Scientific Works. Series C. Veterinary Medicine. Vol. LIX (3)
ISSN 2065-1295, ISSN Online 2067-3663, ISSN-L 2065-1295

HORSE WELFARE ASSESSMENT IN THE FACULTY OF VETERINARY MEDICINE BUCHAREST BASED ON MICROCLIMATIC CONDITIONS AND SERUM BIOCHEMICAL PROFILE

Elena MITRANESCU, Oana PUFULESCU, Alexandru Ioan LATARETU, Laurentiu TUDOR, Ciprian Florin FURNARIS

University of Agronomic Sciences and Veterinary Medicine of Bucharest, Faculty of Veterinary Medicine, 105 Splaiul Independentei Str., District 5, 050097, Bucharest, Romania,
Phone: +4021.318.04.69, Fax: + 4021.318.04.98, Email: mitranescuelena@gmail.com

Corresponding author email: mitranescuelena@gmail.com

Abstract

Welfare is an individual state regarding his attempt to cope with living environment, to rank his priorities for using the available energy in relation with his needs.
In the Clinical Hospital of the Faculty of Veterinary Medicine Bucharest was conducted a welfare assessment for horses based on shelter environmental conditions and on serum biochemical indicators.
To determine the microclimatic conditions were approached the physical factors (air temperature, relative humidity, air draught velocity, light intensity, sound intensity), the chemical factors (concentrations of carbon dioxide, ammonia and hydrogen sulfide) and the biological ones (airborne particulates and air bacterial load – total plate count).
For the study of serum biochemical profile were taken blood samples, from which were determined by dry biochemistry method, using Vettest 8008 device, 18 parameters: blood urea nitrogen, phosphate, calcium, total proteins, albumin, globulins, aspartate aminotransferase, alkaline phosphatase, gamma-glutamyl transferase, total bilirubin, triglycerides, glucose, lactate dehydrogenase, creatinine, magnesium, cholesterol, ammonia and creatine kinase. The obtained results were compared with the reference values.
After determining the microclimate conditions was found that most of the values obtained were appropriate in relation with welfare standards, except for air particulates.
Particulate matter exceeded the limits of 1.16 times, originated mostly in fodders, litter and from the animals' bodies.
Regarding the biochemical parameters, most recorded values within the reference ranges for horses, except for Salomeea (female, age 17 years), in which were recorded increased values for calcium, ammonia and creatine kinase and decreased values for phosphate.
Correlating the results for microclimate conditions and for serum biochemical parameters can be concluded that animal welfare can be rated as medium to good.

Keywords*: horse, welfare, microclimatic conditions, serum biochemical profile.*

INTRODUCTION

Welfare is an individual state regarding the attempts to cope with living environment, to rank his priorities for using the available energy in relation with its needs (Broom, 1996).
As a major concern, of general interest, animal welfare is covered by numerous governmental or nongovernmental organizations and bodies: Food and Agriculture Organization of the United Nation, World Trade Organization, European Council, European Union, Intergroup on the Welfare and Conservation of Animals, Eurogroup for Animals, World Organization for Animal Health, Codex Alimentarius, World Veterinary Association, World Society for the Protection of Animals (Teuşdea, 2001, 2005).

MATERIAL AND METHODS

In the Clinical Hospital of the Faculty of Veterinary Medicine Bucharest was conducted a welfare assessment for horses based on shelter environmental conditions and on serum biochemical indicators.
To determine the microclimatic conditions were approached the physical factors (air temperature, relative humidity, air draught velocity, light intensity, noise intensity), the chemical factors (concentrations of carbon

dioxide, ammonia and hydrogen sulfide) and the biological ones (airborne particulates, air bacterial load – total plate count, yeast and molds).

For the study of serum biochemical profile were taken blood samples, from which were determined by dry biochemistry method, using Vettest 8008 device, 18 parameters: blood urea nitrogen, phosphate, calcium, total proteins, albumin, globulins, aspartate aminotransferase, alkaline phosphatase, gamma-glutamyl transferase, total bilirubin, triglycerides, glucose, lactate dehydrogenase, creatinine, magnesium, cholesterol, ammonia and creatine kinase. The obtained results were compared with the reference values.

RESULTS AND DISCUSSIONS

The results for the assessed microclimate conditions were framed within the welfare standards for horses, except for air particulates which exceeded the limits of 1.16 times, the source being the fodders, litter and the animals' bodies (Table 1 and 2). Nevertheless, such low grade exceeding could not affect the health of horses housed in the Clinical Hospital of Faculty of Veterinary Medicine Bucharest. In Figure 1 are shown the inner space division of the animal house and the open space access areas.

Table 1. Microclimate physical and chemical conditions: average values

	Physical parameters					**Chemical parameters**		
	Tempera-ture (°C)	**Relative humidity (%)**	**Air draught velocity (m/s)**	**Light intensity (I)**	**Noise intensity (dB)**	**Carbon dioxide (%)**	**Ammonia (ppm)**	**Hydrogen sulfide (ppm)**
Horse house	**15**	**70.48%**	**0.22**	**1/10**	**53.26**	**0.1**	**4**	**undetected**
Admitted limits acc. To 76/79 AAIM Order	**12-15**	**60-75**	**0.5**	**1/18**	**50-60**	**0.3**	**26**	**10**

Table 2. Microclimate biological conditions: average values

	Biological parameters		
	Air particulates (no./cm3)	**Total plate count (CFU/m3 air)**	**Yeast and Molds (CFU/m3 air)**
Horse house	**58**	**3'080**	**2'800**
Admitted limits acc. To 76/79 AAIM Order	**50**	**250'000**	**12'500**


Figure 1. Aspects from the Clinical Hospital of Faculty of Veterinary Medicine of Bucharest: exterior view – paddock (left), inner space division (right)

Of the three horses in the study (Johnny, Salomeea, Codruta), the biochemical parameters recorded values outside the reference values in Salomeea (female, 17 years old), respectively increased values for calcium, ammonia and creatine kinase and decreased value for phosphate (Table 3 - 5). These overvalues can be caused by renal failure, liver disorders or muscle injuries, while hypophosphatemia is due to the increased blood calcium.

Table 3. Values of serum biochemical parameters: BUN, PHOS, CA, TP, ALB and GLOB

Serum biochemical parameter	Sample origin/ horse name	Obtained value	Reference range
BUN (blood urea nitrogen: mg/dl)	**Johnny**	**18**	**10 – 25**
	Salomeea	**15**	
	Codruta	**17**	
PHOS (phosphate: mg/dl)	**Johnny**	**2.1**	**1.8 – 5.6**
	Salomeea	**1.7**	
	Codruta	**2.0**	
CA (calcium: mg/dl)	**Johnny**	**11.9**	**10.4 – 12.9**
	Salomeea	**14.2**	
	Codruta	**12.8**	
TP (total proteins: g/dl)	**Johnny**	**7.1**	**5.6 – 7.9**
	Salomeea	**7.3**	
	Codruta	**7.2**	
ALB (albumin: g/dl)	**Johnny**	**3.1**	**1.9 – 3.2**
	Salomeea	**3.0**	
	Codruta	**3.0**	
GLOB (globulins: g/dl)	**Johnny**	**4.0**	**2.4 – 4.7**
	Salomeea	**4.3**	
	Codruta	**4.2**	

Table 4. Values of serum biochemical parameters:
AST, ALKP, GGT, TBIL, TRIG and GLU

Serum biochemical	Sample origin/	Obtained	Reference
AST (aspartate aminotransferase: U/L)	Johnny	276	100 – 600
	Salomeea	305	
	Codruta	350	
ALKP (alkaline phosphatase: U/L)	Johnny	107	10 – 326
	Salomeea	117	
	Codruta	110	
GGT (gamma-glutamyl transferase: U/L)	Johnny	21	0 – 87
	Salomeea	28	
	Codruta	26	
TBIL (total bilirubin: mg/dl)	Johnny	1.4	0.0 – 3.5
	Salomeea	0.7	
	Codruta	1.1	
TRIG (triglycerides: mg/dl)	Johnny	24	11 – 68
	Salomeea	52	
	Codruta	48	
GLU (glucose: mg/dl)	Johnny	90	64 – 150
	Salomeea	74	
	Codruta	81	

Table 5. Values of serum biochemical parameters:
LDH, CREA, MG, CHOL, NH3 and CK

Serum biochemical	Sample origin/	Obtained	Reference
LDH (lactate dehydrogenase: U/L)	Johnny	1190	250 – 2070
	Salomeea	1640	
	Codruta	1420	
CREA (creatinine: mg/dl)	Johnny	1.2	0.8 – 2.2
	Salomeea	0.9	
	Codruta	1.1	
MG (magnesium: mg/dl)	Johnny	2.14	1.70 – 2.43
	Salomeea	1.76	
	Codruta	1.93	
CHOL (cholesterol: mg/dl)	Johnny	78	50 – 110
	Salomeea	87	
	Codruta	71	
NH3 (ammonia: µmol/l)	Johnny	89	0 – 90
	Salomeea	167	
	Codruta	87	
CK (creatine kinase: U/L)	Johnny	162	10 – 350
	Salomeea	1090	
	Codruta	250	

CONCLUSIONS

Most of microclimate parameters were framing into sanitary interval, except air particulates.

Among the 18 biochemical parameters determined, only in horse Salomeea were recorded increased calcium, ammonia and creatine kinase values and decreased values for phosphate.

Correlating the results for microclimate conditions and for serum biochemical parameters can be concluded that the welfare of horses in the Clinical Hospital of the Faculty of Veterinary Medicine Bucharest can be rated as medium to good.

REFERENCES

Broom D. M., 1996. Animal welfare defined in term of attempts to cope with the environment. Acta Agric. Scand. Sect. A. Animal Sci. Supplementum, no. 27, p. 22-28

Teusdea V., Ontanu Gh, 2001. Consiliul Europei, Uniunea Europeană şi bunăstarea animalelor. Buletin Informativ al Societăţii Medicilor Veterinari în Patologia Aviară şi a Animalelor Mici din România vol. XII, nr. 2, p. 28 – 38

Teusdea V., 2005. Bunastarea si protectia animalelor, Editura Omega Print, Bucuresti