The relationship between housing systems and animal welfare

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ABSTRACT – Under natural conditions European wild rabbits can balance between the benefits and costs to mark the best decision. Farmed rabbits are under the control, their welfare depends mainly on the housing conditions created by people. When the group size is above 4-5 rabbits, maximum a litter together, the disadvantages (higher risk of contamination with diseases and mortality, higher rate of aggressiveness – injured rabbits) are higher than the advantages (higher moving possibility, more social contacts). According to several results, the optimal stocking density is 16-18 rabbits/m^2 (40-45 kg rabbits/m^2), depending on the final weight. Deep litter is unfavourable because of the high contamination with coccidiosis (higher mortality), lower productive and carcass traits and less preferred than wire net. There are no differences in productive performance, carcass traits and frequency of behavioural patterns of rabbits housed on wire net or plastic net floor, but at younger age growing rabbits prefer staying on plastic net. It could be important to test other types of wire net floors. A good combination of deep litter and wire net could be a pen with elevated platform and straw litter on it (the lower level is wire net). Growing rabbits prefer staying in cages with top than in open top ones. It seems that the generally used 30-35 cm high cages are suitable for growing rabbits. Environmental enrichment is important against the barren housing. Gnawing stick made of soft wood (Little-leaf linden), fixed on the cage wall at similar height as the rabbits head are the most effective against to aggressiveness (lesions on the body).

Key words: Growing rabbits, Welfare, Behaviour, Housing.

INTRODUCTION

When wild animals in the nature choose a habitat, move to another location or decide to live alone or in smaller or larger groups, and in several other situations, they seek to balance between the benefits and costs.

The European wild rabbit is known as a nocturnal species, living in large groups, digging holes and staying in the warrens during the day. Lombardini *et al.* (2003), on the basis of some published observations, established that European wild rabbits have been described as solitary or gregarious, co-operating or not regarding vigilance, living in warrens or aboveground and selecting open or avoiding it. In scrub-land, where they are well covered and the chance of a predator to notice them is lower, where the soil is too hard to dig or where (in Australia) rabbits live on the ground because they have higher chance surviving of myxomatosis (natural selection - no warren no mosquitoes in the holes), it is frequent that rabbits do not dig warrens. Thus, rabbits are able to weigh up the pros and cons of living in warrens or on the ground.

In the nature, European wild rabbits can balance and choose among different possibilities. Rabbits on farms are under the regulation of people. Their welfare depends mainly on the housing conditions. To improve the wellbeing of farmed rabbits we have to know more about the European wild rabbit, about the behaviour of the domesticated rabbits under different conditions, about the factors modifying their health status and productivity.

Hoy and Verga (2007) summarized the welfare indicators:

-mortality – unavoidable low
-physiological parameters – in the species–specific standard
-behaviour – species-specific
-performance – high level

Recently some detailed reviews and book chapters were published (Hoy and Verga, 2006; Jordan *et al.*, 2006; Szendrő and Luzi, 2006; Verga and Luzi, 2006; Verga *et al.*, 2005; Trocino and Xiccato, 2007; Mirabito, 2007; Verga *et al.*, 2007), some of them were based on the scientific cooperation of COST Action 848. I tried to collect and summarize several published results and focus on some new aspects in connection between housing and welfare.

HOUSING SYSTEMS AND ANIMAL WELFARE

In this paper our knowledge on rabbit welfare in some fields of housing conditions are summarized.

Group size

Based on the fact that wild European rabbits live in colonies (large groups), some of the specialists and recommendations suggest housing of growing rabbits in large groups. Some researchers examined the effect of group size on productive carcass traits and behaviour.

Productive traits on wire floor

Highest weight gain and body weight may be reached with individual housing. The daily weight gain and body weight significantly decreased in groups of 2 or 3 animals/cage (Xiccato *et al.*, 1999; Maertens and De Groote, 1984).

Compared the 2, 4 or 6 animals/cage to larger groups, daily weight gain and body weight decreased on average by 2.67 g/d and 125g (Maertens and De Groote, 1984; Rommers and Meijerhof, 1998; Xiccato *et al.,* 1999; Mirabito *et al.,* 1999ab; Maertens and Van Herch, 2000; Lambertini *et al.,* 2001; Maertens and Van Oeckel, 2001; Bosco *et al.,* 2002; Jehl *et al.,* 2003; Princz *et al.,* 2009; Szendrő *et al.,* 2009ab). Rabbits in larger groups can reach the same body weight for slaughter 2-7 days later than in groups with 2-6 rabbits/cage. The slower growth rate can be related to the higher locomotory activity. Consequently, the consumed energy is used partly for activity. However, rabbits in larger groups consumed less pellet than those in smaller groups.

Examining this in more detail we can see that the differences between smaller and larger groups were higher after weaning than at the end of growing period. In the experiment of Maertens and Van Herck (2000), the difference in weight gain of rabbits housed in cages or pens was -11, -10 and -2% at ages of 4-6, 6-8 and 8-10 weeks, resp.

The same figures were -8, -7, -3, +1 +2, +5% between ages of 5-6, 6-7, 7-8, 8-9, 9-10 and 10-11 weeks in experiment of Princz *et al.* (2009).

The feed conversion in groups of 3-4 or 6-7 rabbits/cage improved, as compared to individual or bicellular housing. When the group size was larger, the feed conversion ratio became weaker.

In most of the cases, mortality was independent of group size. The reason could be the feeding of medicated pellet. Dal Bosco *et al.* (2002) detected a significant increase of mortality in larger groups (2 or 9 rabbits/cage).

The dressing out percentage of rabbits in larger groups decreased (Xiccato *et al.*, 1999; Lambertini *et al.*, 2001; Maertens and Van Oeckel, 2001; Dal Bosco *et al.*, 2002; Combes *et al.*, 2003; Jehl *et al.*, 2003; Dalle Zotte *et al.*, 2009b; Szendrő *et al.*, 2009ab), but the differences were significant only in the experiment conducted by Lambertini *et al.* (2001). It is clear that higher moving activity and lower feed consumption generate a weaker dressing out percentage and lower fat deposition.

Behaviour

According to the literature (Held *et al.*, 1995; Chu *et al.*, 2004), laboratory rabbits in social isolation can display physiological symptoms of stress. Individual housing, especially in cages with solid walls (social solution) is against the welfare, but in case of wire net walls the neighbouring animals give a limited visual social contact, possibly improving welfare.

Several experiments were carried out to investigate the behaviour of growing rabbits depending on the group size. Some of the results are summarized in Table 1. In larger groups rabbits rested less and they were more active. They spent more time for movement, investigatory, social and aggressive behaviour but the frequency of ingestion was lower.

Table 1 – Effect of group size on behaviour of growing rabbits.

Behavioural patterns, %	Number of rabbits/cage or pen						
	Lambertini *et al.* (2001)*			Dal Bosco *et al.* (2002)**		Princz *et al.* (2008a)	
	2	15	30	2	10	2	13
Resting	74.9^{a}	65.7^{b}	68.4^{b}	60	54	66,9^{a}	58.0^{b}
Movement	1.2^{c}	2.4^{b}	4.8^{a}	13^{b}	16^{a}	3.8^{b}	6.7^{a}
Eating	7.7^{a}	7.8^{a}	5.0^{b}	16^{a}	11^{b}	9.5	10.5
Drinking						1.6^{b}	2.1^{a}
Comfort				7^{b}	9^{a}	14.9	14.6
Investigatory	0.5^{b}	3.7^{a}	2.8^{a}			2.2^{b}	3.5^{a}
Social				4^{b}	10^{a}	1.2^{b}	4.4^{a}
Aggressive	0.2^{c}	1.7^{a}	0.8^{b}			0.01^{b}	0.014^{a}

* Observations were made between 8:00 and 24:00

** Ingestion = eating and drinking

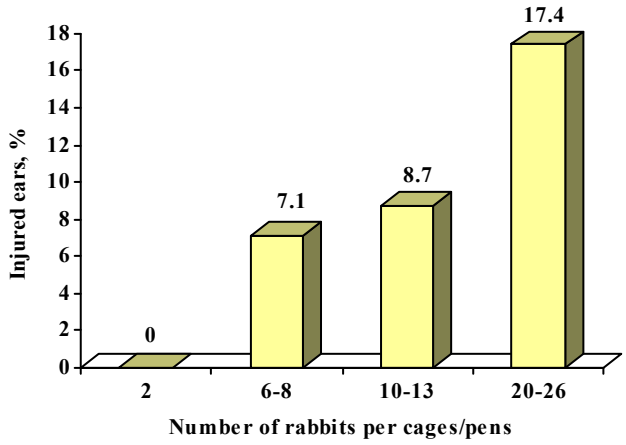
Aggressive behaviour

One of the main problems of housing rabbits in large group is the aggressive behaviour. At the beginning of sexual maturity, aggressive conflicts may occur causing less or more serious injuries on different parts of the body.

In the experiment of Szendrő *et al.* (2009b), the rate of ear lesions was 3.5, 6.1 and 10.4% at the ages of 9, 10 and 11 weeks, resp. Rommers and Meijerhof (1998) observed 6-16 and 20-41% of skin injures at the age of 73 and 80d, resp. Because of the increasing number of injuries they suggest to slaughter the rabbits at 80d at least. Princz *et al.* (2009) also found a close correlation between the group size and injured rabbits (Figure 1).

We have to line out that the percentage of aggressive rabbits could be independent of group size. The reason of increasing frequencies of injuries with increasing group size is that in larger groups an aggressive animal can injure more counterparts than in smaller groups. This phenomenon is definitely against animal welfare aspect.

Figure 1 – Effect of group size on ear lesions (aggressiveness) (Princz *et al.*, 2009).



Summarizing the benefits, the rabbits in larger cage or pen can move more, the possibility for social interactions is higher. However, we can count more serious costs: first of all the aggressive behaviour (injuries) and the probability of infection (diseases, mortality) is higher. Suffering from illness, the pain of injuries and mortality are totally against the welfare. Large groups have some disadvantages, but the too small groups (cages) indicate limited place; thus the best solution may be housing 4-5 rabbits, maximum a litter (littermates) in a cage.

Stocking density

The intensity of animal production is partly depending on the stocking density (how many animals are in one cage, in a building, etc.).

Productive traits

Several researchers examined the effect of stocking density on the productive performance and on the carcass traits (Coulmin *et al.,* 1982; Maertens and Dee Groote, 1984, 1985; Aubret and Duparray, 1992; Xiccato *et al.,* 1999; Verga *et al.,* 2004; Trocino *et al.,* 2004, 2008; Princz *et al.,* 2008a; Szendrő *et al.,* 2009b). When the

stocking density was higher than the recommended (16-18 rabbits/m^2), daily weight gain, final body weight and feed intake declined. When the stocking density was lower, only an random fluctuation was observed. There is no clear connection between the stocking density and mortality. Examining the dressing out percentage, a slight increase was observed when the stocking density was higher than recommended. An opposite tendency was seen in groups of lower density, but the difference was significant only in one case.

Maertens and De Groote (1985) and Aubret and Duperray (1992) demonstrated that not the animals/m^2, but the total weight of animals/m^2 induce the lower feed intake and weight gain if the density is higher than optimal. When the total weight of rabbits per m^2 was higher than 40-45 kg, the daily weight gain declined.

According to a preference test the young kits like huddling together, the stocking density can achieve 50-70 kits/m^2. The number of rabbits per cage at younger ages can be double than by the normal case (Samoggia *et al.*, 1988; Matics *et al.* 2004; Rashwan *et al.*, 2007).

Behaviour

Morisse and Maurice (1996) compared the behaviour of growing rabbits depending on the stocking density. The behaviour of young rabbits (at 7wk) was only slightly affected by the stocking density. At the age of 10wk, resting was the highest and the eating (+drinking) was the lowest in the group of 23 rabbits (57.5 kg)/m^2 (Table 2). Social interactions and locomotory activities were reduced and the comfort was increased above 15 rabbits (38kg)/m^2. Based on the results of the observation, they established that 40 kg/m^2 could be considered as an acceptable threshold in terms of animal welfare.

Trocino *et al.* (2004) compared densities of 12.1 and 16 rabbits/m^2 and they did not observe any significant difference between the behaviour (resting, moving, eating, self-grooming) of growing rabbits. The experiment verified that the stocking density under 16 rabbits/m^2 does not provide any positive effect on the behaviour.

Table 2 – Effect of stocking density on behavioural patterns of growing rabbits (Morisse and Maurice, 1996).

Behavioural patterns, %	Stocking density (rabbits/m^2)			
	15.5	17.8	20.4	23.0
	Stocking density (kg/m^2)			
	38.2	44.5	51.0	57.5
Resting	57.3^{a}	58.1^{a}	57.9^{a}	61.6^{b}
Feeding-drinking	10.6^{ab}	10.1^{ab}	11.1^{b}	8.7^{a}
Comfort	21.8^{a}	24.5^{b}	23.2^{ab}	23.4^{ab}
Investigatory	1.2^{a}	1.9^{b}	1.7^{b}	1.4^{ab}
Social	5.8^{b}	3.4^{ab}	4.0^{b}	2.8^{a}
Agonistic	2.4	0.2	1.4	0.6
Locomotory	3.0^{b}	1.8^{a}	2.0^{ab}	2.1^{ab}

Floor

There is a very close correlation between the floor type and wellbeing of rabbits, as they stay and move on it, so that is one of the most important factors determining animal welfare (Verga *et al.*, 2006; Szendrő and Luzi, 2006).

Deep litter

Some recommendations of organic production systems suggest rearing rabbits on deep litter, to offer a more comfortable floor for the animals.

Productive traits

The differences between wire net caged and deep litter penned rabbits are larger than in the experiments comparing group sizes on wire net (Dal Bosco *et al.*, 2000; Lambertini *et al.*, 2001; Metgzer *et al.*, 2003; Trocino *et al.*, 2008). Dal Bosco *et al.* (2002) examined the effect of floor types (wire net and deep litter). In the straw bedded group the weight gain, body weight and feed intake declined by 1.8 g/d, 89g and 12g/d, resp. The mortality of growing rabbits was higher (9.8 vs. 13.2%) and the dressing out percentage lower (59.4 vs. 58.3%). These results shows not only the larger group but also the deep litter had a negative effect on most of the performance traits.

Kustos *et al.* (2003) inserted the straw litter into the pens for different periods after weaning. The pellet intake and daily weight gain declined at the time when the straw was put into the pen. Jekkel *et al.* (2008), in a similar experiment on the behaviour of growing rabbits, observed a high straw consumption after placing straw litter into the pens.

One of the highest problem with deep litter is the risk of coccidiosis, which causes a worse health condition, higher mortality and lower productivity. The first points of the welfare criteria are the mortality, morbidity and diseases (Hoy and Verga, 2007). In the experiments of Dal Bosco *et al.* (2000, 2002), the mortality of deep litter groups was 5.8 and 3.8 times higher than in cages with wire net.

Among the carcass traits, dressing out percentage, fore part of the carcass, meat-to-bone ratio and the amount of fat deposits decreased because of the higher activity, lower pellet consumption and weaker health conditions. At the same time, in connection with the higher locomotive activity, the ratio of hind part to the carcass was higher.

Behaviour

In the experiment of Morisse *et al.* (1999) half of the pens' floor (1.6m^2) was wire net and the other half was covered with straw. Overall, 89% and 77% of rabbits were observed on the wire-net floor at the age of 7 and 10wk, resp.

The free choice of rabbits between deep litter and wire net floor was also investigated by Orova *et al.* (2004). Independently of age (between ages of 5 and 10wk) and of stocking density (8, 12 or 16 animals/m^2), 82-86% of rabbits were found on the wire net floor.

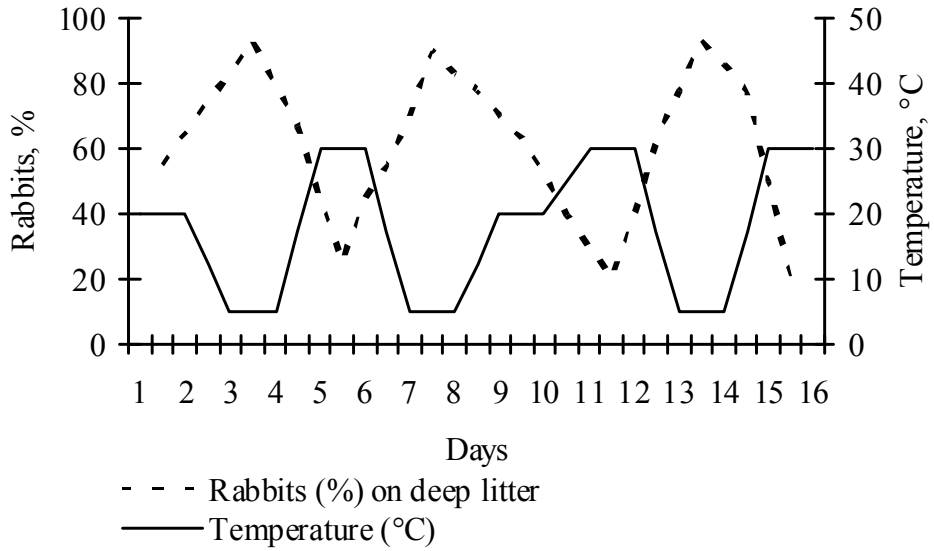
The ultimate answer for the preferences was given by Bessei *et al.* (2002). The rabbits had free choice between deep litter (wood shavings) and floor of perforated plastic in a climatic chamber, where the ambient temperature was fluctuated between 5

and 30°C. Figure 2 shows the preference of rabbits between the two floor types changed. Preference changed towards perforated plastic floor when the temperature was above 20°C, and rabbits choose the deep litter when the temperature was lower. The body of rabbits is covered by fur. They hardly loose metabolic heat when the temperature is higher than the optimum.

Growing rabbits do not prefer to stay on deep litter at ambient temperatures above 15-18°C. The minimum temperature in rabbitries in Europe is not below 15-16°C during winter time, but it can be much higher in summer. Thus, deep litter is discomfortable for growing rabbits under common condition.

It can be concluded that deep litter on normal temperature is against the welfare, as the risk of mortality and diseases, the preference of growing rabbits is against deep litter and the nutrient supply of rabbits is under the requirements. Deep litter is not good from economical aspect as well, since rabbits grow slowly, they reach the slaughter weigh later and their carcass value is lower.

Figure 2 – Preference of growing rabbits between deep litter (wood shavings) and perforated plastic floor (Bessei *et al.*, 2002).



Wire net floor

In intensive farming systems growing rabbits are housed in cages with wire net floor.

Productive traits

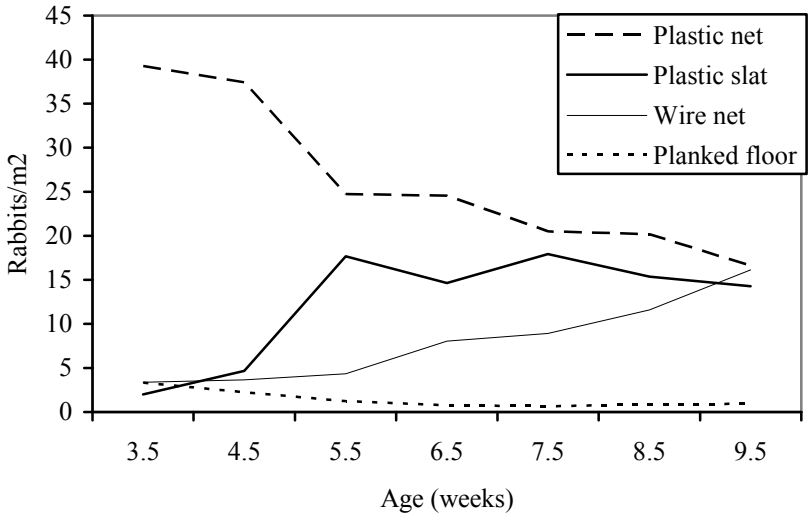
Comparing of different floor types (wire net, steel slat and plastic slat, Trocino *et al.* (2008), wire net and steel slat, Trocino *et al.* (2004), wire net and plastic net, Princz *et al.* (2009), Dalle Zotte *et al.* (2009), in most of the cases authors have not found any significant difference in productive and carcass traits. Significant difference was detected only once, in feed efficiency (better by wire net, Trocino *et al.*, 2004), in dressing out percentage (better on wire net, Trocino *et al.*, 2008), in separable fat (higher on wire net, Trocino *et al.*, 2008), in percentage of head and fore part (higher on plastic net, Dalle Zotte *et al.*, 2009).

Behaviour

Behavioural pattern data showed no differences by rabbits on different floor types (Trocino *et al.*, 2004; Princz *et al.*, 2008a).

Matics *et al.* (2003) observed the preference of rabbits among cages with different floor types. They only differed in the floor type: planked by Oriented Strand Board (OSB) panel (solid floor), plastic slat, plastic net or wire net. The animals could move freely among the cages, through swing doors. The soiled and wet (by urine) planked floor was chosen by fewer and fewer rabbits after the first week. The plastic net floor was the most preferred. With the increase of age, the choice of plastic mesh, plastic slat and wire net floor became similar. Rearing 16 rabbits/m^2, the choice of the three preferred floor types became similar at 7.5wk of age, while rearing 12 rabbits/m^2 it became similar only at 9.5wk of age (Figure 3). The increase in weight of rabbits on 1m^2 could be the main factor to accept a less preferred floor.

Figure 3 – Free choice of rabbits among different cage floor types (12 rabbits/m^2) Matics *et al.* (2003).



It seems that growing rabbits prefer to stay on plastic net floor, although they accept a less preferable wire net or plastic slat floor instead of living at a higher stocking density. The results of Orova *et al.* (2004) showed a high preference of wire net, as compared to deep litter, independently of age or stocking density. In case of 16 rabbits/m^2 , the average number of rabbits was 23-24 per m^2 on wire net and only 4-5 on deep litter.

It can be concluded that wire net floor cannot be considered as an uncomfortable environment and it is not necessarily true that this floor type compromises the welfare of rabbits. Based on these results we can establish a preference order:

deep litter (least preferred) < high socking density < plastic slat = wire net floor < plastic net floor (most preferred).

Combination of deep litter with wire net

In spite of the fact that deep litter is inadequate to the welfare of rabbits, consumers believe that it is the best condition for wellbeing. To satisfy the rabbits' and consumers' demands, some combinations of deep litter and wire net floor were also studied.

Half and half deep litter and wire net

In case of halving the floor of pens for deep litter and wire net, animals do not obtain any benefits. According to the results of Morisse *et al.* (1999) and Orova *et al.* (2004), most of the rabbits stayed on the wire net with high stocking density, which is against the wellbeing. They consumed straw and their daily weight gain and body weight were lower with 4.5 g/d, 205 g, respectively, as compared to the group reared on wire net. At the same time the risk of coccidiosis contamination is high after weaning, at the most sensitive period of the rabbit life, which is against the welfare.

Change of wire net to deep litter some weeks after weaning

Weaning rabbits on wire net and placing deep (straw) litter some weeks later into the pen could be a good solution to meet costumer demands and rabbit welfare.

As it was showed by Kustos *et al.*, (2003) and Jekkel *et al.* (2008), rabbits began to consume litter material immediately when it was put into the pen. From this point on the pellet intake and, as a consequence, the body weight gain decreased (Kustos *et al.*, 2003). Daily weight gain decreased depending on the time (age) when the litter was put into the pens. This method is used in France, named Label Rouge, under very strict control.

In another experiment, growing rabbits were housed in cage (2 rabbits/cage) in flat-deck pen (16 or 11 rabbits/m^2) or in pens with a second level (platform: wire net or straw litter on it), at a stocking density of 11 animals/m^2 (Szendrő *et al.*, 2009a). The feed intake (149, 144, 137 and 133 g/d, resp., NS), weight gain (43.0, 39.2, 40.8, 40.2 and 38.5, resp., $P<0.05$) and body weight at 11wk (2786, 2641, 2710, 2681 and 2602 g, resp., $P<0.05$) were different among groups. The dressing out percentage was not affected, while significant differences were observed in the mid and hind parts of carcass and in percentage of perirenal fat. It has to be underlined that the significant differences in productive and carcass traits were only observed between cage and pen. In spite of the fact that the results in group of platform with deep litter were lower, they were not significantly different from those in the other pen types.

One of the advantages using a mobile platform with deep litter is that it may be cleaned (litter change) more easily than in flat-deck pens. On the other hand the rabbits have a free opportunity to jump up and to stay on it, though only a few of them choose it (less litter consumption, lower risk of coccidiosis contamination).

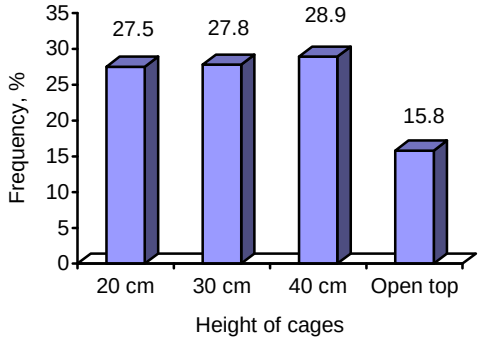
Cage height

One of the most important alertness behaviour of European wild rabbits during grazing is the “upright alert position”. This is the basic behaviour to notice any predators in time. Jensen (2002) pointed out that if the environment does not elicit a

certain behaviour, the lack of this behaviour does not cause a problem for animal welfare. In case of indoor housing there are no predators.

In contrast to some recommendations it seems that growing rabbits have a low preference towards open top cages (Figure 4). Being a prey animal, the European wild rabbit feels protection in burrows. Staying outside is more dangerous because of the risk of predator.

Figure 4 – Rabbits' choice among cages, depending on their height (Princz *et al.*, 2008b).



Comparing the groups of growing rabbits housed in pens with height 20, 30, 40cm or in open top pens, no differences were found in the productive performances, while the proportions of injured rabbits were 20.5, 5.1, 10.3 and 10.3%, resp. (Princz *et al.*, 2008b). The higher percentage of aggressiveness in the lowest pen could be possibly connected with the activity. Rabbits had to move about 50-70m daily between the feeders and drinkers (1.8m distance), which may cause stress.

Based on the the experimental results it can be concluded that the generally used 30-35 cm high cages are suitable for the welfare of growing rabbits.

Environmental enrichment

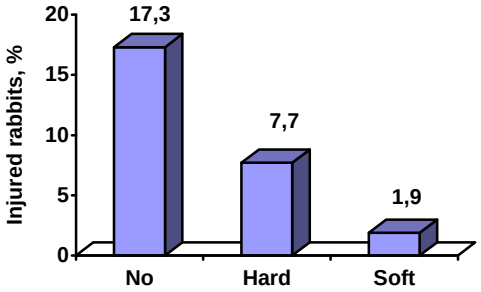
According to the description of Van de Weerden and Day (2009), the environmental enrichment is the modification of barren captive-environment to improve the biological function of animal. Hay or grass are good objects to enrich the cages and to improve the welfare. In contrast, Maertens and Van Oeckel (2001) pointed out that large losses of straw and the corresponding problems with the evacuation of the droppings, a wooden stick seems to be more convenient to combine the needs of gnawing material and optimal hygienic conditions.

The gnawing stick as enrichment in the cages influenced the productive performance or the carcass traits only in a few cases (Maertens and Van Oeckel, 2001; Luzi *et al.,* 2003a/b; Maertens *et al.,* 2004; Verga *et al.,* 2004; Princz *et al.,* 2007, 2008a; Jordan *et al.,* 2008; Rizzi and Chiericato, 2008).

Using gnawing sticks, their material, size and position in the cages are very important factors. The sticks or other materials can be a toy which could be good as enrichment. But they could be more effective if the rabbits can gnaw and consume the easily. If they are thin enough (e.g. 3cm) and are fixed on the wall at the height where the animals heads are, rabbits can reach and gnaw them more easily than in cases when they are hanged from the top of cages and are too thick for gnawing.

One of the main factors of wood species is its hardness. Rabbits prefer most of the soft wood types and reject the hard ones. Princz *et al.* (2008a) compared three groups (no gnawing stick, White locust /hard/ or Little-leaf linden /soft/ sticks), examining the welfare of growing rabbits. The rate of injured rabbits at 11 wk of age was high in cages without gnawing sticks. White locust sticks reduced the results of aggressive behaviour. The soft gnawing stick (Little-leaf linden) is recommended especially for group housing conditions (Figure 5).

Figure 5 – Effect of gnawing sticks (no, hard, soft) on the incidence of ear lesions (Princz *et al.*, 2008a).



Gnawing stick application, in addition to aggressiveness, affects some of the behavioural patterns. Most authors (Johnson *et al.*, 2003; Jordan *et al.*, 2003; Luzi *et al.*, 2003; Verga *et al.*, 2004) agree that in enriched cages the frequency of abnormal (stereotype) behaviour forms of rabbits is lower. Using wooden sticks, the environment is enriched and animals can gnaw them, which is an species-specific behaviour, and they perform a wider range of behaviours in the ethogram (Stauffacher, 1992; Verga, 2000; Jordan *et al.*, 2006).

CONCLUSIONS

Consumers have an increasing attention towards the animal welfare, but their knowledge about the wellbeing under different conditions is limited. Most of them have no direct connection with agriculture, and within this, animal husbandry. Sometimes they think that factors good for the people will also be comfortable for animals. They think that a good practice in the backyard or at a small farm may be also suitable for large farms. Moreover, they think that the natural environment where European wild rabbits live is one of the best and we have to cope some parts of these conditions at intensive farms. To mention only one point, 90-99% of European rabbits die before reaching the one year old age. At the same time the owners and leaders of butcheries, supermarkets and these network follow the idea of consumers. We (scientists, farmers and other people working in the field of rabbit business) have to do everything to inform customers, dealers, traders and shopkeepers about the best (housing) conditions for rabbits, and to clearly demonstrate that some of their ideas are wrong.

The basic question is: what is good for the animals (rabbits), which are the best housing systems, which are suitable for wellbeing, which are advantages for rabbits.

European wild rabbits in the nature can balance among the benefits and the costs. Scientists have to find such housing conditions for rabbits in farms which gives the best solution between its pros and cons. Preference tests are one of the best methods to ask rabbits about their welfare, among different conditions.

We can learn a lot about European wild rabbits. But it is not enough to know their warren systems, territories, social life, habits etc. The main question is why they choose something. Which is good in a given situation (depending on the predation risk, vegetation, quality of soil, etc.) the same could be against to the animal welfare under farm conditions.

Some of the main conclusions of this paper are:

- Housing growing rabbits in large groups has more disadvantages (lesions on the body and stress caused by aggressive behaviour, higher risk of diseases because of the contamination) than advantages (social behaviour, larger moving area). The best solution could be 4-5 rabbits (maximum a litter) per cage/pen.
- Housing growing rabbits on deep litter has several disadvantages (high risk of coccidiosis and mortality, it is less comfortable than wire net (heat loss), from an economic point of view – lower productivity (lower weight gain → longer growing period, lower carcass traits).
- Housing rabbits at less than 16 rabbits/m^2 (40 kg rabbits/m^2) does not provide a better welfare and higher productive performance and carcass traits.
- Open top cage/pen is against the welfare (rabbits feel less safe). The 30-35 cm height cages are suitable for growing rabbits without any adverse effects on welfare.
- Wire net floor does not affect the behaviour, productive performance and carcass traits of growing rabbits negatively. But the results of preference tests show that it is necessary to search for other design (shape of holes, thickness of wire) of wire net to find a more comfortable type for rabbits.
- Gnawing sticks made of soft wood (Little leaf linden) with 3 cm diameter and fixed on the cage wall are one of the best enrichment in the cages to decline the injures on body caused by aggressiveness.

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