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# Well-being of Horses in Various Housing Systems

## Investigations with ALT-Pedometers on Animal Welfare and Daily Rhythms

*Electronic identification and measuring systems are key technologies in progressive automation for future oriented livestock farming systems. New ALT-pedometers continuously register activity, lying times and temperatures of cattle and horses in freely selectable measuring intervals between 1 and 60 minutes. In horse husbandry they were successfully tested on stud farms in Germany and in Switzerland.*

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### Keywords

Horse keeping, sensors, well-being

### Literature

Literature references can be called up under LT 06603 via internet <http://www.landwirtschaftsverlag.com/landtech/local/literatur.htm>.

The growing dissemination of sport and pleasure-riding horse keeping in the entire EU requires an adaptation of the legal bases and general conditions for the individual countries for the horse keeping under the aspects of animal welfare in horse keeping systems.

Well-based statements concerning the daily biorhythm - activity behaviour, standing times, resting times - must be new scientifically basis for revised guidelines and regulations of the keeping order of horses. This must be taken into consideration when planning and dimensioning for the construction of new stables or for the structural alteration measures. The most frequent form of the individual keeping is the single box in the stable. But also inner boxes and outside boxes, with a directly adjacent little paddock, are used.

The group housing for horses in large boxes without permanent entry to a paddock is a relevant keeping system, too. A decisive improvement in horse keeping regarding well-being of the animals are the so-called multiple section group paddock housing systems. This is housing system with an open stable, inside with a lying area, a feeding area inside or outside of the building and a permanently accessible paddock. Newer investigations have shown that especially low-ranking animals show a reduced rest behaviour during the lying time in the group, because they are disturbed over and over again by more high-ranking during her quiescence and sleeping phases [6, 7]. Sleep and deep sleep are essential needs for all mammals.

Adult horses rest about seven hours during the day and they spend approx. 20% in lying position. Pilot studies show that structuring of the lying areas in group housing systems can positively affect the frequency and duration of lying periods, especially for lower-ranking horses.

### Material and methods

The pedometer contains four sensors for recording the step activity, the lying time in two different lying positions and the surrounding temperature. The results from temperature relations permit conclusions about the lying area of the animal and hence on the well-being. A  $\mu$  processor, the data memory, the real-time clock, a lithium battery and the radio module to the wireless data transfer complete ALT - pedometer. The sum of the step activity, the lying times and the surrounding temperatures complete the a data set. The storage capacity of an ALT - pedometer amounts to 740 data sets [4]. First investigation took place in Neustadt / Dosse (Germany) in single inside boxes only with stallions and mares over two weeks. In Switzerland three investigations were carried out in the national stud farm of Avenches [4]. The first were done with stallions and geldings in single inside boxes and boxes with a paddock over four months in autumn und wintertime and then with stallions at the pasture. The ALT pedometer is attached with a ribbon or in a gaiter to a leg, the foreleg has proved itself advantageous for safety reasons (hits out). The decisive advantages of this type of pedometer are the following features:

- Measuring three animal individual parameters (activity, lying time, surroundings, temperature at the pedometer), instead of one feature only (activity) in the conventional pedometer
- free selectable time interval for the recording of all parameters in the measurement range between 1 and 60 min;
- the real time clock in the ALT pedometer permits the defined assignment of all data sets to the biorhythm during the day
- continuous data acquisition, data storage and manual or cyclical automatic data transfer over arbitrary time periods for pre-

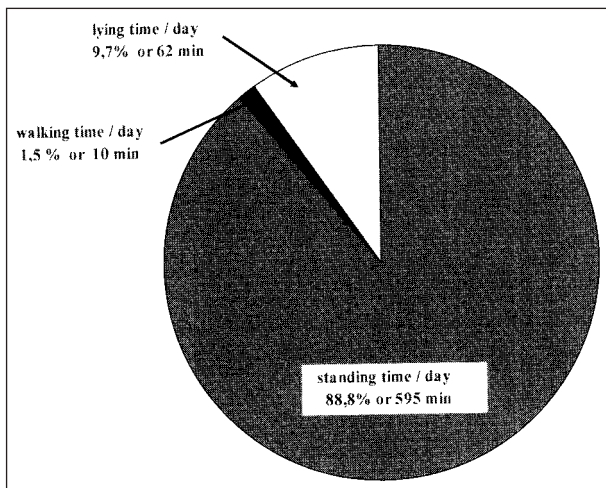


Fig. 1: Daily biorhythm of „Kitaro“ - single inside box (measuring time: 0 to 24 h)

defined measuring interval by means of radio modem to the PC

The high correspondence between activity and lying time permits significant statements for daily biorhythm of horses. Differences in movement activity of the animals under the conditions investigated with and without paddock, were tested with the help of the Wilcoxon test.

## Results

The movement activity is a significant indicator for the well-being of the animals. This assessment is valid for animal health, fertility, performance, well-being and balance. Nowadays there are two dominating keeping systems, the individual or single and group keeping system. In the individual horse keeping system, the horses are substantially restricted in their social contact to other horses by the structural design of the boxes. The most grave disadvantages are the restricted area for moving and their investigative behaviour. Both parameters can not be practised in single inside boxes with a box dimension of < 12m<sup>2</sup>.

From investigations in Switzerland it is known that approximately 84% are kept in single keeping and only about 16% in group keeping [2, 3, 7, 12, 15].

The horses in single keeping are exercised on average five hours per week outside the single box; these are 45 min daily stay outside of the box. However, this daily movement activity doesn't concern all horses as we could find out in our investigations. The monotony for some horses is interrupted on particular days by exercising in the merry-go-round, in the riding hall or by rides in the countryside.

While single horses are ridden or moved in the merry-go-round, some of them are exercised seldomly or aren't without any active movement in their individual box for

days. That means that horses stay approximately 23 hours daily the single box [1, 4, 5]. For an animal, which is daily on an average just 19 hours in motion under natural conditions, a daily movement duration of less than one hour shows a considerable restriction of appropriate species behavioural patterns.

Different investigations have shown that due to the lack of exercise a whole series of illnesses and with it connected suffering and pains and this is often the cause for an early loss of horses [6, 9, 10, 12]. Figure 1 shows the results for the daily biorhythm in a single inside box of a stallion. It shows daily share of the measurement parameters activity, lying time and temperature.

For stallions kept with a paddock we measured on average 18 impulses per minute, without paddock only 12 impulses. The more quiet geldings showed only an average movement activity of six impulses per minute in the keeping with paddock, with box

keeping without paddock only three impulses per minute. The low of the movement activity we measured at 02:00 at night. The results show that the movement activity of horses can be improved by a paddock, which is accessible during the day. Clear differences in the behaviour between stallions and geldings were established. Stallions carried out considerably more changes (16,5%) between box and paddock than geldings (7,2%) for example. The geldings stayed in the paddock on average during 37.63 % of the time, the stallions during 65% of the time. In Figure 2 you can see the influence of the housing system on the well-being of the horses.

The comparison in movement activity of a stallion is shown in Figure 2 between the test periods in single inside box without paddock and on the pasture.

The graph shows clear the daily activity from the stallion in both different housing systems.

The stallion on the pasture reached in the measuring time interval of five minutes between 110 and 130 activity impulses, the values in the same measuring time period in the single inside box reached at ten to 13 activity impulses.

Only the paddock keeping with different functional areas and the diurnal pasture keeping can meet the movement needs of the animals [1, 2, 3, 7, 10].

Under the present keeping conditions, therefore it is to provide the movement loss for a corresponding compensation. The individual keeping should always be a less-than-ideal solution and be used only there where a group keeping is not practicable.

The most suitable keeping form is, if possible, group keeping, in combination with a paddock for movement incentives.

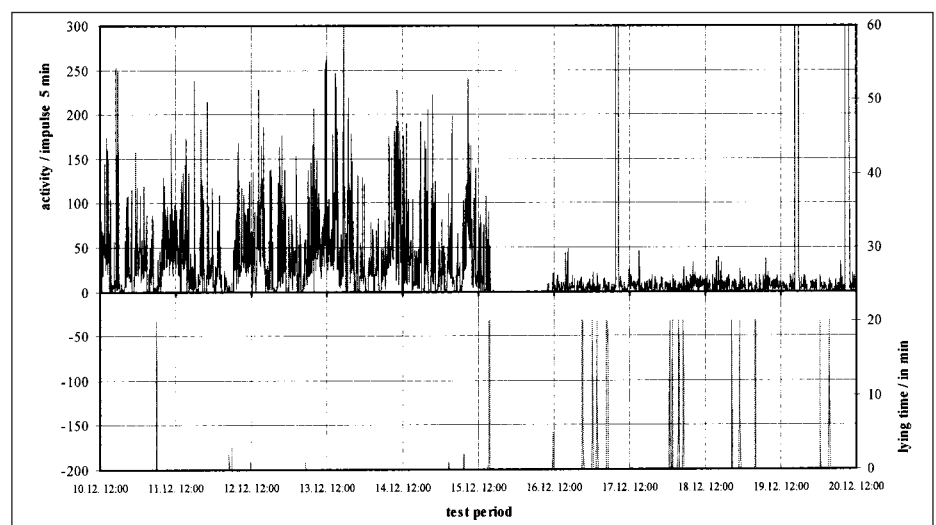


Fig. 2: Comparison between activity and lying time of the stallion „Lorambo“ with experimental variants „pasture“ and „single inside box“