

# RACING BABIES

Researched and  
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## INDEX

- Part 1: Introduction (p. 1)
- Part 2: Stages of Bone Growth in the Horse (p. 3)
- Part 3: Effects of Training and Racing on the Immature Musculoskeletal System (p. 8)
- Part 4: What Racing People Say – Fact or Fiction? (p. 16)
- Part 5: The Verdict — Training Regimens, Too Much, Too Soon? (p. 26)

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## **PART 1 — INTRODUCTION**

GLOBALLY, the sport of horse racing is a multi-billion dollar industry where both fortunes are made and fortunes are woefully lost.

More than \$100 million worth of bets are placed each year on the Kentucky Derby alone. [1]

What once existed as a revered pastime is now a powerful commercial empire replete with influential stakeholders all vying for a piece of the proverbial pie.

While many may believe that the vast majority of the money funnels into the industry via purses and wagering, the principle source of capital is central to the breeding shed and auction ring.

Akin to the stock market, racing is governed by callous investors thirsty for prosperity while profiteering at all and any expense, most notably the horse.

Moreover, with the evolution of this lucrative industry's business model the arrival of two-year-old racing has become the norm.

This is in part as a consequence of the ever-increasing prize money together with the added advantage of maximizing profitability by exploitation of mere babies in the most honest sense of the word.

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More than a sport, horse racing is a huge business where moneyed gentry spend their fortunes during yearling sales with the expectation that these horses begin to earn their keep at the tender age of two.

It is indeed an unyielding situation in which horses are valued largely for the first three years of their life and wherein their bona fide value is ultimately established.

Above all the investor's main objective is to race 2-year olds in preparation for the celebrated 3-year old stakes races after which these adolescent horses will be retired to the breeding shed.

It is well recognized that the modern Thoroughbred's peak earning potential occurs at the age of three with, on average, diminishing return at the age of four and beyond.

"I think there's probably a much stronger tendency to have two year old racing nowadays than there used to be.....and the lure of prize money. There's a great incentive to race their horses too young too immature.

In the old days, you bought your yearlings, you broke them in, you castrated them, you turned them out. You didn't think about them until late 2 year old and mostly three year olds. The big money came with three-year-old racing. The current owners want two-year-old racing and I think it's a pity. I think it's a pity because it certainly does cause the breakdown of a lot of two year olds." - Percy Sykes, horse racing industry vet. [2]

However pressing and cost-effective it is to race a 2-year old rather than maintaining their upkeep without profit for a year, one must query whether this is in the best interest of the horse.

It is a given fact that a horse is not physically mature until the age of six yet racehorses are routinely forced to begin training at 18 months which puts extreme and unnatural stress on their developing musculoskeletal systems. [3]

Many contend this leads to an elevated risk of injury during training and racing while others maintain it is necessary to maximize bone and tendon strength in preparation for the demanding racing schedule many are confronted with as 2- and 3-year olds.

As with anything related to horse racing, it seems, there is much controversy regarding 2-year old racing.

Undeniably exercise is recognized as enhancing strength and bone density during skeletal development. However, for practical purposes, it is the question as to the degree and rigorousness of what exercise regime is necessary.

More to the point, should 2-year old racing be tolerated in consequence of greed overshadowing judiciousness?

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[1] [http://www.msnbc.msn.com/id/30523331/ns/business-cnbc\\_tv/t/cnbc-reportbusiness-horseracing/](http://www.msnbc.msn.com/id/30523331/ns/business-cnbc_tv/t/cnbc-reportbusiness-horseracing/)

[2] [http://www.horseracingkills.com/4\\_1.html](http://www.horseracingkills.com/4_1.html)

[3] [http://www.equinestudies.org/ranger\\_2008/ranger\\_piece\\_2008\\_pdf1.pdf](http://www.equinestudies.org/ranger_2008/ranger_piece_2008_pdf1.pdf)

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## **PART 2 – STAGES OF BONE GROWTH IN THE HORSE**

IN ITSELF, the racing industry is a perilous one for the athlete – the horse and the requirement of exceedingly unyielding solicitation of unsurpassed performance excellence. After all, the expenditure is not trivial and monetary losses incurred can be devastating even to the wealthiest of those who endeavor to invest in this business enterprise.

Most notably, horse racing's most unenviable anathema is the significant incidence of injuries that beleaguer the industry, particularly given that the career of the average racehorse, at best, spans a mere five to six years.

Simply put, the subsistence of a racehorse is a world apart from his expected lifespan.

Moreover, statistics repeatedly reinforce the fact that musculoskeletal injury is by far the most prevalent derivation of what the racing industry terms "wastage" – an idiom used to characterize losses that occur as a result of the training and racing of a horse.

“A number of studies have shown that musculoskeletal injury is by far the most common reason for wastage. In fact, the statistics are staggering -- for example, a study of 314 Thoroughbreds in Newmarket, England, found that lameness was the single most important reason for wastage in young horses in training. More than half of those horses experienced a period of lameness, and in about 20% of affected horses, lameness was severe enough to prevent racing during the period of investigation.” [1]

While there are a host of reasons that can and do contribute to lameness in the Thoroughbred, predominantly as a result of the inherent rigors of such a demanding sport, there is undeniably the question of whether this arises from the unrelenting demands foisted upon the young horse and the potentially harmful effects of intensive training on an immature skeletal structure.

One of the most widely-read factual articles regarding the timing and rate of skeletal maturation in horses is referred to as “The Ranger Piece”, courtesy of the Equine Studies Institute (ESI) which can be found here. [2]

What this article clearly communicates is the fact that the vast majority of horses, particularly in North America, begin their racing careers well before they have physically matured.

“.....bottom line – is that no horse, of any breed, in any country, at any time in history, either now or in the past, has ever been physically mature before it is five and a half years old; and that would be small scrubby mares living on rough tucker. Healthy domestically-raised males, and many females, do not mature until they are six. Tall, long-necked horses may take even longer than that.” [3]

The long bones of a horse develop from cartilage by a process known as ossification or simply “bone formation” both at the center (diaphysis) and ends (epiphysis) of the future bone.

Situated between these two regions is a (metaphyseal) growth plate which permits the lengthening of the long bones as the foal grows.

Additionally there is a second growth plate (epiphyseal) that forms as the ossification at the ends of the bone (epiphysis) advances outward effectively becoming the articular surface of the joint. [4]

Figure 1. Parts of a Long Bone

[SEE NEXT]

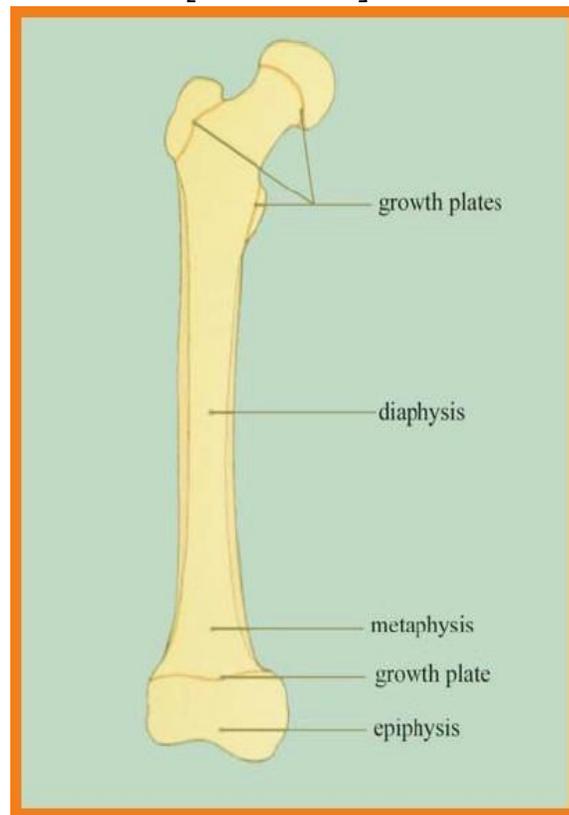
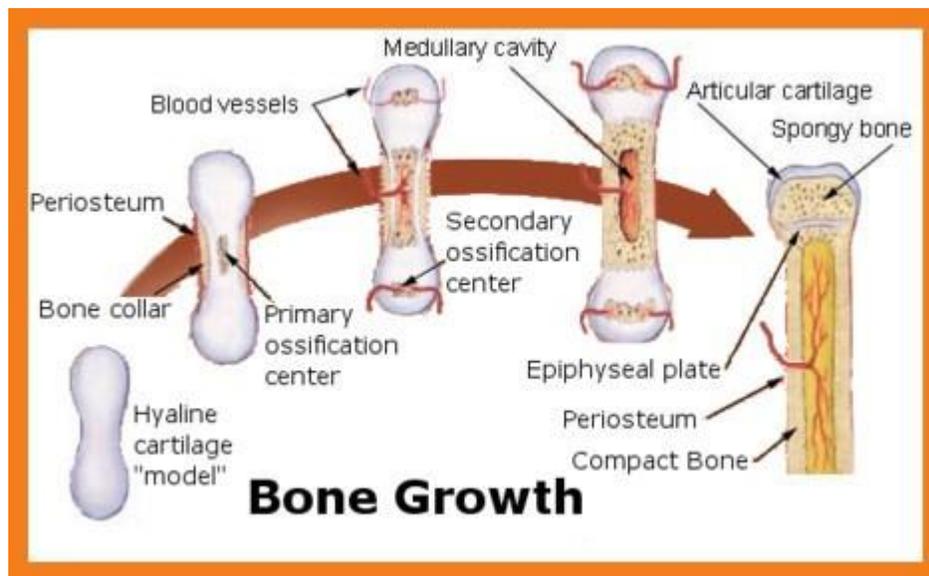


Figure 2. Bone Growth (Endochondral Ossification)  
<http://en.wikipedia.org/wiki/Bone>



What is important to recognize is that, apart from the skull, these growth plates are present in every bone in the skeletal structure of the horse (in some cases multiple plates exist, for example in the spine) wherein conversion to bone takes place at different rates in more or less a "bottom-up" progression beginning with the wedge-shaped coffin bone encased in the hoof.

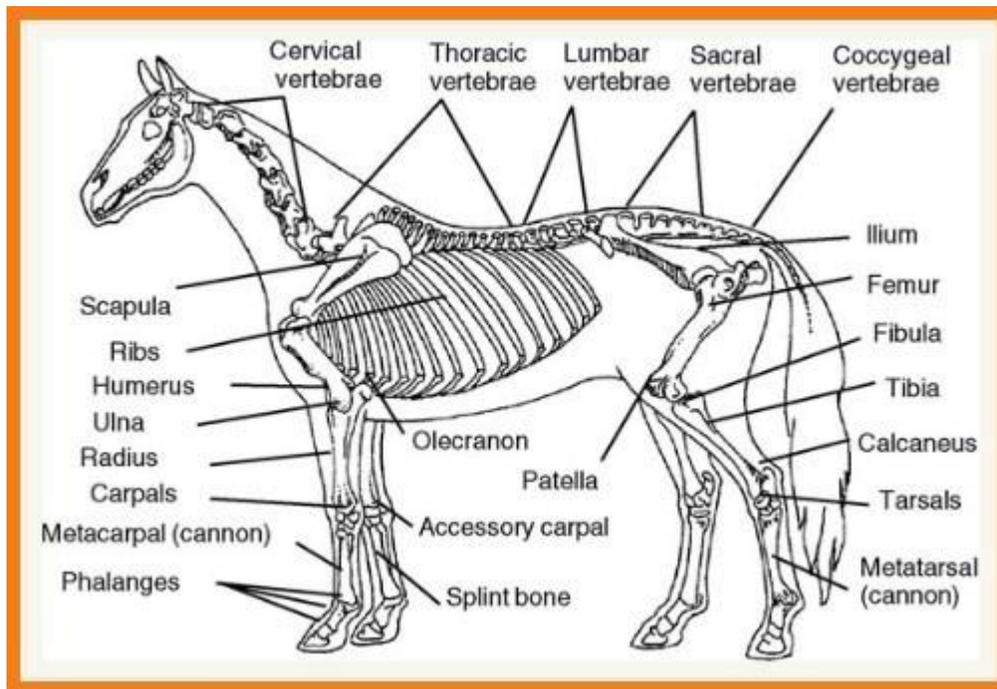
Ascending from the coffin bone, which is fused at birth, up to and including the small bones of the knee requires between 1 ½ to 2 ½ years for complete ossification to take place.

From here upwards and finally to the spinal column - comprised of 32 vertebrae with multiple growth plates and the last to fuse - the conversion process takes a minimum of 5 ½ years depending on the size and sex of the horse.

As a general rule the larger the horse, the longer the time required for ossification where it is possible in some cases for horses not to reach full maturity until the age of 8. [5]

Figure 3. Skeletal System of the Horse -  
The horse's body is made up of 216 bones.

The forelegs carry as much as 60 percent of the weight of the horse.  
<http://www.netplaces.com/horse/horse-anatomy/the-skeletal-system.htm>



Clearly the process of conversion of growth plates to bone takes time; at the age of two the plates in the knees for many of these horses will still not be fully fused, nor will any of the skeletal structure above this location. Moreover even when the conversion to bone is complete and the bone reaches its maximum length this does not imply that its absolute width and cross-section has been attained.

What then, if any, is the correlation between the rate of bone conversion and the high incidence of musculoskeletal injuries and attrition rate in young horses?

Given the demands imposed upon these adolescents during arduous training sessions and racing events an underlying causal relationship seems a rational hypothesis. And exactly how unremitting are the drills they are taxed with?

“The highest weight loading is imposed on the bone structure of the front limbs of racing Thoroughbreds when cornering at the gallop at speeds of up to 15 meters/second (Bailey, 1998). Studies have shown that loading forces on the front limbs of up to twice that of a horse’s bodyweight are imposed when galloping in a straight line (Lawrence, 2003b). For example, when a horse is galloped around a corner on a racetrack, an estimated combined centrifugal and momentum-related loading force of up to 5-10 times the animal’s body weight is placed on bone and joint structures in the lower limbs (Ireland, 1998).” [6]

This speaks volumes. How judicious is an industry that repeatedly subjects these young race horses, racing at near maximum speed, to such overloading of the

forelimbs with the conviction that vulnerability to major debilitating injury is simply part of the “game”?

Unfortunately, the answer is not straightforward and, as with all horse racing “topics”, entwined in the pervasive mêlée between the racing contingent and those on the opposing side of the argument.

[1] <http://www.thehorse.com/ViewArticle.aspx?ID=72>

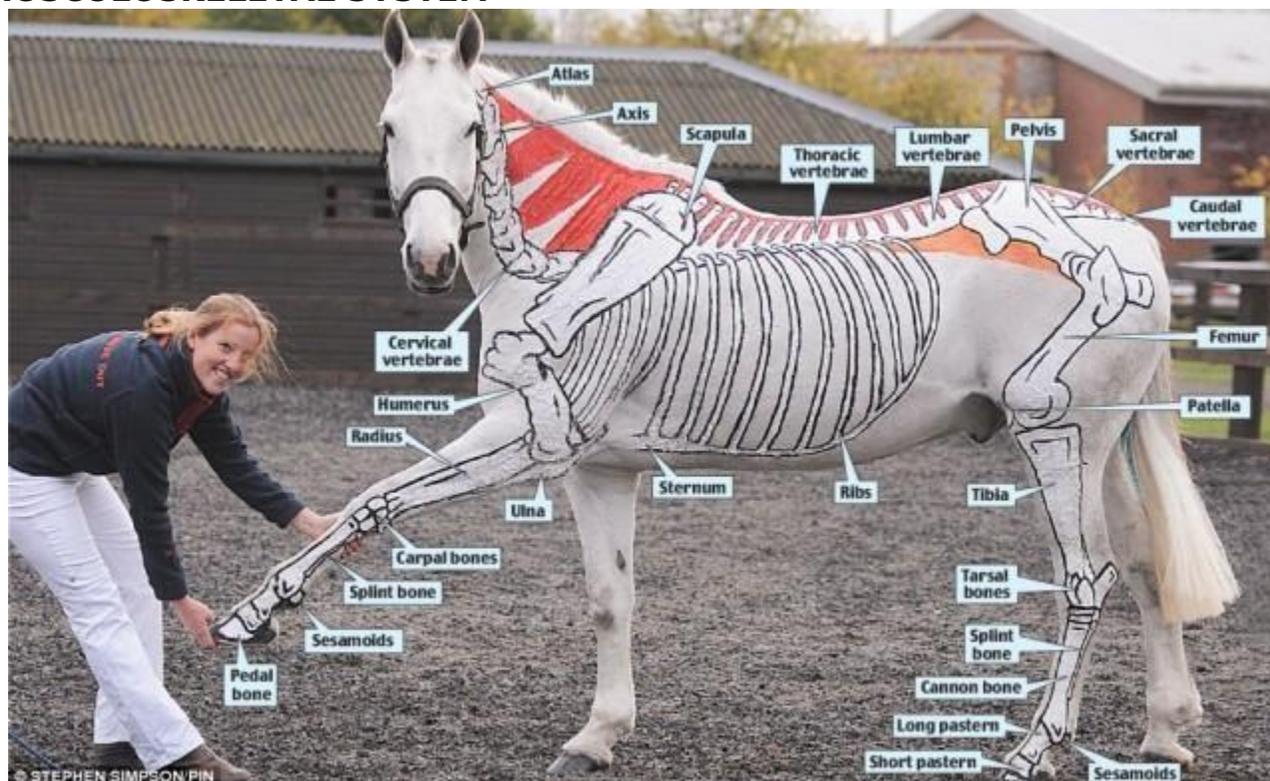
[2] [http://www.equinestudies.org/ranger\\_2008/ranger\\_piece\\_2008\\_pdf1.pdf](http://www.equinestudies.org/ranger_2008/ranger_piece_2008_pdf1.pdf)[3] Ibid.

[4] <http://www.equineortho.colostate.edu/questions/dod.htm>

[5] [http://www.equinestudies.org/ranger\\_2008/ranger\\_piece\\_2008\\_pdf1.pdf](http://www.equinestudies.org/ranger_2008/ranger_piece_2008_pdf1.pdf)[6] <http://en.engormix.com/MA-equines/health/articles/bone-biomechanicsreview-influences-t311/p0.htm>

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### **PART 3 — EFFECTS OF TRAINING AND RACING ON THE IMMATURE MUSCULOSKELETAL SYSTEM**



*Musculoskeletal System Painted On Live Horse Model. By "Horses Inside Out". See <http://www.horsesinsideout.com/>*

Although much research has been conducted on the racing of 2-year olds the consensus as to the effects of early training and racing on musculoskeletal and cardiovascular health is anything but resolved. An Australian study on the rates of injuries that occur during the training and racing of 2-year olds revealed that 85% suffered at least one incident of injury or disease. [1]

Moreover other anecdotal and survey evidence cite a high incidence of breakdowns during the preparation of young horses for 2-year old in-training auctions which elicits concern from an animal welfare perspective.

While it is acknowledged that a wealth of factors can contribute to musculoskeletal injury in performance horses the underlying question is whether the musculoskeletal structure is compromised by entering training and racing circuit at such a young age.

Without question the strength and proper development of the young horse's musculoskeletal system is paramount to providing soundness and structural support during exercise and racing events.

Furthermore while it is true that the bones of immature horses strengthen in response to exercise there is also scientific evidence that overloading of the bone structures as a result of excessive training in the young Thoroughbred can and does lead to increased bone failure and joint injury.

As has been validated time and again, the injury rate and wastage observed amongst two and three year old horses are acutely disproportionate and preeminently musculoskeletal in origin.

For the performance horse the most common musculoskeletal injuries involve tendon and ligament damage, stress and chip fractures as well as strains placed upon the joints and foot soreness.

While the manner in which a young horse is trained and raised for competition has a profound influence on their strength and future soundness, ultimately the severity of any injury is unequivocally associated with the type of training and the physical demands the horse is subject to.

In view of the fact that introduction to the race track for the majority of Thoroughbreds begins at the age of two, most will embark on a training schedule between the ages of 15 and 20 months depending on the month in which they were born. [2]

The disparity in the age at which these young horses begin their training in North

America is a result of the standardization of racing ages stipulated by the American Jockey Club wherein the established birth date for all horses, regardless of the actual foaling date, is January 01.

Apart from the fact that the older horses starting in the same calendar year have a decided advantage on the race track, the maturation rate of growth plates in all of these horses is in the early development phase which begets a profusion of lower-limb ailments and injuries.

The high incidence of unsoundness in the young racehorse has been conclusively linked to overloading of, and excessive concussive forces on the bone structures, the age at which training begins, the speed at which the horse is worked, as well as the ability of the bone and joint structures to adapt as the horse increases in weight and loading forces upon the limbs become more demanding. [3]

Undeniably exercise contributes to robust skeletal development through the process of "bone remodeling", a process in which bones increase in strength and bone mass, however it is critical to acknowledge that this is a slow process. In cases where training takes place during the bone growth phase, such as in young Thoroughbreds, this remodeling process can take up to four months for completion, predisposing the horse to increased risk of career-limiting injury particularly if the training regimen is too aggressive. [4]

Of particular note is that the remodeling of bone in response to exercise does not result in superior quality bone. Bone remodeling is a continuous repair process that occurs in response to physio-chemical factors such as stress from exercise and repair during injury, for example. [5]

During the process of remodeling, bone is removed from a particular location on the surface followed by formation of new bone at the same site which eventually strengthens through the addition of calcium and phosphorous (i.e. mineralized). [6]

By way of increased loading during exercise bones gradually become stronger and denser however the exercise regimen must be well controlled. When repetitive stresses routinely exceed the ability of the bone forming cells (i.e. osteoblasts) to sustain adequate metabolic activity in response to the demands of rigorous loading schedules an increased risk of fatigue or "stress" fractures is inevitable. [7]

Stress fractures are all too commonly observed in young racehorses as a result of repetitive overloading of the immature musculoskeletal system where many

trainers have disregarded the required gradual strengthening phase prior to the return of grueling training or racing sessions.

As several studies in a number of countries have illustrated, the most common cause of "wastage" in 2-year olds in training is dorsal metacarpal disease (DMD), more commonly referred to as shin soreness or "bucked shins".

Technically bucked shins are bilateral fatigue fractures of the third metacarpal bones. While some investigations have reported shin soreness to occur in as many as 90% of 2-year old Thoroughbreds in race training, other estimates are for the most part lower (20% - 70%) principally as a result of geographic location where training methodologies can vary substantially. [8], [9]

This painful forelimb affliction is characterized by temporary lameness and localized soreness over the dorsal cortex of the third metacarpal bones accompanied by swelling and a reluctance to work at speed. [10]

While many trainers believe that the development of bucked shins is a prerequisite for toughening the young Thoroughbred's cannon bones this is certainly not the case, particularly in the US, Australia and New Zealand where 2YO racing is more prevalent and dirt tracks prevail. In fact, the exact opposite is true; this condition is a symptom of acute and continuous overloading during workouts where the bone is incapable of responding quickly enough for normal repair to occur.

"Bucked shins (also known as "shin soreness") can also be regarded as bone modeling gone wrong (see X ray on page 86).

This painful condition is extremely common in young racing Thoroughbreds and Quarter Horses (and occasionally Standardbreds) worldwide.

As expected, with the onset of galloping exercise, additional bone is deposited on the front portion of the cannon bone--which should ultimately result in improved bone strength.

However, early on this new bone appears to be prone to microfractures similar to the stress fractures that can occur in human athletes during training." [11]

In other words, this is abnormal bone growth resulting from cyclic limb overloading which ultimately questions the ability of 2-year old Thoroughbreds to adapt adequately to the rigors of training and racing.

Additionally, this condition is not restricted to 2-year olds but also occurs regularly in 3-year olds. [12] By the age of four and older however bucked shins are not a common occurrence further suggesting a casual relationship between the high incidence of injury and wastage rates observed in the population of young racehorses and the stage of development of their immature bones.

Of particular relevance in terms of the incidence of bucked shins is the type of track and training regimen the young horse is exposed to.

“Surveys indicate that the risk of metacarpal remodeling in horses (and greyhounds) is influenced by the track surface (moisture content and compaction) and design (banking and length of straight gallop), radius and crossfall of bends and end circles, seasonal conditions and the speed and distance of fast exercise in the training program (Ireland, 1998; Bailey, 1998; Table 1).” [13]

As shown in Table 3, there is a profound difference in the incidence of DMD when a more forgiving surface (e.g. turf), longer pre-race preparation and wide radius and straight line gallops are employed in lieu of hard dirt, tight radius turns and insufficient race preparation as is typical in the US and Australia.

TABLE 3.

Incidence and reasons for occurrence of dorsal metacarpal disease in the UK, US and Australia [14]

Country	Incidence (%)	Training Influence
United Kingdom	9-17	Soft training surfaces, on peat moor areas, straight line gallops, long pre-race preparations (12-14 weeks) – low risk of bone strain and adequate time to adapt.
United States	65-70	Dirt tracks, some banking and tight end circles, 10-12 weeks ace preparation – increased bone stress and less time to adapt.
Australia	60-80	In Australia, most horses are trained on circle racetracks. Dry hard track surfaces, small radius bend(s) in tracks, no banking, 8-10 weeks race preparation – high risk of bone strain and overload, little time to adapt to racing speed with a too-fast-tooearly program.

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Clearly the training methods typical of the UK promote gradual incremental loading of the bone at controlled strain loads that allow remodeling to occur at a defined pace with more time to adapt to racing speeds.

“If a horse is pushed too fast too early, the stress loading on the immature bone stimulates emergency modeling with deposition of weaker fibrous elastic bone to reinforce the bone so that it can withstand the forces of galloping.” [15]

Without a proper training schedule to permit controlled remodeling, the rate of new bone growth cannot be sustained in response to exercise meaning that when the bone is loaded there is a high risk of fracture.

This is clearly observed for the North American and Australian methodologies where, at the extreme, the incidence of bucked shins can be as much as eight times as high (i.e. - 10% in the UK versus - 80% in Australia).

Apart from bucked shins, this further suggests that the large difference in injury and breakdown rates observed between the UK, for example, and North America can be attributed to the unnecessary rigorousness of NA training regimens.

However bucked shins are by no means the only injury that plagues the young horse; a plethora of other ailments arise that can lead to debilitating problems ranging from joint, tendon and other musculoskeletal issues to cardiovascular degeneration.

Several studies have indicated that overly strenuous exercise in the 2-year old horse may contribute to the development of chronic degenerative joint disorders. One such undertaking endeavored to correlate the effect of persistent exercise with changes at the molecular level in the articular cartilage of the joints.

Results of this research supported the premise that characteristic training regimes are sufficient enough to trigger a disturbance in the physiological and biochemical development of the collagen network in a joint. [16]

In essence, this disruption in collagen formation was found to have the potential of initiating micro-damage as evidenced by lesions and wear and tear lines on the proximal phalanx of the metacarpophalangeal (MCP) joint, ultimately a predisposing factor to the development of degenerative joint disease. [17]

Yet another study regarding the integrity of the fetlock joint (i.e. the MCP) examined the relationship of the high incidence of injuries to the soft tissues and joints in the distal forelimbs observed in 2-year old horses and the immature musculoskeletal structure as a function of joint stiffness and shock absorption.

Statistical analysis of the data based on the "dorsi-flexion" - backward bending of the fetlock joint - suggested that the tissues and skeletal structure supporting the forelimbs of 2-year old Thoroughbred horses are not sufficiently mature to withstand the cyclic strain experience during race training. [18]

What this study demonstrated was the comparably lower stiffness in the suspensory apparatus tissues in younger horses which is believed to be associated with a measurable decrease in shock absorption ability relative to older Thoroughbreds. Reduced shock absorption will have the effect of increasing the degree and rate of limb loading in the 2-year old horse.

As a result of alteration of the material and mechanical properties of bone in response to overloading, the bones become more brittle and less stiff thereby predisposing the immature musculoskeletal structure to increased risk of fatigue fractures in consequence of the greater bending loads imposed upon the forelimbs. [19]

"In conclusion, forelimb injuries have been shown to decrease with age, maturation, adaptive bone remodeling and adaptation through exercise which all serve to increase the stiffness and toughness of skeletal tissues..... Our findings suggest that 2-year old Thoroughbreds may be too immature to train safely according to traditional regimens." [20]

Tendon and ligament injuries also tend to be a widespread cause of lameness in 2-year old performance horses as a result of inappropriate training or excessive work.

One such common condition that afflicts the young Thoroughbred is the development of "bowed tendons". A bowed tendon (tendonitis) can be described as follows:

"Each tendon is an elastic belt made of thousands of individual fibers, and damage may range from the rupture of only a few tendon fibers to the rupture of the entire tendon. Bleeding from severed fibers into the interior of the tendon causes the tendon to swell. As a digital tendon swells, it bows outward behind the cannon bone--hence the term bowed tendon." [21]

The broad-spectrum cause of this condition in the young horse can be ascribed to severe strain induced by disproportionate loading of the immature musculoskeletal structure.

A bowed tendon is a devastating injury which requires long periods of rest typically anywhere from 6 months to a year and as a rule less than 50% of horses suffering from this condition return to the track to resume successful careers.

[22]

While the pivotal concern of racing 2-year olds is focused on the robustness of the musculoskeletal system, the cardiovascular, respiratory and gastrointestinal health of the young Thoroughbred is also challenged by the rigors of established training programs according to the literature (e.g. atrioventricular valvular regurgitation, pulmonary bleeding, gastric ulceration).

The results of this research together with myriad anecdotal evidence of other afflictions precipitated by imprudent training and racing schedules are by and large suggestive of exploitation in the name of profit at the expense of the horse.

Nonetheless, regardless of what opposing delegates of the argument value in the assessment of whether racing should begin at the tender age of two, what seems fundamental in determining the consequences of traditional training schedules is the wear and tear on the overall immature circumstance of 2-year old horses and the need for a viable and honest assessment of the capacity to tolerate the unwarranted demands put upon them to perform.

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[1] [http://kb.rspca.org.au/What-is-the-RSPCA-position-on-racing-two-year-oldhorses\\_376.html](http://kb.rspca.org.au/What-is-the-RSPCA-position-on-racing-two-year-oldhorses_376.html)

[2] [http://vip.vetsci.usyd.edu.au/contentUpload/content\\_2713/Sullivan.pdf](http://vip.vetsci.usyd.edu.au/contentUpload/content_2713/Sullivan.pdf);  
<http://www.thehorse.com/ViewArticle.aspx?ID=72>

- [3] <http://en.engormix.com/MA-equines/health/articles/bone-biomechanicsreview-influences-t311/p0.htm> [4] Ibid.
- [5] <http://www.eurekalert.org/features/doi/2003-04/danl-mbr041603.php>
- [6] <http://www.thehorse.com/ViewArticle.aspx?ID=3673>
- [7] [http://www.healthhoof.com/bone\\_remodeling\\_equine\\_limb.html](http://www.healthhoof.com/bone_remodeling_equine_limb.html)[8]  
<http://animalscience.tamu.edu/images/pdf/equine/equine-scientificprinciples.pdf>
- [9] <http://igitur-archive.library.uu.nl/student-theses/2009-0225201822/UUindex.html>
- [10] <http://www.wfu.edu/~rossma/Fetlock.pdf>
- [11] <http://www.thehorse.com/ViewArticle.aspx?ID=3673>
- [12] [http://vip.vetsci.usyd.edu.au/contentUpload/content\\_2713/Sullivan.pdf](http://vip.vetsci.usyd.edu.au/contentUpload/content_2713/Sullivan.pdf)[13]  
<http://en.engormix.com/MA-equines/health/articles/bone-biomechanicsreview-influences-t311/p0.htm> [14] Ibid. [15] Ibid.
- [16] [http://vip.vetsci.usyd.edu.au/contentUpload/content\\_2701/Reed.pdf](http://vip.vetsci.usyd.edu.au/contentUpload/content_2701/Reed.pdf)
- [17] Ibid.
- [18] <http://www.wfu.edu/~rossma/Fetlock.pdf>
- [19] Ibid.
- [20] Ibid.
- [21] <http://www.thehorse.com/viewarticle.aspx?ID=3426> [22]  
<http://itoba.com/vetinjuries2.html>

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#### **PART 4 — WHAT RACING PEOPLE SAY: FACT OR FICTION?**

WHAT has been emphasized repeatedly is the notion that conditioning prior to skeletal maturity in the young racehorse is vital to the development of soundness and strength. No question about it.

However as has also been identified there is the fundamental requirement for an appropriate training and racing regimen that precludes unnecessary and debilitating trauma.

In the current Thoroughbred racing prototype, particularly so in North America, the goal is to take advantage of every possible opportunity whether that be through the exploitation of young horses, the use of pain-numbing medications that continue to allow the injured horse to race and of course the incessant inbreeding and over-breeding in pursuit of the next sensation on the track.

It is not surprising then that racing interests insist that rigorous training and racing of young horses is actually of benefit to their immature musculoskeletal systems.

Time and again this excuse is given to justify their standpoint on 2-year old Thoroughbreds. But of course, this is to their own advantage seeing as time is money in the lexicon of the racing world.

And sure enough the racing industry has addressed this issue with their own statistical analysis to evidence the advantages conveyed to these horses.

As always then the question arises as to whether these statistics and the analysis of the data are without compromise. Much of the time these studies are flawed in some way, whether through omission of data or simply inexact conclusions.

*As the saying goes – "torture numbers and they'll confess to anything."  
~ Gregg Easterbrook*

Several studies have focused on the long-term soundness of Thoroughbreds that were worked as 2-year olds to determine whether these horses are in fact predisposed to higher incidents of injury and/or prematurely shortened racing careers.

Two such surveys were undertaken in 2008, one in New Zealand that examined the Australian 1995 foal crop and the other in North America by The Jockey Club using one-year windows at five-year intervals from data sets for the years 1975 through 2000. [1], [2]

## **1. THE AUSTRALIAN STUDY**

Information from an article entitled "The Wait for Age Riddle" authored by Renee Geelen lends some interesting insight as to the veracity of training and racing 2-year olds to enhance and strengthen their musculoskeletal structures compared to those horses who are not raced until after the age of two. Selected data from this analysis is shown in the following charts and tables.

FIGURE 4. Average Seasons Raced Versus Number of Starts at Age 2 [3]

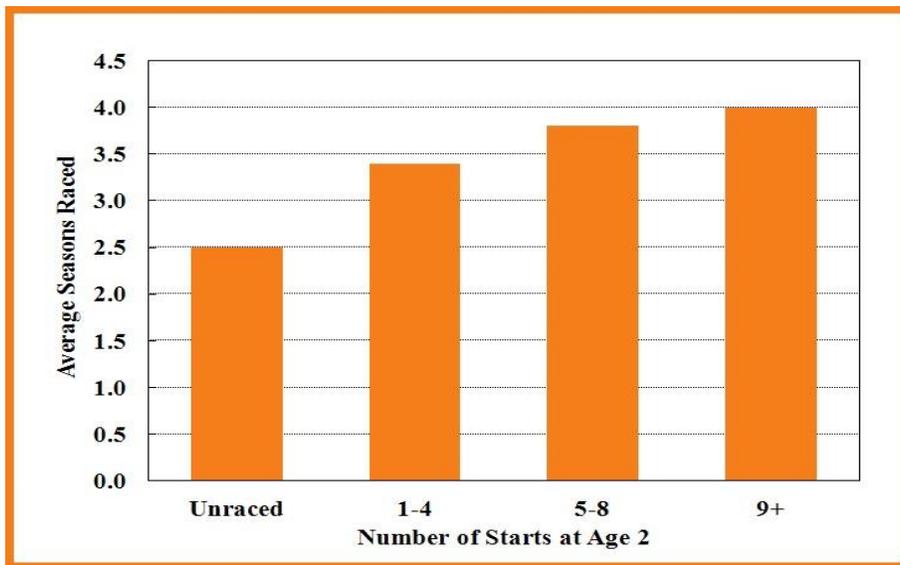
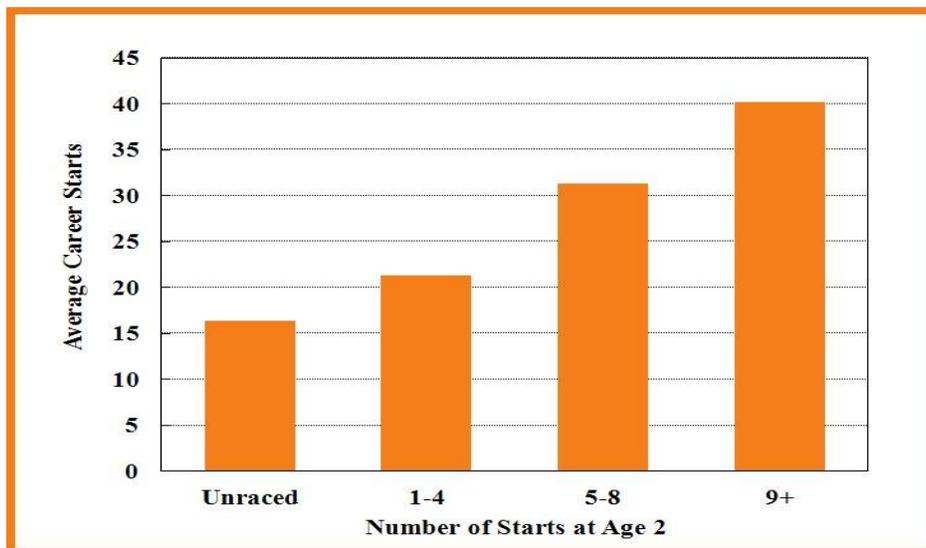


FIGURE 5. Average Career Starts Versus Number of Starts at Age 2 [4]

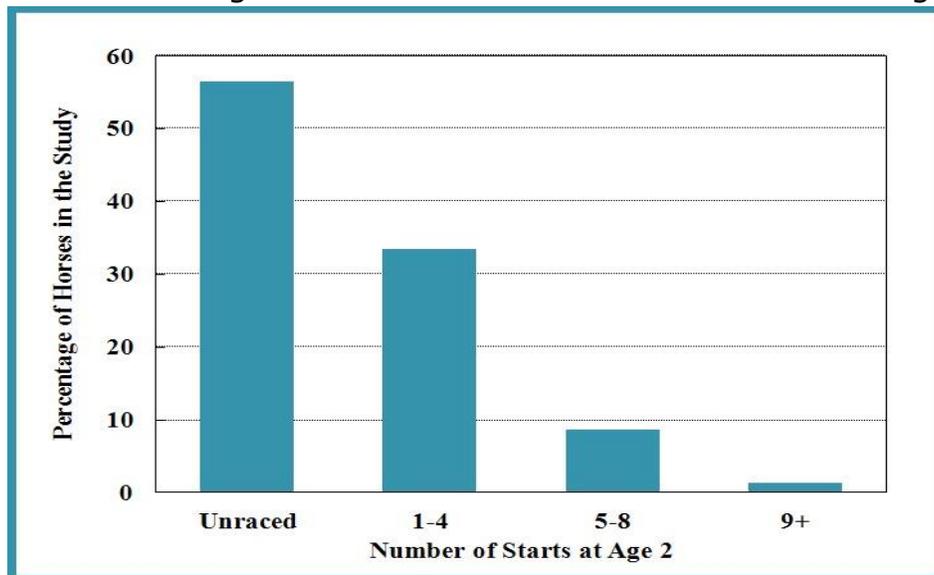


The charts in Figures 4 and 5 suggest that horses who have the most number of starts at the age of two tend to have longer racing careers than those who have fewer starts which supports the hypothesis that higher levels of training and racing contribute to more robust skeletal structures. In other words the higher the number of starts a horse makes at age 2 the longer their career spans and the higher the number of overall starts the horses makes over the length of their career.

However, as shown in Figure 6, on closer inspection it is clear that the greater majority of the horses (~ 90%) in the study had less than 4 starts at the age of 2 with the majority of these horses having been unraced at this age (56%); only

10% managed to compete in 5 or more races during their 2-year old career and a mere 1% raced more than 9 times.

FIGURE 6. Percentage of Horses Versus Number of Starts at Age 2 [5]



What then does this imply?

In the article Geelen plainly identifies the intrinsic ability of any given horse as the determining factor of success on the racetrack. [4]

As in any other sport there is range of ability that sets some athletes apart from others. Therefore one would naturally expect lower performance horses to compete in fewer races.

Is this the case for the seemingly longer careers observed for horses who were worked more rigorously as 2-year olds? Table 1 would certainly suggest so.

TABLE 1. IMPACT OF ABILITY ON THE NUMBER OF SEASONS RACED [6]

SEASONS OF RACING	WINNERS		PLACED		UNPLACED	
	Number	% of Total	Number	% of Total	Number	% of Total
1	233	4.1	297	20.8	1,621	54.2
2	1,002	17.7	625	43.7	1,128	37.7
3-5	3,696	65.2	504	35.2	241	8.1

6+	737	13.0	5	0.4	0	0
Total	5,688		1,431		2,990	

What these numbers elucidate is that the original data is unmistakably skewed by ability. [7]

Clearly 92% of those horses that did not place only raced for 1 (54.2%) or 2 (37.7%) seasons while 78% of stakes winners had 3 or more seasons of racing behind them [i.e. 3-5 seasons (65.2%) and 6+ seasons (13%)].

Otherwise stated, horses with the highest ability are apt to race for longer periods of time simply from a monetary perspective. Those who show less promise early in their careers are not as likely to continue racing for extended lengths of time simply for the reason that they are turning no profit. Moreover a look at the data for stakes-performers-only, taken from the same article, further corroborates this premise of ability over conditioning.

As shown in Table 2 and Figures 7 and 8 the data collected in this study clearly infer that preparation of the young racehorse has little to do with career success, rather it seems, on the whole, it is more so related to a horse's ability.

TABLE 2. NUMBER OF SEASONS RACED: STAKES PERFORMERS ONLY [8]

Number of Starts at Age 2	Number of Horses	% of Total	Average Seasons of Racing	Average Career Starts
Unraced	88	22	4.5	41
1-4	176	44	4.7	36
5-8	115	29	4.3	35
9+	23	6	4.6	44

FIGURE 7. Average Seasons of Racing for Stakes Performers Versus Starts at Age 2 [9]

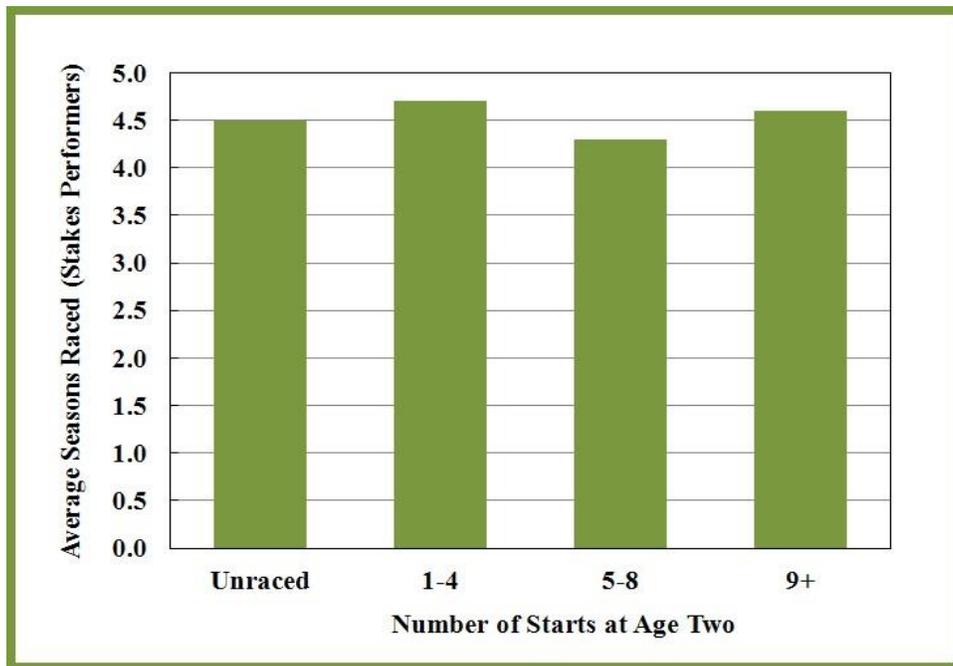
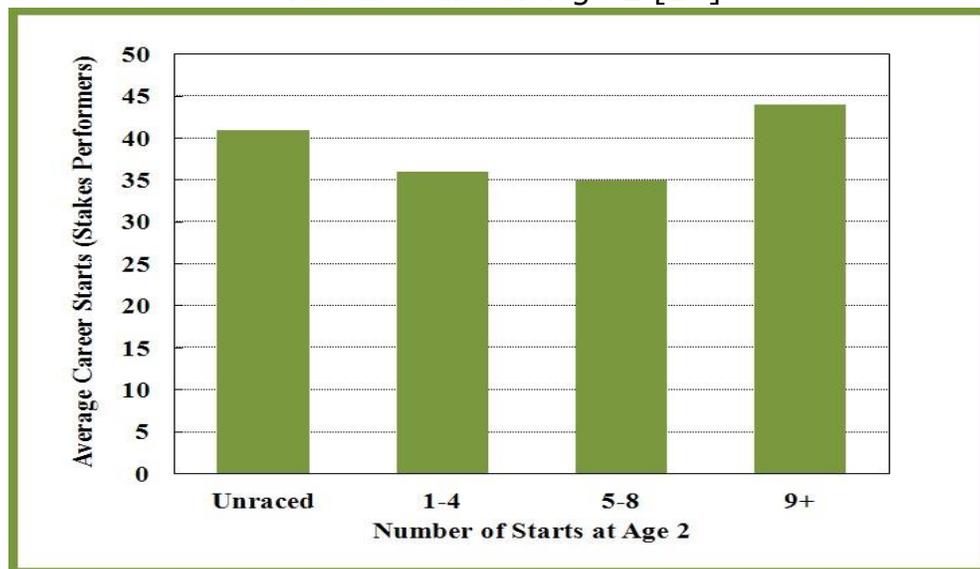


FIGURE 8. Average Career Starts for Stakes Performers Versus Starts at Age 2 [10]



As these figures explicitly demonstrate, early entrance to training as a 2-year old has no effect on either the average number of seasons raced or the average career starts of horses with given ability, as shown by stakes performances.

No significant differences are observed for either of these statistics regardless of whether a horse was unraced at the age of 2 or whether a horse had raced in excess of 9 times as a 2-year old. What this decisively communicates is that the

success of a racehorse, given the required and appropriate training regimen, is a function of the aptitude of the horse, not the age at which they first begin racing.

In consequence of the "stakes-only" horses analysis, what the original study's intentions were in proving out the potential benefits of early training and racing now become debatable.

## **2. THE NORTH AMERICAN JOCKEY CLUB STUDY**

According to The Jockey Club's Thoroughbred Safety Committee, a study on the racing of two-year-olds was initiated to refute the belief held by the "ill-informed" that racing horses at the age of two predisposes them to increased risk of injury, unsoundness and prematurely shortened racing careers.

"We believe that the charges must be addressed based upon data not opinion. Therefore, for the information that we examined our conclusions are rooted in the pragmatic "the data shows" rather than the dubious 'we believe.' " [11]

The evaluation was carried out using one-year window data at five-year intervals for the years 1975 through 2000 inclusive.

Horses were placed into one of two categories; (1) raced as two-year olds and; (2) raced but not as two-year olds and the following data sets examined:

- Average starts per starter – lifetime (Figure 9)
- Average lifetime earnings per starter (Figure 10)• Average earnings per start (Figure 11)
- Percent stakes winners from starters (Figure 12)

[FOR FIGURE CHARTS 9, 10 AND 11 SEE NEXT TWO PAGES]  
FIGURE 9. Average Starts Per Starter: Lifetime [12]

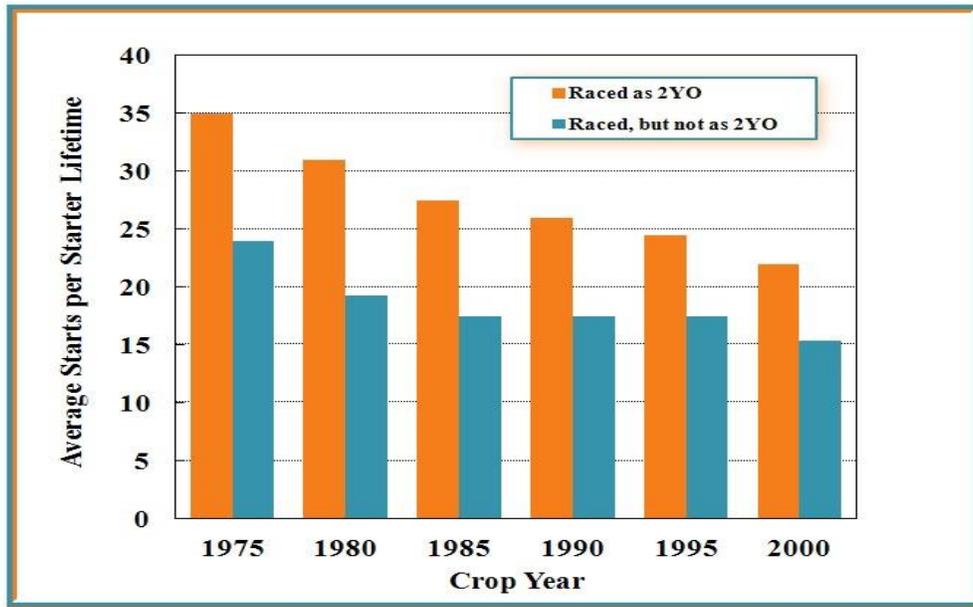
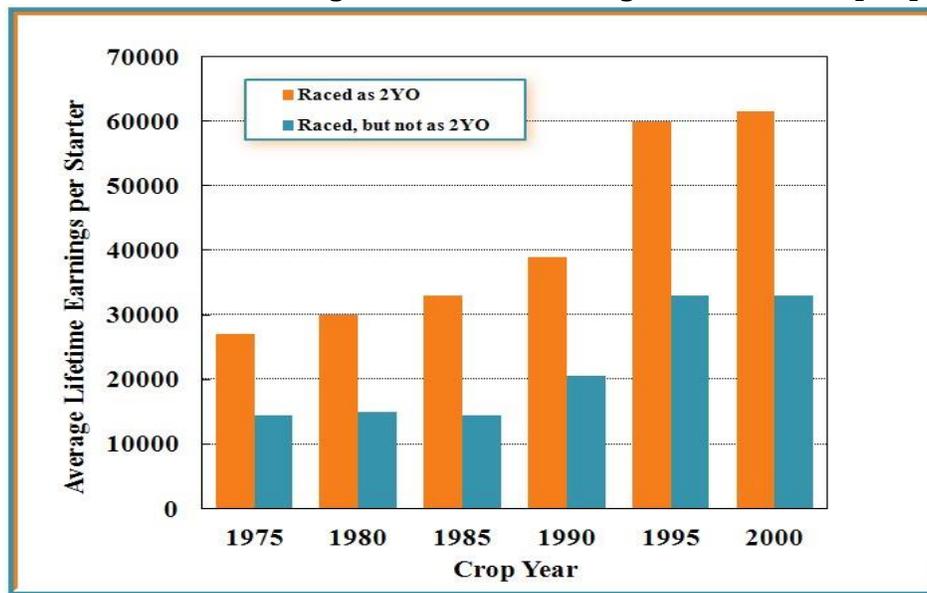
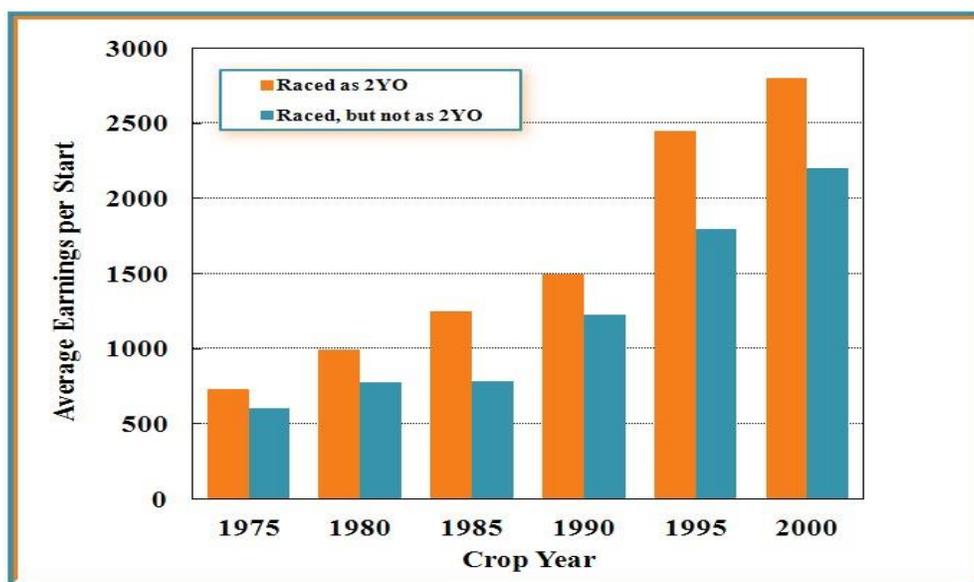


FIGURE 10. Average Lifetime Earnings Per Starter [13]



[CONT'D NEXT]

FIGURE 11. Average Earnings Per Start [14]



Upon inspection there is clearly a trend in the data that presumably supports the premise that horses who begin their racing careers at the age of two are more successful, have longer careers and are less prone to injury.

As Figures 9 through 12 demonstrate, in each and every case, horses who raced as 2-year olds had seemingly longer careers and were more successful on the track. But is this a fair assessment?

In reality what this data does not show, contrary to what the Jockey Club claims, is whether or not horses raced as two-year olds are less prone to injury; in the article this conclusion was arrived at by extrapolation, not factual data. How many 2-year olds sustained career or life-threatening injuries during training and/or racing and are therefore not included in the "head count"?

Moreover, instead of comparing only the number of starts, exactly how long did these horses race? How many were retired to the breeding shed after racing as a three-year old? No doubt these horses account overwhelmingly for career earnings.

Did some of the unlucky ones that didn't race at two simply not make the grade or suffer career ending injuries only to be expediently loaded onto the meatman's truck for the arduous journey through the slaughter pipeline?

Skewed distributions can lead to misleading statistics, since the skewed distribution can drive an average up or down.

For example, the average income of a given population (e.g. group of horses) may be low, but a handful of people (e.g. talented horses) might have high earnings, which skew the average income of the population upward. Hence badly skewed data can lead to erroneous conclusions.

More to the point, just as with the New Zealand study, is this apparent advantage truly a function of the benefits derived as a result of racing as a two-year old or is it conceivably due to ability or other factors not included in the data?

In other words, are Thoroughbreds that start racing at the age of two simply better athletes?

Categorically the ability factor is a key contributor to skepticism of the survey as was shown with the New Zealand study. Secondly, there is no question that in North America, purses are generally highest for two and three year old races. Together with the ability factor this would help explain the higher average lifetime earnings for horses that raced as two-year olds.

Furthermore, stakes graded races (Grade I, II and III) for large purses, such as those leading up to and including the Triple Crown or the Breeders' Cup for example, use pre-defined selection processes and ranking hierarchies based on past performance of the horse.

Each horse is assigned a point value based upon their best performance in the 24 months before and after the race, including performance in the renewal of the race under consideration. [17]

Obviously for 3-year old races, racing as a 2-year old will no doubt increase the odds of earning a berth as a contender particularly for those horses who demonstrate ability – a powerful incentive to start a horse as a 2-year old.

Given that many Thoroughbreds do not race past the age of five due to injury or poor performance on the track while others are retired to the breeding shed at three is it any wonder why horses racing as two-year olds have higher career earnings?

“Most racehorses are retired by the end of their fourth year due to injury, chronic illness or an inability to win in higher classes.” [18]

After all, an extra year of racing represents half of the horse's career after the age of three and a third of their career by the end of their fourth year – a definitive advantage in terms of potential earnings.

In any case, those that earn the honor of retiring to be bred at the age of 3 have, without doubt, turned vast amounts of profit for their owners compared to the average horse. Needless to say, the greater majority of these superstars raced as 2-year olds.

Another piece of data that is missing from the survey is the actual number of horses in each of the categories and if those numbers changed over time; it is well known that large variations in sample sizes when comparing data can complicate interpretation (e.g. how big is the sample size compared to the population size?).

What was the relative proportion of horses that raced as two year olds in 1975 compared to those that did so in 2000. Anecdotal evidence suggests that two year old racing today is far more prevalent than it was 30 years ago.

If this is the case does this lend credence to the idea that aptitude prevails over early entry to a racing career such that in 1975 for example, only the most precocious horses raced as a 2-year old based on their superior ability.

Moreover, by and large, in North America's current business enterprise of racing the majority of horses start their careers as two-year olds primarily by reason of return on investment. And so in today's racing climate since most horses begin their career as two year olds could this information conceivably alter the outcome?

Again, is ability the factor contributing to the results of the data analysis?

In any case, none of these questions is addressed - conveniently, it seems. A number of facts that could potentially confound the data have been cleverly omitted. But then again, this is the only data available for public scrutiny so what else can be expected?

Considering the nature of statistics and ease of data manipulation in combination with factors not included in this assessment is this data skewed?

What it does not explain is the seemingly forthright survey evidence that cites the high incidence of breakdowns during the preparation of young horses for 2year old races and the myriad issues that plague their immature musculoskeletal systems.

Where is this information and how would this affect the results?

Perhaps this opposing assessment of The Jockey Club data is too harsh? You be the judge.

But then again,

"Racing's inability to balance its books was a singular inspiration for an entire book about the game's statistical history. Richard Sowers, one-time turf writer for the Louisville Courier Journal, published 'The Abstract Primer of Thoroughbred Racing' in 2004.....In few sports have our mythic performers been simply that – mythic – because of the lack of truly meaningful data that made valid comparisons possible." [19]

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[1] <http://www.dekabat.com/UserFiles/file/waitAge.pdf>

[2] <http://www.grayson-jockeyclub.org/resources/Vol%2025-no%203.pdf> [3]  
<http://www.breedingracing.com/pdfs/89/Archive%20editorial/waitAge.pdf>

[4] Ibid.

[5] Ibid.

[6] Ibid.

[7] Ibid.

[8] Ibid.

[9] Ibid.

[10] Ibid.

[11] <http://www.grayson-jockeyclub.org/resources/Vol%2025-no%203.pdf> [12]  
Ibid.

[13] Ibid.

[14] Ibid.

[15] Ibid.

[16] <http://www.toba.org/graded-stakes/races.aspx> [17] Ibid.

[18] [http://www.horseracingkills.com/4\\_1.html](http://www.horseracingkills.com/4_1.html)

[19] <http://www.drf.com/news/10-most-unbreakable-records-racing>

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## **PART 5 — THE VERDICT: TRAINING REGIMENS TOO MUCH, TOO SOON?**

It has been sometime now since Barbaro's ill-fated breakdown during the 2006 Preakness and Eight Belles was euthanized on the track following her epic race at Churchill Downs during the 2008 Kentucky Derby.

These and other high profile incidents have added fuel to the debate as to whether racing two-year old horses is a prudent decision.

In light of all the other factors involved - drugs, inbreeding, slaughter reality and overall exploitation of the Thoroughbred - what then is the answer to this controversial topic?

Much of the literature cites a proper training regimen as the key to reducing injury and catastrophic breakdowns in two and three year old horses although there is no defined consensus on what that should entail.

Indeed the science of bone growth and remodeling is well understood however the degree to which immature musculoskeletal systems can be pushed to extreme limits as experienced during a racing event is less than explicit.

Clearly there is much needed research to lend insight to the high incidence of lameness in the young horse and the causal relationship between injury and training methods.

What is unambiguous is that the duress the young Thoroughbred is subject to on the racetrack requires soundness that can only be achieved through appropriate training and conditioning.

And to be clear, there is no question that exercise builds a robust skeletal structure, just as in humans, but let's face it, this argument gets pretty stale after a while.

Years ago horses did not race at the age of two but rather trained for celebrated three year old venues; catastrophic breakdowns and injuries were fewer and the typical horse made significantly more starts than horses today.

Of course, especially in North America, this stems primarily from breeding for speed rather than soundness and stamina together with the emphasis on "futures" racing - races typically for two-year-olds, in which the entrants are selected long before the race is run, sometimes before the birth of the foal.

Moreover, most jurisdictions in the US require that a horse "break maiden" (i.e. win a race) before their fourth birthday such that virtually all Thoroughbreds are training and racing long before they are physically mature.

Nonetheless, statistics aside, it is not whether some Thoroughbreds race from the time they are two until they reach the age of five but more so the amount of "wastage" that equates to those who don't.

These statistics are far and few between. Today more than ever money is the name of the game.

While “old-time trainers” may send horses to their home stables for breaks during the racing season, some trainers will race horses year-round, he said. “Because of the cost of maintaining race horses and buying yearlings, owners want them to race.” [1]

In retrospect the answer seems crystal clear - the fundamental cause of lameness and high wastage rates in the young Thoroughbred is over-training by unscrupulous trainers.

In any case, the sad reality of the horse racing industry is the profoundly loathsome and sobering fact that the average life span of the horse is upwards of 25 years yet the average racehorse is lucky to survive until the age of 7; prematurely entering and finishing a short career, often euthanized or worse, the grim certainty of the slaughter pipeline.

However, racing authorities would like the public to believe otherwise as it is in their best interest to convince us all of their seemingly good intentions.

This includes the notion that the demanding training and racing regimens are a necessity of conditioning when in fact it seems a pretense for the exploitation of young horses all in the name of money and return on investment.

As much as most would love to see racing return to the glory it once was, there are simply too many flaws that have paved the way to its tarnished reputation – drugs, over breeding, inbreeding and zealous greed embodying realms of wealth so removed from the norm it befits sin.

The horse racing industry seems to struggle in their quest to explain the rash of life-ending injuries and until they face the dilemma into which they have so intricately wound themselves how possibly can they continue to defend such immeasurable feats they have asked of their athletes?

*Racing babies - fitting or detrimental?*

It is exceptionally sad that we need even entertain the idea.

END

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[1] <http://www.columbiamissourian.com/stories/2008/06/10/alming-horseracing-controversy-surrounding-eight/>

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