

## The welfare of horses assessed by the zoohygienic inventory method

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**Abstract:** *The welfare of horses assessed by the zoohygienic inventory method.* The performed investigations aimed at assessing the welfare of horses in accordance with the rules and methods of zoohygienic inventory. The investigations were performed and the measurements taken at the Wolica riding complex of Warsaw University of Life Sciences. The basic parameters creating the microclimate were evaluated in the research described in the paper “The welfare of horses assessed by the investigations of chosen parameters of the stable microclimate” published in the present issue of Animal Science. Using the rules and methods of zoohygienic inventory the current paper presents the farm buildings, their equipment, ventilation system and closest surroundings in which the horses are kept. The investigations included the concentration of ammonia in the stables, to demonstrate the effectiveness of drains and ventilation. The obtained results were compared with the binding standards. The obtained results show that the parameters agree with zoohygienic recommendations and exceed the standards only sporadically. The welfare of animals was maintained.

*Key words:* welfare of horses, stable, zoohygienic inventory, ventilation, ammonia concentration

### INTRODUCTION

Since 28 June 2010, horse management has been regulated in Poland by the Regulation of the Minister of Agriculture and Rural Development on the minimum conditions for the maintenance of livestock for which the protection norms are not defined in the UE regulations (Rozporządzenie 2010). Horses in the

stable should be kept on the bedding in boxes, tying stalls or loose housing without tying. The surface of the box for adult horse with the height at withers of over 1.47 m should amount to at least 9 m<sup>2</sup> and for the mare with foal – 12 m<sup>2</sup>. The air cycle, degree of dust loading, and concentration of gases is maintained at the level harmless for animals.

At present the assessment of the animal welfare includes the, so-called, supplementary indexes, namely parameters of the farm building, efficiency of the ventilation system and the way of the movement restriction of animals (Kończak and Bodak 1999). The possibility of ensuring the proper management conditions for the animals including the minimized content of ammonia additives is a criterium of a proper structure of the farm building (Lewandowski 1997). In order to prevent mechanical injury, the stables as well as paddocks should meet the safety rules preventing mutilations, injuries and other factors dangerous for the health and life of horses (Fiedorowicz et al. 2004).

The aim of the investigations was the assessment of the welfare of horses kept in the Wolica stable in accordance to the rules and methods of zoohygienic inventory. The zoohygienic inventory was performed and the ventilation functioning and ammonia concentrations were evaluated.

## MATERIAL AND METHODS

The investigations were performed in the Wolica stables of Warsaw University of Life Sciences from 21 June 2006 to 16 February 2007. The investigation objects comprised two stables in the same area. An attempt to assess the compatibility of zoohygienic and zootechnical parameters in relation to the binding standards (Kołacַz and Dobrzański 2006, Rozporządzenie 2010, Kośła 2011). The basic dimensions, location of the stables, paddocks, stud accommodations (riding school, lungeing space), their position relative to each other and cardinal points were defined. In order to assess the buildings the measurements of the doors, windows, floors, boxes, partitions, ventilation openings, the width of passages and corridors were taken. It was checked whether the mangers and water-bowls are placed at the proper height. It was assessed whether the applied solutions are functional and meet the safety requirements and whether they do not upset the horse state of welfare. The method and frequency of the change of bedding and general state of cleanness in the stables were evaluated. The paddocks were also assessed. It was checked whether the horses had access to water both in boxes and paddocks and the hygiene of mangers and water-bowls was also examined. The functioning of the gravity ventilation was estimated. To demonstrate the effectiveness of drains and ventilation was conducted measurement of the ammonia concentration. The measurement of the ammonia concentration was taken in both stables in the middle of the corridor at 7 a.m. using the gas detector WG-2 and gauge tubes (Kośła 2011).

Statistical analysis of ammonia concentration was done using the programme Statistica 5.0™, ANOVA modulus. The significance of differences between experimental groups was calculated with the help of the LSD or Tukey's tests.

## RESULTS AND DISCUSSION

Stables, riding schools, paddocks and additional buildings form the didactic-breeding complex of Warsaw University of Life Sciences situated at Wolica, near Warsaw.

The complex of stables and paddocks is situated on the escarpment, in a relatively level area. The driveway is hard-surfaced. The entire area is fenced and secured. Horses which are kept in the new and old stable are mainly taken care of by students who are interested in horse riding. The staff has the basic knowledge necessary for proper performing the stable work, feeding the horses, cleaning boxes, turning out horses to the paddocks and everyday grooming. In the stable one can notice that everything is kept in order, feeding times are observed and any improprieties or happenings are immediately taken care of. During the performed investigations no cases of aggression or harassment were noted. Horses were well treated and the work load connected with riding is rationally planned. Animals showing any alarming health signs are immediately examined by a veterinary surgeon. Physical and psychological condition of horses does not arouse suspicion as to the correctness of looking after them (Pirkelmann et al. 2010).

The new stable was built in 2003 together with the adjoining riding school. The stable is made of brick, with a tiled roof and the attic is used for farm purposes. The building is located with its longitudinal axis in the south-east direction, it is of 10.5 m in width and 38.0 m in length. The height of the building measured inside is 3.0 m. The building can be entered through a double door with the total measurement of 2.2 m in width and 2.9 m in height. Additionally the door is barred which allows opening the door which protects the horses against the unfavourable temperature increase. Behind the door there are the special rooms: saddle-room, scrubbing room, locker room and utility room. Inside the stable there two rows of loose-boxes for horses. Between them there is a corridor of 2.5 m in width. The floor in the corridor and driveway is paved with the concrete blocks and wooden blocks are used in the boxes. Between the corridor and the line of boxes, there is a dung channel of 14 cm in width protected with a grid from above.

Boxes are situated in two rows: 9 boxes on the north-west side and 8 boxes on the other side. The boxes are of the same size – 2.9 m in width and 3.9 m in length which makes the total surface of 11.31 m<sup>2</sup> per horse. It agrees with the standards (Kołaczkowski and Dobrzański 2006, Rozporządzenie 2010). Box structure is based on the steel-wooden construction which can be easily disassembled. Partitions and doors up to 120 cm in height are made of wooden boards and above them there is an openwork part of 105 cm in height which agrees with standards (Kołaczkowski and Dobrzański 2006).

Every other partition is built of bricks up to 120 cm and has a heater installed.

Through the verticale bars between boxes the horses can see each other and air circulation in the stable is easier which agrees with the principle of the horse welfare (Kołaczkowski and Dobrzański 2006). The boxes have sliding doors of 1.1 m in width. Kołaczkowski and Dobrzański (2006) report that they cannot be narrower than 1.3 m. Their upper barred part has a hinge allowing opening it in such a way that the horse may lean its head out to the corridor. Inside each box there are a rotating manger, an automatic water-bowl and a rock-salt installed about 100 cm over the floor which allows their welfare (Kołaczkowski and Dobrzański 2006). Rotating manger allows quick and efficient feeding the horses with bulky food without the necessity of entering each box. Automatic water-bowl assures permanent access to fresh water. Horses are kept on the bedding which is cleaned every day, i.e. excrements and wet bedding are removed systematically. Hay is delivered directly on the bedding in the corner of a box. Feeding the concentrate is done three times a day. Halter is screwed to each box as well as the folding (for safety reason) saddle rack.

A system of gravity ventilation was installed in the stables – there are square ventilatory openings in the ceilings whose side is 14 cm. They are located perpendicular to the long walls 4 openings in a row situated over every second partition in such a way that they collect the air from two neighbouring boxes. There are 4 rows of the exhausting ventilation openings.

The old stable is a farm building which was rebuilt and adapted for

a stable in the 1970s. The long axis of the stable runs from north-east to south-west.

The object is made of bricks with the attic used as store-room for bulky feed (hay) and bedding (straw). The roof is made of wood covered with roofing paper. The stable is 55.0 m in length and 9.5 m in width. The height from the floor to the ceiling is 2.95 m. The stable can be entered from three sides: the main doors on the edges of the building are 2.1 m in width and 2.4 in height and a double door in the middle of the building on the south-east side. Similarly as in the new stable the doors have an additional grating installed. On the north-east end of the stable the utility and social rooms are located as well as the saddle room and sanitation facilities which take up about 10.8 m of the entire building. There are two doors to the utility room, one from the outside and one from the inside. There is a comfortable driveway for a tractor with a trailer. Hay and straw are systematically thrown down manually onto the middle of the corridor through the chute opening in the roof. Inside the stable there was a feeding and dunging passage of 2.26 m in width and two rows of boxes located on its both sides. On the junction of corridor and boxes there is a shallow (3 cm in depth) sewage groove. Floor in the corridor is paved with the concrete blocks and boxes have concrete floors. Horses are kept on the bedding with the same method of cleaning them as in the new stable. Boxes are also located in two rows along the long walls. Their measurements are not the same varying from 8.5 to 14.1 m<sup>2</sup> which means that in the case of the smallest boxes the standards are not met (Kołac and Dobrzański

2006, Rozporządzenie 2010). Partitions between boxes are made of a solid wood up to the height of 117 cm and the barred part is of 135 cm in height over the solid part which disagrees with the standards because the solid partitions should be of 140 cm in height (Kołac and Dobrzański 2006, Pirkelmann et al. 2010). Front walls of the boxes from the side of the corridor are of the same measurements, i.e. the solid part up to 142 cm and the barred part over it up to 113 cm. In each box there are a rotating manger, an automatic water-bowl and a rock-salt installed about 90 cm over the floor. The ventilation in the building is of a gravity type. There are four exhaust shafts with the surface of 65 × 55 cm. These shafts end with a roof ventilator.

The results of the measurements of the air movement in the ventilation shafts in the new and old stable are compared in Table 1. In the summer season the gravity ventilation did not work in both stables, it worked better in the autumn and winter seasons when the difference in temperature values inside and outside the buildings was bigger than in summer. More often the air movement was noted in the exhaust shaft in the old stable than in the new one.

In the old stable a treatment surface of the 3.6 × 4.1 m is separated. It is parallel to the corridor and it is used for shoeing of horses, grooming, saddling and veterinary treatments.

Between the old and new stables there is a paddock of 1,440 m<sup>2</sup> in size (60 × 24 m). The fencing is made of a metal tube whose upper border is at the height of 100 cm. Directly behind that paddock there is another, bigger paddock of the 1,875 m<sup>2</sup> (75 × 25 m). Fencing is made

TABLE 1. The air movement in the ventilation shafts in autumn and winter season at 7 a.m., 1 and 7 p.m.

Date of measurement	Air movement					
	07:00		13:00		19:00	
	new stable	old stable	new stable	old stable	new stable	old stable
Autumn season						
12/10/2006	0.00	0.00	0.04	0.00	0.00	0.00
19/10/2006	0.00	0.00	0.00	0.00	0.00	0.00
26/10/2006	0.00	0.00	0.08	0.00	0.00	0.00
02/11/2006	0.00	0.00	0.00	0.00	0.00	0.00
09/11/2006	0.00	0.00	0.00	0.44	0.04	0.08
Winter season						
01/02/2007	0.04	0.41	0.62	0.22	0.04	0.27
07/02/2007	0.00	0.22	0.00	0.08	0.00	0.27
09/02/2007	0.00	0.22	0.22	0.27	0.04	0.04
14/02/2007	0.04	0.04	0.00	0.00	0.00	0.00
16/02/2007	0.00	0.22	0.00	0.41	0.00	0.27

of the same material but the height was 130 cm with an additional tube at the 70 cm in height (Sasimowski 1984). The two level fencing does not allow the horses to get out (Zwoliński 1983). Corners of the paddocks are cut. It prevents the horses to bunch together in the corners which could be dangerous during establishing the social hierarchy or during the horse panic (Jodkowska 2007). While building the new stable and the riding school, the paddock surface was improved and covered with coarse sand mixed with gravel. Unfortunately in the ground there are also some stones of several centimeters in diameter which increase the danger of crippling the horse's foot. Also the smaller stones of the gravel are dangerous because they may become stuck between the shoe and the hoof, inducing a pressure. During warm days plastic portable water-bowls kept full with water are placed on the paddock. All horses use the accessible paddocks (Hansen

2004) and their rotation is frequent and time consuming. There are no green pastures for horses.

Behind the new stable there is a dung pit. It has a concrete bottom and a meter high walls in accordance with the rules of environmental protection (Runowski et al. 2006). Next to both stables, on the paved surface the washing stand is situated. A corridor connects the riding school with the stable. It has a separate gallery, a mirror on a part of the long wall, oblique bands and elastic surface made of sand fraction and sawdust. The riding complex also include a horse exerciser and a roofed lunging ring.

The results of the investigations of ammonia concentration in the stable are presented in Table 2. The obtained values do not show the overstepping of the accepted standards for that compound in the stable air. The norm amounts to 20 ppm (Kończ and Dobrzański 2006, Kośla 2011).

TABLE 2. Seasonal maximum values of ammonia concentration in the stable air at 7 a.m.

Season	Ammonia concentration		
	new stable		old stable
	mg·m <sup>-3</sup>	ppm	mg·m <sup>-3</sup>
Summer	5.0	7.1	0.0
Autumn	3.1	4.4	0.0
Winter	5.1	7.2	0.0

## CONCLUSIONS

1. The conditions of horse keeping in the stables of Warsaw University of Life Sciences – Wolica are correct and do not disturb in a significant way their welfare either in the physical or psychological state. On the basis of the performed investigations it can be stated that the horses are kept at a good level of their welfare.
2. The building a new stable, despite its high aesthetic qualities, is not functional in respect to its feed storage. There is no utility attic.
3. The system of gravity ventilation in the new stable did not function properly or effectively.
4. The presence of ammonia in the of the air new stable was detected, however, its level did not exceed the permissible standards.
5. The total surface of the paddocks is too small in relation to the number of horses kept in both stables. Horses use them for a short time because the rotation is high. The gravel on the paddock ground is too coarse and contains unwanted stones.
6. Horses have no access to pastures which is improper in view of their ethological needs

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**Streszczenie:** *Dobrostan koni oceniony metodą inwentaryzacji zoohigienicznej.* Celem przeprowadzonych badań była ocena dobrostanu koni zgodnie z zasadami i metodyką inwentaryzacji zoohigienicznej. Badania i pomiary przeprowadzono na terenie kompleksu hippicznego Wolica SGGW. Podstawowe parametry tworzące mikroklimat oceniono w „Dobrostan koni oceniony z wykorzystaniem badań wybranych parametrów mikroklimatu stajni” opublikowanym w aktualnym numerze *Animal Science*. W niniejszej pra-

cy, postępując zgodnie z zasadami i metodyką inwentaryzacji zoohigienicznej, opisano budynki inwentarskie, ich wyposażenie, system wentylacji i najbliższe otoczenie, w którym utrzymywane były konie. Zbadano stężenie amoniaku w pomieszczeniach, a otrzymane wyniki zestawiono z obowiązującymi normami. Uzyskane wyniki wskazują, iż badane elementy środowiska koni były zgodne z zaleceniami zoohigieny i tylko sporadycznie przekraczają normy. Dobrostan pod tym względem był zachowany.

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