented with resources that are phrased in ways they can understand. “Greater emphasis among researchers on making science available and accessible to a non-scientific audience has increased the ease with which scientific findings can be disseminated among both the academic community and the wider public” (Douglas et al., 2022). It is easy for the public to begin reading a piece of scientific literature, see a statistic, and interpret it without truly understanding what it means, such as the limitations involved, the population used, and possible bias. Educating the public means ensuring they understand the whole picture. For example, a study found that “the average speeds for all race distances surveyed on turf and dirt increased up until the first half of the age of 4 years old” (Takahashi, 2015). This meant that horses reached a peak speed. If the public just sees that finding without context, they could jump to the conclusion
that the industry is unethically racing Thoroughbreds at young ages because that is when they are the fastest and therefore can make the most money. This is not the case. From looking at all the research provided, it can be assumed that racehorses compete at young ages because their bodies can handle the stress of intense galloping since they are in their prime athletic years, and they are also the fastest at that time. Picking different statistics and findings without understanding the whole picture can change the narrative entirely.

It is imperative for the racing industry to address the public’s concerns directly and display a proactive approach to finding solutions to these concerns. The industry cannot merely aim to address damage to its image but to ameliorate the issues that led to this low opinion. With the 24/7 accessibility of social media, addressing these concerns is urgent. For example, “on September 30, 2019, Fox 11 news station in Los Angeles, California conducted a Facebook poll: “Should Santa Anita Park be shut down (for horse racing)? 18,900 people voted. 54% voted ‘yes, it should be shut down,’ 2200 people made comments and 1300 people shared the poll and subsequent results with others” (Heleski et al., 2020). The actual number of Facebook users who voted, commented, and shared is a fraction of the number who could have seen that poll. The result of the poll, that the majority of those who answered that the racetrack should be shut down shows the threat such incidents now pose to racing.

“This new juxtaposition, which blends traditional horse cultures with the new technology-enabled central positioning of individual horses as sports figures, brings a level of public scrutiny and often expected accountability for sport administrators previously only experienced by the business sector” (Helenski et al., 2020). Media and public opinion are constantly being shared, although it is hard to determine how many people are educated on this topic. On the other hand, to keep the social license to operate, the industry must remain credible,
meaning the public believes that the industry will follow through with its promises and that it remains trustworthy. Otherwise, the industry can expect a loss of trust, decreased economic impact, and the risk of political sanctions. The public might not continue to support the industry if they do not trust that the industry is being honest. Blaming social media is the easy answer, but the real threat is the incidents themselves. Without accidents and issues, social media would have nothing to amplify. To sum up, the maintenance of a social license to operate is not just changing management practices within the industry to satisfy the whole. It also includes strategies for involving the public in decisions regarding the welfare of horses, educating the public, and being honest with them; it is a dual mission.

**Lack of Governing Body**

Regulations regarding Thoroughbred racing are not created and distributed by one nationally governing body. The Federal Trade Commission (FTC), The Jockey Club, and the Horseracing Integrity and Safety Authority (HISA) all have specific rules regarding racing, but it is unclear what exactly the FTC, The Jockey Club, and HISA regulate in comparison to each other. Confounding this further, some states, including Louisiana and West Virginia, do not recognize the authority of some of these initiatives and continue to operate under state regulations (Mullen, 2023). HISA does not have the power to control or penalize states that do not comply, as they can only regulate tracks that allow for interstate wagering (Mullen, 2023). For instance, drug use is unregulated nationwide, and as a result, there are 38 different states that have different drug regulations (Conner, 2017). Organizations trying to impose drug reform also vary. Due to the patchwork of state regulation and holes in the enforcement of rules, implementation of recommended practices to improve animal welfare requires a new regulatory
structure. The Jockey Club seems like a logical choice as it has jurisdiction throughout the industry in terms of registering animals and breeding, meaning they could use that leverage to implement new tracking and mandate changes in management practices.

**RECOMMENDED PRACTICES**

Part of the dual mission is to ensure the well-being of the equine athletes. Available research suggests multiple changes to best practices which could increase animal welfare. These recommended practices can reduce the risk of catastrophic injuries from racing by taking statistics from current research and applying it to management strategies that can be implemented by owners and trainers and the industry at large, utilizing existing governing bodies like The Jockey Club for compliance. However, the existing research is limited due to multiple contributing and confounding variables. Racing-related injuries can be separated into two broad categories: catastrophic and non-catastrophic. Catastrophic injuries are defined in equine veterinary medicine as “a severe musculoskeletal injury sustained by athletic horses during racing or training that results in acute lameness” (Oke, 2008). Non-catastrophic injuries are small injuries that do not lead to acute lameness.

**Hoof & Shoes**

Genetics play an important role in the conformational soundness, longevity, and agility of the equine athlete, and a significant negative genetic trait associated with the Thoroughbred breed is thin hoof walls and soles. “The relatively thin walls and soles of the Thoroughbred foot make it more susceptible to injury and foot distortion” (Morrison, 2013). Consequently, “distortions affect function and have been correlated to musculoskeletal injuries and lameness” (Morrison,
This is analogous to human runners with a low arch. Their movement due to a low arch is impacted as they could be compensating, and they can easily sustain injuries because of low arches. This is why runner’s shoes are critical to performance and preventing injuries. Similarly, equine shoes must provide support and protection for their thin soles and hoof walls. “The typical Thoroughbred conformation of a longer, more sloping pastern places more force on the heel region.” (Morrison, 2013). More force on the heel region can change the turnover of the hoof and placement of the hoof as it hits the ground. Little research has been done on hoof genetics. Identifying and then breeding for genes that improve the conformation of the hoof and pastern could reduce the likelihood of injury and decrease the cost of veterinary care. Research would have to be done to determine if a thicker hoof would decrease turnover, and in turn, the speed of the racehorse. However, if it meant fewer injuries would occur, the public would much rather see the speed of the horse decrease.

Horseshoes are critical for supporting the horse during its race and while in training and research shows that the use of toe grabs can negatively affect racing horses. Toe grabs are a raised rim located on the toe of the horseshoe with the intent to increase traction during racing. They can be equated to spikes utilized by track and cross-country athletes or cleats by soccer and football athletes. While toe grabs increase traction to prevent slipping, research has shown that they can lead to injury. “In this study, the odds of catastrophic musculoskeletal injury in racehorses shod with toe grabs on front shoes were 1.5 times the odds in horses without toe grabs, after controlling for age, sex, number of days since last race, and cumulative number of furlongs” (Dahl et al., 2016). In another study, a similar conclusion was found. “The risk increased with increasing toe grab height, with 3.5- and 15.6-times increased risk for fatal musculoskeletal injury and suspensory apparatus failure, respectively, for horses shod with a...
regular height toe grab compared with horses shod without a toe grab” (Stover, 2003). The utilization of toe grabs during racing is much more likely to lead to catastrophic injuries than shoeing without toe grabs. Even if toe grabs do not lead to fatal injuries, “The odds of subclinical to mild suspensory apparatus injury in horses either racing or in race training that were shod with toe grabs on the front shoes were 2.8 times the odds in horses without toe grabs, after controlling for age and accumulated high-speed distance during the week preceding injury” (Dahl et al., 2016). Although these injuries can appear mild, evidence from previous studies indicates that pre-existing injuries lead to catastrophic injuries and fatalities. Based on this data, a best practice would be to shoe regularly without toe grabs as they are more likely to lead to fatal injuries or mild injuries.

Low heels and a long toe are common means of trimming the foot of the racehorse due to the erroneous belief that it facilitates quicker turnover during each stride, consequently increasing speed, but this is not the case (Hagen et al., 2021). In a study performed by Clayton, it was determined that there were no significant differences between a normal hoof angle and an acute hoof angle in terms of stride length, duration of suspension phase, or break-over speed (Clayton, 1990). The difference in shoeing methods did change the way the horse hoof lands. Normal hooves were found to land heel to toe, but acute hooves were found to land toe to heel. Horses typically only land heel to toe unless they are presenting with a lameness, in which case they land toe to heel. It is unclear if the change in landing placement is due to the angle of the hoof or pain caused by the acute angle (Clayton, 1990). The acute angle also can have deleterious and detrimental effects long-term, as “the greater effort required to rotate the hoof around the long fulcrum is associated with increased tensile stress in the deep digital flexor tendon, and a greater compressive force on the navicular bone” (Clayton, 1990). To prevent
lameness and ensure the longevity of the equine athlete, it is best to stop the practice of acute-angle shoeing.

The anatomy of the hoof itself also plays an important role in preventing injury and lameness, and it has evolved to withstand concussive forces. A well-balanced hoof has specific characteristics such as “even distal interphalangeal (DIP) joint space on anterior-posterior standing radiograph, straight hoof pastern axis, center of DIP joint or widest part of foot should be located in the center of the weight-bearing surface of the shoe in sagittal plane, palmar angle of pedal bone should be between 2° to 5°, heel position should be located at the widest part of the frog… even hoof wall growth from all regions of the coronary band” (Morrison, 2013). The structure of the hoof allows it to sustain impact. It is described that “when a horse is traveling, the moving foot fills with blood during the swing phase, probably from centrifugal force and creating turgor pressure. The fluid in closed spaces may help support the architecture of the foot during ground impact, thus allowing the foot to withstand high impact forces” (Morrison, 2013).

Galloping at high speeds can cause problems within the hoof that can cause injuries. “The average high-speed exercise distance per day also affected the odds of musculoskeletal injury, with every additional furlong increasing the odds of musculoskeletal injury by 73%” (Crawford et al., 2020). In this study, high-speed exercise is defined as “speeds greater than or equal to 15 s/furlong” (Crawford et al., 2020). This study suggests that capping the distance a racehorse trains daily at high speed could prevent injuries and benefit overall longevity. However, in this study, the data might be skewed because track conditions, jockey, age, and training regimes were not taken into consideration.
Turnout

Deterioration of the hoof is not just from racing: standing in a stall for 22 hours a day can also be detrimental. “Long-term, low-magnitude loading creates distortion, rather than short-term, high-magnitude force. Horses standing in a stall with little arch/sole support slowly fatigue the integrity of the capsule and propagate distortions…The insidious nature of a hoof capsule distortion slowly compromises the foot, rendering it more susceptible to acute injury” (Morrison, 2013). Since racehorses spend almost the entirety of a day in their stall compromising their hoof integrity, a best practice that owners and trainers could implement is decreasing stall time. This could include increasing the amount of time or frequency a horse spends in a walker, increasing hand walking by grooms, or restructuring the backsides of track facilities to provide turnout.

Increased turnout can also combat the development of stereotypic behaviors. Adoption is more difficult for horses that have stereotypic behavior (Heleski et al., 2020). Stereotypic behaviors include pawing, cribbing, head bobbing, weaving, stall-circling, etc., which can develop due to a variety of reasons. Some include a lack of the ability to forage. For example, “increased wood chewing may represent the horse’s attempt to take in some form of food to raise gastric pH” (Nicol, 1999). Thus, racehorses must become stimulated in the form of natural foraging to help prevent such issues.

Stereotypic behaviors arise because they are “vacuum activities,” meaning they “occur in the absence of a stimulus” (Houpt & McDonnell, 1993), so these horses must be stimulated perhaps with turnout. For instance, “head shaking, and head bobbing have been interpreted as vacuum activities aimed at nonexistent insects” (Houpt & McDonnell, 1993). The stimulus was initially there, is currently no longer there, but the horse is still acting as if it were stimulated, perhaps to try to simulate stimulation. Furthermore, “intention movements are abbreviated initial
portions of behavior sequences. Stall circling or fence walking may initially result from thwarted attempts to escape confinement” (Houpt & McDonnell, 1993).

Stall weaving may also not only be caused by confinement but also by isolation, and “the motivation of horses to reinstate social contact cannot be underestimated” (Nicol, 1999), so turnout and interaction with other horses can positively impact equine welfare. Based on these specific instances of stereotypic behaviors and their cause, it is critical that Thoroughbred owners and trainers practice management strategies to try to mitigate such causations. This could include more access to turnout so that they are not confined in a stall for most of the day and so that they can naturally forage outside. Additionally, increasing their ability to see and interact with other horses can prevent other stereotypic behaviors caused by isolation. Not only would these management strategies benefit the horse both short term and long term after retirement, but it would also demonstrate proper animal welfare practices the industry must commit to maintain their social license to operate.

Based on the research discussed above, racehorses should spend as much time as possible moving around outside of a stall to prevent injuries caused by hoof deterioration. Although walkers are a solution, a horse can only be put in there for so long, leading to the exploration of other solutions to this particular issue. One solution could be hand walking, but this is not practical in terms of safety, affordability, or employee time. Another solution would be creating turnout paddocks at the tracks. This solution is not the simplest answer either. Tracks and The Jockey Club would have to spend money constructing places for turnout at venues, and the actual layout of these venues might have to change to accommodate turnout space. Even though this solution seems expensive and challenging, it has been done successfully at the World Equestrian Center (WEC) in Ocala, Florida. According to a statement put out by WEC, “turnout is essential
to equine health, so we have installed 250 paddocks for horses to enjoy during their leisure time” (Spickard, 2020). Some could argue that shared paddocks between traveling equines is a biosecurity hazard, but the safety measures put into place to house horses at WEC – including mandatory vaccines, current negative Coggins within 12 months, a 14-day health certificate from veterinary inspection, and a declaration of health signed by the owner agreeing their horse has not had or been exposed to a fever – have prevented any issues thus far (World Equestrian Center, 2024). Turnout is not only beneficial for preventing hoof deterioration but also for preventing the negative stereotypical behaviors aforementioned (cribbing, pawing, weaving, stall-circling, head bobbing, etc. and form due to boredom from spending too much time in a stall) in these racehorses.

Pre-Existing Injuries

Catastrophic injuries are often related to pre-existing sub-catastrophic injuries. Statistically, “horses that sustained a forelimb superficial digital flexor tendon injury during racing were 12.6 times more likely to have an abnormality of the superficial digital flexor tendon on prerace physical inspection than non-injured horses, with abnormalities detected in 54% of injured horses and only 8% of non-injured horses” (Stover, 2003). Racehorses that sustained an injury to the superficial digital flexor tendon (SDFT) were much more likely to have already had an abnormality, or previous injury, to the SDFT before racing, meaning that those animals with identified low-level injuries are at much higher risk of later sustaining a more acute tendon injury. Another study found that “horses that sustained a forelimb suspensory apparatus injury during racing were 3.3 or 5.2 times more likely to have an abnormality of the suspensory ligament on prerace physical inspection than non-injured horses, 26 with abnormalities detected
in 29% of injured horses and 12% of non-injured horses” (Stover 2003). Again, pre-existing injury put the animal at much greater risk of later racing injury. Suspensory injuries that occur due to a race could also be a manifestation of damage to the metacarpophalangeal (MCP) joint: “[H]orses that sustained a forelimb suspensory apparatus injury during racing were 2.1 times more likely to have an abnormality of the metacarpophalangeal joint on prerace physical inspection than non-injured horses, with abnormalities detected in 64% of injured horses and 48% of non-injured horses” (Stover, 2003).

This data indicates that veterinarians should complete a full risk assessment of milder injuries to determine if the horse should be retired early. Owners and trainers might be opposed to early retirement as they can lose money. However, this would prevent breakdown injuries, reducing risk to the horse, the jockey, and the sport’s SLO. However, if a governing body of the industry, such as The Jockey Club, initiated a mandatory retirement based on the risk assessment done by the veterinarian, it might work. This is analogous to the mandatory retirement of human athletes due to repeated head trauma. If owners and trainers were worried about possible mandatory retirement due to pre-existing injuries, they might be more motivated to breed sounder animals and implement other aforementioned strategies to prevent mild injuries from occurring.

Other studies suggest a similar linkage between previous injury, lameness, or abnormalities and fatal injury. “Risk for fatal injuries … was increased for horses that were examined by a veterinarian immediately before a race (on vet list) or had sustained a previous injury” (Georgopoulos & Parkin, 2016). In the same study, it was found that “the risk that a horse would sustain a fatal injury increased approximately 3% for each scratch (withdrawal from a race).” (Georgopoulos & Parkin, 2016). Horses that were seen by a veterinarian before a race for
a health checkup or issue, or who had many withdrawals are more prone to injury. From this study, some best practices could be implemented by The Jockey Club or another governing body. They could require a mandatory scratch if the horse has sustained a previous injury right before racing and provide a set number of weeks that the horse needs off from racing. They could also mandate a maximum number of scratches that each horse can have before they are required to retire early. It is better to retire horses with milder injuries early so that they can have a second career than to allow the milder injuries to progress into a fatality. Again, preventing breakdown can benefit the horse’s welfare, the jockey’s safety, and the industry’s SLO.

**Duration Between Races**

Pre-existing injuries can also lead to longer intervals between races which could cause injuries due to muscle atrophy and loss of bone density, increasing the risk for bone fracture and soft tissue injury. “Horses that return to training after a layup of more than 2 months are at risk for humeral fracture. Injuries of the superficial digital flexor tendon have been related to an interval of more than 60 days between the race in which the horse was injured and the previous race among Thoroughbreds in Kentucky” (Dahl et al., 2016). The same study also states that “horses with a preexisting injury have an extended interval between their last 2 races, they accumulate less high-speed distance during the 30- or 60-days preceding injury, and they are at high risk for bone fracture because they may have insufficient bone mass to prevent microdamage with exercise” (Dahl et al., 2016). In this instance, pre-existing injuries and an extended period of rest between races can both lead to more injuries. But when those two precursors are separated, they are also individual predispositions to injuries. They can both separately lead to repercussions due to racing too soon caused by decreased bone density and
muscle/tendon strength due to atrophy during healing, not enough conditioning before the next start, or a more severe injury, all of which should give cause to mandatory retirement.

A suggested practice would be that racehorses with a pre-existing injury need to be rehabbed appropriately to slowly build up the bone mass and muscle needed to prevent injury. Specific methods for rehabilitation are not discussed in this paper but should be thoroughly researched and planned out with the overseeing veterinarian. As Stover states, “there are great opportunities for intervention and injury prevention because injuries develop over weeks and months of time. Excellent candidates for injury prevention include management practices to minimize low hoof heel angle; incorporation of more frequent, shorter high-speed works or races in exercise regimes; avoidance of excessive accumulation of high-speed distances over short periods of time; recognition and rehabilitation of mild injuries; and avoidance of use of high toe grabs” (Stover, 2003).

However, research also suggests that too little time between races is similarly damaging, and research recommends that it is beneficial for racehorses to have time off between races. “The odds of catastrophic musculoskeletal injury in racehorses with less than 22 days since their last race were 1.9 times the odds in horses with more than 22 days since their last race” (Dahl et al., 2016). Based on this research, the best practice is for horses to have more than three weeks between starts. Although owners could balk at this timetable, judicious management of the horses to prevent injury has the long-term benefit of reducing veterinary costs, and care and extending the horses’ racing and potential earning career. This could be easily mandated by The Jockey Club preventing entries in less than the mandated waiting time. Similarly, The Jockey Club itself should reevaluate the racing calendar and mandate an appropriate length of time between critical events, including for example a reevaluation of The Triple Crown which
typically consists of three races in five weeks. It is important to note that Dahl addresses the small sample size used in the case study. The sample size is small, so this finding could be seen as not statistically significant, even though it is relevant.

A different study indicates that “fatal injury increases for horses with more than a one-month break between races” (Georgopoulos & Parkin, 2016). Milder injuries can also be associated with more time off from racing: “The risk of a horse sustaining a non-fatal SDFT injury increased 8-fold after more than a two-month break in racing” (Georgopoulos & Parkin, 2016). When comparing this study to Dahl’s research, it is clear that there is an optimal number of days between races to reduce injuries and associated fatalities. While 22 days seems like the minimum requirement for days between races, it seems like a month (about 30 days), is the maximum. Injuries seem to occur outside of the 22–30-day range. Of course, this is not always easy for owners and trainers to follow as races are placed on a set schedule. Following this recommendation as closely as possible is proven to decrease the chances of catastrophic injuries.

**Training Regimes**

Additionally, “the number of workouts, or exercise sessions, for racehorses is positively associated with the risk of proximal sesamoid bone fractures.” (Georgopoulos & Parkin, 2016). This suggests the best practice would be to cap the number of training sessions per week. Currently, there are no guidelines, and no required recording of the intensity, duration, frequency, or number of training sessions racehorses undergo before or between races. Recording this information would allow further study and result in best practices, which could even include regulation of the amount of exercise sessions that training racehorses can have between races in order to prevent injury.
Finally, “the risk of an SDFT or suspensory apparatus injury was greater for horses with no race starts than for horses with multiple race starts” (Georgopoulos & Parkin, 2016). Experienced racehorses that had started before were less prone to injury when compared to racehorses starting for the first time. The reason behind this relationship is unclear, but it would be beneficial to continue to perform more research to determine the causal factors. Taking age, shoeing methods, genetics, track conditions, and other practice recommendations are crucial for preventing injury in horses competing in their first race.

**Age of the Horse**

Other, sometimes contradictory studies also suggest that age can be a factor in racehorse injury. “The structural remodeling of equine limb bones in response to the biomechanical forces of high-speed exercise occurs more efficiently at ages in the range of 18–24 months compared to older horses with developmentally mature bones” (Heleski et al., 2020). This does not mean that bone remodeling does not occur at ages such as 5 or 6, but it is easier in younger ages. Meanwhile, “the physiological development of Thoroughbred racehorses is thought to be completed during the latter part of the age of 4 years old. With respect to their skeletal development, the latest epiphysis closure occurs at the age of 4–5 years old in a cervical vertebra” (Takahashi, 2015). Interestingly, “the running performance of Thoroughbred racehorses also reaches a peak at the same time” (Takahashi, 2015). Based on the results from Heleski and Takahashi and balancing their recommendations, the ideal racing age is three (Heleski et al., 2020; Takahashi, 2015).

Stover also details statistical analysis of racing injuries in horses ages two-, three-, and four years old. “Two-year-old racehorses are particularly susceptible to dorsal metacarpal disease
(bucked shins) when these horses begin work at fast speeds” (Stover, 2003). Similarly, “tibial stress fractures are more likely to occur in 2-year-old horses, whereas humeral stress fractures were more likely to occur in 3-year-old horses” (Stover, 2003). Younger horses are more prone to getting stress fractures or conformational injuries. “For injuries that prevented horses returning to racing for at least 6 months there was a 1.2 to 4.1 times increased risk for each year of age” (Stover, 2003). This suggests that as the horse ages, there is a higher chance that an injury they could get would prevent them from racing for six months. Also, “horses 4 years of age or older are at greater risk for moderate to severe injuries than are younger horses. However, it has also been noted that the risk for injuries that result in death decreased with increasing age” (Stover, 2003).

Again, based on this data, three is the ideal age for racehorses. Even though this is recommended as a best practice, it is not necessarily practical. Racing a Thoroughbred does not occur overnight but requires proper training beforehand. This recommendation should be taken into consideration as it relates to the other recommendations within this discussion. Racing a thoroughbred at age three means training it at the age of two, perhaps causing more injuries. However, when combined with other research-based management strategies highlighted in this paper, such risks could potentially be minimized. “Knowledge that 4-year-old horses are at greater risk for suspensory apparatus failure allows trainers to focus on monitoring these horses for early signs of suspensory desmitis. Enhanced index of suspicion facilitates identification of horses with mild injury, which in turn, when followed by appropriate management and rehabilitation, results in prevention of more severe injury” (Stover, 2003). Previous injury should result in federation-mandated retirement to prevent catastrophic injury from occurring later. Although “early” retirements may be seen as monetary loss for the owners, high-profile
breakdowns serve no one – critically injuring the horse themselves, increasing risk to jockeys and other horses, raising veterinary cost to the owners, and damaging the reputation of trainers and the racing industry at large. Milder injuries that are correctly rehabilitated in horses that retire early means that they can still go on to have a successful second career.

**Sex of the Horse**

The gender of the horse is also shown to perhaps change the risk of injury. “Stallions are more likely than mares and geldings to fracture the proximal sesamoid bones of the forelimb…. Stallions are also at greater risk of sustaining a catastrophic musculoskeletal injury, nonfatal SDFT injury, or indeed any form of fatal injury, compared with mares and geldings” (Georgopoulos & Parkin, 2016). Such data could possibly be skewed due to the method by which it was collected, posing a possible area for further research. Based on this study, it is unclear if the data takes into consideration the number of starts involved. Stallions typically have more starts, as they are more frequently raced than geldings or mares and are at a greater risk of sustaining a catastrophic injury. The researchers must look at the ratio of injuries related to starts for each sex. However, the “risk of fatal injury was greater for stallions than for mares and geldings and increased as the number of previous nonfatal injuries and race withdrawals and level of competitiveness of the horse or race increased” (Georgopoulos & Parkin, 2016). It might be beneficial to decrease the amount of stallions racing. This practice would be complicated as this can impact the consequential breeding of successful competitors, since successful racing stallions go on to breed new prospects and because most thoroughbred mares do not race for long as they become brood mares.
Track Surface

Research also indicates that track surface plays a critical role in many injuries and in injury prevention. Although much more research needs to be done about the best safety practices for track conditions, one study performed by Setterbo et al. utilized a track-testing device that mimics equine hoof impact to determine the effects of track type, comparing dirt to synthetic, surface depth of two, three, and four layers, test boundary area, harrowing, and impact angle (0 degrees & 20 degrees from vertical) (Setterbo et al., 2011). The device took the impact velocity and force of the equine hoof into consideration and was studied in a box in the lab which minimized variables and confounding factors. However, the device can only assess one-dimensional movement so vertical and horizontal surface properties could not be independently assessed. It also does not take into consideration the horse’s conformation, natural gait, other surfaces, environmental conditions, or different base layers.

In the same study, Setterbo et al. concluded synthetic surfaces can absorb more of the impact during high-speed exercise compared to dirt footing (Setterbo et al., 2011). “Lower forces have been linked to lower occurrence of lameness, and likely result in lower stress to limb structures. Lower load rates indicate that impacts are less violent for the synthetic surface than for the dirt surface” (Setterbo et al., 2011). The differences in load rates can be compared in the graph included in their study (Figure 1).
Figure 1: Average load rate of dirt and synthetic surfaces taken from Setterbo et al., 2011.

They also determined that all surfaces should be properly harrowed to help prevent injuries. They even found that “harrowing decreased stiffness and relative differences between the dirt and synthetic dynamic surface properties” (Setterbo et al., 2011). Although it is more crucial that dirt surfaces are harrowed before races, synthetic surfaces also should be harrowed. It is unclear whether harrowing is a standard practice for every race, so it should be more thoroughly regulated and mandated.

Furthermore, Kentucky’s Churchill Downs racetrack has received heightened public backlash surrounding track fatalities over the past few years after installing synthetic footing. As of recently, Santa Anita has installed new Tapeta synthetic footing, the same footing as at Churchill Downs, which claims to have an injury rate of 0.63% compared to other synthetic surfaces at 1.1%, turf at 1.36%, and dirt at 1.74% (Tapeta Footings, 2017). Santa Anita has also
received recent scrutiny online due to catastrophic injuries related to racing, but “the race-associated fatality rate for racehorses in California was greatest for dirt tracks followed by turf and then synthetic tracks” (Georgopoulos & Parkin, 2016). To add in, a study of nuclear scintigraphy of humeri from 841 Thoroughbred racehorses at 3 racetracks for 2 years before and after conversion from a dirt surface to a synthetic surface indicates that “horses at synthetic racetracks had a greater proportion of distal humeral lesions, whereas horses at dirt racetracks had a greater proportion of caudoproximal lesions” (Dimock et al., 2013).

Based on these injuries, proximal lesions were typically more severe than distal lesions, while most complete fractures were found with caudoproximal lesions, often more severe than distal lesions (Dimock et al., 2013). Data from this research indicates that common injuries sustained from dirt tracks were more severe than common injuries sustained at synthetic tracks. However, this study did not account for age differences, sex, frequency of training, or previous injury history. Similarly, Georgopoulos and Parkin found that “compared with racetracks with synthetic surfaces, the risk of fatal injury was greatest for racetracks with off-dirt and dirt surfaces followed by racetracks with turf surfaces.”

**Regulations of Other Countries**

Research comparing Thoroughbred racing in the United States to the United Kingdom further suggests that differences in racing regulations change the injury rates. “The incidence rates of fatal injuries in Thoroughbred racehorses in the United States appear to be much higher than those for racehorses in the United Kingdom and Australia” (Georgopoulos & Parkin, 2016). The United States and Canada have different guidelines for racing compared to the United Kingdom and Australia (as well as other countries such as Japan). Some differences include track
surfaces, the use of Lasix, distances, and obstacles. In the UK, racing is performed on grass rather than synthetic or dirt footing like in the US. Grass is more “natural” for horses since many breeds evolved roaming on grass. Lasix is an anti-bleeding drug that prevents bleeding in the lungs for horses who have exercise-induced pulmonary hemorrhage (EIPH), which is common among racehorses. In the UK, the use of Lasix is banned on race day, while in the US, each state determines the regulations of Lasix (Soma & Uboh, 1998). Furthermore, in the UK, thoroughbreds run much longer distances and must jump over obstacles. For comparison, the Grand National in the UK is four miles and two and a half furlongs, while the Belmont Stakes in the US is one and a half miles long (Aintree Racecourse, 2024). In Australia, the Grand Annual is about 2 miles and a half furlong, but it has 33 obstacles – the most in the world (Just Horse Racing, 2024). Following the guidelines of racing in other countries could decrease the injury rate in the United States.

Such data on the comparison among different Thoroughbred racing countries should be further researched to determine what management strategies are best. The lower incidence rate in the UK compared to the US could be due to a multitude of reasons as mentioned above, as well as the fact that race paces in the US and Canada are faster, for example (Georgopoulos & Parkin, 2016). Because “the incidence rates within each jurisdiction, or country, have remained fairly consistent since the 1980s,” it would be beneficial to study this data and perhaps implement certain practices from the UK into US racing (Georgopoulos & Parkin, 2016). In another study, Takahashi collected data in Japan where there are different track surfaces, and a handicap weight is added after the age of four to ensure all horses are carrying the same weight (Takahashi, 2015). The comparison between these different countries could be eye-opening in determining what management strategies are the safest. The UK, Australia, and Japan also do not have separate
states that dictate their own rules for the sport, and they have their own racing commissions, which would be important to study.

RECOMMENDATIONS FOR FURTHER RESEARCH

Data Collection

Despite research and data collected about Thoroughbreds, from injuries to racing to footing to breeding, there are still many areas in which further research could be done. Many of these studies have limitations with data collection due to confounding variables or small sample sizes. Others have limited statistical significance because the data collection was skewed to a certain population or did not account for variables.

Common data collection problems lie in the fact the sport is poorly regulated. Each state has its own racing commission which may establish the rules for racing in that state. For example, Louisiana has different state regulations than Delaware, even though there are also federal regulations put into place. This can be problematic when horses are competing in races across the nation, as racing rules and drug restrictions can vary greatly (Albany Law, 2021). There are also a multitude of organizations that provide differing regulations regarding the sport. “The Federal Trade Commission is responsible for drafting and enforcing uniform safety and integrity rules in Thoroughbred racing in the United States” (Stover & Uzal, 2022). However, The Jockey Club is responsible for the “improvement of Thoroughbred breeding and racing… and the maintenance of The American Stud Book in a manner that ensures the integrity of the breed in the United States, Canada, and Puerto Rico” (The Jockey Club, 2024). For instance, The Jockey Club regulates breeding by requiring live cover, registering purebred horses, and requiring all horses entering sanctioned races to be registered with The Jockey Club. Recently, to
try to fix the lack of standardized regulation in the US across each state, the Horseracing Integrity and Safety Authority (HISA) was established as a private organization after the Horseracing Integrity and Safety Act was put into place in 2020. “The Horseracing Integrity and Safety Act, passed into federal law in 2020, grants HISA jurisdiction over all Thoroughbred horse races in the US that are the subject of interstate off-track or advance deposit wagers” (Equus, 2023). According to their website, the HISA began governing the industry on July 1, 2022, and the FTC oversees HISA.

Although the creation of a governing body to regulate the industry is an improvement, there is still a discontinuity between every group involved in the industry. HISA is not accepted throughout the entirety of the industry, meaning that their ability to actually create and pass federal laws regarding racing may not happen quickly (Albany Law, 2021). The establishment of HISA can also lead to a “potentially strained relationship between HISA and state-level racing commissions” (Albany Law, 2021). It is also unclear how the other organizations fit in with the establishment of HISA. The Federal Trade Commission does not have experience working with equines, so their understanding and opinion of equine-related topics could be skewed or biased. The concept of a governing body is valid and promising for gathering data and provides a stepping stone for the next actions, but the Jockey Club, US Department of Agriculture (USDA), or American Veterinary Medical Association (AVMA) would have a more educated standpoint for developing such regulations.

Some of the rules and regulations put into place can be faulty because they do not account for the entire population since legislation varies by state. Injuries related to racing occurring in specific states have never been studied, indicating that there could be correlations between certain states that perhaps allow Lasix and lead to an increase in injuries. “The FTC
recently approved a rule mandating autopsy for all horses that die spontaneously or are euthanized at a covered racetrack facility” (Stover & Uzal, 2022). This specific rule does not account for horses that are euthanized at a non-covered facility, which can skew any data that they find. Also, although this rule would provide a more significant amount of data regarding catastrophic injuries related to racing, it would make more sense coming from the AVMA. If The Jockey Club mandated data collection as part of the requirements for registration and entry, and used revenue from the registration of horses, then the subsequent research on that data could be used by the FTC, HISA, The Jockey Club, etc. to support and enforce mandatory nationwide regulation to protect animals in the sport and the sport’s continuance in the future.

Injuries, lamenesses, and fatalities are only reported on the day of racing and during a race, so those that occur as a result of a race are not reported, nor are those that occur before races, or during exercise or training rides. “Thus, it is possible that more horses than those included in this study may have had musculoskeletal injuries, but their identification was difficult because the official racetrack veterinary only follows up with horses identified as lame; attending veterinarians are not required to provide full disclosure of all injured horses” (Dahl et al., 2016). This means that there are more occurring than being recorded, and the racing industry’s problem is bigger than publicly perceived, even by social media. The Jockey Club and other governing bodies could be collecting and analyzing data and using the conclusions from that source to promote change or even mandate change within the industry. Their passivity regarding doing research, more heavily regulating the sport, and promoting equine welfare can be detrimental to their SLO. These organizations must change their definition of leadership and oversight if they wish to continue to have a sport to govern, raise awareness of the necessity to protect the horses and preserve the SLO, and maintain the sometimes-difficult changes in the
interest of the animals and the industry at large. The greater scrutiny now placed on the industry
demands a proactive approach that embraces transparency and reform.

Furthermore, horses are not considered livestock, so research is not performed by the Food and Drug Administration. Horses are not small pets either, and it is much easier – fiscally and managerially – to conduct research on cats or dogs. However, such data needed for further research in the racing industry is not difficult to obtain with the current state of technology, and the Jockey Club could easily take steps to finance it, by adding a surcharge on registration and post fees, just as the United States Equestrian Federation (USEF), the national governing body of other equestrian sports, charges a drug testing fee and a federation fee to all competitors (USEF, 2018). The Jockey Club has a vested interest in preserving the future of racing, as do all thoroughbred owners, trainers, and breeders. The Jockey Club is therefore ideally positioned to both incentivize the financial investment and promote the necessity of such investments to those stakeholders.

One way The Jockey Club could collect data to spark research is by commissioning the development of an app for trainers and owners to record data regarding their Thoroughbred, including recording training frequency, speed, time, distance run, turnout, feed given, veterinarian visits, injuries, lameness, illnesses, shoeing cycles, races, pedigrees, and so much more. A similar app available currently is SLEIP, which is a tool for veterinarians to use in assessing and treating lameness by analyzing gate movement through artificial intelligence. It could either be required by The Jockey Club to be used for early detection of lameness, or as a model for what they could include in their app design. Collecting that data and making it available to relevant researchers could change the way that Thoroughbred research is done. It would also provide a new dimension to data available in the industry as it would allow for the
collection of training data, giving a more accurate total of injuries due to training, and allowing trainers to correlate how much training is beneficial and how much or how little is detrimental. A more accurate understanding of the issue and stressors, as well as a more comprehensive best practice is crucial for the potential prevention of catastrophic injuries and the ability for early detection.

Doing so would demonstrate the industry’s commitment to transparency and to the welfare of its animals which would raise its standing in the eyes of the public and help to preserve its SLO. A well-designed app could improve research by addressing limitations seen in other studies. Data would be more complete and could account for confounding variables such as individual conformation, natural gait, other surfaces, environmental conditions, or different base layers. Data such as this could be easily put into an app or reported separately by tracks and transmitted to The Jockey Club, allowing researchers to compare data between track conditions on given days in certain environments while taking into consideration many more variable factors. Digital technology and smartphones now provide the opportunity to analyze previously inaccessible data such as conformation. The Jockey Club could require registered animals to submit frontal, side, and behind images, which not only identify the animals but allow researchers to utilize such programs to evaluate the conformation of each horse. When cross-referenced with winnings, injuries, and pedigrees has the potential to revolutionize training, regulation, and thoroughbred breeding.

In addition, specific data collection on factors related to injuries needs to be examined more thoroughly to ensure that the entire Thoroughbred population is accurately represented. “Risk factors are likely interrelated, and some are not directly related to injury. Some factors appear associated with injury but only by correlation with another, sometimes unknown, factor
that is directly related to injury” (Stover, 2003). Research has shown pre-existing injuries, track conditions, genetics, training regimes, frequencies of races, showing methods, etc. all can contribute to injuries, lamenesses, and fatalities. “Similar perplexities evolve from likely associations of horse age with skeletal development, intensity of training, and career racing variables (e.g., lifetime races). It is clear the factors associated with injury are multiple, interrelated, and complex” (Stover, 2003). However, it is unclear how they are related to each other, which is an area for further research that could be addressed through a mandated collection of data as outlined above. The Jockey Club began the Equine Injury Database (EID) to help quantify racing injuries so that management practices could be put into place to improve safety (Georgopoulos & Parkin, 2016). The intent should be beneficial, but the data collected is inadequate to serve the purpose, as statistics found are solely collected for injuries occurring within 72 hours of the finish of the race, and exclude steeplechase races (The Jockey Club, 2024). Lamenesses identified after races are unaccounted for, as are horses who scratched from races, fatalities occurring after 72 hours, and any steeplechase races. Another important statistic that they highlight on their website is the fact that, as of 2022, there were only “1.25 fatalities per 1,000 starts” – a significant change from the “2.00 fatalities per 1,000 starts” in 2009 (The Jockey Club, 2024). This statistic does not reflect training injuries, but an app could easily fill in the gaps, allowing for a more comprehensive analysis of practices and increased transparency.

Additionally, although the relationship between the number of workouts and injuries is positively correlated, it is unclear what is the best training regime (Georgopoulos & Parkin, 2016). This merits further research to determine how many workout sessions, length of sessions, and at what distance are best for training that increases athleticism but minimizes risk. Thirdly, many researchers, such as Georgopoulos and Parkin, cited above, indicate that stallions have an
increased risk of fatal injuries compared with geldings or mares (Georgopoulos & Parkin, 2016). However, none of the research shows whether this is because stallions have more starts than geldings or mares. Additional research is needed to determine if the statement would hold true when comparing the ratios of injuries to related starts. If so, then perhaps it would be beneficial to increase the number of mares or geldings racing.

Finally, more research on track surfaces needs to be conducted to determine the best solution for racing. Results from the Setterbo et al. study concur that synthetic surfaces have the potential to be safer for the racehorse as “the Thoroughbred racehorse fatality rate decreased in California at major racetracks that converted to synthetic surfaces, however, concurrent changes in horseshoe toe grab regulation and pre-race examination practices confound interpretation of this finding” (Setterbo et al., 2011). Specifically comparing the number of injuries and fatalities related to training/racing on each track and eliminating different variables should be researched. It is surprising that major racetracks replaced their dirt surfaces with synthetic surfaces before doing extensive comparative research.

Genetics

Genetics plays an important role in Thoroughbred racing. As early as the reign of King Charles II in England, public betting favored horses that had the most successful lineage or genetics, demonstrating that, “success lies in buyers’ confidence that a horse will have a productive racing career” (Bailey et al., 2022). Genetic research within the contemporary industry analyzes different aspects of performance to determine what traits can be passed on to progeny. This is quantified as heritability, the “measure of the proportion of variation in any particular trait that is due to genetics” (Bailey et al., 2022). A higher heritability indicates that the
progeny is more likely to receive that trait. Data observed from Bailey et al. study “suggest that diverse genetic strategies have contributed to producing a successful racehorse, and genetic variation contributing to athleticism remains important” (Bailey et al., 2022). However, it is difficult to accurately measure how genetics specifically relates to racing success because of variances in age, distance, footing, weather, jockey, weight carried, training regimen, and number of starts.

Furthermore, progeny who do not race – whatever the reason -- are not tracked. Additionally, “only 40-70% of Thoroughbred horses enter races, and even then, race time is recorded only for the winning horse. For example, Jockey Club records for 2016 from the United States show that only 70% of the horses born and registered competed by the time they were three years old, and of those, only 50% had won at least one race” (Bailey et al., 2022). The data included in future studies could change tremendously if the Jockey Club keeps records of race times and distances of every horse and race, even if they do not win that race.

“[M]ore recently, scientists reported that winning times in some prominent Thoroughbred horse races have not been improved significantly after 1910” (Bailey et al., 2022). There are some different hypotheses as to why race times have not significantly improved. One is that the “limit to maximum accomplishment may have been reached, or nearly reached, for racehorse performance” (Bailey et al., 2022). This suggests that thoroughbreds have a maximum speed that could be reached by selective breeding, and that maximum has been reached. Alternatively, while “racehorses may be capable of record-setting performances, this is not true of most horses in the breeding population” (Bailey et al., 2022). Although some horses are incredibly fast and agile, they only make up a very small proportion of the genetic population included in breeding. This means that the frequency of such traits is very low and rarely passed down.
Comprehensive tracking of injuries through the Jockey Club could be automatically linked to the animals’ pedigree, allowing for easier identifications of trends within families, which would be a benefit to breeders and facilitate genomic identification of traits that contribute to susceptibility to injury. “Fracture risk in the Thoroughbred horse is a complex condition with an underlying genetic basis. Multiple genomic regions contribute to susceptibility to fracture risk. This suggests there is the potential to develop SNP-based estimators for genetic risk of fracture in the Thoroughbred racehorse, using methods pioneered in livestock genetics such as genomic selection” (Blott et al., 2014). If such a tool could be created, the information that it could provide would be beneficial to breeders, owners, and trainers.

Some breeders might be initially opposed to this research for fear that valuable stallions or mares might be linked to problematic traits or genes, but this will need to be promoted by a governing body, against objections, for the welfare of the horses and the preservation of the sport and industry at large. They could easily see if a horse in their care or ownership was at risk of a fracture, ultimately leading to a change in training plan or even racing. It is important to note that Blott et al. study was conducted in the United Kingdom, where racehorses compete on grass for longer distances, without the use of Lasix, and with jumping involved (Blott et al., 2014). If this test were conducted in the United States, there would be more genetics involved that could lead to injury. Moreover, there is a lack of genetic research to track injury related to lineage. If fracture risk is something that can easily be quantified and identified, figuring out if it comes from a specific lineage could change the genetic pool. Such collaboration between a geneticist and genealogist could perhaps reveal, for example, that a prominent stallion passes on certain genetics that lead to most of its progeny injuring its suspensory ligament. This could further improve selective breeding: instead of breeding only for the fastest traits and best conformation,
breeding can be done with the purpose of getting rid of unwanted risk genes within the population.

**DRUG USE & DOPING**

Lasix is just one drug that is used in the US during racing and training, but many others are used as well. Equine drug use and doping can come in different forms including steroids, non-steroidal anti-inflammatory drugs (NSAIDs), or other medications. In the Thoroughbred racing industry, “steroids are legal in 28 of the 38 states where horse racing is held, including the three states holding Triple Crown races, and their use is prevalent” (Finley, 2008). The goal of doping, or the use of drugs in sports, is to increase the oxygen-carrying capacity of red blood cells by increasing the number of red blood cells (Gledhill, 1982). Even though doping and drug use can have benefits, such as pain relief, and is legal in some states, as it enhances the speed and ability of the racehorse, the long-term effects and ethics are questionable which is why the industry needs to be taking proactive changes. The ethics involved with the use of drugs and doping in the Thoroughbred industry, and the public’s opinion of such practices, could be detrimental to the SLO of the industry.

To increase the endurance and speed of a racehorse, trainers, owners, or even veterinarians can prescribe drugs. For example, the use of cobalt chloride has become a prominent compound given to racehorses to help them run faster. This compound promotes erythropoiesis, a mechanism in the body to enhance the oxygen-carrying capacity of blood, allowing muscle contractions to occur faster and more successfully without fatigue or lactate accumulation (Gledhill, 1982). Cobalt chloride is not the only compound used in racehorses, but the way that it enhances endurance capabilities is similar to many other doping mechanisms.
Cobalt chloride is not the only compound that can enhance performance. Anabolic steroids are also administered to enhance performance, but the negative connotation associated with anabolic steroids makes their use extremely controversial. Specifically, in the racing industry, “the Federal Drug Administration allows four steroids – Winstrol, Equipoise, Durabolin, and testosterone – to be administered to horses” (Jabroski 2008-2009; Finley, 2008). Stanozolol, commonly known as Winstrol, is an anabolic steroid that is used to help the body build strong, lean muscle, and increase that muscle strength (Davidson & Plumb, 2003). Many racehorse owners also claim that the steroid increases appetite in the horse. In the Thoroughbred racing industry specifically, the ex-racehorse Big Brown, winner of the 2008 Kentucky Derby and the Preakness, was administered Winstrol once a month (Finley, 2008). The use of the anabolic steroid in Big Brown gained national attention and sparked a lot of controversy about the use of steroids within the industry, but it did not strip him of his title of being the Kentucky Derby and the Preakness winner. Because this gained national attention and the public responded negatively, The Jockey Club should have taken a different approach to address the concerns regarding the use of steroids in the industry to reassure the public and for the overall well-being of the horses involved.

Other drugs including corticosteroids have been used in high-profile racehorses, which resulted in public scrutiny. For example, Betamethasone, a corticosteroid injected into joints to ease inflammation and pain associated with consistent, intense training was found in the 2021 Kentucky Derby winner Medina Spirit, resulting in his disqualification (Cherwa, 2021). His owners and trainer claimed that Medina Spirit was only treated with a betamethasone-containing ointment called Otomax and denied that his joints were ever injected (Cherwa, 2021). Even
though The Jockey Club addressed public concern and disqualified Medina Spirit, the press coverage that this scandal received brought increased attention to drug use in the racing industry and a contemporary discussion of the ethical aspects of drug use in the sport (Frakes, 2021).

Based on current research, the prolonged use of drugs, whether it be steroids or stimulants, can have detrimental side effects on the health of the animal. The long-term use of cobalt chloride can lead to many heart health problems, including cardiomyopathy, cardiac arrest, and death (Mobasheri & Proudman, 2015). The side effects of Winstrol include unusual behavior, water retention, irregular and weak heart rate, liver disease, and an increase in calcium which can lead to other health problems (Davidson & Plumb, 2003). The steroid Equipoise can cause respiratory problems, kidney failure, liver failure, and a change in blood pH (National Center for Biotechnology Information, 2022). For the sake of the animal’s overall welfare and its SLO, the industry and The Jockey Club should be proactively reforming the use of drugs within the sport.

Since there has been increased awareness of drug use in the industry, some organizations have put rules into place, but there are no federal laws that are followed by every state. The Big Brown scandal resulted in the National Thoroughbred Racing Association to begin investigating the use of steroids to determine whether they enhance performance or put horses at risk (Jabroski, 2008-2009). The Medina Spirit scandal resulted in many repercussions for the trainer, Bob Baffert, and any others involved, as Baffert was suspended from entering any future horses into races held at Churchill Downs, and Baffert and any others involved were fined and stripped of their titles, (Frakes, 2021). This is a step in the right direction, but these enforcements only applied to one specific instance in one specific place.
Before any race, horses are tested for anabolic steroids, specifically Winstrol, Equipoise, Durabolin, and testosterone, through urine and blood samples, and each state that regulates these four anabolic steroids has certain legal thresholds that the tests cannot surpass. For example, in California, Winstrol cannot exceed 1 nanogram per milliliter, otherwise, it is illegal. However, overall federal regulation of such steroids and the use of drugs is absent. Currently, the Racing Medication and Testing Consortium (RMTC) is pushing to implement federal laws around the use of drugs. Some states have adopted the model rules that the RMTC proposed, but it has not been federally approved (Jabroski, 2008-2009). The establishment of HISA and modification of its original act in 2020 tries to enact more rules, standards, and procedures regarding the use of prohibited substances. HISA is currently trying to ban the use of race day Lasix, but the organization must go through a two-year research and trial period to determine if banning the substance positively affects equine health (Albany Law School, 2021). Further research into the effects of different drugs is needed to create change in the industry that owners and trainers will accept, but the need for this change is a requirement by the public and the maintenance of the industry’s SLO. The establishment of a true governing body of the sport is also crucial to ensuring that drug reform can effectively occur.

SECOND CAREERS

Enabling successful second careers for retired Thoroughbreds is crucial for the industry to keep its social license to operate. Practices within the racing industry must evolve to include the “whole-life welfare” of the animals the industry depends on. Owners and trainers must make decisions utilizing a long-term lens that considers not just the animal’s racing career, but its post-racing well-being. Although there may be some short-term costs in improving animal housing at
tracks or retiring animals early if research suggests they are prone to injury, those costs will be offset by the long-range benefits or reduced veterinary costs, increased long-term health and behavior of individual horses, and improved reputation and preservation of the SLO of the racing industry. The Jockey Club is again well-positioned to take the lead in promoting such initiatives to breeders, trainers, owners, and the public.

Numerous organizations and programs exist to retrain horses for new careers, to act as liaisons between retirement and adoption, and to encourage the adoption of retired racehorses through promotion and various incentives. New Vocations Racehorse Adoption Program, Communication Alliance to Network Thoroughbred Ex-Racehorses (CANTER), and the Thoroughbred Aftercare Alliance (TAA) are all examples of such initiatives. The goal of most of these organizations is to accept retired racehorses and provide them with the appropriate veterinary care, rehabilitation, and training, to then be able to be adopted. Within these groups, other incentives have been put into place to encourage people to adopt ex-racehorses, such as creating retired Thoroughbred horse shows to display their second careers. Environments in which “the breed’s versatility is showcased by competition in 10 diverse events, both English and western: barrel racing, competitive trail, dressage, eventing, field hunters, freestyle, polo, ranch work, show hunter, and show jumping” (Helenski et al., 2020) are valuable means of demonstrating the racing industry’s commitment to “whole-life welfare” of the horses involved.

With these programs becoming increasingly popular, they can also spread awareness about the versatility of the breed and improve its favorability in the opinion of the public. The promotion of these programs and organizations needs to exponentially increase for them to effectively help maintain the industry’s social license to operate. In the industry, racehorses are bred to race for a few years, then are discarded when they are too old to race. Because of the high
population of ex-racehorses, it is not uncommon for them to end up in a slaughterhouse. If this information were to become widespread, it could be detrimental to the industry. Instead, the industry should help fund and advertise these programs. Alone, “CANTER has helped over 25,000 retired Thoroughbreds transition into new homes since its inception” (Helenski et al., 2020). The advertisement of this information could help spread awareness of Thoroughbred adoption and increase its popularity.

Although many of these programs do keep track of second careers, there is no current way to track the entire population. The Jockey Club could consider incentivizing individuals who adopt retired racehorses to keep records on their horse and submit them to a database that the program creates. With this data, more research could be done to provide information on the best second careers for ex-racehorses.

CONCLUSION

In order for thoroughbred racing to continue in the United States in the age of changing attitudes and increased scrutiny through social media, amendments need to be made regarding equine welfare and injuries, recording and tracking data, as well as actively addressing public concerns. Potential exists to standardize best practices in the sport to ensure the well-being of the animals and the sport alike. By embracing the technological revolution, The Jockey Club could use available smartphone technology to leverage its authority as a breed registry to promote transparency and the “whole-life welfare” initiative by utilizing research to implement best-practice recommendations or mandates regarding management practices can be followed regarding hoof genetics and shoeing, training methods, racing frequency, pre-existing injuries,
age, sex, and track conditions to prevent catastrophic injuries, as well as the influence of genetics on all of these variables.

By following these recommended practices, trainers and owners could decrease the risk of catastrophic injuries, improve animal welfare, and prevent monetary loss. However, such research depends upon improvements in data collection to track all variables and increase sample sizes. The establishment of a true national governing body of the sport is critical to its future. This governing body would oversee, promote, and incentivize equine research, and ensure animal welfare, especially regarding the use of drugs in the sport and including facilitating second careers for retired racehorses.

ACKNOWLEDGEMENTS

The author wishes to thank her associated Honors senior thesis advisor Sarah Rigg for her support and guidance throughout this project. She would also like to thank her peers who have helped her on this academic journey, and her family for supporting her equestrian passion.
REFERENCES

https://www.thejockeyclub.co.uk/the-grand-national/about-the-event/grand-national-facts-figures/


https://www.twinspires.com/edge/racing/horses-dollar122-billion-annually-to-the-us-economoy/


HISA. (2024). About Us. HISA. https://hisaus.org/about-us


https://www.jockeyclub.com/default.asp?section=About&area=0


https://www.usef.org/forms-pubs/y43CKVwh4Mc/drugs-medications-faq


World Equestrian Center (2024). Ocala Horse Show Forms. *World Equestrian Center.*

https://worldequestriancenter.com/ocala-fl/equestrian-events/members-and-exhibitors/forms/