# FREQUENCY OF ENGAGEMENT WITH DIFFERENT MATERIALS BY GROWING RABBITS

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## ABSTRACT

The frequency of engagement with different materials as environmental enrichment by growing rabbits in cages with plastic slatted floor was studied in two experiments using a total of 108 rabbits (ZIKA hybrids). In each experiment, 54 rabbits were kept in four group-cages with different group-sizes (8, 8, 16 and 22) at the same stocking density (625 cm²/rabbit). The cages were equipped with nipple drinkers and feeders. Feed and water were available *ad libitum*. The duration of the photoperiod was 16 hours. In the first experiment (D1), pellets were fed ad libitum from a conventional feeder installed outside the cage. In the second experiment (D2), another feeding system which gives the rabbit the possibility to take crude-fiber *ad libitum* was additionally located in the middle of every cage. Three different occupational tools were installed in the cages: an iron-chain with a wooden gnawing stick (WGS) for the two groups with eight rabbits (A, B), one iron-chain with a plastic gnawing stick (PGS) placed in the group with 16 rabbits (C) and two iron chains connected by a horizontal iron stick (ICS) for the group with 22 rabbits (D). In both experiments, the same kinds of occupational tools were located in the same cages. The frequency of occupation was studied by 24 hours video-observation with infrared cameras at the beginning, the middle and the end of the fattening period (eight weeks). Continuous ethological analyses were performed with the program Observer (Noldus). Additionally, the time sampling method with an interval of five minutes during three periods a day (08:00-10:00; 19:00-21:00; 01:00-05:00) was used to register the number of rabbits in each group showing the following behavioural patterns: eating, drinking, lying, hocking, hopping, own body licking, erecting, engagement with the materials, miscellaneous. In D1, the frequency of occupation was the highest in cages A and B with WGS followed by cage C with PGS and cage D with ICS. In D2, there were no significant differences between the cages, but the frequency of occupation with the different tools in all cages was significantly lower than in D1. Also the results of the time sampling method showed a significant higher frequency of occupation in D1 compared with D2. In the second experiment, the rabbits of all cages were more often observed “eating total” (hopper with pellets plus feeder for crude-fiber) than in D1 (only pellets from the hopper). Experiment 2 shows that a feeding system which gives the rabbits the possibility to satisfy the demand for crude-fiber-intake is a tool in the housing system that allows the rabbits to express a species-specific behaviour.

**Key words**: Growing rabbit, Frequency of occupation, Gnawing sticks, Environmental enrichment, Feeding system.

## INTRODUCTION

Group housing systems are more acceptable than single cage systems as they allow the rabbit to socialize and to show a large variety of behavioural patterns. The negative aspects of group housing cages are the levels of aggression and the high frequency of scratching, sneezing and head shaking (Podberscek *et al*., 1991). In intensive systems, growing rabbits are usually kept on wire-grid (Dal Bosco *et al*., 2001; Orova *et al*., 2004; Morisse *et al*., 1999; Morisse and Maurice, 1994) but housing in litterless cages represents a very barren environment (Hansen and Berthelsen, 2000). By contrast environmental enrichment in group-cages with growing rabbits has no negative impact on the

performance and causes fewer stereotypies (Verga *et al*., 2004). Also, "welfare friendly" pens with a plastic platform, a hiding box and gnawing material have no negative influence on the performance of growing rabbits (Maertens *et al*., 2004). The kind of occupational tool and the modality of occupation provide to the rabbit can have different outcomes (Jordan *et al*., 2006). For example, the type of wood in gnawing sticks can influence the duration of feed intake (Jordan *et al*., 2006). The wooden stick provided as gnawing material should be hung from the rood of the box, as otherwise there is a risk of it becoming contaminated with faeces (Hoy and Verga, 2006). To reduce abnormal behaviour, hay in a bottle was the most effective occupational tool compared with grass-cubes, a box and different gnawing sticks (Lidfors, 1997). Rabbits, kept in an enriched cage system with shelter and raised height, had better "welfare" than rabbits kept in a conventional cage system (Hansen and Berthelsen, 2000).

The aim of this study was to investigate the frequency of occupation of growing rabbits kept in groups in a conventional cage system with plastic slatted floor and provided with different materials for environmental enrichment.

## MATERIALS AND METHODS

### Animals and environmental enrichment

The investigation was carried out on the research-station "Oberer Hardthof" of the University of Gießen, Germany. A total number of 108 rabbits (ZIKA hybrids) were kept in standard group-cages with plastic slatted floor. In each round 54 rabbits were housed in four group-cages with different group sizes (8, 8, 16 and 22) but always using the same stocking density (625 $cm^2$/rabbit) during the growing period, from 35 to 91 days of age. The cages were equipped with nipple drinkers and feeders. Feed and water were available *ad libitum*; the duration of the photoperiod was 16 hours. In the first round (D1), pellets were fed ad lib by a conventional feeder installed outside the cage. In the second round (D2), another feeding system which gives the rabbit the possibility to take crude-fiber *ad libitum* was additionally located in the middle of every cage. Three different occupational tools were installed in the cages: an iron-chain with a wooden gnawing stick (WGS) for the two groups with eight rabbits (A, B), one iron-chain with a plastic gnawing stick (PGS) placed in the group with 16 rabbits (C) and two iron chains, connected by a horizontal iron stick. (ICS) for the group with 22 rabbits (D) (Figure 1). In both rounds the same kinds of occupation tools were located in the same cages.

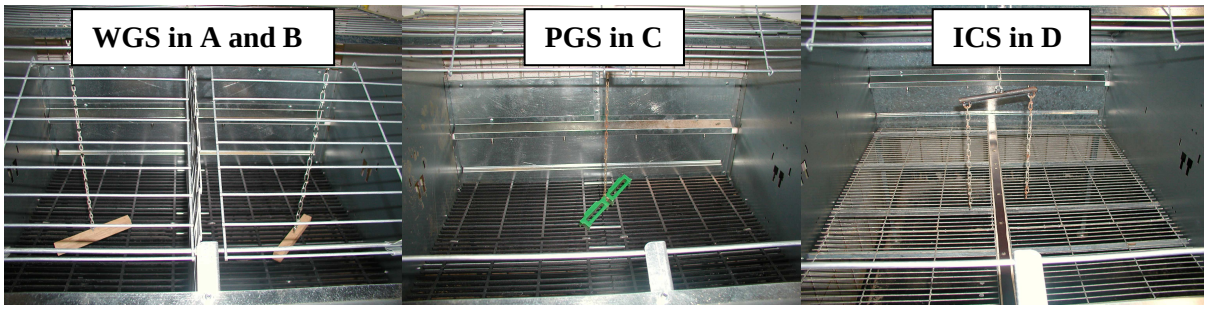


**Figure 1**: Different occupation tools installed in different cages

### Behaviour

The behaviour was video-recorded at the beginning, the middle and the end of the fattening period (24 hours each period), using three cameras connected to a VCR tape recorder. Each cage was observed for 72 hours in total per fattening period. The behaviour of the rabbits in all cages was recorded at the same time. Two methods of observation were used. With the help of "THE OBSERVER" program (Noldus, NL), the frequency of occupation with the tools was continuously observed during 24 hours. Additionally, the time sampling method with an interval of five minutes during three periods a day

(08:00-10:00; 19:00-21:00; 01:00-05:00) was used to register the number of rabbits in each group showing the following behavioural patterns: eating, drinking, lying, hocking, hopping, own body licking, erecting, engagement with the material, miscellaneous. Because the group size was somewhat different the frequency of behavioural patterns was calculated per rabbit and 24 hours.

**Statistical analysis**

Statistical data analysis was conducted using pairwise t-Student-test and Student-Newman-Keuls multiple test to compare means between groups and rounds (SPSS 12.0 for Windows).

## RESULTS AND DISCUSSION

In D1, the round without the crude-fiber-feeding-system, there was a significant difference between the cages concerning the frequency of occupation with the different materials. The frequency of occupation was the highest in cages A and B with the wooden gnawing sticks WGS (62.43%; 66.33% respectively on average per rabbit and 24 hours) followed by cage C with PGS (34.32%) and cage D with ICS (24.15%) (Figure 2).

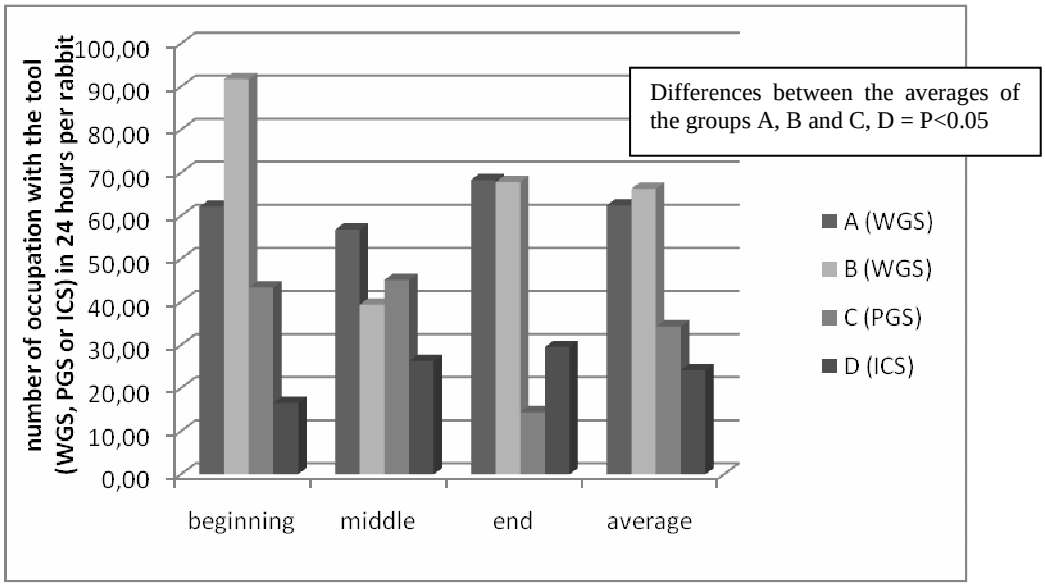


**Figure 2**: Frequency of occupation with different tools (WGS, PGS or ICS) per rabbit in 24 hours, D1

In D2, there were no significant differences among the cages or groups concerning the frequency of use of the different tools. Yet, these frequencies in all cages were significantly lower in D2 than in D1 (Figure 3) perhaps because the rabbits had the possibility to spend more time with the occupation with crude-fiber from the new feeder. Also, the results of the time sampling method showed a significantly lower frequency of occupation with the different materials in D2 compared with D1.

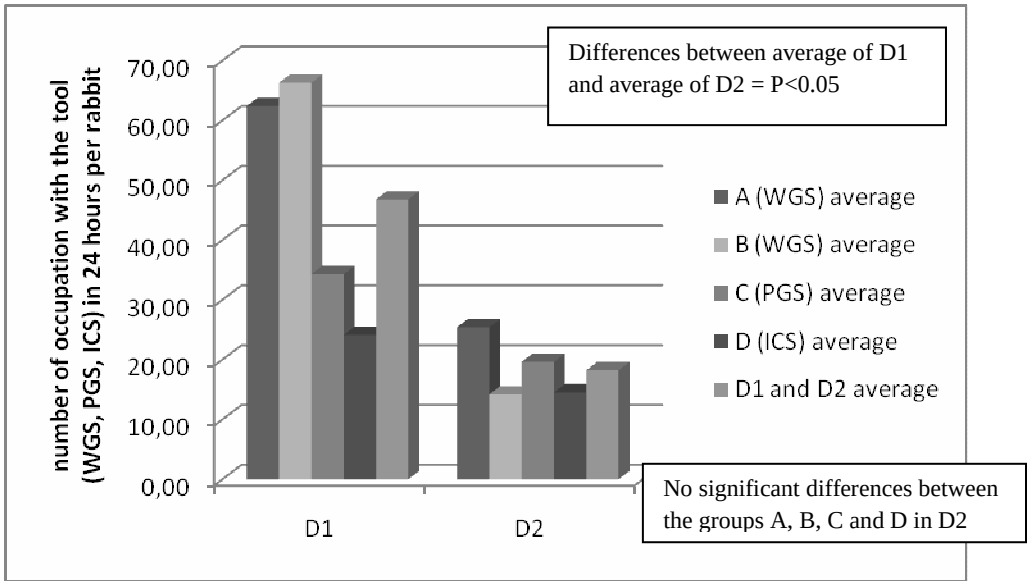


**Figure 3**: Frequency of occupation with different materials (average per round/rabbit in 24 hours) in D1 and D2

Furthermore, the results of the time sampling method showed that there was a significant difference between rounds D1 and D2 concerning the frequency of eating. In the second round the rabbits in all cages were more often found sitting at the new feeder (for crude-fiber) and at the hopper (for pellets) (="total eating") than in D1 where they had only the possibility to eat pellets from the hopper. In both rounds, there was no difference among the four cages regarding the frequency of eating in 24 hours (Figure 4).

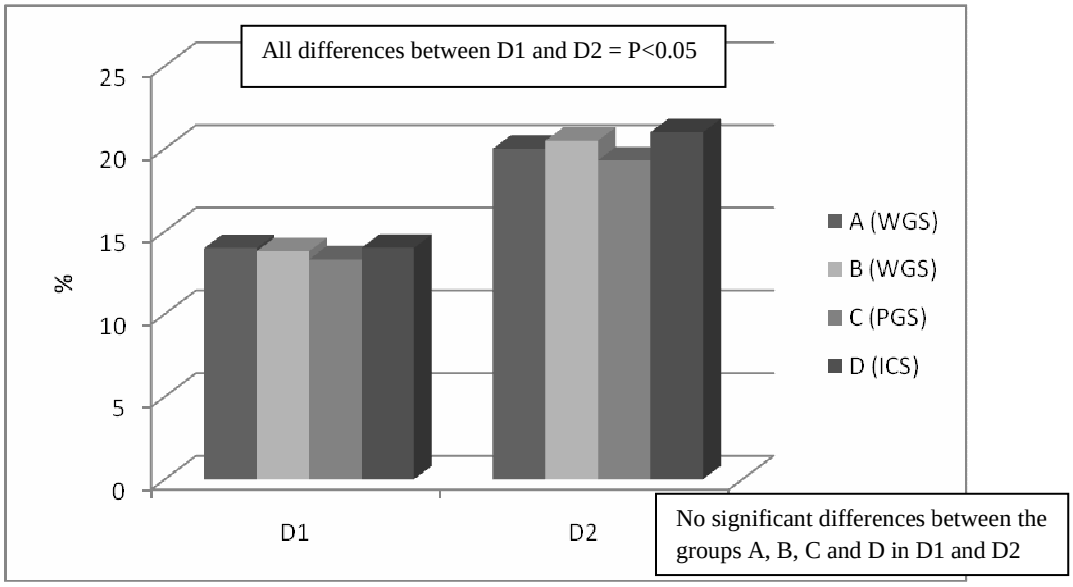


**Figure 4**: Frequency of eating (as percent per rabbit in 24 hours) in D1 and D2

## CONCLUSIONS

The wooden gnawing stick was used most frequently but the effect of the tool cannot be separated from the effect of group size.

The frequency of engagement with different materials is much lower ($P<0.05$) if the rabbits have the possibility to eat crude-fiber ad *libitum* from a new feeding system. The frequency of "total eating" (pellets plus crude-fiber) is significantly higher if the rabbits have access to pellets in a traditional feeder and crude-fiber in a new feeding system (round D2) compared to only pellets from a hopper (round D1).

A feeding system which gives the rabbits the possibility to satisfy the demand of crude-fiber intake is at the same time a tool in the housing system that allows the rabbits to express a species-specific behaviour.

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