VETERINARY MEDICAL DIAGNOSTIC PROGRAM

JANUARY 2010 TO DECECMBER 2010

Supported by the

Oklahoma Horse Racing Commission

Conducted by the

Oklahoma Animal Disease Diagnostic Laboratory

Center for Veterinary Health Sciences

Stillwater, OK

May 2, 2011

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 2010 through December 2010**

Introduction

This report summarizes the case submissions and diagnostic findings of the Veterinary Medical Diagnostic Program for the period starting January 1, 2010 and ending December 31, 2010.

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 must be 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 of necropsy examination are reported to the OHRC office in Oklahoma City with a copy sent to the Official OHRC Veterinarian at the submitting racetrack. The necropsy examination includes: 1) a complete necropsy with 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 suspected; and 4) toxicology testing as indicated by necropsy findings or as requested by the OHRC.

For the calendar year 2010, a total of seventy-eight (78) horses were submitted to OADDL under the Veterinary Medical Diagnostic Program. Eleven (11) animals died and sixty-seven (67) animals were humanely destroyed. A summary of OADDL's necropsy findings follow. For the remainder of this report individual tracks are identified by initials: Remington Park (REM), Fair Meadows Tulsa (FMT) and Will Rogers Downs (WRD). Specific OADDL necropsy reports are referenced in parentheses (10XXXXXX). These reports have all been previously submitted to the commission.

Submissions:

Table 1: Total Equine Necropsy Submissions - 2003 to 2010

	2003	2004	2005	2006	2007	2008	2009	2010
Necropsy Submissions	35	41	53	73	70	61	60	**78**

A total of seventy-eight (78) horses from Oklahoma racetracks were submitted to OADDL for examination during the 2010 calendar year. This is an all time high for mortality in this program going back to it's inception and occurred in spite of the loss of one racetrack facility (Blue Ribbon Downs) from the racing calendar. The previous high mortality was 2006 with 73 deaths at all four racetracks. Table 1 (above) indicates the total submissions for the joint OADDL:OHRC program for the year 2010.

Table 2: Total Mortality by Track 2010:

	REM	FMT	WRD	TOTAL
DIED	7	1	3	**11**
EUTHANIZED	36	14	17	**67**
TOTAL	**43**	**15**	**20**	**78**

Total equine mortality was increased at all tracks in 2010, with the most significant rise in mortality noted at Fair Meadows Tulsa during 2010, up from 4 submissions in 2009.

Monthly Distribution of Submission:

Table 3 below represents the distribution of submissions from each racetrack, sorted by month. The monthly fluctuation of cases most likely coincides with the number of racing days and training activity. During 2010 there were peak submissions in April and November, slightly different than in previous years. Ten cases were submitted in an 11 day period from April 25 to May 6 and 12 cases submitted in a 12 day period from November 10 to November 22.

Table 3: Monthly Distribution of Necropsy Submissions for 2010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
REM	0	0	2	10	8	0	0	1	5	7	9	1	**43**
FMT	0	0	0	0	0	5	10	0	0	0	0	0	**15**
WRD	0	1	1	7	2	0	0	0	2	0	7	0	**20**
Total	**0**	**1**	**3**	**17**	**10**	**5**	**10**	**1**	**7**	**7**	**16**	**1**	**78**

Breed of Horse:

Table 4 (below) shows the monthy submissions by horse breed. During this reporting period, Thoroughbred submissions were again more than Quarter Horse and American Paints. There were no Appaloosa submissions in 2010. Previous studies have reported increased Thoroughbred fatalities and this may reflect differences in training, race distance and gait. This information should be assimilated with known residence numbers, known race starters per breed, reported race results and training history for an accurate analysis. There was a peak in submission of Quarter Horses in April and for Thoroughbreds in November.

Table 4: Monthly Distribution of Necropsy Submissions by Breed for 2010

Breed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Thoroughbred	0	1	1	7	2	2	3	1	5	7	9	1	**39**
Quarter Horse	0	0	2	9	7	2	6	0	2	0	6	0	**34**
Paint	0	0	0	1	1	1	1	0	0	0	1	0	**5**
Total	**0**	**1**	**3**	**17**	**10**	**5**	**10**	**1**	**7**	**7**	**16**	**1**	**78**

Gender of Horse:

The sex distribution of necropsy case submissions to OADDL for 2010 is similar to that reported in other jurisdictions and is presented in Table 5 below. The majority, 54% (42/78), of animals submitted were geldings (neutered male) in 2010; with more Thoroughbred geldings submitted. Gender is segregated by breed in 2010 by request of breed registries in this table. Approximately equal numbers of stallions and mares were submitted by breed. The number of colts plus fillies approximately equals the number of geldings submitted.

Table 5: Gender and Breed of Submissions 2010

		REM	FMT	WRD	TOTAL
Male	Thoroughbred	5	0	0	5
	Quarter Horse	2	1	2	5
	Paint	0	0	0	0
Female	Thoroughbred	8	1	4	13
	Quarter Horse	5	3	4	12
	Paint	0	1	0	1
Gelding	Thoroughbred	10	4	7	21
	Quarter Horse	11	4	2	17
	Paint	2	1	1	4
Total		43	15	20	**78**

Age of Horse:

The distribution of racehorse submissions arranged by age during 2010 is shown in Table 6 below. This data is also segregated by breed per request of breed registries. Our Oklahoma data continue to indicate larger numbers of 2-3 year old animals in total mortality in 2010, although this year more three year old mortalities were noted. There may be more animals in the two- and three-year old age group in active training and racing in Oklahoma, and thus are the greater at risk population. No horses older than 7 years were submitted for necropsy and the three 7-year old animals were all still racing in 2010. Quarter Horses accounted for the largest number of 2 year old submissions and Thoroughbreds for the largest number of 3 year old submissions.

Table 6: Age of Horse and Breed.

		REM	FMT	WRD	Total
Two year old					**17**
	Thoroughbred	5	0	0	5
	Quarter Horse	3	3	3	9
	Paint	2	1	0	3
Three year old					**28**
	Thoroughbred	14	2	2	18
	Quarter Horse	5	2	3	10
	Paint	0	0	0	0
Four year old					**19**
	Thoroughbred	3	3	2	8
	Quarter Horse	7	2	1	10
	Paint	0	1	0	1
Five year old					**8**
	Thoroughbred	1	0	3	4
	Quarter Horse	1	1	1	3
	Paint	0	0	1	1
Six year old					**3**
	Thoroughbred	0	0	3	3
	Quarter Horse	0	0	0	0
	Paint	0	0	0	0
Seven year old					**3**
	Thoroughbred	0	0	1	1
	Quarter Horse	2	0	0	2
	Paint	0	0	0	0
Total		43	15	20	**78**

Age of Horse (years) by Breed:
Table 7 below again stratifies the 2010 necropsy submissions by age and breed. This information was requested by the Commission during our presentation of the 2006 report.

Table 7: Age of Horse and Breed 2010

Breed	2	3	4	5	6	7	Total
Thoroughbred	5	18	8	4	3	1	**39**
Quarter Horse	9	10	10	3	0	2	**34**
American Paint	3	0	1	1	0	0	**5**
Total	**17**	**28**	**19**	**8**	**3**	**3**	**78**

This table displays that the majority of two-year-old fatalities occur in Quarter Horses, 9/17 (53%). Five of 17 (29%) of Thoroughbred fatalities were in two year olds and over one-half (3/5) American Paint fatalities were in two year olds. Thoroughbred horses accounted for the majority of three-year-old submissions, 18/28 (64%). Older equine athletes continued in competition in 2010 as shown by the submission of 14 (18%) animals 5, 6, or 7 years of age.

Fatal Event by Age (in years):

Table 8: Fatal Event by Age (years) 2010

Age	Racing	Training	Non-exercise	Total
2	11	6	0	**17**
3	18	7	3	**28**
4	14	1	4	**19**
5	6	1	1	**8**
6	3	0	0	**3**
7	2	0	1	**3**
Total	**54**	**15**	**9**	**78**

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, accidents and those dying of non-exercise or "natural" disease conditions. This category is continued for 2010 in Table 8 to the left. Oklahoma continues to report more race day fatalities compared to training reported fatalities than other jurisdictions. There were no accident cases submitted in 2010; however there were two race day accidents which are discussed below.

Fatal Event by Breed:
This year we also display the fatal event categories by breed in table 9 on the next page. All breeds are at increased risk for mortality with racing, but this may represent a bias in the current necropsy program. Total race population and race starters for each breed would be necessary for an accurate assessment. Race day mortality remains the primary submission to the OADDL:OHRC necropsy program, 54/78 (69%) submissions. All the American Paint submissions and over half (27/34) the Quarter Horse fatalities occurred on race day. There were increased numbers of training mortalities reported in 2010, particularly during the fall Thoroughbred meet at Remington Park.

Table 9: Fatal Event by Breed 2010

Breed	Racing	Training	Non-exercise	Total
Thoroughbred	22	14	3	**39**
Quarter Horse	27	1	6	**34**
American Paint	5	0	0	**5**
Total	**54**	**15**	**9**	**78**

Complete tabulation of category of death by breed plus by track is presented in table 10 below:

Table 10: Fatal event by breed and track.

			REM	FMT	WRD	Total
RACE DAY						**54**
		Thoroughbred	10	5	7	22
		Quarter Horse	11	8	8	27
		Am. Paint	2	2	1	5
	Before Race					**(2)**
		Thoroughbred	0	0	1	1
		Quarter Horse	0	0	1	1
		Am. Paint	0	0	0	0
	During Race					**(51)**
		Thoroughbred	9	5	6	20
		Quarter Horse	11	8	7	26
		Am. Paint	2	2	1	5
	>1 day **after**					**(1)**
		Thoroughbred	1	0	0	1
		Quarter Horse	0	0	0	0
		Am. Paint	0	0	0	0
TRAINING						**15**
		Thoroughbred	12	0	2	14
		Quarter Horse	1	0	0	1
		Am. Paint	0	0	0	0
Non-Exercise						**9**
		Thoroughbred	1	0	2	3
		Quarter Horse	6	0	0	6
		Am. Paint	0	0	0	0
TOTAL			43	15	20	**78**

The majority of race day deaths (51/54) occurred during or soon after competition. There was one Thoroughbred filly that was managed for several days following injury prior to euthanasia. There were also two fatalities prior to competition at Will Rogers Downs. One animal flipped in the paddock and one animal escaped and injured itself during the post parade.

GOAL 1: INVESTIGATE AND DOCUMENT TYPES OF INJURIES:

Distribution of Fatal Activity and Track:

Table 11: Fatal Activity by Track - 2010

TRACK	Racing	Training	Non-exercise	Total
REM	23	13	7	**43**
FMT	15	0	0	**15**
WRD	16	2	2	**20**
Total	**54**	**15**	**9**	**78**

Table 11 above represents the distribution of fatal activity stratified by submitting racetrack. This may represent a bias in submission of samples, as noted above some training and non-exercise deaths do not occur under OHRC jurisdiction. All of the fatalities from FMT were in race day situations in 2010.

Table 12, below, stratifies the total fatalities in a different manner based on final necropsy analysis. Cause of death is stratified into categories of natural disease states (non-exercise related and accidents), cases of exercise induced pulmonary hemorrhage (EIPH) and finally conditions involving musculoskeletal injury.

Table 12: Cause of Death by Track - 2010

	REM	FMT	WRD	Total
Natural Disease/Non-Exercise	7	0	2	**9**
EIPH (bleeder on RACE DAY)	1	0	2	**3**
Musculoskeletal Injury	35	15	16	**66**
Racing:	22	15	12	49
Training:	13	0	2	15
Pre-race Accident:	0	0	2	2
Total				**78**

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.

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 since early history in the horse and research efforts remain directed at the underlying pathophysiology, treatment and management of this condition. The condition 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 2010 there were 3 submissions where EIPH was confirmed as the cause of death, all on race day animals (two from WRD, one from REM, two were TB and one was QH). The EIPH animals are included in table 13 above.

Musculoskeletal Injury:

As shown in Table 12, 85% (66/78) of the total fatalities were related to musculoskeletal disorders, essentially unchanged from 2003. It has been previously reported that the majority of musculoskeletal injuries sustained by horses racing in the United States involve the limbs.

Table 13 (on the following page) displays the distribution of limb injuries sustained by animals during racing or race training. This data is also segregated by breed in 2010. There were increased numbers of bilateral front limb fractures during racing in 2010. All of these injuries occurred in "sprint" type races with 4 Quarter Horse and one Paint fatality. Also noted in 2010 is a trend continued from 2009 with increased numbers of right front limb injuries over-all when compared to left front limb. Nearly twice as many right front limb injuries were noted at both Remington Park and Fair Meadows Tulsa when compared to left front. The difference was not as great at Will Rogers Downs. In 2010 there were only 8% (5/66) musculoskeletal fatalities described which did not involve the limbs. These injuries all occurred during racing and involved the head/skull, spine or pelvis/sacrum. Two of these were "accident" situations that occurred on race day (paddock and post parade). One animal was a Thoroughbred, three were Quarter Horses and one was a Paint.

Table 13: Limb injury by breed and racing/training 2010.

		REM		FMT		WRD		TOTAL	
		Race	Train	Race	Train	Race	Train	Race	Train
R. front		**13**	**8**	**7**	**0**	**4**	**0**	**24**	**8**
	TB	4	7	3	0	3	0	10	7
	QH	8	1	4	0	1	0	13	1
	Pnt	1	0	0	0	0	0	1	0
L. front		**6**	**3**	**4**	**0**	**4**	**2**	**14**	**5**
	TB	3	3	2	0	1	2	6	5
	QH	3	0	0	0	3	0	6	0
	Pnt	0	0	2	0	0	0	2	0
R. hind		**0**	**2**	**0**	**0**	**0**	**0**	**0**	**2**
	TB	0	2	0	0	0	0	0	2
	QH	0	0	0	0	0	0	0	0
	Pnt	0	0	0	0	0	0	0	0
L. hind		**2**	**0**	**0**	**0**	**1**	**0**	**3**	**0**
	TB	2	0	0	0	0	0	2	0
	QH	0	0	0	0	1	0	1	0
	Pnt	0	0	0	0	0	0	0	0
Bilateral		**0**	**0**	**2**	**0**	**3**	**0**	**5**	**0**
	TB	0	0	0	0	0	0	0	0
	QH	0	0	2	0	2	0	4	0
	Pnt	0	0	0	0	1	0	1	0
Other		**1**	**0**	**2**	**0**	**2**	**0**	**5**	**0**
	TB	0	0	0	0	1	0	1	0
	QH	0	0	2	0	1	0	3	0
	Pnt	1	0	0	0	0	0	1	0
TOTAL		**22**	**13**	**15**	**0**	**14**	**2**	**51**	**15**

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/tarsus) as the most common injury in the racing equine athlete. Table 14 below reports the anatomic site of injury for all musculoskeletal injury fatalities at Oklahoma race tracks for 2010.

Table 14: All Fatal Injuries during Racing or Race Training & Track 2010

Injury	REM	FMT	WRD	Total
Fetlock Failure:	12	6	4	**22**
Sesamoid Fracture	12	6	4	
Soft Tissues	4	6	4	
Condyle	3	1	1	
Carpal Fracture:	12	4	5	**21**
Radial CB	6	1	1	
C3	9	4	5	
Metacarpus/tarsus:	2	1	2	**5**
Scapula:	1	2	1	**4**
Vertebrae (C,T, L):	1	2	1	**4**
Humerus:	2	0	1	**3**
Pastern (P1/P2):	1	0	1	**2**
Shoulder (not specified):	1	0	0	**1**
Skull:	0	0	1	**1**
Ilium:	1	0	0	**1**
Femur:	1	0	0	**1**
Tibia:	1	0	0	**1**
Total	**35**	**15**	**16**	**66**

In 2010 there were 76% (50/66) fatal musculoskeletal injuries documented affecting the region from the carpus/tarsus distal. The greatest majority of injuries involved the fetlock joint, however there were almost equal number of carpal fractures again submitted in 2010. There were more fractures of the humerus submitted in 2010 and proximal limb (fore and hind) fractures totaled 11/66 (17%) in 2010. One fracture of the proximal forelimb was not completely characterized at necropsy during this reporting period. Vertebral fractures were also increased in the 2010 racing year.

GOAL 2: MONITOR FOR EPIZOOTIC DISEASE:

In Table 10 from page 6, there were nine (9/78 – 12%) of submitted fatal cases reported due to non-exercise related activities. These animals include cases of infectious or communicable disease of importance to all animals competing, training or residing in the racetrack environment. Table 15 below documents cases based on final necropsy analysis at OADDL.

Table 15: Disease Condition and Track 2010

Disease Condition:	REM	FMT	WRD	Total
Undetermined/Dry ingesta, Na Normal:	1	0	0	**1**
Gastrointestinal:	3	0	0	**3**
SI volvulus	1	0	0	
Colic/undetermined (*)	1	0	0	
Liver changes (*)	1	0	0	
Respiratory/pulmonary hemorrhage:	2	0	0	**2**
Head trauma/perivascular cuffing:	0	0	1	**1**
Equine Protozoal Myelitis:	1	0	0	**1**
Anaphylaxis (high normal Se):	0	0	1	**1**
Total	**7**	**0**	**2**	**9**

2010 year was associated with required testing for Equine Piroplasmosis at Oklahoma Race Tracks. This disease was re-emergent in late 2008-early 2009 in both a natural outbreak in South Texas and in racehorses from Mexico imported to the United States. A stable with an infected horse did arrive at Oklahoma City and was quarantined. Two deaths occurred at that stable during quarantine indicated by (*) above. These horses are included in the Remington Park data, but they were not on grounds. Both animals were negative for protozoa by cytology at the time of necropsy.

Clenbuterol (a beta-2 agonist) associated with acute equine deaths (www.fda.gov/cvm) was identified by a reference laboratory testing in two of the reported deaths in the above table. One of the deaths was reported as pulmonary hemorrhage in an animal that had raced 5 days previous. The second respiratory death was also a Clenbuterol case.

One animal with recurrent and non-responsive equine protozoal myelitis (EPM) was euthanized at Remington Park. Another horse with neurologic signs at Will Rogers Downs had inflammation around blood vessels in the brain suggestive of previous injury/disease. Will Rogers Downs also had a horse suffer anaphylaxis when administered a vitamin supplement. Further analysis on that case revealed high normal levels of Selenium in tissues at the time of death.

Screening cases as indicated at necropsy were negative for equine herpes virus-1 and equine influenza during 2010. Streptococcus equi ssp. equi (Strangles) and ssp. zooepidemicus were isolated from 3 separate cases in 2010. A chronic lung granuloma was also noted in one animal that was not cultured. These four cases had gross evidence

of pneumonia and enlarged lymph nodes and 3 deaths occurred race day and one occurred while training.

The disease surveillance emphasis for the cooperative OADDL:OHRC program is vital to the Oklahoma racing industry. Surveillance for Piroplasmosis will continue in 2011 based on the identification of over 100 positive animals nation-wide that have racetrack connections. Recent national outbreaks of Equine Viral Arteritis (EVA) in 2006, Equine Herpes-1 (EHV-1, neurologic form) in 2006/2007 and Contagious Equine Metritis (CEM) in the fall of 2008 have emphasized the importance of disease surveillance for general health of the equine population. As part of OADDL's continued commitment, we plan to monitor a percentage of routine submissions from each track for respiratory viruses, bacteria and salmonella during the 2011 calendar year.

Drug Testing (TOXICOLOGY):

Since the initiation of the cooperative OADDL:OHRC Diagnostic Program, some toxicology analysis has been added, at the request of the OHRC. When possible, urine and synovial fluid are harvested from fatally injured equines that died during or immediately following an OHRC race. During 2010 OADDL analyzed 44 cases in the toxicology section on either urine or synovial fluid specimens. OADDL's mass spectrophotometer was inoperable for 4 months during the summer and 25 specimens were forwarded to another AAVLD Accredited Laboratory for testing during that time. An additional 6 specimens were also forwarded to a commercial analytical laboratory for testing at the request of OHRC. In total, 75 specimens were analyzed by toxicology and that data is included in appendix I, at the end of this report. Urine remains the desired sample for testing, however it is not always available at necropsy. OHRC track veterinarians or OADDL personnel transporting the horses can obtain urine if it begins leaking after death. This is standard operation for the laboratory personnel once the animals arrive at Stillwater for examination.

The majority of compounds identified during 2010 were associated with euthanasia (pentobarbital). The OADDL toxicology section verified pentobarbital in all but 2 specimens tested. The accredited contract laboratory OADDL used had detection limits too high for most non-steroidal medications of interest. Identification of non-steroidal anti-inflammatory drugs (NSAID) in racing and training deaths was determined again in 2010. There was Phenylbutazone present in fluids of 26/33 (79%) race day fatalities tested at OADDL. Oklahoma regulations do allow the use of this NSAID and the levels were not quantified. There were 2 race day fatalities in which both Phenylbutazone and Flunixin (Banamine) were detected. Such "stacking" of multiple NSAID's has recently been reported to be of grave concern to both the medical well being and musculoskeletal health of equine athletes. Suprisingly, there were 8 training fatalities with Phenylbutazone and 4 training fatalities with stacking of Phenylbutazone and Flunixin in 2010. These results were forwarded to OHRC however it remains uncertain the benefit such medication would play during routine training of a normal horse.

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. This examination is attempted on all submissions, including non-exercise related deaths and pony horse/outrider animals. Table 16 displays the hoof/shoeing data compiled during the 2010 time period. The abnormalities are quantitated for 2010 and also reported by breed (rather than track) at the request of breed associations.

Hoof Anatomy/Shoe Characteristics:

Table 16: Hoof Anatomy and Horse Shoe Characteristics - 2010

		Thoroughbred	Quarter Horse	Paint	TOTAL
Toe Grabs:					
	Front < 5mm	33	30	5	68
	Front > 5mm	0	2	0	2
	Hind < 5mm	19	3	1	23
	Hind > 5mm	6	19	2	27
Shoes Not Examined:		5	1	0	6
Hind Shoes Not Examined:		8	10	2	20
Barefooted:		1	1	0	2
Toe/Heel Length	Normal	11	8	2	21
Long toe/low heel	Mild	5	8	1	14
	Moderate	11	13	1	25
	Marked	7	5	1	13
	Not reported	5	0	0	5
Under-run heels	Normal	2	2	0	4
	Mild	12	9	3	24
	Moderate	19	17	1	37
	Marked	6	6	1	13
	Not reported	0	0	0	0
Poor hoof/shoes		10	7	0	17
Pads		1	2	0	3
Squared toes		2	0	0	2

A concerted effort was made to record the hoof morphology and shoeing characteristics on all horses submitted under the OADDL:OHRC Program in 2010. There was an interest in this topic generated during the Commission meeting in 2007 (for year-end report 2006). Some shoes were not examined as we converted to using the alkaline tissue digester at OADDL for disposal of carcasses. This device requires the removal of all metal prior to processing and some shoes were discarded prior to necropsy evaluation. Long toe grabs were present on front feet of only 2 Quarter Horses. Long toe grabs were noted on the hind limbs of 27 horses from a variety of breeds. Over-all 45% (35/78) hoof sets evaluated were "normal" or "mild" with respect to toe length, heel length and symmetry. Over-all there continues to be improvement in the hoof and shoeing characteristics monitored in this necropsy program. Disappointing however was the noting of several 22% (17/78) long over-grown feet (in need of re-set), abnormally shaped hooves (or imbalanced), abnormal growth rings, quarter cracks and epoxy repairs.

Gastric Ulcers:

Table 17: Gastric Ulcers - 2010

	Thoroughbred	Quarter Horse	Paint	TOTAL
None	13	14	2	29
Mild	14	12	1	27
Moderate	8	6	1	15
Marked	3	0	1	4
Not Examined	1	2	0	3
Total	39	34	5	78

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. Monitoring of gastric ulcers continues to be a component of the OHRC:OADDL Diagnostic Program. Table 17 presents the data compiled during 2010 regarding gastric ulceration in the Oklahoma racehorse diagnostic program. This data is presented by breed at the request of registry participants.

Only three submissions were not examined for gastric ulcers. Of the 46 animals with gastric observations, 59% (27/46) had only mild ulcers and 39% (29/75) had no ulcers identified. A majority of the horses with ulcers were young animals or animals new to race training based on other physical findings and history, however the trend for fewer gastric ulcers continues. These findings suggest that trainers, owners and veterinarians recognize the importance of gastric ulcers in the horse.

Fatal Injury and Track Location:

Table 18: Race Fatality by Track Location 2010

	REM	FMT	WRD	Total
Paddock	0	0	1	**1**
Post Parade	0	0	1	**1**
Out of Starting Gate	1	1	0	**2**
First Turn	0	1	1	**2**
Home Stretch	0	4	2	**6**
1/16 Pole	1	0	0	**1**
1/8 Pole	1	0	0	**1**
1/4 Pole	0	0	1	**1**
1/2 Pole	0	0	1	**1**
3/8 Pole	1	0	1	**2**
Finish Line/At Finish	8	9	2	**19**
Finished Race	9	0	4	**13**
Not Reported	2	0	2	**4**
Total	23	15	16	**54**

The reporting 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 2010 data for track location is included in this report as Table 18 above and includes bleeders and pre-race fatalities. This data is for race day deaths only and no location was reported in 4 of these cases. The majority of cases continue to be described as occurring at or just past the finish line. This was the most frequent location reported at Fair Meadows Tulsa where over half (9/15) the injuries were described at this site. More in-depth analysis and standard reporting of track location will continue to be an objective of this program.

Race Fatality and Class of Race:

Table 19: Race Fatality by Class of Race - 2010

	REM	FMT	WRD	Total
Undetermined	0	0	1	**1**
Maiden Race	5	0	2	**7**
Claiming:	11	7	8	**26**
$0-4999	1	0	2	**3**
$5000-7499	2	4	2	**8**
$7500-9999	5	0	2	**7**
$10,000-19,999	2	3	2	**7**
$20,000-up	1(^)	0	(^)	**1**
(maiden claiming)	(3)	(3)	(3)	**(9)**
Futurity Trial	0	4	1	**5**
Futurity	0	0	1	**1**
Derby	0	1	1	**2**
Allowance	4	3	0	**7**
(Allowance/Claim)	2^	0	1^	**3^**
Stakes	1	0	1	**2**
Total	**23**	**15**	**16**	**54**

In the 2006 year-end report to OHRC, OADDL included data regarding class of race, this data was continued in 2010. The 54 race fatality cases (including EIPH and pre-race deaths) are displayed with respect to class of race in Table 19. Requests from OHRC in 2009 to stratify the claiming price are included in this table. There were three Allowance Race fatalities indicated by (^) which were written as an "Optional Claiming" race. Two were for $100,000 and one for $25,000. This race category is given its own entry row in the 2010 report. Also, Maiden Claiming races are considered to be a subset of the category, Claiming races. During 2010 the great majority of fatalities are again in claiming races 48% (26/54), with the majority occurring in races with animal claiming values between $5,000 and $7,499. It remains very disappointing that 37% (20/54) race day fatalities occurred in "select" race conditions (futurity, derby, allowance, stakes) in 2010. Fatal events in these higher class races was increased from 9 in 2009. Requests were made to segregate data by breed and this class of race data is presented again in table 20 below with respect to breed.

Table 20: Class of Race and Breed 2010

	TB	QH	Paint	Total
Undetermined	0	1	0	**1**
Maiden Race	3	2	2	**7**
Claiming:	14	10	2	**26**
$0-4999	2	0	1	**3**
$5000-7499	2	5	1	**8**
$7500-9999	5	2	0	**7**
$10,000-19,999	4	3	0	**7**
$20,000-up	1	0	0	**1**
(maiden claiming)	(6)	(3)	0	**(9)**
Futurity Trial	0	4	1	**5**
Futurity	0	1	0	**1**
Derby	0	2	0	**2**
Allowance	3	4	0	**7**
(Allowance/Claim)	2^	1^	0	**3^**
Stakes	0	2	0	**2**
Total	**22**	**27**	**5**	**54**

Seventy-five percent (15/20) "select" race fatalities occurred in "sprint" type races for Quarter Horses and Paints. Claiming race and Maiden race fatalities were approximately equal between Thoroughbred, Quarter Horse and Paint animals. The great majority of these races, **81%** (44/54), did have purse money included from the **Accredited Oklahoma Bred** program again in 2010.

Chronic Musculoskeletal Lesions:

Identification of pre-existing or chronic changes in the musculoskeletal system remains a major component of the OADDL:OHRC diagnostic program. Examination for chronic musculoskeletal changes was completed on all animals submitted, regardless of cause of death in 2010. A majority of these cases involve mild changes that are considered normal for animals in athletic training, such as osselets (dorsal fetlock arthrosis) and dorsal margin remodeling of carpal bones. Other lesions are boney changes that may be related to conformation or considered to be blemishes, such as splints and bucked shins. In 2010 there were 67 animals with chronic dorsal margin remodeling of the fetlock joints (osselets) and 32 animals with chronic dorsal margin remodeling of carpal bones. Thirteen animals (13) had splints of either MCII or MTII and 9 animals had bucked shins (cortical exostosis of MCIII or MTIII). Only two animals with chronic bowed tendons (deep and superficial digital flexor) were found. Three of the 4 scapular neck fractures submitted did have nodular exostosis of the distal scapular spine which has been reported as a predisposing factor to fractures of this bone. There were 16 cases submitted in which chronic lesions were considered to be significant and these are included in table 21 on the next page.

Table 21: Significant Chronic Musculoskeletal Lesions 2010

Mon	Age	Breed	Track	Death	Fatal Lesion	Chronic findings:
Mar	4	QH	REM	Race	Pastern Fx.	Moderate Dorsal Fetlocks with chip in R.
Mar	2	QH	REM	Train	Scapula Fx.	Pneumonia; Bad Feet; Chronic carpal lesions with chip in R.; Marked bilateral front fetlocks.
Apr	6	TB	WRD	Race	EIPH	Marked bilateral carpi, chip in R.; Moderate bilateral front fetlocks.
Apr	4	QH	REM	Race	R. carpas Fx.	R.front fetlock w/ OCD of MCIII, wing fxt of axial prox. sesamoid.
May	7	QH	REM	Died	S.I. vovulus	Marked bilateral front fetlocks, chip in L.; bilateral splints; R. bucked shin.
May	5	QH	REM	Race	R. carpal Fx.	Moderate bilateral carpi with chips; Moderate L. front fetlock with chip.
Jun	4	TB	FMT	Race	L.front Fet. Fx.	Marked R. front fetlock with chip; Marked L. carpas (RCB, ICB).
Jul	2	QH	FMT	Race	Vertebra Fx.	Bilateral front fetlocks w/ chips; R. carpas chip; Bilateral bucked shins.
Jul	4	TB	FMT	Race	R.front Fet. Fx.	Marked bilateral carpi w/ chips; Marked L.front fetlock with bone cyst & susp.lig.
Jul	4	QH	FMT	Race	R. capas Fx.	L. carpas old C3 slab; Marked bilateral front fetlocks; R. front splint.
Jul	3	QH	FMT	Race	R. carpas Fx.	L. carpas 0.7 cm chip; Mild bilateral front fetlocks.
Oct	3	TB	REM	Race	R. carpas Fx.	L. carpas chips; Bilateral front fetlocks w/ chips (0.7 cm L.).
Nov	5	PNT	WRD	Race	Bilateral MCIII	Marked front fetlocks, fibrosis/ankylosis; Moderate R. carpas; bad feet.
Nov	3	QH	WRD	Race	L.rear Fet. Fx.	R. rear bow and bucked shin; Moderate bilateral carpi; Moderate L. front fetlock; bad feet.
Nov	4	QH	WRD	Race	L.front Fet. Fx.	Marked R.front fetlock w/ chips; Marked L. carpas w/ chips.
Nov	3	TB	REM	Race	L.front Fet. Fx.	Moderate R.front fetlock; moderate bilateral carpi; R. splint; 6 starts in meet.

The 16 chronic lesion cases presented in table 21 are felt to represent predisposing lesions that could have been detrimental to routine training and racing. Ten of the cases were Quarter Horses, 5 were Thoroughbreds and one was an American Paint. Fourteen suffered race day catastrophic injury, one a catastrophic injury during training and one a natural death. Seven cases were from Remington Park, 5 from Fair Meadows Tulsa and 4 were from Will Rogers Downs. Four such animals were submitted in July and four also in November. There were 2 two-year-old animals in this group. If these 16 cases had been removed from the data this year, there would have been 62 fatalities reported; a number more in keeping with previous annual reporting cycles.

SUMMARY:

Conclusions from the 2010 year-end report indicate that Oklahoma racetracks remain an active and relatively safe environment for equine athletes. There are concerns however given an increase in submissions to 78 animals, with reduction in racing due to the loss of one race track. Careful re-evaluation of track surfaces, medication rules/enforcement and pre-race examinations are warranted during the 2011 racing year. The public data available from OHRC statistics for 2010 reports 211 racing days available, down from 238 in 2009. During that time period, there were 49 race day musculoskeletal fatalities, 3 EIPH fatalities and 2 pre-race musculoskeletal fatalities submitted, described and reported by OADDL. These data allow calculation of a catastrophic musculoskeletal index per day of live racing for the entire OHRC program and subdivided for each track. This data is presented below in table 22 and will exclude the EIPH cases. This is not a traditional value for comparison used by other jurisdictions but is useful in providing analysis for Oklahoma. The index of musculoskeletal fatality by race day rose dramatically state-wide with a doubling at Will Rogers Downs and quadruple increase at Fair Meadows Tulsa. Remington Park showed a very mild reduction in this index.

Table 22: Number of Musculoskeletal Fatalities per Number of Race Days

		Catastrophic Musculoskeltal Fatality	Number of RACE DAYS	Catastrophic Musculoskeletal Fatality per Race Day
TOTAL	**2006**	**44**	**264**	**0.167**
	2007	**46**	**265**	**0.174**
	2008	**39**	**265**	**0.147**
	2009	**40**	**238**	**0.168**
	2010	**51**	**211**	**0.242**
Remington Park	2006	23	118	0.195
	2007	14	119	0.118
	2008	16	117	0.137
	2009	23	117	0.197
	2010	22	117	0.188
Blue Ribbon Downs	2006	7	71	0.098
	2007	16	70	0.229
	2008	5	70	0.071
	2009	8	43	0.186
Fair MeadowsTulsa	2006	10	33	0.303
	2007	11	34	0.324
	2008	15	34	0.441
	2009	3	34	0.088
	2010	15	34	0.441
Will Rogers Downs	2006	4	44	0.091
	2007	5	42	0.119
	2008	3	44	0.068
	2009	6	44	0.136
	2010	14	60	0.233

A more classic analysis of catastrophic musculoskeletal injury used by most racing jurisdictions is the CMI by number of starters – number of animals starting races. This is a more traditional manner of comparing injury statistics. This data is accumulated for Remington Park and Fair Meadows by Dr. Garrison (OHRC Veterinarian). That more classic index is supplied to OHRC in his end-of-year report. These race starter statistics have not been supplied by either Blue Ribbon Downs or Will Rogers Downs. OADDL has received requests for further comparison of injury by breed. It is possible to subdivide musculoskeletal fatality per race day for both Remington Park and Will Rogers Downs, as they have dedicated meets. Comparison of fatality per race day index and by breed is included in table 23.

Table 23: Musculoskeletal Race Day Fatality by Breed.

		MusSkel Fatality #	# Race Days	INDEX
Quarter Horse	**Total**	19	78	**0.244**
	REM	11	50	**0.222**
	WRD	8	28	**0.286**
Thoroughbred	**Total**	15	99	**0.152**
	REM	10	67	**0.149**
	WRD	5	32	**0.156**

The musculoskeletal fatality index by breed displays that sprinting Quarter Horses have almost double the value of Thoroughbreds. This has been assumed in other publications and may relate to running style and differences in running an all out sprint versus rating speed on a longer course.

The injured limb again favored the right front. Anatomic location of injuries were similar with increased carpal injuries. The month the injury occurred was similar to previous years' reports. Disease surveillance did identify several classic equine pathogens within the population and the identification of Piroplasmosis in Oklahoma necessitated testing and quarantine protocols. Toxicology analyses of specimens were performed on many urine and synovial fluid specimens and results were forwarded to the OHRC. Phenylbutazone was present in toxicology samples from a majority of animal fatalities tested on race day submissions and in training related deaths. Stacking of multiple NSAID's was also documented. Monitoring of hoof anatomy, shoe characteristics, gastric ulcers and the presence of chronic limb lesions recorded and forwarded to OHRC upon completion of each case. New comparisons of injury data to OHRC racing information and expansion of breed differences was continued in hopes of extending the scope and impact of this 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. Grant B. Rezabek & Dr. Bill J. Johnson
Oklahoma Animal Disease Diagnostic Laboratory

SUMMARY TABLE: Veterinary Medical Diagnostic Program

	Racing	Training	Non-exercise	Accident	TOTAL
Remington Park:					
2003	10	2	1	0	**13**
2004	10	1	2	0	**13**
2005	14	5	3	2	**24**
2006	25	5	2	1	**33**
2007	14	5	3	2	**24**
2008	16	7	2	2	**27**
2009	23	4	3	1	**31**
2010	23	13	7	0	**43**
Blue Ribbon Downs:					
2003	8	3	5	0	**16**
2004	8	2	7	0	**17**
2005	9	4	10	0	**23**
2006	7	1	10	1	**19**
2007	16	2	7	0	**25**
2008	5	4	1	2	**12**
2009	8	3	3	0	**14**
Fair Meadows:					
2003	4	2	0	0	**6**
2004	6	1	4	0	**11**
2005	5	0	0	0	**5**
2006	11	0	0	0	**11**
2007	11	2	1	0	**14**
2008	15	0	2	0	**17**
2009	3	1	1	0	**3**
2010	15	0	0	0	**15**
Will Rogers Downs:					
2005	0	1	0	0	**1**
2006	5	2	1	2	**10**
2007	5	1	1	0	**7**
2008	3	1	1	0	**5**
2009	6	2	2	0	**10**
2010	16	2	2	0	**20**

APPENDIX I: TOXICOLOGY			
History/Drugs	**OADDL Tox**	**AAVLD**	**COMMERCIAL**
Train/P.barb, Rompun	P.barb(u)		
Race/P.barb&Scc	P.barb(u,s)		
Train/P.barb	P.barb,Bute,Flnx (s)		
Race/P.barb	P.barb (u,s)		
Colic?/no history			Results to OHRC (u,s)
Race/P.barb	P.barb,Bute (s)		
Race/P.barb	P.barb,Bute (s)		
Race/P.barb,Rom&Scc	P.barb,Bute (s)		
Race/P.barb&Scc	Insufficient sample		
Race/died	Bute (u)		
Race/P.barb	P.barb,Bute,Rom (u)		
Race/Rom,SD,P.barb	P.barb,Bute (u)		
Died/Anaphyl, vitamin	None(u); Se high norm.		
Race/P.barb&Scc	Bute (u)		
Race/P.barb&Scc	P.barb (s)		
Died/Piro suspect			Trimeth&Flnx (a) MePd&Flnx (s)
Pre-Race/died			Sulfa (a) Sulfa,MePd,CleB,Flxn (s) Sul,CleB,Flxn,Las,Tri (u)
Died/Piro barn			Trimeth, CleB (a) CleB (s)
Race/P.barb&Rom		NONE	
Race/P.barb&Scc		P.barb (s)	
Race/P.barb&Scc		P.barb (s)	
Race/P.barb&Scc		NONE	
Race/P.barb&Scc		P.barb (s)	
Colic/Rom,Trb,Drm,Flxn		NONE	
Died/		NONE	
Race/P.barb&Scc		P.barb (s)	
Race/But,Rom,Flxn,Pbarb		P.barb, Bute (s)	
Died/		NONE	
Race/P.barb,Scc		P.barb (s)	
Race/P.barb,Scc		NONE	
Train/P.barb		NONE	
Race/P.barb		NONE	
Race/P.barb		NONE	
Race/P.barb		P.barb (s)	
Race/P.barb		NONE	
Race/Died		NONE	

History/Drugs	OADDL Tox	AAVLD	COMMERCIAL
Race/P.barb		P.barb (s)	
Race/P.barb		P.barb (s)	
Race/P.barb		P.barb (s)	
Race/P.barb		P.barb (s)	
Race/P.barb		P.barb (s)	
Race/P.barb		P.barb (s)	
Race/P.barb	P.barb,Bute (u)		
Race/P.barb	P.barb,Bute (s)		
Race/P.barb	P.barb (s)		
Train/P.barb	P.barb,Bute (u)		
Train/P.barb	P.barb,Rom,But,Flxn (u)		
Race/P.barb	Bute,Flxn (s)		
Train/P.barb&Rom	P.barb,Bute,Flxn (u)		
Race/P.barb,Rom,Drm	P.barb,Bute,Flxn (u)		
Race/died	Bute,Flxn (u)		
Train/P.barb	P.barb,Bute,Flxn (s)		
Race/P.barb	P.barb,Bute,Flxn (s)		
Race/P.barb	P.barb (s)		
Race/P.barb&Scc	P.barb,Bute (s)		
Race/P.barb	P.barb,Bute (s)		
Race/P.barb	P.barb,Bute (s)		
Train/P.barb	P.barb,Bute (u)		
Train/P.barb,Rom	P.barb,Bute (u)		
Race/P.barb,Rom			Results to OHRC (u,s)
Race/P.barb	P.barb,Bute (u)		
Race/P.barb,But,Rom,Flx	P.barb,Bute (s)		
Race/P.barb	P.barb,Bute (s)		
Race/P.barb	P.barb,Bute (s)		
Race/P.barb	P.barb,Bute (u)		
Race/P.barb	P.barb,Bute (s)		
Train/P.barb	P.barb (s)		
Train/P.barb			Results to OHRC(u,s,a)
Train/P.barb	P.barb,Bute (s)		
Race/P.barb	P.barb,Bute (s)		
Race/P.barb&Scc	P.barb,Bute,Phytn (s)		
Train/P.barb	P.barb (s)		
Race/P.barb&Scc	P.barb,Bute (u)		
Race/P.barb&Scc	P.barb,Bute,Phytn (s)		