Effect of Alternative Housing on Carcass Traits of Rabbits

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SUMMARY

One hundred and sixty one New Zealand White weaned rabbits were housed in cages (0.4x0.4 m, 3 rabbits/cage, 18.7 rabbits/m^2) or in a pen on deep litter (3x3.3 m, 0.2 m thick wheat straw litter, 80 rabbits/pen, 8.1 rabbits/m^2).

At 13 weeks of age pen-housed rabbits (n=52) had lower body weight (2318 vs. 2437 g; P<0,01) and dressing out percentage (59.8 vs. 61.0 %; P<0,01) than the cage-housed animals (n=68). Higher proportion of the fore (32.3 vs. 31.4 %; P<0,01) and the hind part of the carcass (40.3 vs. 37.9 %; P<0.001) were found in pen-housed group compared to cage-housed rabbits. While the proportion of the intermediate part (27.5 vs. 30.7 %; P<0,001) was lower in pen-housed animals. The ratio of perirenal fat to pre-slaughter body weight was lower in pen-housed rabbits (0.45 vs. 0.83 % P<0.001) than in cage-housed group.

KEY WORDS

rabbit, housing, cage, pen, carcass traits

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INTRODUCTION

Nowadays scientists, leaders of food industry and even consumers need information on the effect of alternative housing system not only on the animal welfare and health but also on carcass traits. The main results of studies in the theme of different alternative housing systems on the performance of fattening rabbits were reviewed by Verga (2000). In these experiments fattening rabbits were kept under different conditions. Cages of different size were used with different stocking densities or group sizes and many varieties of housing rabbits on deep litter were examined. According to Maertens and Van Oeckel (2001) Podberschek et al. (1991), Van Der Horst et al. (1999), Mirabito et al. (1999) and Dal Bosco et al. (2000, 2001) the housing system affects body weight, some carcass parameters and sometimes the meat quality (Dal Bosco et al. (2000, 2002).

The aim of our experiment was to study the influence of different housing systems (cage or pen) on some carcass traits.

MATERIALS AND METHODS

Experimental design

The experiment was carried out at the rabbit farm of Lab-Nyúl Ltd. in Gödöllő. At 5 weeks of age, 161 New Zealand White rabbits were randomly divided into two groups. The average body weight of groups was equal (1.04 kg). One of the two groups was housed in cages (0.4 × 0.4 m, 0.35 m high, 3 rabbits/cage, 18.7 rabbits/m^2, n=81) while the other one was housed in pen on deep litter (3 x 3.3 m, 80 rabbits/pen, 8.1 rabbits/m^2 n=80). Wheat straw was used as deep litter, which was placed on the concrete floor (0.2 m thick) and changed every second week. The temperature of rabbitry was 18±2 °C during the experiment.

Rabbits received a commercial pellet (16.3% crude protein; 15.2% crude fibre; 10.6 MJ DE/kg feed, calculated) and drinking water ad libitum.

Slaughtering and dissection of rabbits

At 13 weeks of age all the surviving rabbits (n=120, cage: n=68, pen: n=52) were slaughtered. After 24-hour fasting the body weight of rabbits were measured before slaughter. After slaughtering (using electrical stunning) and after cooling at 3 °C for 4 h, both the hot and chilled (commercial) carcass was weighed (together with the head, liver and kidneys). After the dressing process the chilled carcass was cut into three parts between the 7^{th} and the 8^{th} thoracic vertebrae and between the 6^{th} and 7^{th} lumbar vertebrae according to the method of Blasco et al. (1993).

Statistical analysis

The experimental results were evaluated by one-factor analysis of variance using body weight as covariate with the programme SPSS 10.0 for Windows.

RESULTS AND DISCUSSION

Body weight

Body weight of pen-housed rabbits was 4.9% lower (P<0.01) compared to the cage-housed animals (Fig 1). Similar differences were observed by Maertens and Van Herck (2000), as well as Maertens and Van Oeckel (2001). However compared to cage-housed rabbits more than 10% lower body weight of pen-housed animals was reported by Van Der Horst et al. (1999), Dal Bosco et al. (2000) and Canquil et al. (2001). According to Maertens and Van Herck (2000), increased locomotor activity, while according to Dal Bosco et al. (2000) and Morisse et al. (1999) the consumption of litter material is also responsible for the poorer body weight gain of pen-housed animals. In our experiment the difference between body weight of the two groups could mainly be caused by the different locomotor activities and the different mortality (cage: 16%, pen: 35%). Probably the mortality of rabbits of poor growth and lower body weight was higher in the pen-housed group

Carcass traits

Dressing out percentage of pen-housed rabbits (calculated on the basis of chilled carcass) was 1.2% (P<0.01) lower than that of the cage-housed animals (Fig 2).

Similar results were found by Van Der Horst et al. (1999) and Dal Bosco et al. (2000, 2002), while Maertens and Van Oeckel (2001) did not find significant difference between the groups. Dressing out percentage is influenced by stocking density; higher stocking density and smaller living place are disadvantageous (Ferrante et al., 1997; Xiccato et al., 1999). In our experiment the pen-housed rabbits had lower stocking density (consequently larger living space) therefore their poorer dressing out percentage is not related to the stocking density. Different body weight of cage- and pen-housed rabbits may have played a role in the different dressing out percentage, as heavier rabbits have a higher dressing out percentage (Szendrő 1989; Roiron et al., 1992; Milisits et al., 2000). Furthermore, it is known that growth rate affects the development of tissues (Prud'hon et al., 1970; Ouhayoun, 1998). This was the reason why body weight was used as covariate in statistical analysis and the difference between groups still remained significant.

The ratio of fore and hind parts to reference carcass were higher (P<0.01 and 0.001, respectively) while that of intermediate part was lower (P<0.001) in

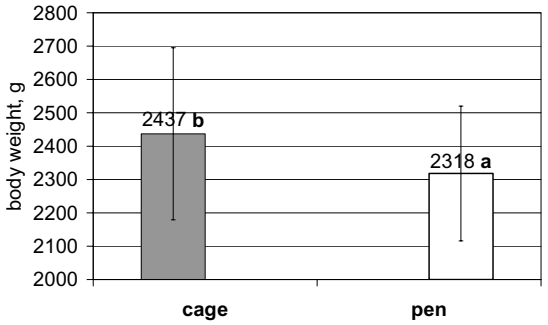

Figure 1. Pre-slaughter body weight of rabbits housed in cages or in pen (a, b: P≤0.05)

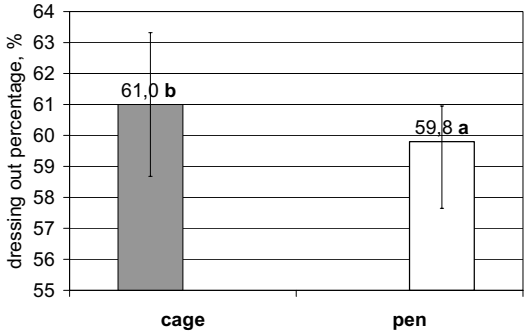

Figure 2. Dressing out percentage of rabbits housed in cages or in pen (a, b: P≤0.05)

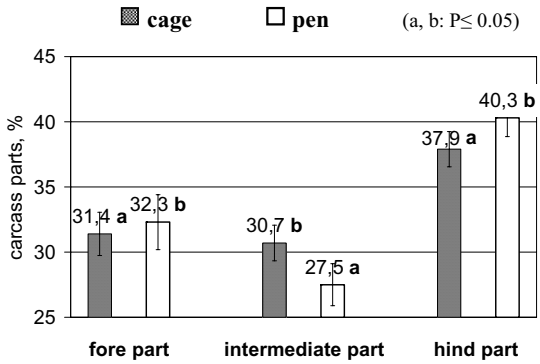

Figure 3. Percentage of carcass parts in the reference carcass of rabbits housed in cages or in pen

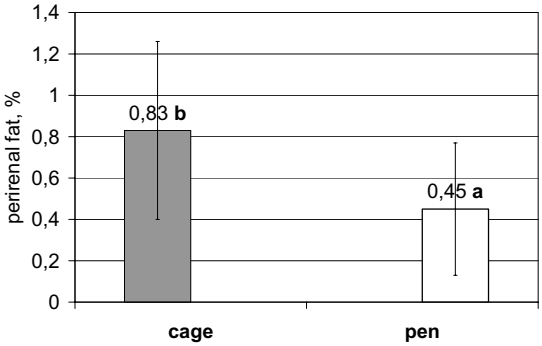

Figure 4. Ratio of perirenal fat to body weight in rabbits housed in cages or in pens (a, b: P≤0.05)

pen-housed rabbits than in cage-housed animals (Fig 3). Therefore the fore and hind parts of carcass – closely related to locomotor activity – increased at the expense of the intermediate part in the pen-housed rabbits. Dal Bosco et al. (2000, 2002) found an increase only in the proportion of hind part in pen-housed rabbits. Xiccato et al. (1999) found a larger tibia diameter in rabbits kept in larger cages.

The ratio of perirenal fat to live weight in pen-housed rabbits was about a half of that found in the cage-raised animals (P<0.001) (Fig 4).

Similarly large difference was published by Van Der Horst et al. (1999) (on the average: cage: 2.8 %, pen: 1.8 %) and Dal Bosco et al. (2000, 2002) (cage: 2.43 %, pen: 0.84 % and cage: 2.68 %, pen: 1. 06 %). Both the amount and proportion of fat depots are in close correlation with the locomotor activity of the animals. Podberschek et al. (1991) and Mirabito et al. (1999) found all the active behaviours higher among rabbits kept in pens. However, lower feed (Maertens and Van Herck, 2000; Maertens and Van Oeckel, 2001) and energy intake – due to the consumption of litter material (Morisse et al., 1999; Dal Bosco et al., 2000) influence the amount and proportion of fat depots.

CONCLUSIONS

Pen-housed rabbits reached the same body weight a few days later (according to literature this can be even one week) compared to the cage-housed group. According to our results the weight of chilled carcass is 100 g lower in pen-housed rabbits in case of fattening until the same age. For this reason the rearing costs could be increased as a consequence of the longer fattening period, while these higher costs could be compensated by the lower investment costs.

As a consequence of increased locomotor activity, the ratio of hind part was higher in pen-housed rabbits, while the weight of that in the two groups was not differed (473 and 470 in cage and pen, respectively). This is advantageous since under pen-housing conditions the weight of a most valuable product is not altered while the percentage of it become higher. On the contrary, the decreasing weight and percentage of intermediate part is disadvantageous.

The decrease of perirenal fat to a ca. 50% in pen-housed rabbits, compared to cage-housed ones, can be advantageous because a lower ratio of the consumed feed is converted to fat.

One of the most important conclusions of these examinations is that the breeders have to pay attention to the new trends of animal husbandry, which appear in a better quality of products including the improvement of life-quality of animals.

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