Exercise History Report (Full)
Horse #5

UCDAVIS
VETERINARY MEDICINE
J. D. Wheat Veterinary Orthopedic Research Laboratory

Oct-03-2013

Exercise History Report (Full)

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This report summarizes the high speed exercise history for Case Horse. There are four parts to this report:

Part 1 is a graph that depicts the races and officially recorded high speed workouts for Case Horse over the horse's career. The graph is useful for visually assessing features of a horse's career like: career length, periods of layup, and exercise consistency. If Case Horse had zero recorded high-speed exercise events, this graph is not produced. Event histories for three breed, sex, age, and event-matched control horses are also plotted.

Part 2 includes graphs which illustrate Case Horse's exercise history alongside that of Control Horses. These graphs are useful for visually comparing periods of layup and specific rates of exercise in the horses' exercise histories.

Part 3 is a chronological listing of races and officially timed works beginning with the most recent event (race or work).

Part 4 is a chart that allows comparison of exercise variables between Case Horse and other racehorses of similar age, sex, and breed that did not die at the same time from an injury. Similar to comparing the results of a blood test to a range of normal values, the values for Case Horse can be assessed in the context of a normal range for 95% of a sample of similar racehorses that did not die during the same time as Case Horse.

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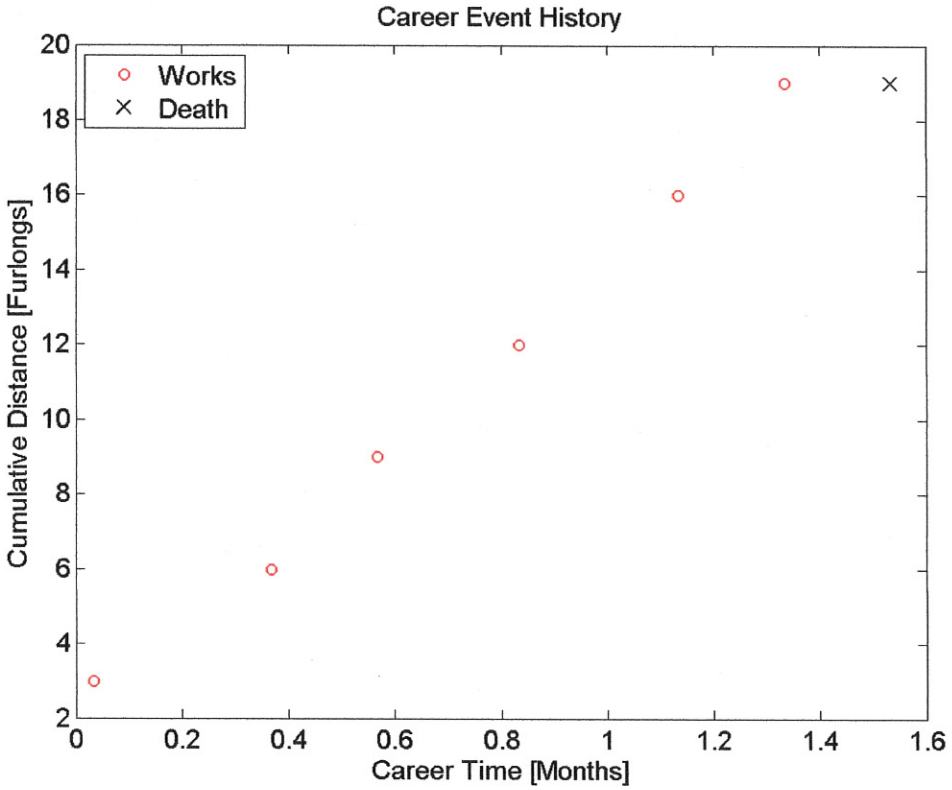
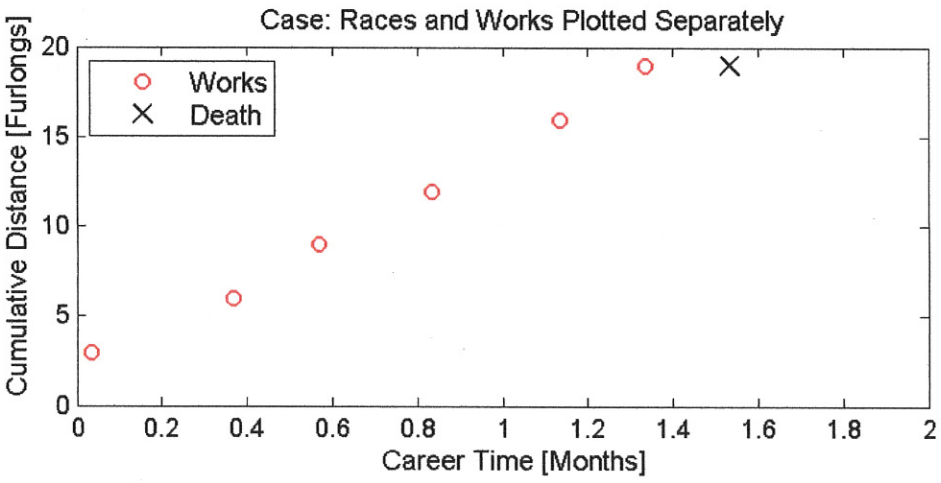
Part 1: Graphical Representation of Individual High-Speed Exercise Histories

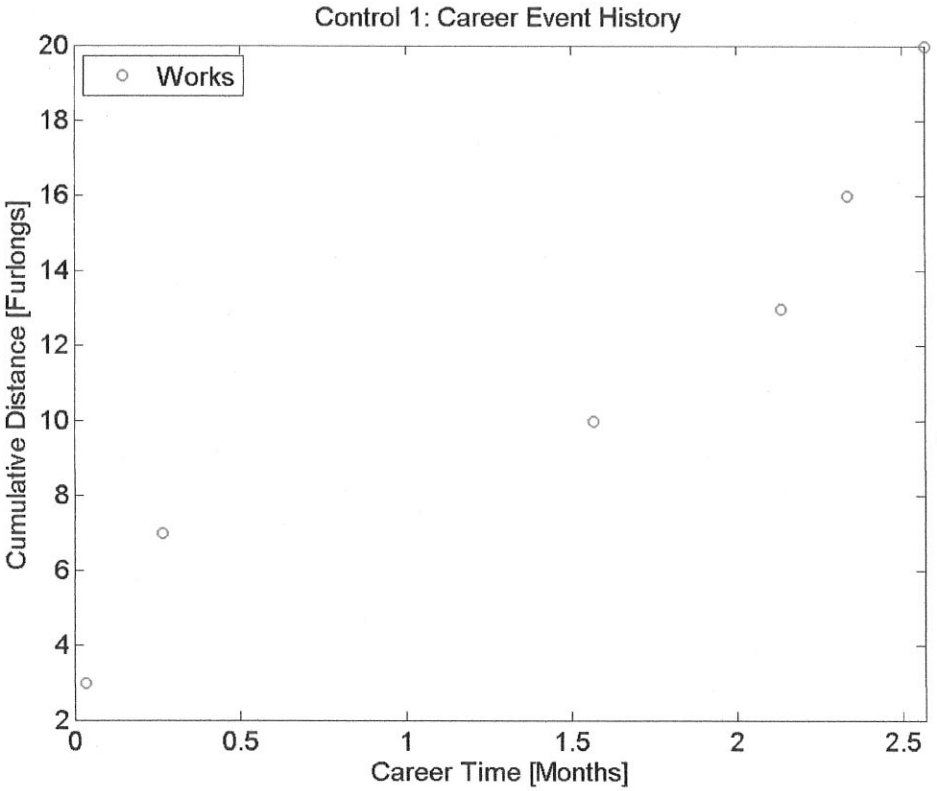
Races (filled circles), officially timed high-speed works (open circles), layups (line with endcaps, periods of time greater than 60 days in length without a race or timed work), and time of death (X) are illustrated over time (Career Time in months). With each event (race or work), the number of furlongs the horse exercised in that event is added to the number of furlongs exercised in all previous events.

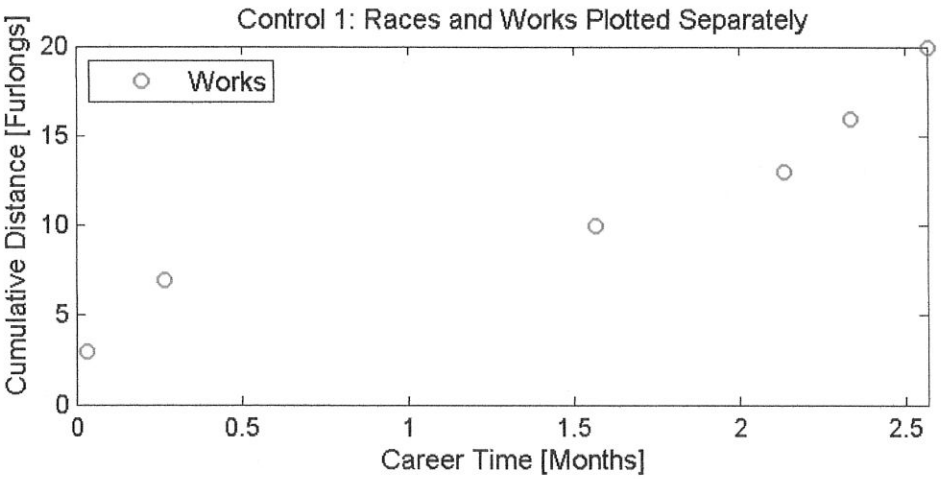
Case Horse High Speed Exercise History



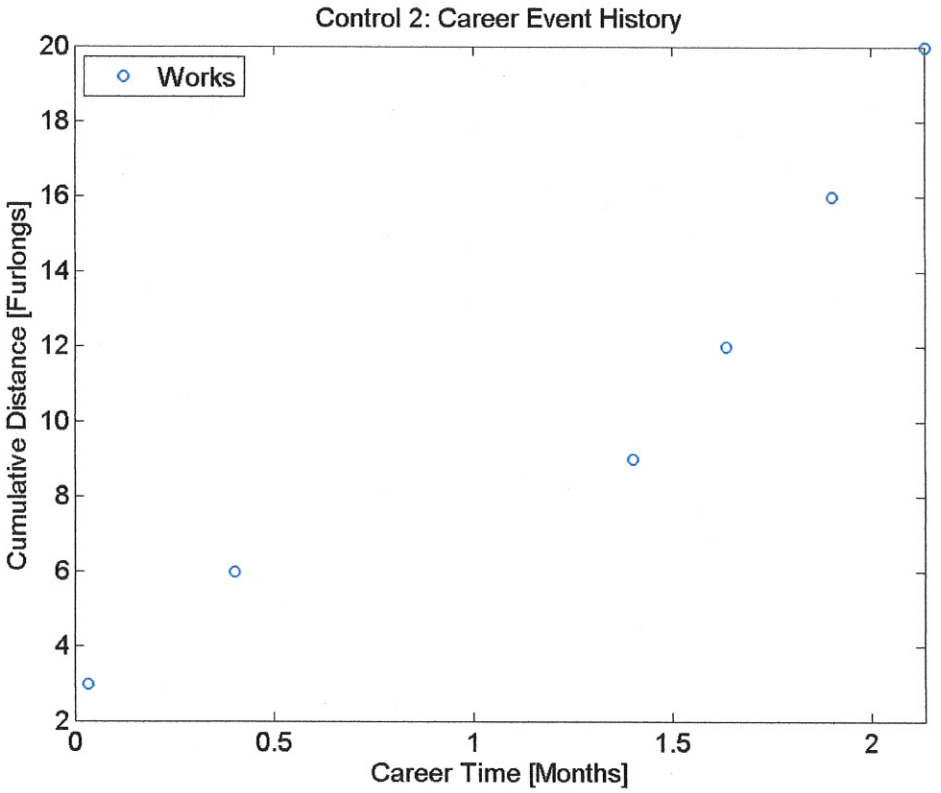


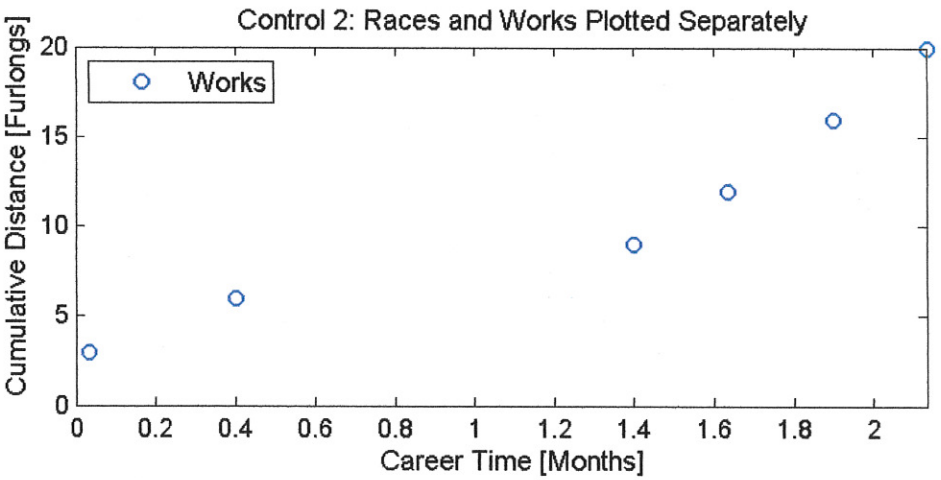
Control 1 High Speed Exercise History



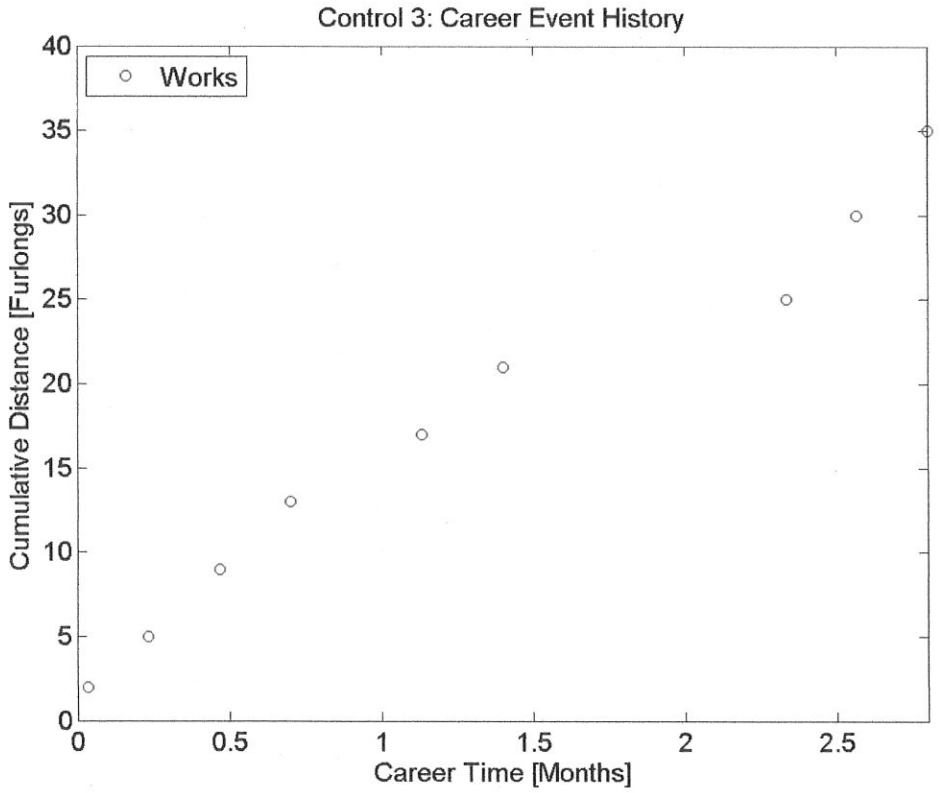


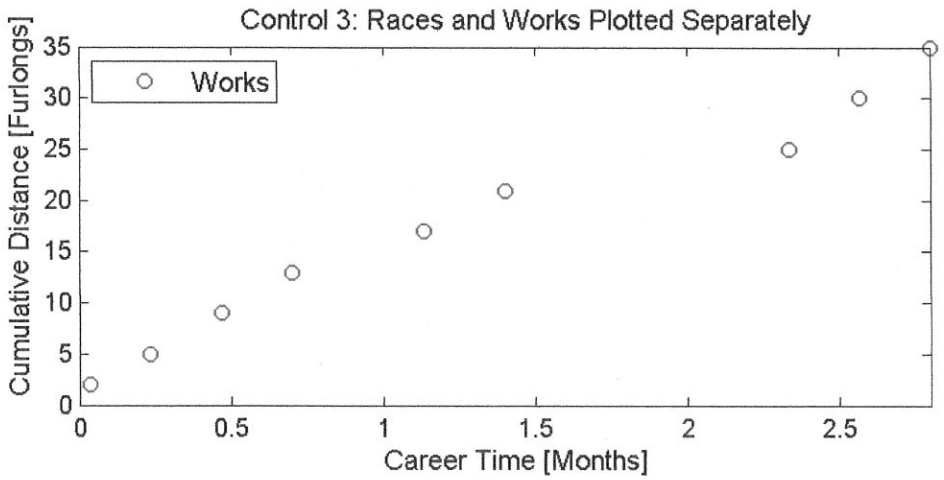
Control 2 High Speed Exercise History



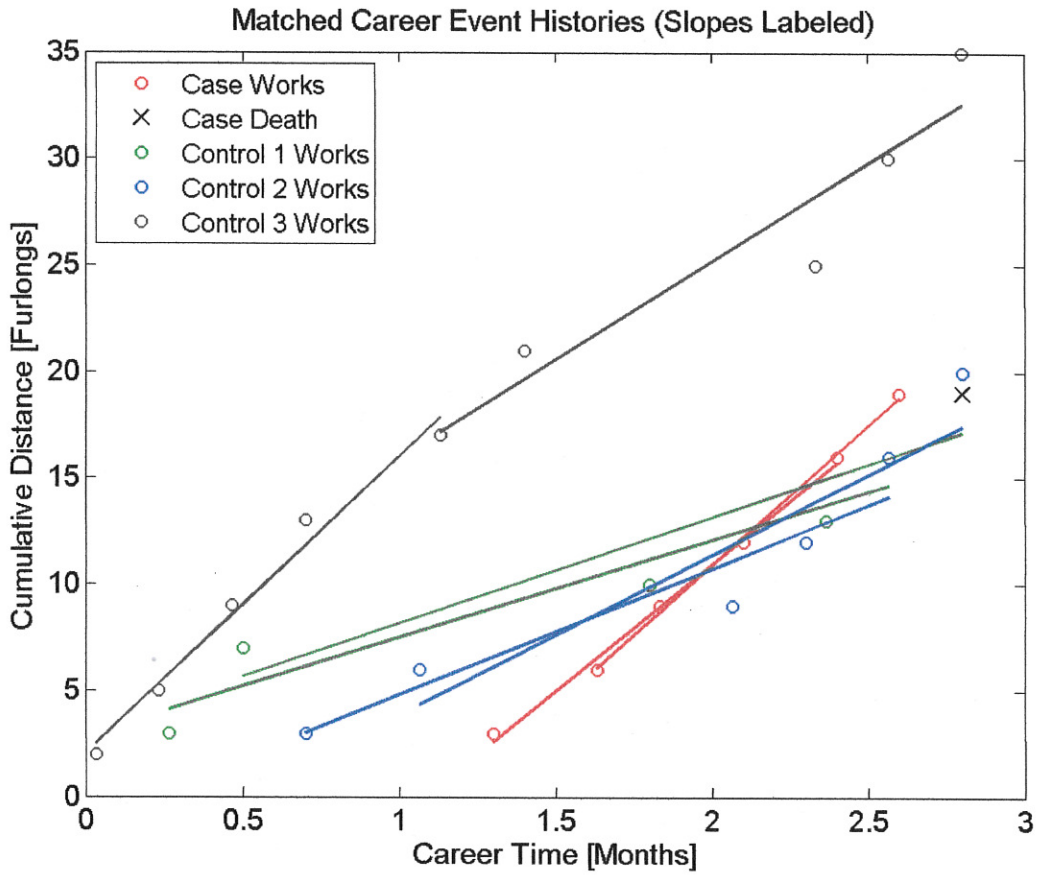


Control 3 High Speed Exercise History

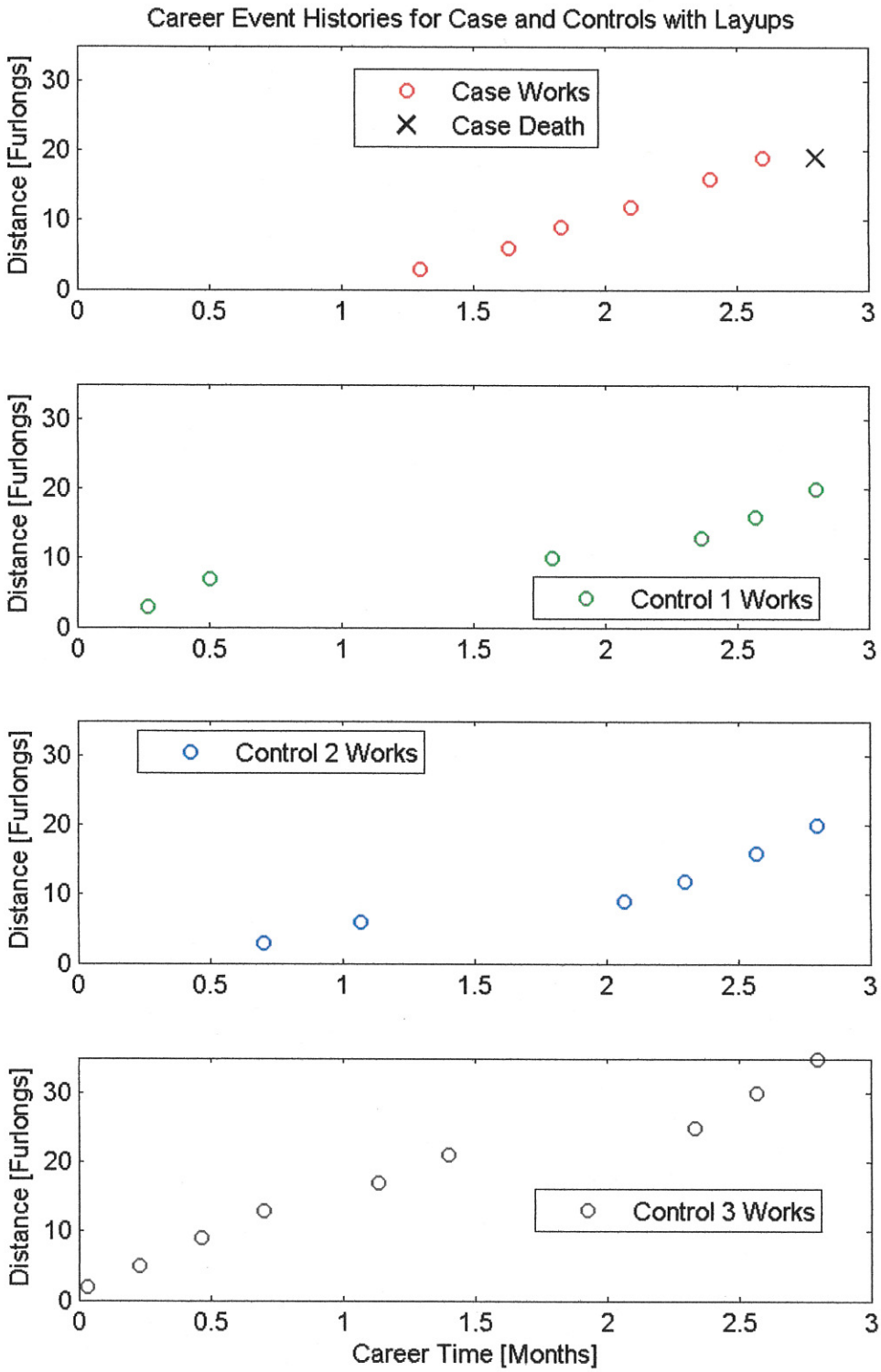


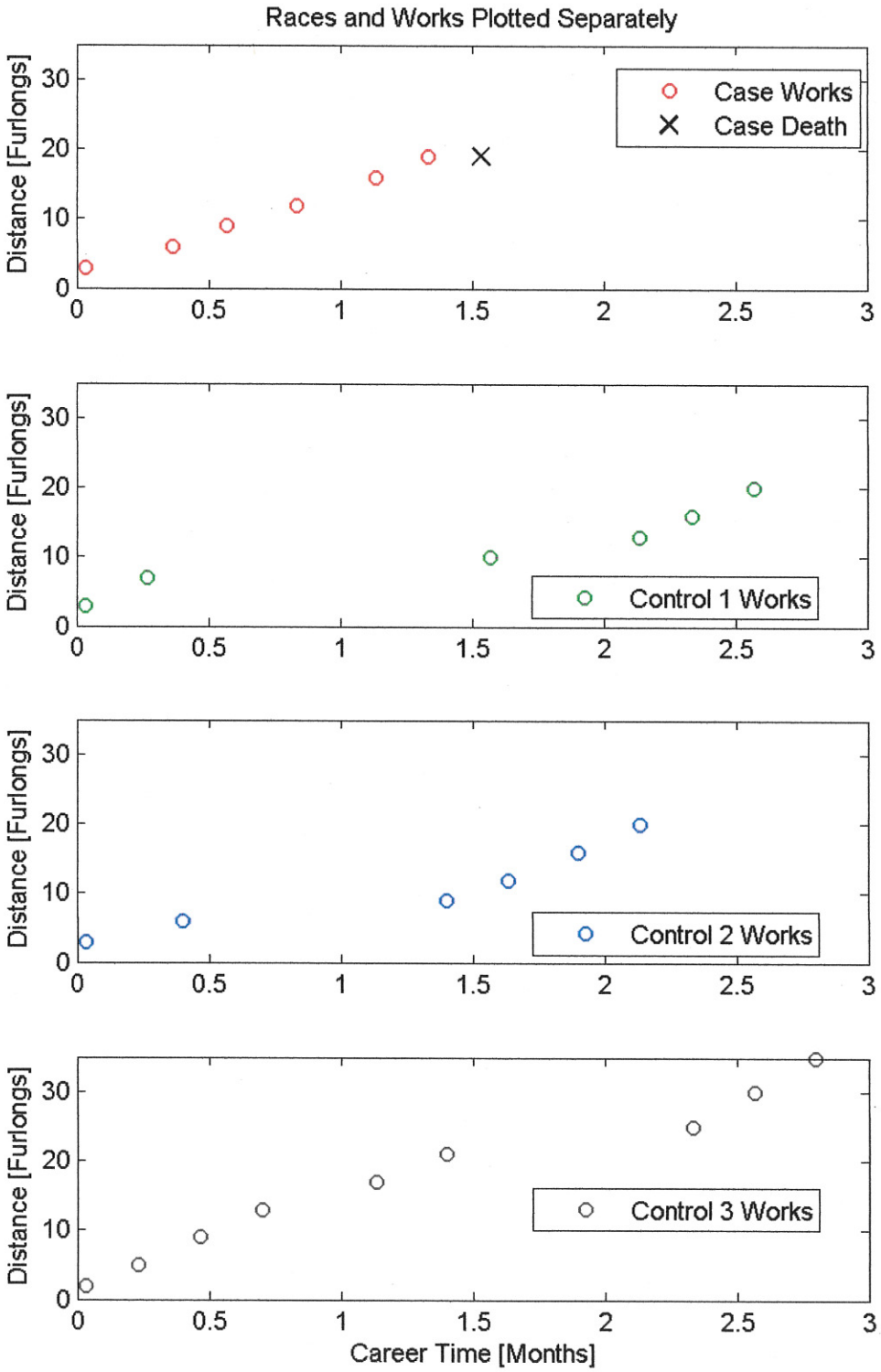


Part 2: Case and Control Horses Plotted Together



Case and Control Horses' exercise event histories are plotted on the same axes. The plots are aligned by the match date (equal to the date of death of Case Horse). Lines segments indicate specific rates of exercise at the start of career, end of career (for Case Horse), and match date (for Control Horses). Event rates are calculated as the slopes of the plots over 2 to 5 events not spanning a layup period, in units of furlongs per month.

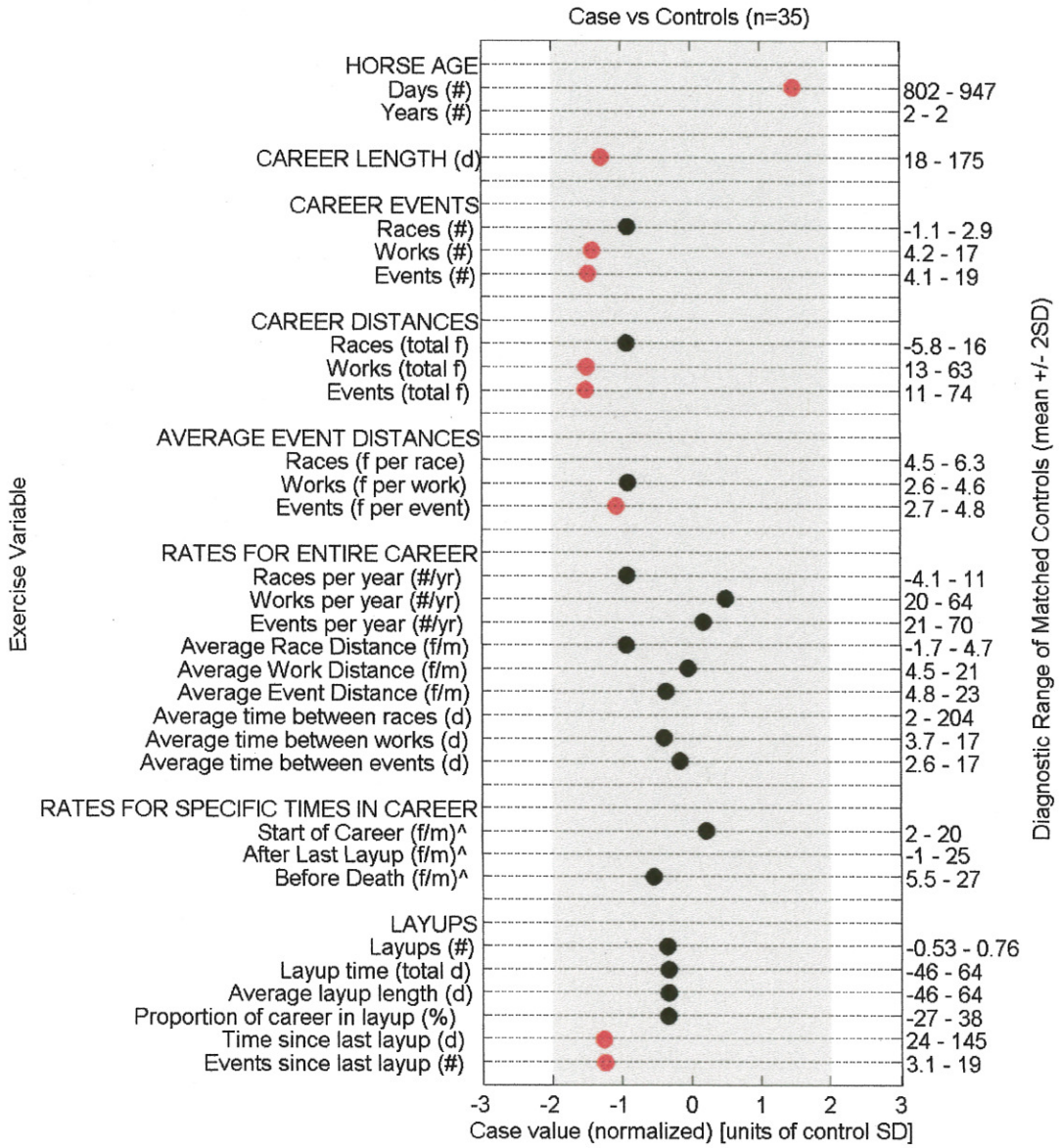

Career Event Histories for Case and Controls with Layups
Distance [Furlongs]
Case Works
Case Death
Control 1 Works
Control 2 Works
Control 3 Works
Career Time [Months]
0
10
20
30
0.5
1
1.5
2
2.5
3


Races and Works Plotted Separately
Distance [Furlongs]
Case Works
Case Death
Control 1 Works
Control 2 Works
Control 3 Works
Career Time [Months]
0
10
20
30
0.5
1
1.5
2
2.5
3

Part 3: Case Horse's Event History

Date	Race/ Work	Fur- longs	Track	Surface	Track Cond.	Time	Age/ Sex	Race Class	Earn- ings	Finish
8/14/2012	W	3.0	BHP	AllWthr	Fast	:37.80				
8/8/2012	W	4.0	BHP	AllWthr	Fast	:50.80				
7/30/2012	W	3.0	BHP	AllWthr	Fast	:36.40				
7/22/2012	W	3.0	BHP	AllWthr	Fast	:36.80				
7/16/2012	W	3.0	BHP	AllWthr	Fast	:37.80				
7/6/2012	W	3.0	BHP	AllWthr	Fast	:39.40				

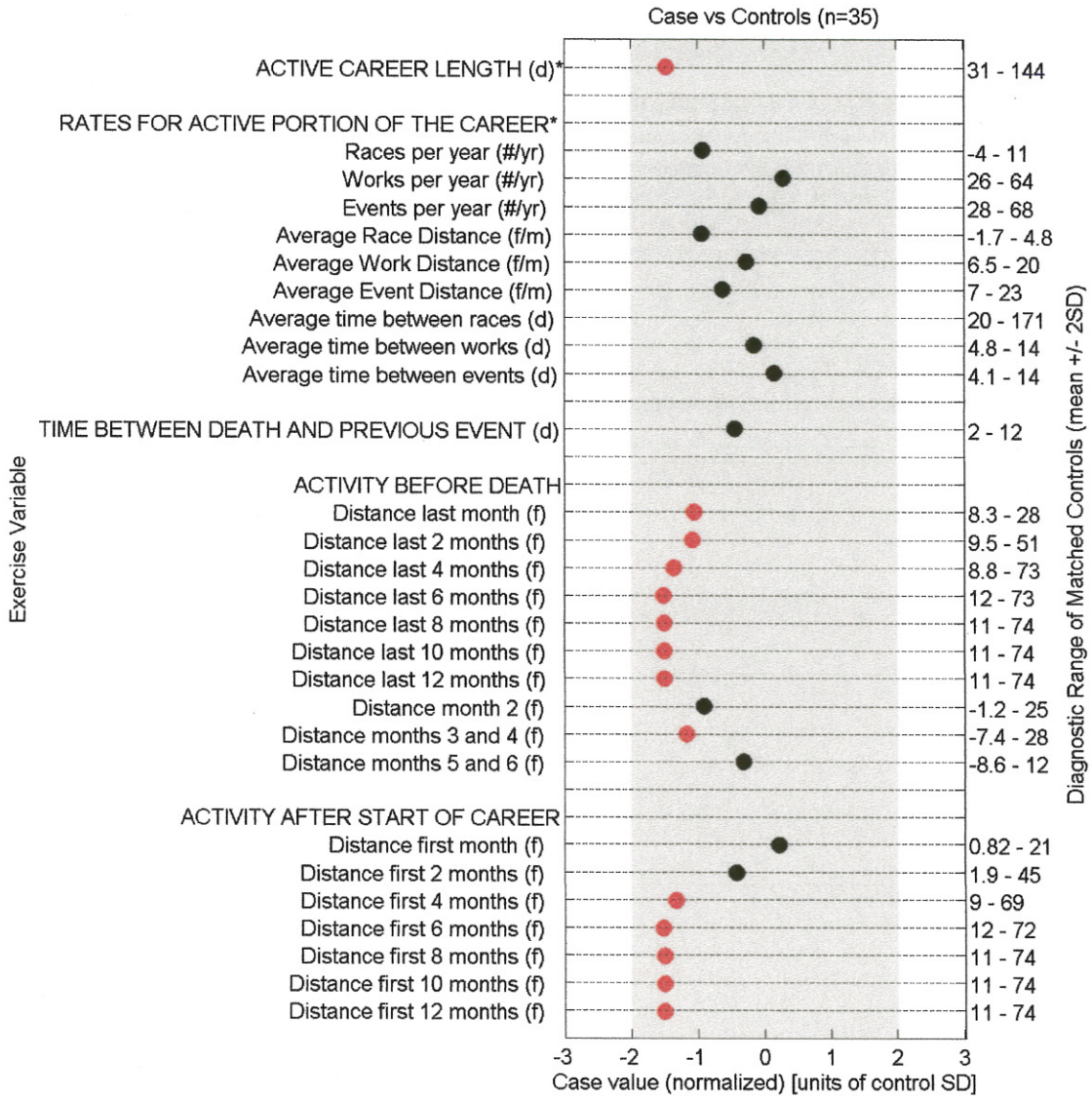
Part 4: Comparison of Exercise Variables between Case Horse and 35 Control Horses (2 year old, male, Thoroughbred)



Case Horse values are indicated by black or red symbols: circles indicate values considered normal for 95% of 2 year old, male, Thoroughbreds (n=35) (gray region) (black and red indicate within 1 and 2 SD, respectively, of mean value of controls), X's indicate values outside of the normal range. Two and 3 year old case horses are also matched to control horses by the quarter in which the case horse died (Jan-Mar, Apr-Jun, Jul-Sep,Oct-Dec). Variables that are not calculable are not plotted (e.g. time between races for a horse with zero events). f=furlongs; yr=year; m=month; d=days.

^Rates are calculated over 2 to 5 events.

*Active Career Length is the career length excluding the time during layups.



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California Animal Health & Food Safety Laboratory System
105 W. Central Avenue
San Bernardino, CA 92408-2113
(909) 383-4287

Final
Version 1
This report supersedes all previous reports for this case

CAHFS Case #:Horse #5
Referral #: [redacted]
Date Collected: 08/20/2012
Date Received: 08/20/2012
Case Coordinator: Hailu Kinde, DVM, MPVM
Electronically Signed and Authorized By: Kinde, Hailu on 9/22/2012 2:53:39PM

Email To:
ARTHUR, RICK M
RMARTHUR@UCDAVIS.EDU

Incident Track:
HOLLYWOOD PARK RACETRACK
1050 S PRAIRIE AVE
INGLEWOOD, CA 90301

Comments: CHRB

Case Contacts

Bill To	CALIFORNIA HORSE RACING BOARD	916-263-6000	1010 HURLEY WAY SUITE 300ATTENTION: ACCOUNTS PAYABLE SACRAMENTO, CA 95825
Insurance	NARVICK INTERNATIONAL	858-759-0502	16079 SAN DIEGUITO ROAD RANCHO SANTA FE, CA 92067
Owner	[redacted]	[redacted]	[redacted]
Report To	UZAL, FRANCISCO	909-383-4287	CAHFSL105 WEST CENTRAL SAN BERNARDINO, CA 92408
Report To	ARTHUR, RICK M	626-665-8130	311 E GRAND VIEW AVE SIERRA MADRE, CA 91024
Attending Vet	LATSON, KEITH	818-515-6789	10542 WALKER ST CYPRESS, CA 90630
Submitter	GRANDE, TIM	858-792-3860	PO BOX 700 Del Mar, CA 92014
Trainer	BAFFERT, BOB	626-446-2167	PO BOX 661912 Arcadia, CA 91066

CHRB - Related Information

Horse's Name:	[redacted]	Human Injury?	N
Tattoo:		Death Related to:	Training
Age:	2.00 Years	Track Surface:	Synthetic
Gender:	Male	Location on Track:	
Taxonomy:	Thoroughbred Horse	Insured?	Y

Medications: "none" As Written By The Veterinarian;

Laboratory Findings/Diagnosis

History of previous heart problem in a Thoroughbred colt, with:

- Myocarditis, lymphocytic, moderate to marked (right ventricular wall, atrial appendages, and in the semilunar valve region)
- Subendocardial fibroelastosis, mild to moderate (pulmonary artery semilunar valve and elsewhere in the heart taken at random)
- Pulmonary congestion and edema, mild to moderate

Likely cause of death: Heart failure

Other findings:
- Gastric ulcer, locally extensive, squamous/glandular region, chronic, severe.
- Routine and extensive toxicology using GC/LC/MS on urine and liver tissue: Nandrolone was detected in the urine sample.
- Unremarkable bacteriology

Case Summary

Gross examination revealed pulmonary congestion and edema; white stable froth in larynx and trachea; chronic gastric ulcer; pericardial effusion (~50-75 ml). Analysis of the pericardial fluid will be performed. Complete cardiac protocol will be followed for the histological evaluation of the heart and routine histology on other tissues will be conducted. Routine and extensive toxicology will be requested on selected specimens. Limited bacteriology will also be performed (aerobic culture) and Salmonella culture/PCR on the liver and colon, respectively.

9-7-2012: Histopathology of the heart in several sections showed moderate to marked multifocal lymphocytic infiltrates in particular in the right ventricular wall, in the pulmonary artery semilunar valve and in the right and left appendages. Mild to moderate subendocardial fibroelastosis was noted in the region of the pulmonary artery semilunar valve as well as in the endocardium of other sites taken randomly. Though I cannot explain what these lesions mean in relation to the sudden death, collectively I suspect they may indicate some heart problem. Endocardial fibroelastosis has been described in humans, cats, horses and cattle. Equine endocardial fibroelastosis is an uncommon condition that has previously been associated with sudden death following exercise in 2 young Thoroughbreds. Entrapment and subsequent degeneration of Purkinje fibers within the fibroelastic tissue, with resultant conduction disturbances, has been hypothesized to be the cause of sudden death in humans and animals with endocardial fibroelastosis. Extensive toxicology by LC/GC/MS on urine sample and liver tissue did not reveal any chemical compound or drug exposure. Bacteriology and Salmonella PCR were negative. I will send the slides to other pathologists for their opinion and provide an updated report later.

9-22-2012: I have reviewed the heart lesions with Dr. Janet Moore. It is her opinion that the lesions are remarkable and she has not seen heart lesions as severe as these in the recent sudden death cases. We both think based on the clinical history and the heart lesions (endocardial fibroelastosis and the subacute/chronic inflammation) around the valves cardiac failure is the likely cause of death.
The urine sample was subjected to MS/LC/GC/MS: Nandrolone was detected.

Clinical History

Left sided systolic murmur previously ausculted; no clinical evidence of exercise intolerance reported.

Gross Observations

Necropsy of a [redacted] Thoroughbred colt with [redacted] began at 1:30 PM on 8-20-2012.
Externally, the carcass was unremarkable. The carcass was well fleshed with adequate fat reserve and tissues were in good state of postmortem decomposition. The larynx and trachea were filled with white stable froth. The lungs were diffusely congested and mildly consolidated due to edema. The pericardial sac contained about 50-75 ml of reddish/straw colored fluid. The heart was unremarkable grossly.
The stomach contained a small amount of mucoid ingesta. The squamous/glandular region of the gastric mucosa was marked by locally extensive, corrugated chronic ulcer. The small intestines had a moderate amount of yellowish mucoid ingesta. The colon and cecum had normal contents of digesta mainly composed of hay roughage with some grains. The liver, kidneys, spleen, adrenals and pancreas were unremarkable. The urinary bladder was moderately full with urine. The skull was paramedially dissected; no abnormalities were noted in the brain or the skull.

Bacteriology

BACTERIAL AEROBIC CULTURE

Animal/Source	Specimen	Specimen Type	Results
[redacted]	[redacted]	Liver Tissue	Mixed flora Rare

Salmonella PCR and Confirmation Culture

Animal/Source	Specimen	Specimen Type	Results
[redacted]	[redacted]	Liver Tissue	No salmonella detected
[redacted]	[redacted]	Colon Contents	No salmonella detected

Histology

The following tissues were examined histologically: several sections of the heart (per protocol 1- 11 and additional sections

taken at random), skeletal muscle, diaphragm, kidney, adrenal, lung, spleen, colon, stomach, small intestines, urinary bladder and brain.

Lesions found:

1. Right ventricular free wall: Mild to moderate multifocal lymphocytic infiltrates; mild multifocal hemorrhages, mild; one vessel showed a small stalk of elongated epitheloid like cells growing in to the lumen from the endothelium.
2. Pulmonary artery semilunar valve: multifocal lymphocytic infiltrates; mild multifocal hemorrhages
3. Right atrial appendage: sub- endocardial fibro-elastosis; acute, mild myocardial degeneration
4. Sinoatrial node region: No significant lesions: any significant lesions
5. Left atrial appendage: acute, moderate to marked acute myocardial degeneration.
6. Left atrioventricular valve: mild multifocal lymphocytic aggregates
7. Left ventricular papillary muscle: no significant lesions
8. Section of second papillary muscle: no significant lesions
9. Atrioventricular node región: no significant lesions
10. IV septum: no significant lesions
11. Aortic semilunar valve: mild to moderate multifocal lymphocytic infiltrates
12: Myocardium: sub- endocardial fibro-elastosis
13. Myocardium – no significant lesions

Lung: diffuse congestion; subpleural and alveolar edema

Spleen: marked diffuse congestion

Other tissues were unremarkable.

Toxicology

Reporting Limit (Rep. Limit): The lowest routinely quantified concentration of an analyte in a sample. The analyte may be detected, but not quantified, at concentrations below the reporting limit. Sample volumes less than requested might result in reporting limits that are higher than those listed.

The submitted colon contents contained no oleandrin, no strophanthidin, and none of the listed ionophore antibiotics or alkaloids at or above the stated reporting limit.

The submitted brain had an acceptable cholinesterase activity for horses (adequate > 2.1 uM/g/min).

The submitted liver had the listed metals, including selenium, in acceptable concentrations for horses.

The submitted urine contained none of the listed drugs at or above the stated reporting limits. The urine was also analyzed by our gas chromatography - mass spectrometry (GC/MS) organic chemical screen and no toxic compounds were detected. The GC/MS screen is designed to potentially detect a large number of organic compounds belonging to diverse chemical classes (pesticides, environmental contaminants, drugs and natural products). Control matrices were obtained to compare analytical results with those obtained from the submitted specimen. No unexpected chemicals were identified. Within the limits of the samples tested and the analytical procedures performed, chemical contamination of the submitted specimens appears unlikely.

The submitted liver and urine contained no toxic compounds when analyzed by our accurate mass liquid chromatography - mass spectrometry (LC-MS) organic chemical screen. The LC-MS screen is designed to potentially detect a large number of organic compounds belonging to diverse chemical classes (pesticides, drugs, natural products, and other toxins). Control matrices were obtained to compare analytical results with those obtained from the submitted specimen.

No toxic compounds were detected on the submitted liver or urine by our gas chromatography - mass spectrometry (GC/MS) organic chemical screen. The GC/MS screen is designed to potentially detect a large number of organic compounds belonging to diverse chemical classes (pesticides, environmental contaminants, drugs and natural products). Control matrices were obtained to compare analytical results with those obtained from the submitted specimen. No unexpected chemicals were identified. Within the limits of the samples tested and the analytical procedures performed, chemical contamination of the submitted specimens appears unlikely.

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Urine and pericardial fluid samples submitted to EACL for analysis for presence of exogenous drug substances by Liquid Chromatography-Mass Spectrometry and Gas Chromatography-Mass Spectrometry.

The following were detected:

Urine: Nandrolone

ALKALOID SCREEN

Animal/Source	Specimen	Specimen Type
[redacted]	[redacted]	Colon Contents

Analyte	Result	Units	Rep. Limit	Units
Anabasine	Not Detected	ppm	1.0	ppm
Atropine	Not Detected	ppm	1.0	ppm
Coniine	Not Detected	ppm	1.0	ppm
Deltaline	Not Detected	ppm	1.0	ppm
Nicotine	Not Detected	ppm	1.0	ppm
Scopolamine	Not Detected	ppm	1.0	ppm
Sparteine	Not Detected	ppm	1.0	ppm
Taxus	Not Detected	% plant	1.0	% plant

CHOLINESTERASE

Animal/Source	Specimen	Specimen Type	Results	Units	Rep. Limit	Ref. Range
[redacted]	[redacted]	Brain Tissue	3.2	uM/g/min	0.1	2.1-4.7

Drugs of Abuse Screen by LC-MS/MS

Animal/Source	Specimen	Specimen Type
[redacted]	[redacted]	Urine

Analyte	Result	Units	Rep. Limit	Units
Amphetamine	Not Detected	ppb	50	ppb
Cocaine	Not Detected	ppb	50	ppb
BGE (Benzoylecgonine)	Not Detected	ppb	100	ppb
Norcocaine	Not Detected	ppb	50	ppb
Ephedrine	Not Detected	ppb	100	ppb
Lysergic acid diethylamide (LSD)	Not Detected	ppb	50	ppb
Methamphetamine	Not Detected	ppb	50	ppb
MDMA	Not Detected	ppb	50	ppb
Nicotine	Not Detected	ppb	100	ppb
Phentermine	Not Detected	ppb	200	ppb
Psilocin	Not Detected	ppb	150	ppb

Delta9-Tetrahydrocannabinol (THC)	Not Detected	ppb	50	ppb
THC-OH	Not Detected	ppb	100	ppb
Methadone	Not Detected	ppb	50	ppb
Morphine	Not Detected	ppb	50	ppb
THC-COOH	Not Detected	ppb	500	ppb
JWH-018	Not Detected	ppb	50	ppb
HU-210	Not Detected	ppb	50	ppb
6-monoacetylmorphine	Not Detected	ppb	0	ppb
Fentanyl	Not Detected	ppb	0	ppb
Norfentanyl	Not Detected	ppb	0	ppb
JWH-073	Not Detected	ppb	0	ppb

GCMS Screen

Animal/Source	Specimen	Specimen Type
[redacted]	[redacted]	Liver Tissue

Analyte	Result	Units	Rep. Limit	Units
Negative	See comment under Toxicology	NA	NA	NA

[redacted]	[redacted]	Urine

Analyte	Result	Units	Rep. Limit	Units
Negative	See comment under Toxicology	NA	NA	NA

HEAVY METAL SCREEN

Animal/Source	Specimen	Specimen Type
[redacted]	[redacted]	Liver Tissue

Analyte	Result	Units	Rep. Limit	Units	Ref. Range
Lead	Not Detected	PPM	1	PPM	<3.0
Manganese	1.8	PPM	0.04	PPM	1-6
Iron	180	PPM	0.2	PPM	100-300
Mercury	Not Detected	PPM	1	PPM	<1.0
Arsenic	Not Detected	PPM	1	PPM	<1.0
Molybdenum	0.54	PPM	0.4	PPM	<2.0

Zinc	42	PPM	0.1	PPM	40-125
Copper	5.4	PPM	0.1	PPM	4-7.5
Cadmium	Not Detected	ppm	0.3	ppm	<20

IONOPHORE SCREEN

Animal/Source	Specimen	Specimen Type
[redacted]	[redacted]	Colon Contents

Analyte	Result	Units	Rep. Limit	Units
Lasalocid	Not Detected	ppm	0.1	ppm
Monensin	Not Detected	ppm	0.1	ppm
Narasin	Not Detected	ppm	0.1	ppm
Salinomycin	Not Detected	ppm	0.1	ppm

LCMS Screen

Animal/Source	Specimen	Specimen Type
[redacted]	[redacted]	Liver Tissue

Analyte	Result	Units	Rep. Limit	Units
LC-MS Screen	See comment under Toxicology	NA	NA	NA

[redacted]	[redacted]	Urine

Analyte	Result	Units	Rep. Limit	Units
LC-MS Screen	See comment under Toxicology	NA	NA	NA

OLEANDER GLYCOSIDES

Animal/Source	Specimen	Specimen Type	Results	Units	Rep. Limit
[redacted]	[redacted]	Colon Contents	Not Detected	ppm	0.05

SELENIUM - TISSUE/OTHER

Animal/Source	Specimen	Specimen Type	Results	Units	Rep. Limit	Ref. Range
[redacted]	[redacted]	Liver Tissue	0.80	ppm	0.020ppm	0.3-1.0

STROPHANTHIDIN

Animal/Source	Specimen	Specimen Type	Results	Units	Rep. Limit
[redacted]	[redacted]	Colon Contents	Not Detected	ppm	0.25