

# VETERINARY MEDICAL DIAGNOSTIC PROGRAM

JANUARY 2007 TO DECEMBER 2007



Supported by the  
Oklahoma Horse Racing Commission



Conducted by the  
Oklahoma Animal Disease Diagnostic Laboratory  
Center for Veterinary Health Sciences  
Stillwater, OK  
April 2007



# **Veterinary Medical Diagnostic Program**

Supported by: **The Oklahoma Horse Racing Commission (OHRC)**

Conducted by: **The Oklahoma Animal Disease Diagnostic Laboratory (OADDL)  
Center for Veterinary Health Sciences  
Oklahoma State University**

Reporting Period: **January 2007 through December 2007**

## **Introduction**

This report summarizes the case submissions and diagnostic findings of the Veterinary Medical Diagnostic Program for the period starting January 1, 2007 and ending December 31, 2007.

The Veterinary Medical Diagnostic Program, initiated in 1997, serves to: 1) 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) 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) evaluate the overall effects of all other aspects (including diet and stress) of racing and race training on the health and well being of Oklahoma's racehorses. This program is the result of an alliance formed between the Oklahoma Horse Racing Commission (OHRC) and the Oklahoma Animal Disease Diagnostic Laboratory (OADDL).

All horses that die or are humanely euthanized on any of the four Oklahoma racetracks that fall under the OHRC jurisdiction are to be submitted to OADDL for a comprehensive necropsy examination. Results are reported to the OHRC office in Oklahoma City with a copy sent to the Official Veterinarian at the submitting racetrack. The necropsy examination includes: 1) a complete necropsy and gross examination of the carcass including microscopic examination of tissues (histopathology) if necessary; 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 in cases where infectious diseases are suspect; and 4) toxicology testing as indicated by necropsy findings or as requested by the OHRC.

For the calendar year 2007, a total of seventy (70) horses were submitted to OADDL under the Veterinary Medical Diagnostic Program. Sixteen (16) animals were found dead and fifty-four (54) animals were humanely destroyed, see Table 1. A summary of OADDL's necropsy findings follow. For the remainder of this report individual tracks are identified by initials: Remington Park (RP), Blue Ribbon Downs (BRD), Fair Meadows Tulsa (FMT) and Will Rogers Downs (WRD). These reports have all been previously submitted to the commission.

**Table 1: Total Equine Mortality - 2007**

	RP	BRD	FMT	WRD	TOTAL
<b>DIED</b>	5	8	3	0	16
<b>EUTHANIZED</b>	19	17	11	7	54
<b>TOTAL</b>	24	25	14	7	70

**Submissions:**

A total of seventy (70) horses from Oklahoma racetracks were submitted to OADDL for examination during the 2007 calendar year. This number is very similar to the total of submissions in 2006, which were 73. There was an increase in submissions noted in the early 2000's associated with both growth of the Oklahoma Horse Racing Industry as well the addition of a fourth approved track (WRD) in 2005. Table 2 (below) indicates the total submissions for the joint OADDL:OHRC program for the years 2003-2007.

**Table 2: Total Necropsy Submissions, OADDL:OHRC Program 2003-2007**

	2003	2004	2005	2006	2007
<b>Necropsy Submissions</b>	35	41	53	73	70

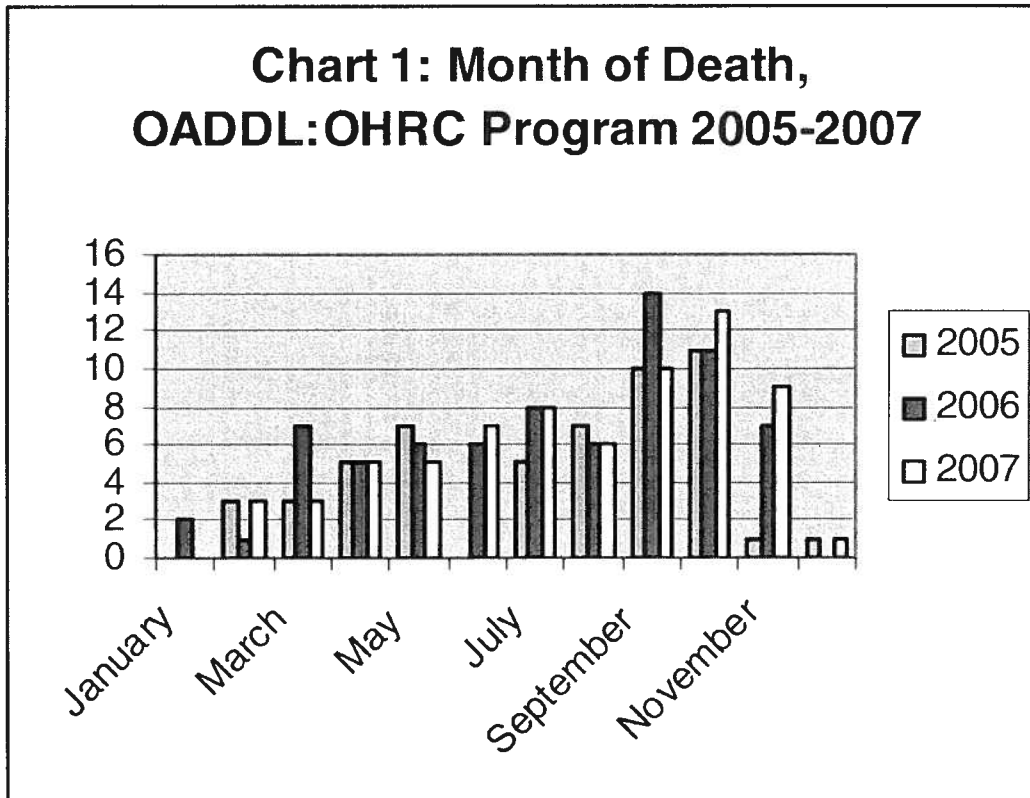
**Monthly Distribution of Submission:**

Table 3 represents the distribution of submissions from each racetrack, sorted by month. One animal again in 2007 was injured during a race and transported to another OHRC facility prior to euthanasia. This animal was injured at Will Rogers Downs (WRD) and euthanized at Blue Ribbon Downs (BRD), (the horse is included with the WRD statistics), this monthly distribution probably reflects more racing days and training activity. During 2007 there were peak submissions in September through November. Previous years had peaks during summer months and a small increase was again noted during that time frame in 2007. The fall/winter peak in 2007 may reflect the expanded role of the Fall Race meet at Remington Park and increased race days for Blue Ribbon Downs during that period. Longer racing seasons are also associated with increased frequency of injury.

**Table 3: Monthly Distribution of Necropsy Submissions for 2007**

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
<b>RP</b>	0	2	0	3	1	0	0	2	6	6	3	1	24
<b>BRD</b>	0	0	1	0	1	1	1	4	4	7	6	0	25
<b>FMT</b>	0	0	0	0	1	6	7	0	0	0	0	0	14
<b>WRD</b>	0	1	2	2	2	0	0	0	0	0	0	0	7
<b>Total</b>	0	3	3	5	5	7	8	6	10	13	9	1	70

Looking at a three year cumulative representation, Chart 1 below indicates that September and October are the peak months for submittals in Oklahoma.



**Breed of Horse:**

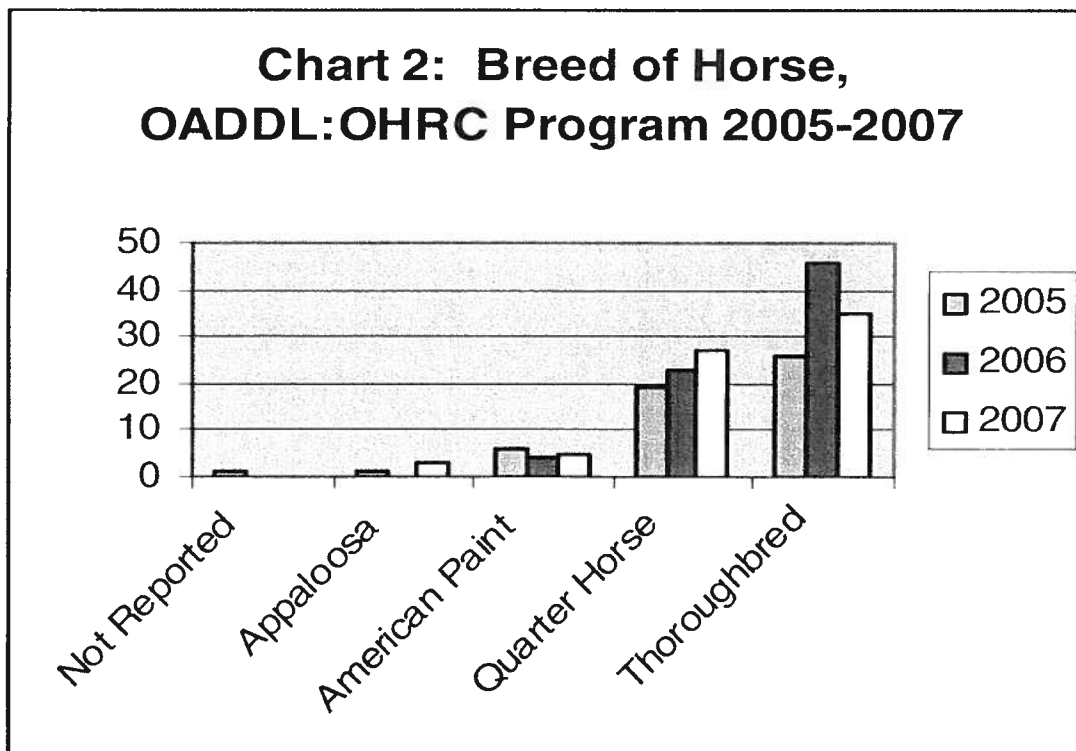
**Table 4: Breed of Horse - 2007**

BREED	Number of Horses
Thoroughbred	35
Quarter Horse	27
American Paint	5
Appaloosa	3
Total	70

Table 4 shows the submissions by horse breed. During this reporting period, Thoroughbred submissions were again more than Quarter Horse, American Paint and Appaloosa submissions. Previous studies have reported increased Thoroughbred fatalities and this may reflect differences in training, race distance and gait, as well as number of animals at risk. This information should be assimilated with known

residence numbers, reported race results and training history for an accurate analysis. There may be increased numbers of races for Thoroughbreds, improved purses for Thoroughbred races and increased numbers of Thoroughbreds raised, trained and raced in Oklahoma.

The three year trends depicted in Chart 2 below also confirm consistently more submissions from the Thoroughbred breed. The year 2006 had double the Thoroughbred submissions over Quarter Horses. The current year of 2007 revealed more balance with respect to breed expected in the horse racing population of Oklahoma.



**Sex of Horse:**

The sex distribution of necropsy case submissions to OADDL for 2007 is similar to that reported in other jurisdictions. The majority of animals submitted were geldings (neutered male) which represent the highest at risk sex in a typical racing environment. Table 5 lists the 2007 necropsy cases by sex distribution. Forty-six (66%) were geldings with 19 (27%) females and 5 (7%) intact males (stallions) being submitted.

**Table 5: Sex of Horse - 2007**

	<b>Stallion</b>	<b>Gelding</b>	<b>Mare</b>	<b>Total</b>
<b>Number</b>	5	46	19	70

## Age of Horse:

**Table 6: Age of Horse (years) by Track - 2007**

Age	RP	BRD	FMT	WRD	Total
1	0	1	0	0	1
2	10	8	4	0	22
3	6	6	2	3	17
4	2	5	4	2	13
5	2	1	2	0	5
6	3	1	1	2	7
7	0	2	0	0	2
8	1	0	0	0	1
9>	0	1	1	0	2
<b>Total</b>	<b>24</b>	<b>25</b>	<b>14</b>	<b>7</b>	<b>70</b>

The distribution of racehorse submissions arranged by age during 2007 is shown in Table 6. Case controlled studies have suggested increasing age as a risk factor for catastrophic injury in racehorses. Our Oklahoma data continue to indicate larger numbers of 2-3 year old animals suffering catastrophic injury. A single yearling animal was

submitted during 2007. The age distribution in race training is not known, there may be are probably more two- and three-year olds in active training and racing in Oklahoma, and thus are the greater at risk population. Two-year old Quarter Horses, Paints and Appaloosas and three-year old Thoroughbreds are in their first season of competition, and naturally more susceptible to disease, musculoskeletal injury and even accidents. Comparison of individual track records for animals in residence, age demographics for race starts and number of races should be considered for accurate interpretation of injuries. One older animal submitted was a thirteen year old Appaloosa pony horse and the other an eleven year old Thoroughbred raced at Fair Meadows Tulsa.

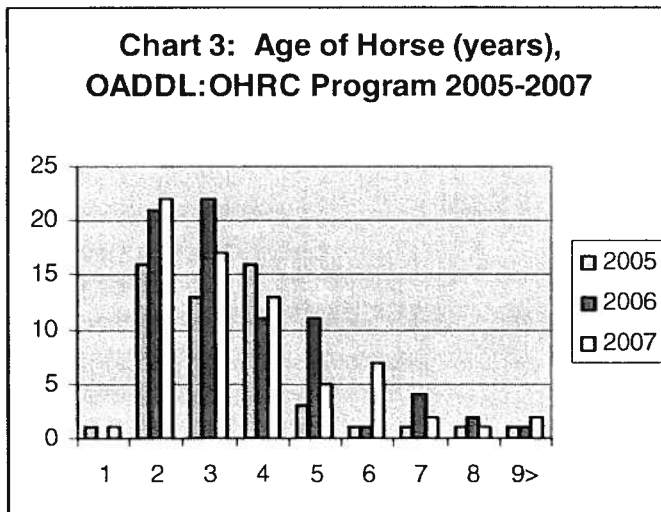


Chart 3, to the left, displays the three year distribution of necropsy submissions by age of horse in years. The trend for increased numbers of two and three year old animals is expected to continue for the reasons stated above. Continued vigilance by owners, breeders, trainers, veterinarians and OHRC officials is warranted for this large group of young animals being acclimated to the racing environment.

**Age of Horse (years) by Breed:**

Table 7 below stratifies the 2007 necropsy submissions by age and breed. This information was requested by the Commission during our presentation of the 2006 report.

Breed	1	2	3	4	5	6	7	8	9>	Total
Thoroughbred	0	6	10	7	5	5	0	1	1	35
Quarter Horse	0	11	6	6	0	2	2	0	0	27
American Paint	1	4	0	0	0	0	0	0	0	5
Appaloosa	0	1	1	0	0	0	0	0	1	3
<b>Total</b>	<b>1</b>	<b>22</b>	<b>17</b>	<b>13</b>	<b>5</b>	<b>7</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>70</b>

This table displays that the majority of two-year-old injuries occur in the sprint breeds (Quarter Horse, Paint and Appaloosa), 16/22 (73%). The Quarter Horse breed accounts for 11/22 (50%) of the necropsy submissions for two-year-old animals. Four of five (80%) of the Paint horses submitted were two-year-old animals and the fifth was a yearling. Thoroughbred animals accounted for the majority of three-year-old submissions 10/35 (29%), and 10/17 (59%) of Thoroughbreds submitted were three-year-olds. Roughly equal numbers of 2-, 4-, 5- and 6-year old Thoroughbreds were submitted. Two of the three Appaloosas submitted were two- or three-year-old animals, with the aged animal of this breed being a pony horse.

**Fatal Event by Age (in years):**

**Table 8: Fatal Event by Age (years)**

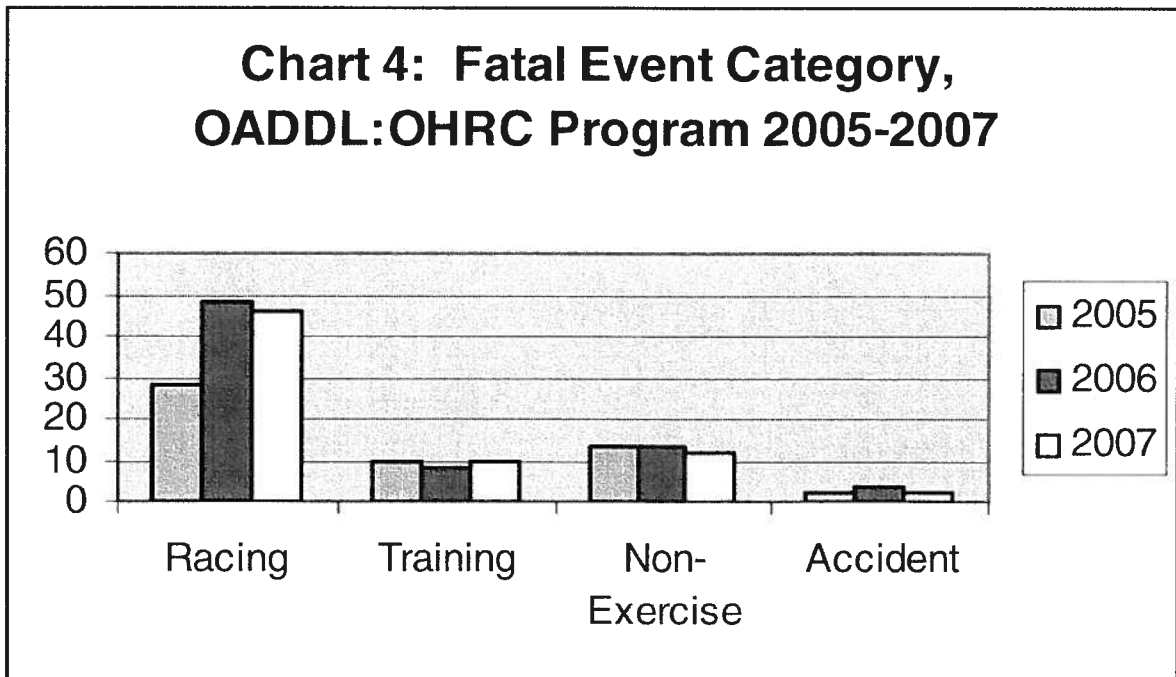
Age	Racing	Training	Non-exercise	Accident	Total
1	0	0	1	0	1
2	13	4	3	2	22
3	13	4	0	0	17
4	8	1	4	0	13
5	4	0	1	0	5
6	5	0	2	0	7
7	2	0	0	0	2
8	0	1	0	0	1
9>	1	0	1	0	2
<b>Total</b>	<b>46</b>	<b>10</b>	<b>12</b>	<b>2</b>	<b>70</b>

This section describes the fatal event (determined by OHRC history and OADDL necropsy) as compared to age of the horse. The categories included are animals injured during racing, routine training, and accidents as well as those dying of non-exercise or “natural”

disease conditions. This category is continued for 2007 in Table 8 to the left. There were increased numbers of younger animals presented for both racing fatalities and non-exercise related fatalities. This age group may represent a larger proportion of animals residing and competing at Oklahoma race tracks (see above section on age). Management changes and exposure to other animals (congregation) can predispose or expose animals to natural disease states (non-exercise) such as metabolic conditions (colic, laminitis) and

infectious disease (pneumonia, enteritis). Younger animals are also developing muscle, tendon and bone while beginning athletic training for racing. Athletic training and acclimation to the training barn and training regimen will remain risk factors for young animals. Continued vigilance by all racing authorities, regulatory veterinarians, practicing veterinarians, trainers and owners is necessary to safeguard the younger equine population; however, some fatalities will remain unpreventable. The “accident” category was included in the 2007 summary and represents unpreventable injuries associated with equine husbandry. There were fewer accidents reported in 2007 than in 2006.

Chart 4 below summarizes the fatal events categories for all submissions under the OADDL:OHRC Program for the years 2005-2007. The number of training, non-exercise and accident fatalities submitted has remained relatively stable during that time span. There was an increase in race fatalities noted between 2005 and 2006. As previously noted this corresponded to the addition of one racing venue (WRD) and an increase in racing days and starts state wide during that period. The number of racing fatalities was nearly identical in 2006 (48) and 2007 (46).





**GOAL 1: INVESTIGATE AND DOCUMENT TYPES OF INJURIES:**

**Distribution of Fatal Activity and Track:**

**Table 9: Fatal Activity by Track - 2007**

TRACK	Racing	Training	Non-exercise	Accident	Total
RP	14	5	3	2	24
BRD	16	2	7	0	25
FMT	11	2	1	0	14
WRD	5	1	1	0	7
Total	46	10	12	2	70

Table 9 represents the distribution of fatal activity stratified by submitting racetrack. As noted above, there are fewer training fatalities in Oklahoma than reported in other racing jurisdictions. This chart may represent a bias in submission of fatalities, as some training and non-exercise deaths do not occur at facilities under OHRC jurisdiction. The larger number of race day fatalities experienced at both Remington Park and Blue Ribbon Downs do not necessarily represent track surface issues or management. In 2007 Blue Ribbon Downs submitted more cases (25) than any other facility. Remington Park has more race days, more races, more entries and more horses in residence than the other three tracks. A larger population at risk would be associated with a higher number of fatalities. Fair Meadows Tulsa and Will Rogers Downs do not have a significant year round resident population; therefore, the majority of the fatalities reported from these tracks were race associated. Table 10, below, stratifies the total fatalities in a different manner based on final necropsy analysis. Cause of death is stratified into categories of natural disease (non-exercise related), cases of exercise induced pulmonary hemorrhage and finally conditions involving musculoskeletal injury.

**Table 10: Cause of Death by Track**

	RP	BRD	FMT	WRD	Total
Natural Disease/Accident	5	7	1	1	14
Pulmonary Hemorrhage	2	1	0	0	3
Musculoskeletal Injury	17	17	13	6	53
Racing:	14	16	11	5	46
Training:	3	1	2	1	7
Total	24	25	14	7	70

The majority of “injuries” sustained by athletic horses affect the musculoskeletal system. This method of separating racetrack injuries has been used in most other jurisdictions world-wide. By this means of segregation, it is possible to assess the Catastrophic Musculoskeletal Injury Index (CMI) utilized to evaluate over-all incidence of exercise associated injury. The two accidental deaths are included with non-exercise deaths in this grouping.

**Exercise Induced Pulmonary Hemorrhage:**

Exercise induced pulmonary hemorrhage (EIPH), or “bleeders” in the horse remains an enigma affecting racehorses and other equine athletes. This condition has been reported for many years and research efforts remain directed at the underlying pathophysiology, treatment and management of this condition. EIPH is typically not reported as an “injury” in most jurisdictions since the majority of these cases are not fatal. Identification systems for “bleeders” are in place in Oklahoma. During 2007, only three cases of acute pulmonary hemorrhage were submitted to OADDL for examination. These cases represent severe bleeding throughout the lung parenchyma resulting in death, not merely bleeding noted at the nostrils. It is interesting that the EIPH cases are clustered during peak months of October and November, very late after a long racing season.

**Musculoskeletal Injury:**

As seen in Table 10, 76% (53/70) of the total fatalities were related to catastrophic musculoskeletal injury, the identical percentage reported in 2006. It has been previously reported that the majority of musculoskeletal injuries sustained by horses racing in the United States involve the limbs. Continued monitoring of limb injuries is important to provide Commission Veterinarians, Track Veterinarians, Track Management and Groundskeepers information to ensure and improve a safe racing environment.

**Table 11: Primary Injured Limb by Track**

Limb	RP	BRD	FMT	WRD	Total
Right Front	6	7	5	3	21
Left Front	8	7	6	3	24
Right Hind	1	0	0	0	1
Left Hind	0	1	0	0	1
Bilateral	0	1	0	0	1
Other Injury	2	2	2	0	6
Total	17	17	13	6	54*

Table 11 displays the distribution of limb injuries sustained by animals during racing or race training. Only one animal submitted in 2007 had multiple limb injuries. That animal had a primary injury to the right front limb, and also injured the left front limb prior to being eased (\*Table 11). In

2007, slightly more injuries were sustained in the left front limb than the right front. These findings are similar to our 2004 and 2006 annual reports and opposite from the 2005 report. Several studies indicate slightly increased incidence of left front limb injury

over right front limb in the United States with counter-clockwise oval flat-track and turf courses. It is uniformly accepted that the front limbs, which bear the majority of a horses' weight, are more frequently injured than rear limbs in flat racing. Sprint races common in the Quarter Horse, Paint and Appaloosa breeds generally report more near equal distribution between right and left front limb injury. There were six fracture cases that did not involve limbs in 2007, one skull fracture, one rib fracture case, one lumbar vertebral fracture, one neck injury (without fracture and concurrent pneumonia) and two cases of artery rupture. The later two artery rupture cases occurred during racing (\*Table12) and were associated with muscle hemorrhage in the region. The cause/mechanisms for artery rupture/aneurysm in the horse may or may not be related to musculoskeletal abnormality, however these cases are included in this category for the 2007 report.

### **Musculoskeletal Disorder – All Racing or Race Training Injuries:**

Surveys and research in other racing jurisdictions have reported increased injury frequency to the front limbs and identified injuries to the distal limbs (distal to the carpus) as the most common injury in the racing equine athlete. Table 12 below reports the anatomic site of injury for all musculoskeletal injury fatalities at Oklahoma race tracks for 2007.

**Table 12: All Fatal Injuries during Racing or Race Training & Track 2007**

<b>Injury</b>	<b>RP</b>	<b>BRD</b>	<b>FMT</b>	<b>WRD</b>	<b>Total</b>
<b>Fetlock Failure:</b>	11	7	3	6	27
<b>Sesamoid Fracture</b>	10	6	3	6	25
<b>Suspensory Ligament</b>	7	5	0	4	16
<b>Condyle Fracture (P1/MCIII)</b>	1	1	1	2	5
<b>Scapula:</b>	0	2	4	0	6
<b>Metacarpus/tarsus:</b>	2	1	2	0	5
<b>Carpal Fracture:</b>	1	1	2	0	4
<b>Radial CB</b>	0	1	0	0	1
<b>Intermediate CB</b>	0	0	2	0	2
<b>C2</b>	1	0	0	0	1
<b>C3</b>	1	1	2	0	4
<b>Ileum:</b>	2	0	0	0	2
<b>Humerus:</b>	0	2	0	0	2
<b>Artery Rupture*:</b>	0	0	2	0	2
<b>Long Pastern (P1/P2):</b>	0	1	0	0	1
<b>Radius:</b>	0	1	0	0	1
<b>Ribs:</b>	0	1	0	0	1
<b>Lumbar Vertebrae (L3):</b>	0	1	0	0	1
<b>Skull:</b>	1	0	0	0	1
<b>Total</b>	17	17	13	6	53

In 2007, 70% (37/53) of the fatal musculoskeletal injuries involved the limb from the carpus distal. This agrees with previously published findings for race track injuries in the horse. The majority of injuries involved the fetlock joint, 51% (27/53). During the 2007 racing year there were 6 (11%) catastrophic fractures of the scapula, which represents the second most frequent anatomic site of injury in Oklahoma for 2007. Previous reports to OHRC identified 3, 2 and 5 scapular fractures in 2004, 2005 and 2006 respectively. Not only does the number of submitted scapular fractures appear to be increasing, but the numbers reported in Oklahoma are elevated in comparison to other published data. Gross examination and desiccation of these limbs has so far not identified pre-existing fracture lines.

**GOAL 2: MONITOR FOR EPIZOOTIC DISEASE:**

In Table 9 from page 8, there were twelve (17%) fatalities due to natural disease states. These animals include cases of infectious disease of importance to all animals competing, training or residing in the racetrack environment. Table 13 below documents cases based on final necropsy analysis at OADDL.

**Table 13: Disease Condition and Track 2007**

<b>Disease Condition:</b>	<b>RP</b>	<b>BRD</b>	<b>FMT</b>	<b>WRD</b>	<b>Total</b>
<b>Gastrointestinal:</b>	1	6	0	0	7
<b>Gastric Distension/Rupture</b>	1	3	0	0	4
<b>Large colon torsion</b>	0	1	0	0	1
<b>Rectal tear/peritonitis</b>	0	1	0	0	1
<b>Clostridial enteritis</b>	0	1	0	0	1
<b>Respiratory:</b>	1	1	1	0	3
<b>Lung abscess/hemorrhage</b>	1	0	1	0	2
<b>Aspiration/DIC</b>	0	1	0	0	1
<b>Laminitis:</b>	0	0	0	1	1
<b>Septic Tendon Sheath:</b>	1	0	0	0	1
<b>Total</b>	<b>3</b>	<b>7</b>	<b>1</b>	<b>1</b>	<b>12</b>

The majority (58%) of natural disease fatalities during the 2007 were again due to gastrointestinal disorders. This is similar to national data for the equine population as a whole (2005 USDA-NAHMS) and for equine athletes in any form of athletic or show training. The gastrointestinal disorder diagnoses are fairly standard for those seen in equine veterinary practice. Submission of samples from these cases to the microbiology section of OADDL did reveal one E. coli species and one Clostridium species bacteria. These organisms can be potentially communicable to other horses and reports with antimicrobial sensitivity patterns were forwarded to the Commission. Several animals with fine ground, high grain gastric contents and acute gastric distension were submitted in 2007. It was uncertain if management issues or wet conditions during the summer of 2007 (with grain fermentation) were predisposing factors in these cases, and reports were issued to the commission on all four cases.

The second largest category of natural disease states was respiratory disease (25% - 3/12). Respiratory diseases including upper airway disease, lymphadenitis and pneumonia are highly prevalent in all populations of horses and increase in frequency when animals are congregated or commingled, as seen at racetracks. Tissues from these cases and two EIPH horses were submitted to the microbiology section. Streptococcus equi, Salmonella sp., Actinobacillus equuli and Klebsiella sp. bacteria were isolated in separate cases and forwarded along with antimicrobial sensitivity patterns to the Commission. Histopathology and virology analysis (by FA) in these cases did not confirm viral disease. Finally, single cases of laminitis (founder) and a septic tendon sheath were seen. Laminitis is a systemic disorder which displays itself in the laminar regions of the hoof wall and is the result of a variety of stressors. Many severe cases are eventually euthanized for humane reasons. The 2007 case involved an animal with a non-healing distal limb wound secondary to spider in venomization that developed secondary laminitis with pedal rotation. Septic tendon sheaths remain a serious and frequently life-threatening condition for the horse, even when managed in hospital environments.

The disease surveillance emphasis for the cooperative OADDL:OHRC program is vital to the Oklahoma racing industry. The outbreak of Equine Herpes-1 (neurologic form) in the United States during 2006/2007 emphasized the importance of disease surveillance for general health of the equine population. There is bias in the current program, however, in that only necropsy examinations are being performed. If interest increases or funding becomes available for expanding the disease surveillance portion of this program to live animals, we at OADDL would be very interested in participation. There are rapid PCR screening procedures for the detection of most equine respiratory viruses currently available.

#### **Drug Testing (TOXICOLOGY):**

When possible, urine and synovial fluid are harvested from fatally injured equines that died during or immediately following an OHRC race. Urine and/or synovial fluid were tested in the toxicology section on 58 cases. The twelve cases not screened were natural disease states or animals that were too autolyzed for analysis. During 2007, 93 drug

items were detected in urine samples and 76 drug items were detected in synovial fluid samples by mass spectrophotometry in the toxicology section of OADDL. One additional cerebral spinal fluid sample was analyzed by this method and a single brain sodium level test was also performed. The toxicology results were forwarded to both the Commission and Track Veterinarians upon completion. The toxicology results are summarized in table form below, Tables 14 and 15 below:

**Table 14: Mass Spectrophotometry Analysis of Urine**

Substance Detected	Number of Animals	Comments
Phenylbutazone	27	NSAID
Pentobarbital	31	Detection indicates that barbiturates used to euthanize animals move extremely rapidly to synovial fluid as well as brain and major organs.
Phenytoin	14	Euthanasia drug
Oxyphenbutazone	2	Phenylbutazone metabolite.
Xylazine	2	Sedative
Ketamine	2	Sedative- assumed to be related to euthanasia.
4-hydroxyphenylbutazone	11	Sedative- assumed to be related to euthanasia.
Procaine	1	Local anesthetic.
Menthol	1	Alcohol from mint oil.
Clomethiazole	1	Sedative/anticonvulsant.
4- methyl-5- thiazolethanol	1	Thiamine derivative.

**Table 15: Mass Spectrophotometry Analysis of Joint Fluid**

Substance Detected	Number of Animals	Comments
Pentobarbital	30	Detection indicates that barbiturates used to euthanize animals move extremely rapidly to synovial fluid as well as brain and major organs.
Phenylbutazone	23	NSAID
Phenytoin	13	Euthanasia drug
Ketamine	4	Sedative- assumed to be related to euthanasia.
Xylazine	1	Sedative
Metharbital	1	Long acting barbiturate.
4-hydroxyphenylbutazone	3	Phenylbutazone metabolite.
Methylprednisone	1	Glucocorticoid steroid.

Urine remains the most valuable and useful sample for toxicology analysis. In an attempt to obtain more urine samples, cooperation with both Commission and Track Veterinarians was improved during 2006 and continued in 2007. Veterinarians on-site could obtain urine for laboratory submission to OADDL if urine began leaking from the animal following death. This procedure is standard operation for the laboratory personnel who transport the animals to Stillwater for examination. The majority of compounds identified during 2007 were associated with euthanasia or common non-steroidal anti-inflammatory (NSAID) medications currently allowed under OHRC regulations. A sedative/anticonvulsant (Clomethiazole) and a glucocorticoid steroid (Methylprednisone) were identified in two separate cases and reported to OHRC.

### **GOAL 3: OVERALL RACEHORSE HEALTH:**

The overall health and well being of the Oklahoma racehorse population remains a stated goal of the joint OADDL:OHRC Program. Of particular interest to the two senior pathologists in this program is the hoof anatomy/morphology/angle and shoeing characteristics of the equine population. Table 17 displays the hoof/shoeing data compiled during the 2007 time period.

#### **Hoof Anatomy/Shoe Characteristics:**

**Table 17: Hoof Anatomy and Horse Shoe Characteristics - 2007**

	<b>RP</b>	<b>BRD</b>	<b>FMT</b>	<b>WRD</b>	<b>Total</b>
<b>Not Performed</b>	0	0	2	2*	4
<b>HOOF:</b>					
<b>Barefoot:</b>	0	1	0	0	1
<b>Quarter crack/Epoxy Repair:</b>	0	1	1	2	4
<b>Abnormal shape/growth:</b>	0	2	1	1	4
<b>Long Toe:</b>	4	4	2	0	10
<b>Long Toe/LOW Heel:</b>	13	7	7	3	30
<b>Under-run Heel:</b>	13	12	6	2	33
<b>Within normal limits:</b>	7	9	2	2	20
<b>Shoe Toe Grabs:</b>					
<b>Front LONG (&gt;0.5cm):</b>	4	6	5	3	18
<b>Front SHORT (&lt;0.5cm):</b>	21	15	6	2	44
<b>Hind Present:</b>	12	6	2	3	23

A concerted effort was made to make recordings of the hoof morphology and shoeing characteristics on all horses submitted under the OADDL:OHRC Program in 2007. Only two animals were not completely examined and two animals from Will Rogers Downs had their shoes removed prior to transport to the laboratory (\*Table 17). There was an interest in this topic generated during the Commission meeting in 2007 (for year-end report 2006). Over-all there were 30% (20/66) sets of hooves evaluated as “normal” with respect to toe length, heel length and symmetry. Long toe morphology (with or without low heels) continued to be observed and under-run heels exceeded low heels during 2007. There was no data compiled regarding severity of the hoof imbalance (mild, moderate, marked) however it was the impression of the veterinary staff that over-all hoof morphology was better in 2007 than in 2006 (the first year of data collection). These findings were substantiated with respect to toe-grab incidence. Although 94% (62/66) animals presented with toe grabs on the front shoes, only 27% (18/66) were “long” toe-grabs exceeding 0.5 cm in length. It may be that farriers, trainers, owners and Commission Officials awareness regarding the importance of hoof morphology and shoe characteristics has already had a positive effect on race horse health.

**Gastric Ulcers:**

**Table 18: Gastric Ulcers - 2007**

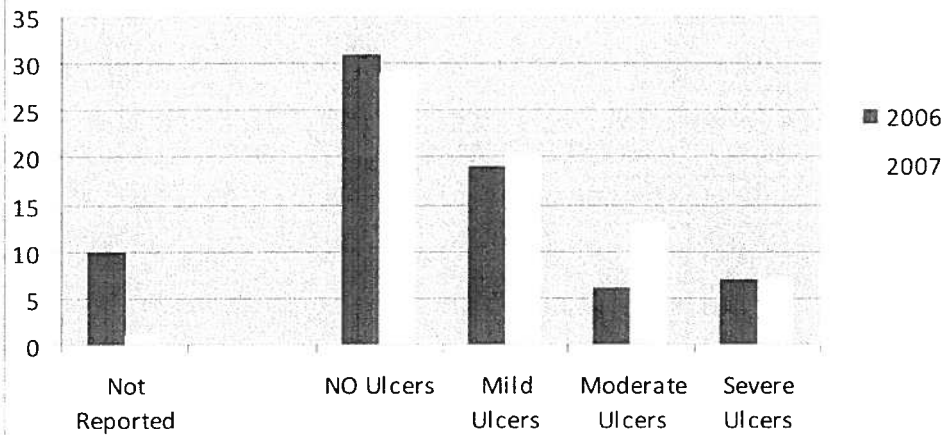
	RP	BRD	FMT	WRD	Total
<b>Gastric Ulcers:</b>					
<b>None</b>	10	12	4	3	<b>29</b>
<b>Mild</b>	3	9	5	3	<b>20</b>
<b>Moderate</b>	7	3	2	1	<b>13</b>
<b>Severe</b>	4	1	2	0	<b>7</b>
<b>Not Reported</b>	0	0	1	0	<b>1</b>

Gastric ulceration has been increasingly identified over the last twenty years as a serious disease condition affecting equine athletes. Indeed, stalled animals

involved in a variety of training situations can be affected by significant gastric ulceration – regardless of activity and diet. We are fortunate at the Center for Veterinary Health Sciences, Oklahoma State University to have researchers involved in the identification, treatment and pathogenesis of equine gastric ulcers. Monitoring of gastric ulcers continues to be a component of the OHRC:OADDL Diagnostic Program. Table 18 presents the data compiled during 2007 regarding gastric ulceration in the Oklahoma racehorse diagnostic program. In only one submission were there no observations recorded regarding ulcers. Of the 69 animals with gastric lesions reported, 42% (29/69) had no grossly detected ulcers present. The majority of these horses were young animals or animals new to race training based on other physical findings and history. Research has shown that gastric ulcers take time to develop when animals are placed in a stall environment and exposed to training. Of the remaining animals with ulcers, the majority had only mild or moderate gastric ulceration, and were very similar to 2006. These findings suggest that trainers, owners and veterinarians recognize the importance of gastric ulcers in the horse. Chart 5 (next page) demonstrates the reported findings for gastric ulcers in 2006 and 2007.



Chart 5: Gastric Ulcers, OADDL:OHRC Program 2006-2007



**Fatal Injury and Track Location:**

**Table 19: Race Fatality by Track Location**

	RP	BRD	FMT	WRD	Total
<b>Not Reported</b>	2	2	3	2	<b>9</b>
<b>Paddock</b>	1	0	0	0	<b>1</b>
<b>At/Out of Starting Gate</b>	1	2	0	0	<b>3</b>
<b>Near Turn</b>	1	0	0	0	<b>1</b>
<b>Far Turn</b>	1	0	0	0	<b>1</b>
<b>Start of Stretch</b>	1	4	2	1	<b>8</b>
<b>Home Stretch</b>	1	2	1	1	<b>5</b>
<b>1/8 Pole</b>	4	0	0	2	<b>6</b>
<b>1/4 Pole</b>	2	0	0	0	<b>2</b>
<b>3/8 Pole</b>	1	0	1	0	<b>2</b>
<b>1/2 Pole</b>	0	1	1	0	<b>2</b>
<b>5/8 Pole</b>	0	0	1	0	<b>1</b>
<b>Finish Line/At Finish</b>	3	6	2	0	<b>11</b>
<b>Finished Race</b>	1	0	2	0	<b>3</b>

The analysis of location on a racetrack where a catastrophic injury occurs to a racehorse has been utilized by several racing jurisdictions to improve overall safety for equine competitors. This data is compiled as part of the cooperative OADDL:OHRC diagnostic program but is also reliant upon submission of this data from Commission/Track personnel. The 2007 data for track location is included in this report as Table 19. Nine cases did not have track location of injury reported by Commission or Track Veterinarians at the time of submission. This information is requested on all racing and

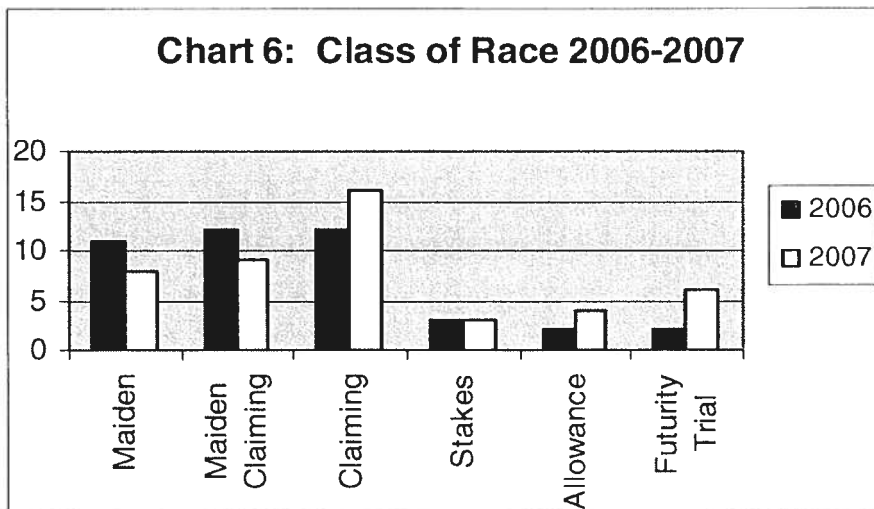
training related fatalities. The majority of cases were reported “at the finish” or as “finished the race”, similar to 2006. Several in 2007 were described as “start of stretch” or “home stretch” particularly used for sprint races. This information may be useful to Commission and Racing Officials for 2008 race year; however standardization of nomenclature for track location could strengthen these findings.

**Race Fatality and Class of Race:**

**Table 20: Race Fatality by Class of Race**

	RP	BRD	FMT	WRD	Total
<b>Maiden Race</b>	2	3	3	0	8
<b>Maiden Claiming</b>	3	2	1	3	9
<b>Claiming</b>	5	6	4	1	16
<b>Stakes</b>	2	0	0	1	3
<b>Allowance</b>	1	1	2	0	4
<b>Futurity Trial</b>	1	4	1	0	6
<b>Total</b>	<b>14</b>	<b>16</b>	<b>11</b>	<b>5</b>	<b>46</b>

In the 2006 year-end report to OHRC the OADDL report included data regarding class of race and this data was continued in 2007. The 46 race fatality cases (excluding EIPH horses and training accidents) are displayed with respect to class of race above in Table 20. The majority of fatal racing injuries were again reported in Claiming and Maiden Claiming events. During 2007 there were increased race day fatalities for Futurity Trials, decreased fatalities for Maiden races and similar numbers of fatalities for Stakes and Allowance races. The summary findings for 2006 and 2007 are included in Chart 6 below:



### Race Fatality and Distance of Race:

The fatal race cases are also reported with respect to distance of race in 2007. This information is included in Table 21 below. The majority of fatalities were at 5 ½ and 6 furlongs for Thoroughbreds and at 330 and 350 yards for Quarter Horses and other sprint breeds. These may reflect the number of horses available to race at these distances in 2007; however it was of interest there were no fatal injuries submitted for sprint horses at less than 300 yards (yet Futurity Trial fatalities increased).

**Table 21: Race Fatality by Distance of Race - 2007**

	RP	BRD	FMT	WRD	Total
<b>Classic Distances:</b>					
4 furlong	0	0	3	0	3
5 furlong	1	1	0	1	3
5 1/2 furlong	2	0	2	1	5
6 furlong	3	1	1	1	6
6 1/2 furlong	3	0	0	0	3
1 Mile	1	0	1	0	2
1 Mile 70 Yards	1	0	0	0	1
1 1/16 Miles	0	0	0	1	1
<b>Sprints (QH Distance):</b>					
300 Yards	0	1	0	1	2
330 Yards	1	3	1	0	5
350 Yards	1	5	3	0	9
400 Yards	0	1	0	0	1
440 Yards	0	1	0	0	1
870 Yards	1	3	0	0	4
<b>Total</b>	<b>14</b>	<b>16</b>	<b>11</b>	<b>5</b>	<b>46</b>

### Race Fatality and Accredited Oklahoma Bred Program:

Of the 46 race day fatalities presented in 2007 there were 31 (67%) eligible and currently enrolled in the Accredited Oklahoma Bred Program (AOBP). The distribution of these animals by both age and breed is presented below in Table 22. This information may be of interest to owners and breeders of horses competing in Oklahoma.

**Table 22: Fatal Race Cases Enrolled in A.O.B.P.**

Age(yrs)	Number	Breed	Number
2	7	Thoroughbred	15
3	8	Quarter Horse	13
4	7	Appaloosa	2
5	4	Paint	1
6	4	<b>Total</b>	<b>31</b>
7	1		
<b>Total</b>	<b>31</b>		

### Chronic Musculoskeletal Lesions:

Complete identification of pre-existing or chronic changes in the musculoskeletal system continues to be documented in the OADDL:OHRC diagnostic program. This analysis was completed on all animals submitted, regardless of history in 2007. Table 23 (next page) reports the findings of chronic lesions in various locations identified in 2007. Seventeen animals were evaluated as normal with no abnormal wear and most of these horses were new to race training.

The pre-existing or chronic lesions noted in animals with musculoskeletal injuries are similar to those reported for many equines in athletic and race training. Dorsal fetlock arthrosis or "osselets" were the most frequently identified pre-existing condition. These are very common in race training and generally considered a normal event. Table 23 is used as an identifier in this 2007 report. Some animals had chronic lesions in more than one limb so numerical interpretation or percent of animals affected is not possible. More significant fetlock cartilage wear was noted in eleven limbs with osteophytes or chip fractures present in ten animals. Cannon bone lesions included four "bucked shins" (common in younger animals in early race training) and ten limbs with splint formation in the MCII/MTII or IV bones. These later splints are considered a "blemish" by many horsemen and can also be associated with poor conformation. Chronic changes in the carpal bones were present in twenty-four animals, an increase over those described in 2006. Again, some change and remodeling of bone is necessary and expected in animals undergoing rigorous training and racing. The radial carpal bone was most frequently noted and is consistent with other reports. Only two limbs had evidence of chronic tendon or ligament thickening, and four limbs had evidence of osteochondritis dessicans (OCD), which is considered a developmental orthopedic disease of the equine species. A majority of pre-existing lesions were present in the contralateral limb to the primary limb

of injury, a finding also supported by previous studies. These chronic and pre-existing lesions were documented and reported to the OHRC and Track at the completion of each case.

**Table 23: Chronic Limb/Joint Lesions - 2007**

	<b>RP</b>	<b>BRD</b>	<b>FMT</b>	<b>WRD</b>	<b>Total</b>
<b>None Present/Normal</b>	8	3	4	2	<b>17</b>
<b>Fetlock:</b>	13	19	6	2	<b>40</b>
<b>Osselet</b>	10	17	5	1	33
<b>Cartilage Wear</b>	3	6	1	1	11
<b>Chip/Osteophyte</b>	3	3	3	1	10
<b>Carpus:</b>	8	13	8	3	<b>32</b>
<b>Radial CB</b>	5	9	7	3	24
<b>Intermediate CB</b>	3	7	5	2	17
<b>C3</b>	1	0	1	1	3
<b>Distal Radius</b>	2	3	4	1	10
<b>Cannon (MCIII/MTIII):</b>	4	4	2	1	<b>11</b>
<b>Cortical Thick (Buck)</b>	0	2	1	1	4
<b>Splints</b>	4	4	2	0	10
<b>Chronic Lig./Tendon:</b>	1	0	1	0	<b>2</b>
<b>OCD:</b>	1	1	1	1	<b>4</b>
<b>Contralateral to Injury:</b>	4	3	1	3	<b>11</b>
<b>Ipsilateral to Injury:</b>	1	0	0	0	<b>1</b>

**SUMMARY:**

Conclusions from the 2007 year end report indicate that Oklahoma racetracks remain an active and safe environment for equine athletes. The public data available from published OHRC statistics for 2007 reports 265 racing days available. During that time period, there were 46 race day musculoskeletal fatalities submitted, described and reported by OADDL. These data allow calculation of an index of musculoskeletal injury per day of live racing for the entire OHRC program and subdivided for each track. This data is presented on the following page in Table 24. For the over-all OHRC program there was a very slight increase in the fatality index/race day in 2007. This index rose from 0.165 in 2006 to 0.174 in 2007. It is interesting to note that this index went down

rather dramatically for one track (RP) while it rose for the other three tracks. Number of race days for the four tracks was similar from 2006 to 2007 and the two-year summary of these data is also included in table 24.

**Table 24: Number of Musculoskeletal Fatalities per Number of Race Days**

	TOTAL		RP		BRD		FMT		WRD	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
<b>Race Fatality (number)</b>	<b>44</b>	<b>46</b>	23	14	7	16	10	11	4	5
<b>Number of Race Days</b>	<b>266</b>	<b>265</b>	118	119	71	70	33	34	44	42
<b>Index: Fatality/Race Day</b>	<b>0.165</b>	<b>0.174</b>	0.195	0.118	0.098	0.229	0.303	0.324	0.091	0.119

More standard analysis of catastrophic musculoskeletal injury used by most racing jurisdictions is the catastrophic musculoskeletal index (CMI). This index requires the known number of animals starting races. That data was supplied for Remington Park and Fair Meadows Tulsa in the Test Barn end-of year report in 2007. We at OADDL appreciate this data which allows calculation of a CMI index that can be compared to other racing venues. The CMI for the two tracks is presented below in table 25.

**Table 25: Catastrophic Musculoskeletal Index**

	Remington Park	Fair Meadows Tulsa
<b>Race Fatality (#)</b>	14	11
<b>Number of Starters</b>	10,380	3519
<b>*CMI Index (per 1000)</b>	1.35	3.13

The CMI reflects the number of catastrophic musculoskeletal injuries sustained per 1000 animal starts. For 2007 this index includes both Thoroughbred and Quarter Horse fatalities, although most reported CMI's are for Thoroughbred racing jurisdictions. The index for Remington Park compares favorably to other published CMI's in the United States which generally range from 1.1 to 1.7. The CMI for Fair Meadows Tulsa remains over twice that reported for Remington Park.

Limb of injury, anatomic location of injury and month of injury were all similar to previous years' reports. Disease surveillance on necropsy cases did identify common equine bacterial respiratory pathogens and enteric pathogens however no evidence of viral disease was confirmed. Toxicology analysis of specimens was performed on many urine and synovial fluid specimens and those results forwarded to the OHRC. Monitoring of hoof anatomy, shoe characteristics, gastric ulcers and the presence of chronic limb lesions continued and was forwarded to OHRC upon completion of each case. New comparisons of injury data to OHRC racing information was begun in hopes

of extending the scope and impact of the programs usefulness. The Oklahoma Animal Disease Diagnostic Laboratory remains proud to be included as an integral part of the Veterinary Medical Diagnostic Program in cooperation with the Oklahoma Horse Racing Commission. The OADDL remains committed to accomplishing the goals outlined for this project and pleased to support the important racing and equine industries of the state.

Respectfully submitted:

Dr. Bill Johnson & Dr. Grant Rezabek  
Oklahoma Animal Disease Diagnostic Laboratory

**SUMMARY TABLE: Veterinary Medical Diagnostic Program**

	<b>Racing</b>	<b>Training</b>	<b>Non-exercise</b>	<b>Accident</b>	<b>TOTAL</b>
<b>Remington Park:</b>					
2003	10	2	1	0	<b>13</b>
2004	10	1	2	0	<b>13</b>
2005	14	5	3	2	<b>24</b>
2006	25	5	2	1	<b>33</b>
2007	14	5	3	2	<b>24</b>
<b>Blue Ribbon Downs:</b>					
2003	8	3	5	0	<b>16</b>
2004	8	2	7	0	<b>17</b>
2005	9	4	10	0	<b>23</b>
2006	7	1	10	1	<b>19</b>
2007	16	2	7	0	<b>25</b>
<b>Fair Meadows Tulsa:</b>					
2003	4	2	0	0	<b>6</b>
2004	6	1	4	0	<b>11</b>
2005	5	0	0	0	<b>5</b>
2006	11	0	0	0	<b>11</b>
2007	11	2	1	0	<b>14</b>
<b>Will Rogers Downs:</b>					
2005	0	1	0	0	<b>1</b>
2006	5	2	1	2	<b>10</b>
2007	5	1	1	0	<b>7</b>