Effects of Oxyrich on pO2 and pCO2 in equine venous blood

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Executive Summary

Oxyrich is an oxygen nutritional dietary supplement, produced by Herli Rapid Pty Ltd, Melbourne. The manufacturers claim that their product contains stabilised oxygen molecules that, along with essential trace minerals, promote healthy cell growth and has anti-microbial properties. Results from this study have shown that the pO_2 in equine venous blood (resting state) increases by 4.5% ($P = 0.06$) up to one hour after consumption of an oral dose of Oxyrich (0.11 mL/kg).

Introduction

Oxyrich is an oxygen supplement that is produced by Herli Rapid Pty Ltd and is claimed to increase oxygen availability to the cells and to have anti-microbial properties. The product is formed by passing an electric current through demineralised water to generate "bioavailable, stabilised dissolved oxygen" (Roschach 1997). Oxyrich is reported to contain 5 % w/v oxygen, Atlantic salt (containing essential and trace minerals) and is buffered to the approximate pH of blood (7.2).

Aim

To test the hypothesis that an oral dose of Oxyrich (oxygen supplement) will increase the venous oxygen content in resting horses.

Methods and Materials

Animals

Ten geldings (average weight 471 kg; average age 6.9 years) were stabled separately in a quiet environment. All animals had catheters inserted in the jugular vein on the morning of the experiment, which remained in place for the duration of the study. Animals 42, 43, and 44 were treated on March, 24 1998; animals 45, 46, 48, and 52 were treated on September, 10 1998; and animals 47, 49 and 50 were treated on September, 11 1998.

Treatment

Blood samples (1 mL) were taken from each animal every 15 minutes during the experiment and the time of each sample was recorded. Heparin was used to coat the inner walls of the syringes to prevent clotting of the blood samples prior to analysis. Four samples were taken prior to drenching with Oxyrich and up to eight samples were taken after drenching. Each animal was drenched with Oxyrich (50 mL) via a naso-gastric tube.

Instrument validation

A validation experiment was performed prior to the study to determine if the blood gas analyser (AVL OPTI 1 Blood gas analyzer with OPTI cassettes BP7508) would be capable of measuring a change in pO_2 or pCO_2 levels in equine blood.

The blood samples were analysed immediately after collection. The parameters measured by the instrument were (at 37°C): pH, pCO_2 (mm Hg), and pO_2 (mm Hg). The instrument was designed for use as a critical care analyser for human patients and the calculated parameters (HCO_3 (mM), BE (mM), O_2 sat (%), and st. HCO_3 (mM)) produced by this instrument are based upon human blood data. The parameters of interest in this study were pCO_2 (mm Hg) and pO_2 (mm Hg).

Results

Figure 1 Average pO_2 levels (mm Hg), with standard error and t-test statistics, before and after dosing with Oxyrich.

Sample	pO_2	std dev	std error	P value 1 to 4
pre-treatment (1 to 4)	38.40	8.17	2.58	
0 to 1 h post (5 to 8)	40.14	6.24	1.97	0.057
1 to 2 h post (9 to 12)	39.68	6.09	1.92	0.33

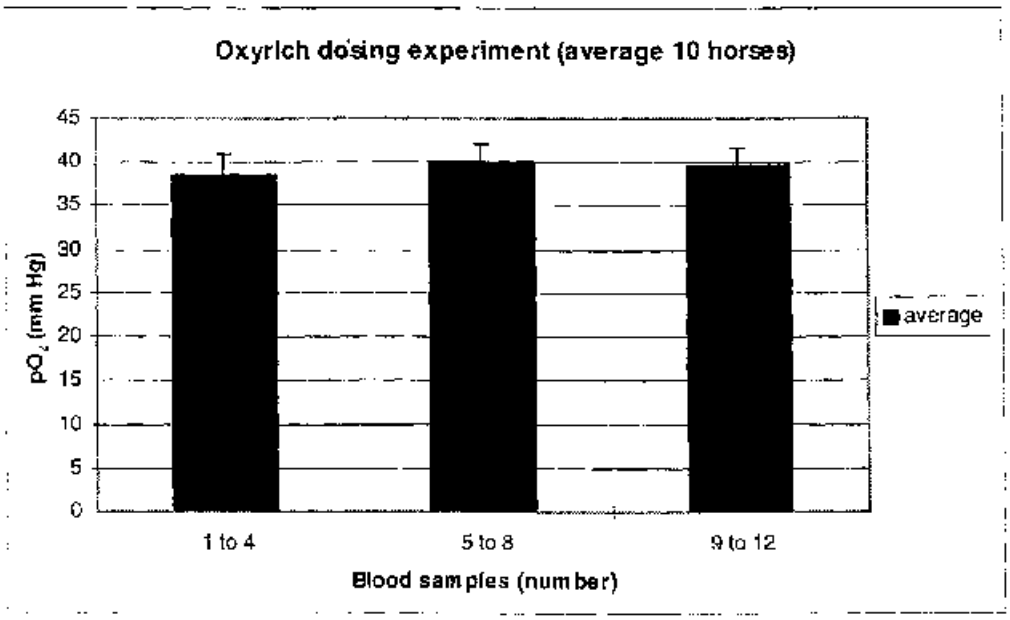
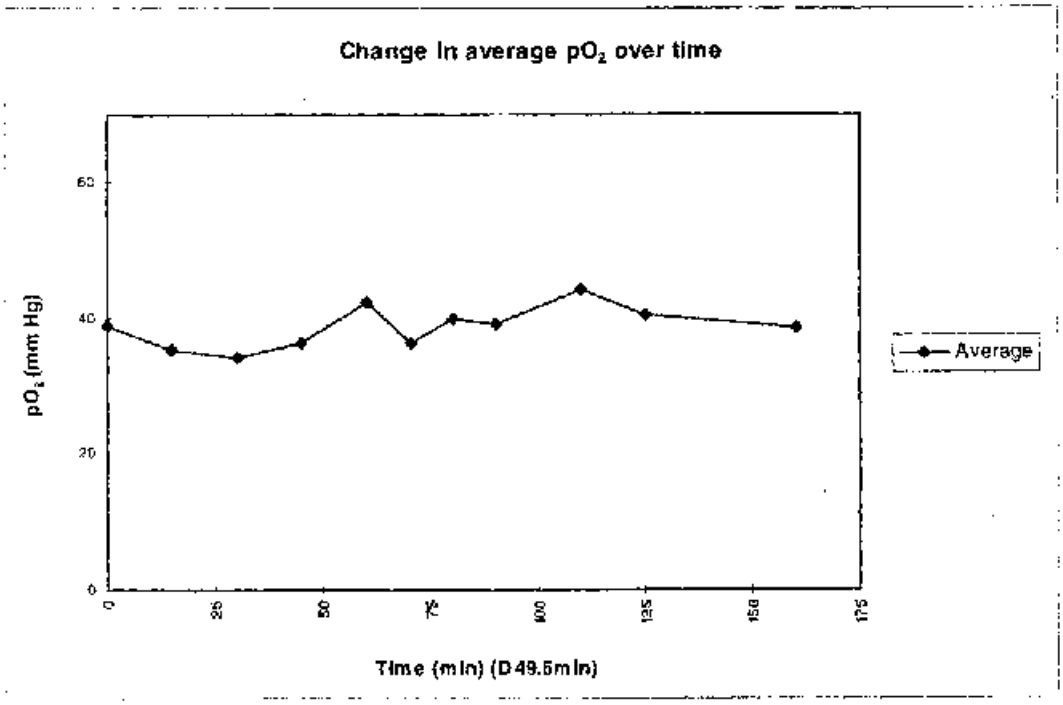


Figure 2 Changes in pO_2 levels in blood samples over time for average of 6 to 10 horses per sample. (D is time of drenching)



Time	Average pO_2
0	38.90
15	35.17
30	34.21
45	36.38
60	42.32
70	36.34
80	39.87
90	39.17
110	44.13
125	40.37
160	38.40

Figure 3 pO_2 data for blood samples from individual horses 42 - 50 and 52 over time.

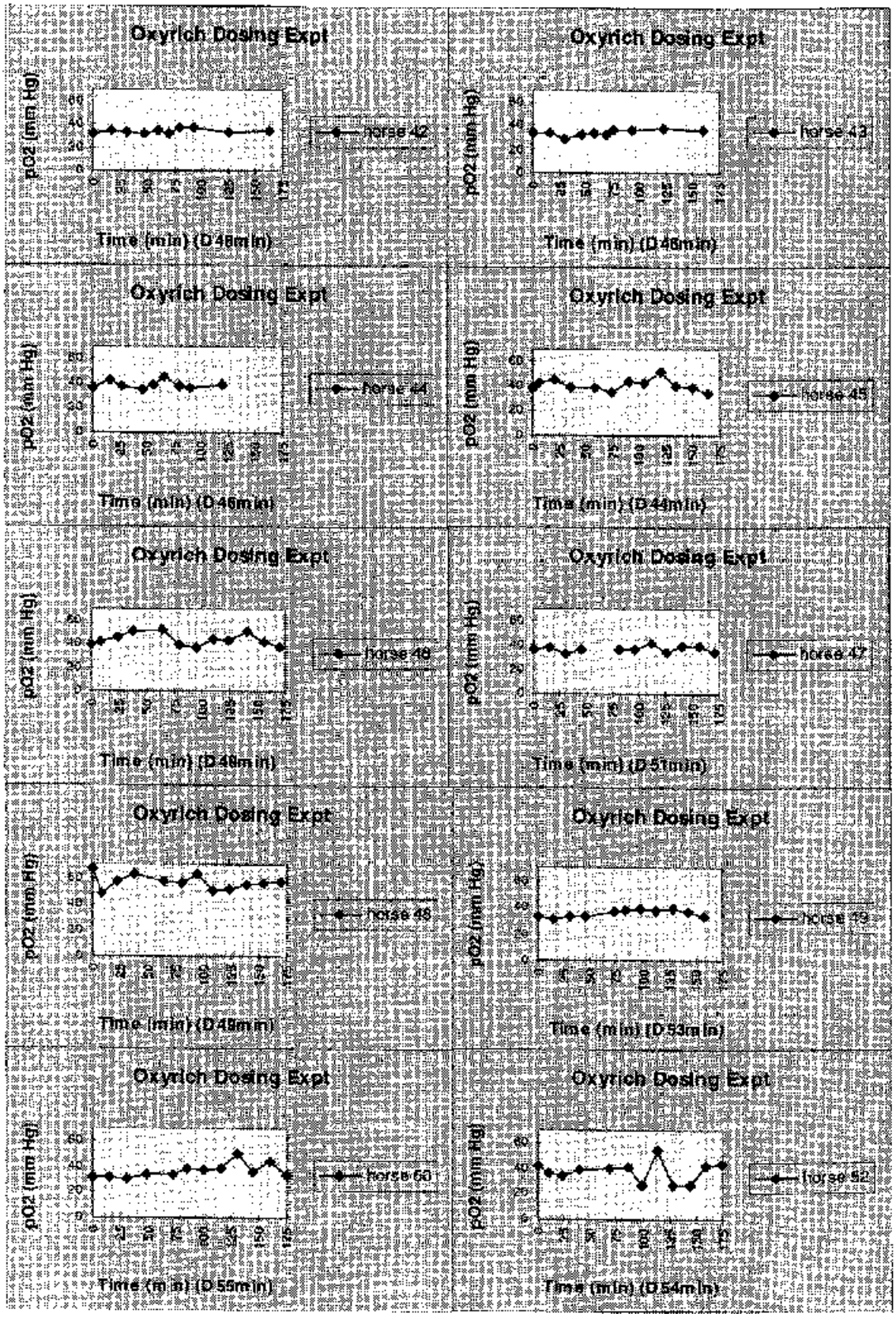


Figure 4 Average pCO_2 levels (mm Hg), with standard error and t-test statistics, before and after dosing with Oxyrich.

Sample	pCO_2	std dev	std error	P versus 1 to 4
pre-treatment (1 to 4)	46.58	3.68	1.16	
0 to 1 h post (5 to 8)	46.06	2.65	0.84	0.49
1 to 2 h post (9 to 12)	47.56	2.59	0.82	0.34

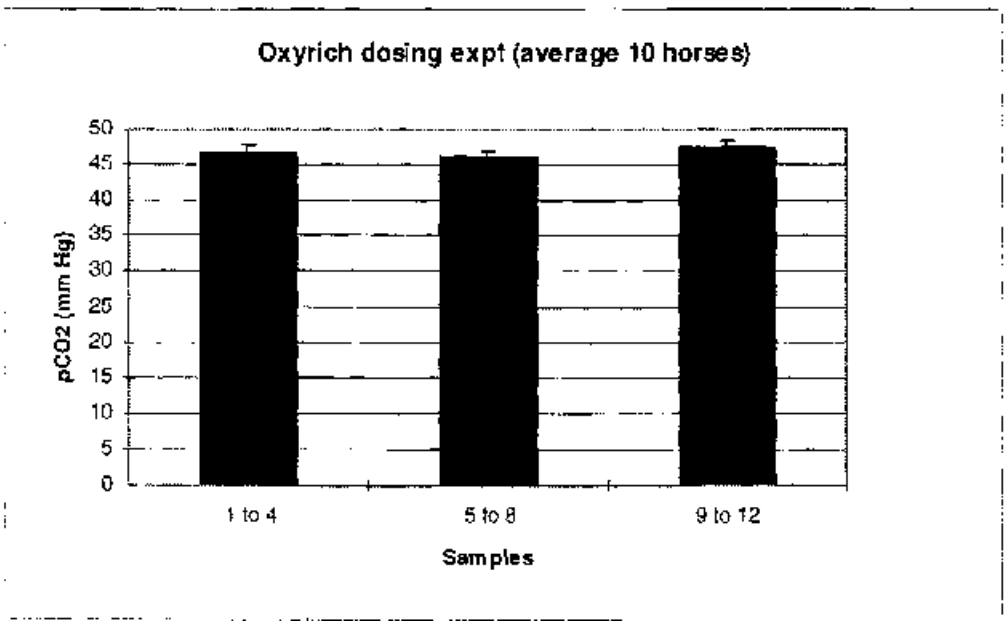
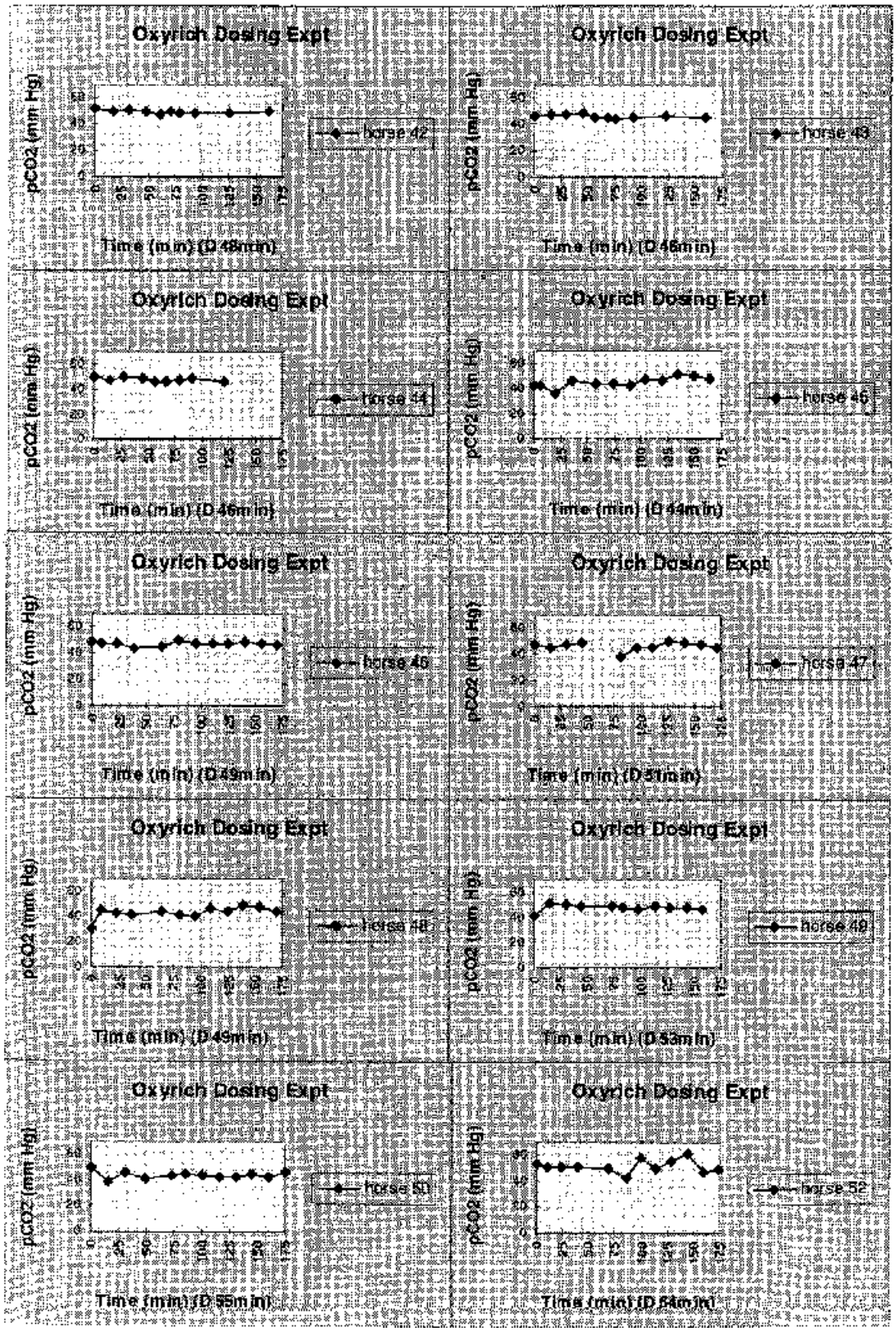


Figure 5 pCO_2 data for blood samples from individual horses 42 - 50 and 52 over time.



Discussion

In an initial validation test, the AVL OPTI 1 Blood gas analyzer was used to compare the pO_2 levels of two blood samples, one containing a 30% solution of Oxyrich and the other without. The instrument recorded a 37% increase in pO_2 levels in the Oxyrich/blood sample. From this experiment it was determined that the instrument would be able to measure any change in pO_2 in this study.

pO_2 levels were measured in blood samples taken from the equine jugular vein. A 4.5% increase was observed, based upon pooled values for 4 samples collected within one hour after dosing ($P = 0.06$). Pooled samples collected between one and two hours after dosing showed no statistically significant increase in pO_2. No significant change in pCO_2 levels was recorded.

A dose-response study was not conducted to determine the optimum Oxyrich dose. The dosage used in this study (horses) was equivalent to 0.11 mL/kg bodyweight, which is 10 times higher than the manufacturer's recommended dose for humans (0.011 mL/kg assuming average weight is 70 kg).

References

Roschach, M. Oxygen Supplements: Harnessing the Earth's Most Abundant Element. Herli Rapid Pty Ltd, Melbourne 1997.

Appendix

Table 1 pO_2 (mm Hg) in blood samples from horses 42 - 50 and 52 over time (*min*).

time	horse 42	time	horse 43	time	horse 44		
0	32.1	0	33.9	0	36.7		
17	33.8	15	34	15	42.7		
31	32.4	30	28.3	27	37.6		
47	32.3	45	32.1	45	34.7		
D 48		D 46		D 46			
60	34.4	57	34.2	56	38.5		
70	31.3	68	32.9	66	45.1		
79	36.7	76	36.6	79	37		
93	36.6	93	36.7	90	36.2		
125	32.4	122	37.3	120	38.7		
162	34.6	159	36.9				
time	horse 45	time	horse 46	time	horse 48	time	horse 52
0	37.2	0	39	0	66.4	0	42
6	42.9	8	41.5	8	48.4	10	36.3
20	45.2	23	45.1	22	56.8	24	34
35	38.5	38	50	37	62.8	39	38.2
D 44		D 49		D 49		D 54	
59	38.3	64	51.8	64	56.7	69	39.7
74	35.4	79	39.1	80	55.5	86	41
89	43.8	94	36.6	94	63.4	99	27
104	42.1	110	43.6	109	50.3	114	54.4
119	51.1	124	43.2	124	50.9	129	26.9
134	40.1	140	50.2	139	54.6	144	26.6
149	38.6	155	41.9	154	55.9	159	42.2
164	33.9	170	37	169	43.4	174	43.3
time	horse 47	time	horse 49	time	horse 50		
0	36.1	0	33.8	0	31.8		
15	37.5	15	30.5	15	31.4		
30	32.4	30	33.2	30	30.7		
45	36.4	45	33.6	49	33.7		
D 51		D 53		D 55			
73		73	36.5	72	33.5		
81	36.5	83	38	85	38.4		
96	35.7	98	38.5	100	37.2		
111	41.1	113	38.2	115	39.2		
126	33.5	128	38.8	130	50.9		
141	38.7	143	36.4	145	36.2		
156	39	158	33.7	160	45		
171	34.3	172		175	33.4		

Table 2 pCO_2 (mm Hg) in blood samples from horses 42 - 50 and 52 over time (min).

time	horse 42	time	horse 43	time	horse 44		
0	51.9	0	45.7	0	49.8		
17	50	15	47.4	15	48.1		
31	51.3	30	47.7	27	49.4		
47	50	45	48.2	45	48.3		
D 48		D 46		D 46			
60	47.3	57	44.9	56	46.5		
70	50	68	45.5	66	46.5		
79	49.2	76	44.4	79	47.9		
93	49	93	44.8	90	48.2		
125	49	122	46	120	46.6		
162	50	159	45				
time	horse 45	time	horse 46	time	horse 48	time	horse 52
0	43	0	48.1	0	30.3	0	52.6
6	42.8	8	47.6	8	44.8	10	51
20	36.8	23	47.8	22	42.5	24	50.2
35	46.1	38	44.2	37	41.2	39	51
D 44		D 49		D 49		D 54	
59	43.2	64	45.2	64	43.5	69	49.1
74	44.2	79	50.2	80	41.5	86	42.8
89	42.3	94	47.7	94	39.9	99	58.3
104	47.9	110	47.9	109	46.7	114	49.8
119	46.7	124	47.5	124	44.3	129	55
134	50.9	140	48.6	139	48.2	144	61.3
149	50.5	155	47.5	154	47	159	47.1
164	47.4	170	46.2	169	43.4	174	49.8
time	horse 47	time	horse 49	time	horse 50		
0	48	0	40.9	0	49.1		
15	45.5	15	51.4	15	39.1		
30	47.6	30	49.6	30	45.8		
45	48.6	45	48.6	49	41.1		
D 51		D 53		D 55			
73		73	48.8	72	43.8		
81	37.9	83	47.9	85	44.7		
96	45.5	98	46.7	100	43		
111	45.6	113	49.1	115	41.8		
126	49.9	128	48.1	130	42.6		
141	48.9	143	46.9	145	44.4		
156	47.4	158	46.6	160	42.8		
171	44.5	172		175	45.8		

Table 3 Description of geldings used in study.

Horse	Weight (kg)	Age (yr)
42	448	11
43	486	13
44	452	4
45	494	6
46	536	6
47	554	9
48	472	4
49	436	4
50	368	3
51	492	8
52	448	8
average	471.46	6.91