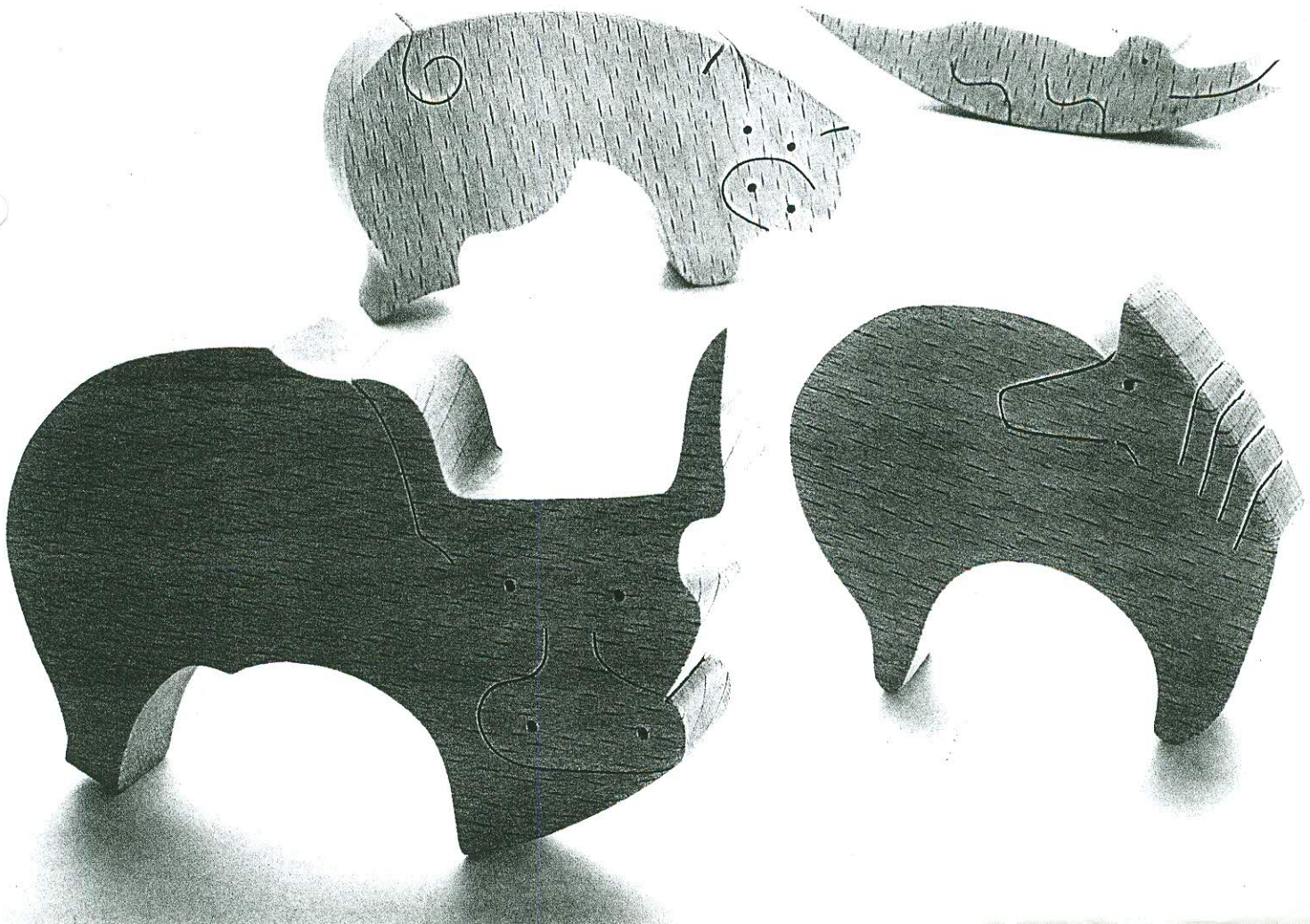
World Veterinary Congress

XXV Congress of the World Veterinary Association
XX Congress of the World Small Animal Veterinary Association

Congrès mondial vétérinaire
Welt-Tierärztekongress
Congreso Mundial de Veterinaria
Всемирный Конгрес Ветеринаров
世界獣医学大会

3-9 September, 1995,
Yokohama, Japan

ABSTRACTS
(WVA Scientific Programme)



FC2.8.3

VENTILATION AND ARTERIAL BLOOD GASES IN EXERCISING COPD HORSES IN CRISIS AND IN CLINICAL REMISSION

Art T, Anciaux N, Duvivier H, Votion D, Vandenput S, and Lekeux P*

Equine Sports Medicine Unit, Faculty of Veterinary Medicine, University of Liège, Bât. B42, Sart Tilman, B-4000 Liège, Belgium

Chronic Obstructive Pulmonary Disease is a common condition encountered in horses that is generally associated with chronic cough, bronchial constriction and hypersecretion, dyspnea and exercise intolerance. The present study was conducted in order to better understand the mechanisms leading to the decrease in exercise capacity in horses suffering from COPD.

Five horses with history and clinical signs of COPD were submitted to a standardised treadmill exercise, once while they were in clinical remission and once while they were in crisis. The bronchoconstriction was obtained by exposure to mouldy hay. A clinical examination and pulmonary function tests, ie arterial blood gas analysis and mechanics of breathing, performed before the exercise test allowed to objectivate these two clinical stages.

The standardised test consisted in a 7-min exercise of increasing intensity at 4.2 m/sec and with a slope of 2 %, 4 %, 6 %, 8 % (1 min each for each step) and 10 % (3 min). Respiratory airflow and pleural pressure were simultaneously recorded during the exercise. Arterial blood was sampled each minute and analysed for O_2 and CO_2 partial pressure (PaO_2 and $PaCO_2$). Venous blood was also sampled each minute and used to measure plasma lactate (LA). Heart rate (HR) and blood temperature were continuously recorded.

On the basis of the collected values, the expired minute volume (VE) and the respiratory frequency (RF) were calculated. All data given in Table 1 were obtained at the third minute of the highest intensity of work, i.e. 10 % slope.

Table 1 - Cardio-respiratory parameters from 5 COPD horses performing an intense exercise either in clinical remission (Rem) or in crisis (Cr)

	PaO_2 mmHg	$PaCO_2$ mmHg	VE L/min	FR br/min	HR B/min	LA mml/L
Rem	71.9	49.3	1242	77.0	194.5	4.96
	±5.8	±3.9	± 85	± 4.9	± 2.7	± 0.72
Cr	57.2**	62.9*	1074*	66.0*	203.3*	6.02**
	±3.3	± 5.3	± 46	± 4.4	± 2.2	± 0.61

Data are given as mean ± SEM. * significantly from R data with $p < 0.05$; ** with $p < 0.01$

These data showed that COPD horses were significantly more hypoxemic and hypercapnic when exercised during a crisis than during clinical remission. This phenomenon was at least partly associated to a significantly lower VE, mainly due to a lower RF. The exercise was consequently more exhausting in this condition as suggested by the higher HR and LA.

FC2.8.4

NEW ASPECTS OF THE PATHOGENESIS OF COPD IN HORSES

Maisi P*, Koivunen A-L and Sandholm M

Dept. of Clinical Veterinary Sciences, University of Veterinary Medicine, P.O. Box 6 Hämeentie 57, 00581 Helsinki, Finland

Chronic obstructive pulmonary disease (COPD), a domestication disease in horses stabled for long winter periods, starts from a mild bronchiolitis and finally results in chronic emphysema. The pathogenesis of the disease complex is not clear.

Proteolysis within the respiratory tract has been suspected as one major pathogenetic factor in human emphysema. The degree of free proteolytic activity depends on the equilibrium between proteolytic enzymes and their inhibitors. Free proteolytic activity as well as decreased concentrations of active inhibitors (trypsin inhibitor capacity) has been shown to occur in the respiratory secretions of horses with COPD.

Proteolytic enzymes can be divided into four major groups: serine proteases, cysteine proteases, acid(aspartic)proteases and metalloproteases. Serine proteases seemed to have a minor role in most of the COPD cases. A group of metalloproteases, gelatinases, showed clearly increased activities in tracheal secretions of COPD horses.

When different protease inhibitors were tested *in vitro* and the inhibitor profiles of the tracheal fluids of COPD horses were compared with those of pure serine type proteolytic enzymes, the profiles of the tracheal fluids resembled more each other than any of the pure proteases, suggesting a mixed type of proteolytic activity in the respiratory secretion of COPD horses. Acetylcystein, pentamidine and diminazene inhibited *in vitro* the proteolytic activity of tracheal fluids of the COPD horses.

FC2.9.1

Efficiency of Intranasal Vaccination of Foals against Equine Influenza Virus.

K.P. Yurov*, E.F. Zabegina, V.I. Loparev.
Dept.of Virology, All-Russia Institute of Experimental Veterinary Medicine, 109472, Moscow, Russia.

Standard approach to the foals' immunization against influenza virus don't permit immunity to be rather tensitive. Basically, the protection of foals against infection is provided with mother's (colostral) antibodies, the quantity of which is rather insufficient, especially in foals, which have been received from young mares.

In this study, 42 foals at the age of 2-8 weeks were investigated. The efficiency of intranasal application of the vaccine from the inactivated equine-2 influenza virus was analyzed. The vaccine application on to the nasal mucous membrane caused the local (secretory) antibodies production with the titres 1:16 - 1:18, but didn't stimulate humoral antibodies output. Repeated intramuscular inoculations of vaccine were the cause of the secretory antibodies titre raising and humoral antibodies formation with the titre 1:32 - 1:128, which provided the detection against equine-2 influenza virus.

FC2.9.2

DIARRHEA CAUSED BY ROTAVIRUS CAN BE AVOID IN NEWBORN FOALS BY THE INJECTION OF INACTIVATED ROTAVIRUS VACCINE TO PREGNANT MARES

Imagawa H*, Fukunaga Y, Wada R and Kamada M
Epizootic Research Station, Equine Research Institute, Japan Racing Association, 1400-4, Shiba, Kokubunji-machi, Shimotsuga-gun, Tochigi 329-04, Japan

Diarrhea caused by rotavirus occurs the heaviest in the Hidaka region of Japan, where more than 90% of light breed horses in Japan are reared. The development of an effective vaccine has been requested by the breeders. We examined the immunological response in pregnant mares after an injection of inactivated vaccine and the protective efficiency in foals through acquired passive immunity.

① The inactivated vaccine against equine rotavirus (HO-5 strain of serotype G3) was inoculated intramuscularly to three pregnant mares, twice, at one month intervals. Three pregnant mares posessed prevaccination Elisa antibody titers in range of 320 to 640, which rose to a range of 2560 to 10240 post-second vaccination. ② The three colostrum fed foals (33 to 39 days old, Elisa antibody titers from 2560 to 5120) which were born from vaccinated mares did not contract diarrhea after oral administration of the HO-5 strain (10^6FFU/20ml). Virus was not isolated from feces of two foals although it was isolated on one day only from the third foal. ④ The three colostrum-deprived foals (32 to 72 days old, Elisa antibody titer of less than 80) which were born from non-vaccinated mares were also administered the HO-5 strain orally. Two foals contracted diarrhea, but the remaining foal did not. Virus was isolated from all three foals from 4 to 7 days after inoculation.

It was demonstrated that pregnant mares can achieve high antibody by the injection of an inactivated vaccine and that foals can acquire high passive immunity by drinking colostrum. Therefore it was suggested that foals might escape contacting diarrhea after a rotavirus challenging.

P2.1.1

PECULARITIES OF EXERCISE PHYSIOLOGY IN THE ARDENNAIS DRAUGHT HORSE

Crigel MH, Art T, Votion D, Anciaux N, and Lekeux P*
Equine Sports Medicine Unit, Faculty of Veterinary Medicine, University of Liege, Bât. B42, Sart Tilman, B-4000 Liège, Belgium

The Ardennais draugt horse (DH) is more and more used for harnessing competitions. The aim of the study was to improve our knowledge of its cardiorespiratory pecularities, both at rest and during exercise.

Eight mares and one gelding (height : 156 ± 1cm; weight : 738 ± 19kg; age : 5.6 ± 0.8 years; mean ± SEM) were tested. At rest, arterial blood gas analysis was performed to measure O_2 content (O_2cont). Tidal volume (V_T) was measured with a pneumotachograph. Pleural pressure was measured by mean of an oesophageal balloon catheter connected to a pressure transducer. Total pulmonary resistance (R_L) and dynamic compliance (Cdyn) were calculated. Experiments during exercise were performed on a treadmill. The intensity of the standardised test was sufficient to just overshoot the OBLA threshold. The test was of increasing intensity and lasted 22 min. The ventilatory parameters were measured during the last 5 min. They were running for 3907 ± 270 metres. Volume minute (VE), V_T and f were measured. Respiratory O_2 and CO_2 fraction were measured with a mass spectrometer. Oxygen uptake (VO_2), CO_2 output (VCO_2) and VE/VO_2 were calculated. Heart rate (HR) was continously measured.

The results were compared to data recorded in standarbred horses (SH) during a standardised exercise leading to a similar lactacidemia (LA) and peak HR (Tables 1 and 2).

Table 1 - Pulmonary fonctions values in resting DH and SH

	V_T (l)	R_L (kPa/l/sec)	Cdyn (l/kPa)	maxΔPpl (kPa)	O_2cont (ml/l)
SH	4.90±0.10	0.023±0.01	23.3±1.0	0.44±0.06	134±3
DH	5.42±0.50	0.07±0.10***	13.3±1.37***	0.75±0.04***	70±3***

* Significantly different from SH with p ≤ 0.05; ** p ≤0.01; *** p≤ 0.001

Table 2 - Cardio-respiratory values in exercising DH and SH

	HRpeak (beats/min)	VO_2peak (ml/kg/min)	VCO_2peak (ml/kg/min)	VEpeak (ml/kg/min)	VE/VO_2 (l/l)	LA (mmol/l)
SH	202±5	133±3	134±3	2.76±0.21	20.8±1.7	4.6±0.7
DH	196±5	73.4±2.7***	69.7±2.7***	2.26±0.06*	31.2±0.9***	5.1±0.70

In conclusion, the lower aerobic capacities of DH are at least partly correlated with their higher cost of breathing and lower blood gas transport capacity.

P2.1.2

ACCURACY OF A PORTABLE LACTATE ANALYSER FOR MEASUREMENTS IN SPORTS HORSES

Art T, Meynié J, Anciaux N, Ghafir Y, Thomas Y, Lekeux P*

Equine Sports Medicine Unit, Faculty of Veterinary Medicine, University of Liege, Bât. B42, Sart Tilman, B-4000 Liège, Belgium

Recently, a new portable lactate analyser (Accusport®, Boehringer Manheim) has been proposed in human medicine. The advantage of this analyser is that the blood do not need to be collected on tube containing anticoagulant nor to be centrifuged. This analyser is defined as being reliable to analyse blood with packed cell volume (PCV) < 55 %. The aim of the present work was to test the accuracy of this device for LA analysis in horses.

Seven horses were used. They underwent a 10 minutes treadmill test different for each horse according to their fitness. During and after each test, 10 to 12 venous blood samplings were performed. Prior to the experiment, a 14G catheter was placed in the jugular vein. A 110 cm plastic extension line, allowed the blood to be sampled every minute. After each sampling, a drop of blood was immediately analysed for plasma LA, using the Accusport®. The rest of the sampling was stocked into 2 tubes , one containing sodium fluoride and potassium oxalate and the other containing EDTA. The first was used to determined plasma LA with a reference enzymatic method (Boehringer), the other to determined the PCV.

Seventy seven samples were analysed. The LA results were classified into 2 groups, according to the fact that the corresponding PCV was either ≤ (n=56) or > (n=21) to 55 %. The correlation between the LA measured by the Accusport and by the reference method was high. It was higher when the PCV was lower than 55 % but was also satisfactory for the results obtained on blood with PCV > than 55 %, suggesting therefore that this analyser is reliable for horses, even after strenuous exercise leading to an increase of the PCV up to more than 55 %.

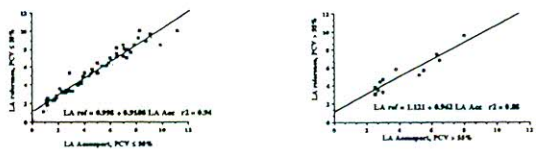


Fig.1: Relationship between LA measured with the Accusport and with a reference method. data were divided according to the fact that PCV was ≤ or > than 55%

P2.1.3

EQUINE ERYTHROCYTE AND SKELETAL MUSCLE ß-ADRENERGIC RECEPTORS. EFFECT OF OXIDATIVE STRESS PRODUCED BY EXERCISE.

White A[1], Sánchez C[1], González O[1], Filgueira G[1], González E[1], Behn C[1], Yutronic J[1], Martínez R[1]*.
Dept. of Physiology & Biophysics, Faculty of Medicine[1] and Dept. of Animal Biologic Sciences, Faculty of Veterinary and Pecuary Sciences[1], University of Chile, P.O. Box 70005, Santiago 7, Chile

The increase of oxygen consumption inherent to exercise, leads to oxidative stress which may cause alterations in hormone-receptor interactions involved in energy production and red cell deformability, as the interaction between catecholamines and ß-adrenergic receptors in cells such as equine erythrocytes and striated fiber muscles. Nevertheless, there is no information about the presence of ß-adrenergic receptors in these tissues.

In this work, the presence of ß-adrenergic receptors was determined in erythrocytes and gluteus medius of 4 thoroughbred racehorses and 26 hybrid equines sacrified in slaughterhouses and in erythrocytes of 19 thoroughbred racehorses trained and competing in racetracks. Furthermore, the effect of oxidative stress produced by a race at maximal speed in thoroughbred racehorses was investigated.

Receptor number found in erythrocytes and gluteus medius muscle's membranes of hybrid equines, was 89.6 ± 18.2 and 24.8 ± 4.5 fmoles/mg protein, respectively, in basal conditions; being 0.75 ± 0.14 and 0.99 ± 0.14 mM its corresponding disociation constant (Kd). Receptor number and Kd found in trained thoroughbred racehorse's erythrocytes, in basal conditions, were 95.7 ± 10.8 fmoles/mg protein and 2.04 ± 0.32 mM, respectively. A significant decrease to 50.1 ± 5.5 fmoles/mg protein and 0.97 ± 0.24 mM was observed in both parameters as consequence of exercise.

Variations observed in ß-adrenegic receptors of thoroughbred racehorse's erythrocytes may be due to oxidative stress produced by exercise and it could be interesting if this changes affect the rheologic properties of red cell increasing the muscle perfusion in race.

Supported by FONDECYT, Grant NO 1940486

P2.2.1

SURGICAL APPROACHES TO THE ABDOMINAL CAVITY OF HORSE

Sardari K* Fathi B.

School of Vet. Med. Department of Clinical Sciences Ferdowsi University of MASHHAD. IRAN P.O.Box 91775 - 1793

Surgical operations on abdminal cavitiy of equine particulary of the horse require spccific conditions.

One of these conditions is the selection of appropriate site and suitable approach to access the abdominal cavity, which proviedes the success of operation.

Therefore knowledge of different surgical approaches in this region have a specific importanc.

This article presents the introduction and survay of differant approaches to the abdominal cavity.

These approaches are;

1. Lateral wall approaches
2. Venterad wall approaches
3. Inguinal canal approaches
4. Vaginal approaches

It also considers the ways of access to the differant organs and the correction of abnormalities. There are nine acute conditions in horse which need surgical operations to rescue the animals life and these are as follow:

1. Obstructions
2. Displacements
3. Inflammatory lesions
4. Neoplasms
5. Congenital disorder
6. Angiopatheis
7. Ruptures
8. Perforations
9. Exteraperitoneal causes

The figures presented in this article demonstrate the incisions os the left flank, but all these incisions can be done in the same manner on the right flank according to the type of surgery.