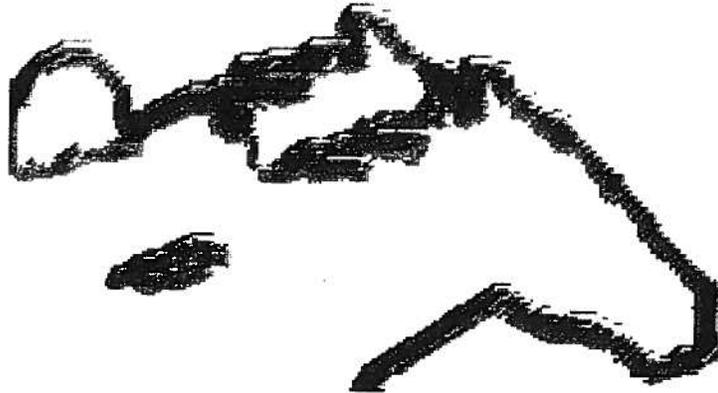


VETERINARY MEDICAL DIAGNOSTIC PROGRAM



Conducted for the
Oklahoma Horse Racing Commission
January 2005 - December 2005



Oklahoma Animal Disease Diagnostic Laboratory
Stillwater, OK
March 2006



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Introduction

This report summarizes the racehorse submissions and diagnostic findings of the Veterinary Medical Diagnostic Program for the period starting January 1, 2005, and ending December 31, 2005.

The Veterinary Medical Diagnostic Program is the result of an alliance formed between the Oklahoma Horse Racing Commission (OHRC) and the Oklahoma Animal Disease Diagnostic Laboratory (OADDL). This program, initiated in 1997, serves 1) to investigate and document the types of injuries sustained by horses involved in horse racing and in race training related activities on racetracks that fall under OHRC jurisdiction; 2) to monitor this population of migrating horses for the presence of any epizootic disease(s) that may pose a threat to Oklahoma's horse industry; and 3) to evaluate the overall effects of all other aspects (including diet and stress) of racing and race training on the health and wellbeing of Oklahoma's racehorses.

All horses that die or must be humanely euthanized on any of the four Oklahoma racetracks that fall under the OHRC jurisdiction are submitted to OADDL for a comprehensive necropsy examination. Results are reported to the OHRC office in Oklahoma City with a copy to the Official Veterinarian at the submitting racetrack. The necropsy examination includes: 1) a complete necropsy and gross examination of the carcass; 2) a thorough examination of all injuries, including an analysis of pre-existing conditions that may have led to the occurrence of the injury; 3) microbiology testing of cases in which infectious diseases are suspect; and 4) toxicological testing as indicated by necropsy findings or as requested by OHRC.

For the calendar year 2005, a total of fifty-three horses were submitted to OADDL under the Veterinary Medical Diagnostic Program. A summary of OADDL's necropsy findings follow.

Submissions

A total of fifty-three horses from Oklahoma racetracks were submitted to OADDL for examination during the calendar year 2005. Table 1 shows the distribution of submissions from each racetrack, sorted by month.

Table 1: Monthly Distribution of Case Submissions for 2005

Track*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
BRD		3	2	2	3		1	2	4	6			23
FM					1		4						5
REM			1	3	3			5	6	5	1		24
WRD												1	1
Totals	0	3	3	5	7	0	5	7	10	11	1	1	53

*BRD = Blue Ribbon Downs; FM = Fair Meadows; REM = Remington Park; WRD = Will Rogers Downs

The 2005 calendar year represents an increase of twelve horses from the previous reporting period (January through December 2004). The increased submissions came from Blue Ribbon Downs which had six additional submissions and Remington Park which had eleven additional submissions compared to the previous reporting period. Fair Meadows had six less submissions than the previous year. The decrease in fatal injuries from Fair Meadows is not as dramatic as the numbers suggest. There were three horses injured at Fair Meadows which were then taken to Blue Ribbon Downs or Remington Park for medical attention. When therapeutic measures failed and the horses were euthanized, the submissions appear on the records as originating at those tracks rather than the track where the injury occurred. The major differences with Remington Park submissions were for September and October when eleven fatal injuries occurred compared to only two submissions for the same time period the previous year. A review of this increased injury rate would need to take into account the number of race days for each year and the type of races occurring during that time.

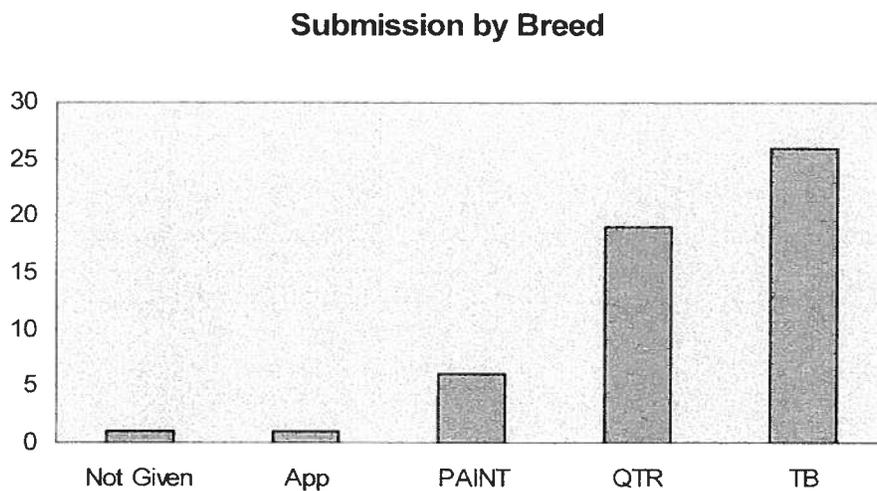
The submission from Will Rogers Downs is the first in several years. Since racing was not occurring at Will Rogers Downs, the track was not operating under the jurisdiction of the OHRC, so any deaths occurring at the track were not submitted under this necropsy program.

The majority of the submissions occurred during the summer and early fall which is different from last year when most of the injuries occurred in late spring and during the summer. This may be just a reflection of changes in race days. Similarly, when comparing injuries by racetrack, one needs to take into account the number of races, number of entrants per race, the number of Thoroughbred versus Quarter Horse races and the age distribution of the horse population on the racetrack and in the races. Generally, there is a higher incidence of injuries among Thoroughbreds during racing and race training than with the Quarter Horses. Part of this is a reflection that the Thoroughbreds spend more time at racing speeds than the Quarter Horses, and Thoroughbreds workout at higher speeds in training than the Quarter Horses. Also horses that are just entering

racing or race training have a higher incidence of catastrophic injuries and disease than more mature four- and five-year-old horses.

Figure 1 shows the submissions by horse breed. As typical of most years, the majority of the fatal injuries were Thoroughbred horses. Last year there were almost twice as many Thoroughbred injuries compared to Quarter Horse injuries. This was an abnormally high ratio but may have been a reflection of fewer race meets for the Quarter Horse. As noted earlier, one would expect the Thoroughbred horses to have a higher incidence of catastrophic injuries.

Figure 1: Case Submissions Based on Horse Breed



The distribution of racehorse submissions based upon age is shown in Figure 2. For 2005 practically all the fatal injuries were in two-, three- and four-year-old horses. The other ages affected were miniscule. This is the first reporting year that we have seen an almost identical number of four year olds affected as two and three year olds. As always, it is difficult to draw serious conclusions from this data without knowing the age distribution for all horses in race training on all racetracks under the jurisdiction of the OHRC. It is reasonable to expect that the majority of the horses in race training on Oklahoma racetracks are two, three and four year olds.

Figure 2: Case Submissions Based on Age of the Horse

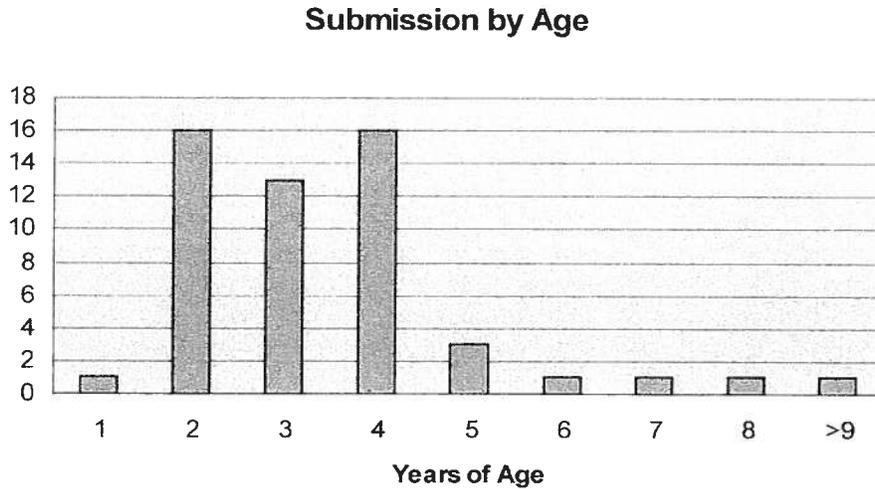


Table 2 shows the distribution of the horses' ages related to the horses' activity at the time of catastrophic injury or disease. This table gives more insight into Figure 2. Results from previous years and the experience of other states' racehorse injuries, the two- and three-year-old horses have the most catastrophic injuries and diseases. This is to be expected as a young horse enters race training. There is no way to get the horse's skeletal system ready for the rigors of racing than repeated training periods at or near racing speeds. This intense training will sometimes result in a catastrophic injury to the young horse. The intense training requires a much higher protein and carbohydrate diet than was necessary on pasture. This change in diet puts the young horse at a higher risk for developing colic or resulting laminitis. Also the young horses that are brought off the farm to training facilities are now subjected to more infectious diseases from an ever changing population of horses.

Table 2: Distribution of Injury Activity by Age of the Horse

Age Yrs.	Racing	Training	Non-exercise	Accident
1			1	
2	6	6	4	
3	9	1	2	1
4	10	2	3	1
5	2	1		
6			1	
7	1			
8			1	
>9			1	
Totals	28	10	13	2

Interestingly, Table 2 reveals much fewer training injuries than racing injuries. From other studies, Thoroughbred horses have shown almost equal numbers of catastrophic injuries training as racing while the Quarter Horse suffers very few fatal injuries training. Since Figure 1 shows an almost equal number of combined Quarter Horse, Paint and Appaloosa horses, (all short distance runners), as Thoroughbred horses, one could reasonably expect less injuries training than racing. Race year 2005 has six more race training injuries than 2004 despite roughly the same number of Thoroughbred horse injuries. As stated earlier, Thoroughbred horses typically have more training injuries than the Quarter Horse since the Thoroughbred trains more often and longer at racing speeds. One explanation is that the Thoroughbred horses were being trained at facilities not under the jurisdiction of the OHRC and only came to the racetrack immediately prior to the race event. Another, but more unlikely explanation is that Thoroughbred horses in Oklahoma receive less race training than Thoroughbred horses in other states.

The non-exercise injuries include the colics, pneumonias, founders and other infectious type maladies. There were the same numbers of non-exercise related problems for 2005 as 2004.

A fourth category, "Accident", was re-instated for the 2005 report. This group of horses represents those suffering a fatal injury due to some type of a "one-of-a-kind" incident or "accident". This represents those horses that got loose and ran into some object or reared and fell causing a fatal injury. It seemed more logical to break out this category than to combine these injuries with race training or non-exercise. For this reporting period, both of these injuries resulted from horses rearing and falling backwards in the race barn.

In Table 3 the distribution of breeds by activity at the time of injury is given. This table points out what was previously mentioned that few Quarter Horse injuries occur during training. The Paint is similar to the Quarter Horse in that they rarely train at racing speeds. Table 3 also points out an anomaly that Thoroughbred horses sustain half as many fatal race training injuries as fatal racing injuries. This is uncharacteristic based on reports from other states. Thoroughbred horses usually sustain almost as many injuries

training as racing. Even in the 2004 report, there were fifteen Thoroughbred racing fatalities and only three race training fatalities.

Table 3: Distribution of Breeds by Injury Activity

	Racing	Training	Non-exercise	Accident
Not Given			1	
Appaloosa			1	
Paint	4	1	1	
Thoroughbred	14	7	4	1
Quarter Horse	10	2	6	1
Totals	28	10	13	2

Table 4 shows the distribution of activity at time of injury per each racetrack. Again, this year Remington Park had more catastrophic injuries occurring during racing than the three other Oklahoma racetracks. The higher number of fatal injuries at Remington Park cannot be viewed purely as a reflection of track conditions. The number of races, type of races, number of entrants per breed, and the age of the entrants all influence the chances of an injury occurring during a race. As noted earlier, Fair Meadows may have had a few more racing injuries than noted as a few horses suffered an injury at Fair Meadows and were taken to another track for possible surgical treatment, only to be euthanized at the other track. The lack of any training injuries at Fair Meadows may be a reflection of a higher population of Quarter Horses or lesser training at that facility.

Table 4: Distribution of Activity at Injury by Track

Racetrack	Racing	Training	Non-exercise	Accident	Totals
BRD	9	4	10		23
FM	5				5
REM	14	5	3	2	24
WRD		1			1

Racing and Race Training Injuries

Tables 5 and 6 give a distribution of race and race training injuries. As reported in numerous research papers, the majority of catastrophic racehorse injuries are limb injuries, predominately the front limbs, and most often from the carpus distally. The majority of the injuries were to the right front limb which is opposite to the 2004 report where there were a third more injuries to the left front leg than the right front. It has been the experience of pathologists at the OADDL that the limb affected can be a reflection of the bone that is injured.

Table 5: Distribution of Catastrophic Limb Injuries during Racing or Race Training

Limb	Total
Right Front	18
Left Front	6
Both Front	7

Table 6 also confirms that the majority of musculoskeletal injuries that occur to racehorses during racing and race training happen from the carpus down. The injuries listed in this report are similar to the most common injuries occurring to the Thoroughbreds and Quarter Horses on racetracks in other states.

Table 6: List of all Catastrophic Injuries During Racing or Race Training

Injury	Total
Carpal, Fracture	7
Metacarpal, Fracture	8
Scapula, Fracture	2
Humerus, Fracture	3
Sesamoid(s), Fracture	10
Head, Vertebrae	5
Ligament rupture	1
Internal Hemorrhage	3

Three cases of fatal, internal hemorrhage were diagnosed, two in Quarter Horses and one in a Thoroughbred. Two cases happened during racing and one during a race training session. Two were massive hemorrhages into the abdomen from ruptured vessels that supply the intestines. OADDL has seen occasional cases of fatal, internal hemorrhage in stallions during breeding and in other performance-type horses. The massive hemorrhage is most likely from the rupture of a previously undetected aneurysm. The third case of internal hemorrhage was in the spinal cord of the lower neck. The horse had stumbled and went down. It could not be determined if the hemorrhage in the spinal cord happened first or was the result of trauma consequent to the horse going down. In all likelihood, the spinal cord hemorrhage was due to trauma as a result of the fall and was responsible for the death.

The vertebral injuries could easily have been categorized as accidents. These injuries were associated with the starting gate, falling at the finish line or falling through a fence after or during a race or race training session. All of the cases represent fractures.

Non-exercise Related Injuries

The Veterinary Medical Diagnostic Program received thirteen submissions that were not associated with a racing or race training event (Table 7). This is identical to last year's report. The submissions in this category represent a broad distribution of disease problems with nothing indicating a high incidence of a particular disease.

Table 7: Catastrophic Diseases not Related to Racing or Race Training

Disease Condition	Cause	Total
Arthritis	Bacterial	2
Colic	Non-infectious	3
Endotoxemia	Salmonella	1
Fractured pelvis	Accident	1
Intestinal perforation	Foreign body	1
Myositis	Trauma	1
Neurologic disorder	Protozoal	1
Neurologic disorder	Non-infectious	1
Pleuropneumonia	<i>Streptococcus zooepidemicus</i>	2

Three horses suffered a colic and a fourth horse suffered an endotoxemia from a bacterial infection caused by salmonella. Two horses accidentally injured themselves, one getting loose and suffering severe muscle lacerations and the other suffering a fractured pelvis. There were two horses that suffered a very severe pneumonia due to the bacteria *Streptococcus zooepidemicus*. Another horse developed a rear limb incoordination due to a protozoal infection in the spinal cord.

All of the submissions in the “Non-exercise” category were common disease problems that affect horses and would be expected in a large horse population. There was one horse that clinically appeared to colic, and then over the course of a day, developed a neurological problem. Toxicological testing revealed high brain sodium levels which may have been a result of the clinical colic and resulting dehydration which would explain the terminal neurologic signs.

Toxicological Examination of Joint Fluids

The OHRC requested that toxicological testing be routinely performed on horses that suffer catastrophic injuries during a race using urine when available or synovial joint fluid in the absence of available urine. The main purpose of this screening was to serve as a deterrent to any practices that could be inhumane to the horse or could mask a potential problem that might lead to a catastrophic injury.

In accordance with this request, the pathologists collected urine whenever present or if no urine was available, joint fluid from three joints, typically the injured limb and the opposite limb were collected. Often very little urine is present in the bladder at the time of necropsy, necessitating the use of synovial fluid. The carpal and fetlock joints were the ones most often collected. The urine and synovial fluid were analyzed by gas chromatography-mass spectrometry. The results are summarized in Tables 8a and 8b.

Table 8a: Mass Spectrophotometry Analysis of Urine

Substance Detected	Number of Animals	Comments
Pentobarbital	18	Detection indicates that barbiturates used to euthanize animals move extremely rapidly to synovial fluid as well as brain and major organs.
Phenylbutazone	18	NSAID
Flunixin	2	NSAID
Cresol	4	Naturally occurring phenolic
Phenytoin	8	Euthanasia drug
Dimethylsulfone	2	Naturally occurring sulfoxide
Methylphenidate	1	CNS stimulant
DMSO	6	Solvent for drugs
Procaine	1	Anesthetic
4-methyl-5-thiazole ethanol	1	Thiamine precursor & found in panax ginseng
Methotrimeprazine	1	Tranquilizer
Prophan	1	Herbicide- not detected in significant levels
Estrone	1	Naturally occurring steroid
Nordiazepam	1	Diazepam metabolite- muscle relaxant
Mesalamine	1	NSAID*
Zolpidem	1	Hypnotic*
Aspirin	1	NSAID
Various vitamin B metabolites	1	Naturally occurring compounds
No Drugs Detected	2	
No Toxicology Performed	11	

* Unable to confirm presence of compound.

Table 8b: Mass Spectrophotometry Analysis of Joint Fluid

Substance Detected	Number of Animals	Comments
Pentobarbital	17	Detection indicates that barbiturates used to euthanize animals move extremely rapidly to synovial fluid as well as brain and major organs.
Phenylbutazone	9	NSAID
Ketamine	3	Sedative- assumed to be related to euthanasia.
Xylazine	1	Sedative
Phenytoin	1	Euthanasia drug
Flunixin	1	NSAID
No Drugs Detected	4	
No Toxicology Performed	11	

Both tables point out clearly that urine is far easier to analyze than synovial fluid which is much more viscous with more proteins in it. The only unusual substance found was in one horse that injured itself in the saddling area prior to a race. A compound with the characteristics of Zolpidem was found in the urine. This compound is found in some sleeping pills and acts as a hypnotic. There was insufficient sample to confirm the presence of this drug using known standards.

Summary

There was a 29% increase in racehorse submissions to the Veterinary Medical Diagnostic Program for the 2005 reporting period compared to the 2004 report. The major portion of this increase is from racing and race training injuries in four year olds and race training injuries in two year olds. In 2004 the four year old horses had just four fatal injuries racing and none training, while in 2005 there were ten racing injuries and two training injuries in the four-year-old horses. In two-year-old horses, there was one fatal race training injury in 2004, and in 2005, there were six fatal race training injuries. The number of non-exercise related deaths was equal to the previous reporting year.

The program did not identify any pre-existing pathologic changes that might indicate inhumane treatment of a horse that later suffered a catastrophic injury.

The Oklahoma Animal Disease Diagnostic Laboratory is once again proud to be an integral part of this joint venture with the Oklahoma Horse Racing Commission. OADDL is pleased to have an opportunity to do its part to help protect Oklahoma's racehorses and its horse industry at large and looks forward to continuing this program in years to come.