

TECHNICAL NOTE: PLASTIC MATS PREVENT FOOTPAD INJURIES IN RABBIT DOES

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ABSTRACT: In the Netherlands, welfare regulations indicate that rabbits should be housed on 3 mm wire floors. In a pilot study, 3 mm wire floors did not decrease footpad injuries as expected, whereas a plastic mat fixed to the 3 mm wire did improve footpad quality. However, more data were necessary to support this finding. To this end, footpad injuries were studied in does housed on 3 mm wire floors (NOMAT) and 3 mm wire floors with a plastic mat (MAT) on 5 rabbit farms. On each farm, 25 cages were used for each floor type and footpad quality was measured during 5 successive reproductive cycles. Footpad quality was scored once every production cycle of 42 or 49 d, using a scale from 0 (=intact footpads) to 4 (=wounds). The total number of does in the experiment declined at later parity, due to relocation within the farm and mortality. The percentage of does with intact footpads on NOMAT declined from 96.4 to 13.3% from the 1st to the 5th parity, respectively. On MAT, 81.3% of the does still had intact footpads at the 5th parity. Results indicated that on NOMAT footpads became injured after the 2nd parity, with a negative effect on the welfare of the does. The average footpad score was significantly lower for the does on MAT as compared to the does on NOMAT (average scores±standard deviation were 0.17±0.43 and 0.32±0.54, respectively; $P<0.05$). Fewer injuries were observed on MAT. Thus, plastic mats have a positive effect on prevention of footpad injuries.

Key Words: footpad injuries, floor type, welfare, rabbit does.

INTRODUCTION

Footpad injuries are commonly observed in commercial rabbit production (EFSA, 2005; Rosell and de la Fuente, 2004). A survey conducted in 1993 including 40 commercial farms in the Netherlands showed that 25% of these farms replaced does due to footpad injuries (Rommers and Meijerhof, 1996). A field survey on 130 commercial doe farms in Spain revealed that on average 0.3% of the culled does were removed because of footpad injuries, with a maximum of 2.2% (Rosell and de la Fuente, 2009). Footpad injuries may cause pain and infections by micro organisms and will finally result in culling of the doe. Footpad injuries have a clear negative effect on rabbit welfare and economic costs. Different factors might have an effect on the occurrence of footpad injuries, such as the rabbit breed (Rosell and de la Fuente, 2004), body weight (Drescher and Schlender-Bobbis, 1996), climate on the farm, hygiene (Lebas *et al.*, 1986), and floor type (Rommers and Meijerhof, 1996). It has been suggested that floor type is the key factor for the occurrence of footpad injuries in rabbits (Drescher and Schlender-Bobbis, 1996), and alternatives to wire-mesh flooring were developed several years ago. Although footpad injuries were reduced

on these alternative floors, the alternatives were not useful in practice because of dirtiness and/or rabbits gnawing on the alternative floor (Rommers and Meijerhof, 1996). However, there are indications that the use of a plastic mat on commercial farms reduces the prevalence of footpad injuries (Rosell and de la Fuente, 2004).

In the Netherlands, welfare regulations for commercial rabbit farms have been in force since 2006 (PVE, 2006). Concerning the floor of the cages, the wire size should be increased from about 2 to 3 mm, and the space between the wires should be between 10 to 16 mm. In a pilot study, in which the 'old' 2 mm wire was compared with the 'new' 3 mm wire floor, it was concluded that the 3 mm wire floor did not reduce footpad injuries. However, a plastic mat (25×40 cm) fixed to the 3 mm wire floor improved footpad quality (de Jong *et al.*, 2008). As the plastic mats were only tested on one farm, a new experiment was proposed in which more farms were included.

The aim of this study was to compare footpad injuries in rabbit does housed on 3 mm wire floors, or 3 mm wire floors with plastic mats on 5 commercial farms.

MATERIALS AND METHODS

Animals and experimental design.

The study was performed from January until October 2008. Five commercial rabbit farms in the Netherlands participated in the study, using 25 cages with 3 mm wire floors (NOMAT) and 25 cages with 3 mm wire floors with a plastic mat (MAT) on each farm. The experiment started on the 1st farm at the end of January 2008, whereas the last farm trial started in mid-April 2008. Two farms were located in the North East of The Netherlands, the other three farms in the South of the Netherlands and the number of does per farm ranged from 500 to 1100 does.

At the beginning of the experiment, on each farm 25 primiparous crossbred does (approx. 4-4.5 kg bodyweight) were selected per floor type for the experiment. Does were housed on one of the 2 floor types and were not moved to other cages until they were excluded from the experiment due to their relocation within the farm (reasons for relocation are for example a doe not pregnant after 1st insemination, or low production performance), disease or mortality. All producers worked with 2 or more batches, where does not pregnant after 1st insemination were transferred to another group. To avoid mistakes, non-pregnant does transferred to another batch were excluded from the experiment. During the experiment, all excluded does were replaced by pregnant nulliparous does, mated between 17 and 19 wk of age (depending on the farm). All nulliparous does were housed during rearing on a 2.45 mm wire floor without plastic mat.

At the start of the experiment, all cages were used for at least 6 mo. This implies that the wire floor surface was smooth. Farmers were asked not to treat footpad injuries. Footpads of all does were scored once per cycle (in the 1st wk after kindling), during all reproduction cycles (reproduction rhythm of 42 or 49 d) according to the method described below. The new (pregnant nulliparous) does that were introduced during the experiment were observed as long as the experiment lasted. Thus, if nulliparous does started for example in the 3rd production cycle, they were only observed until the 5th cycle.

Footpad scores.

Footpads were scored according to Rommers and Meijerhof (1996). The different scores are shown in Figure 1. For each doe, both footpads were inspected and the worst score was noted.

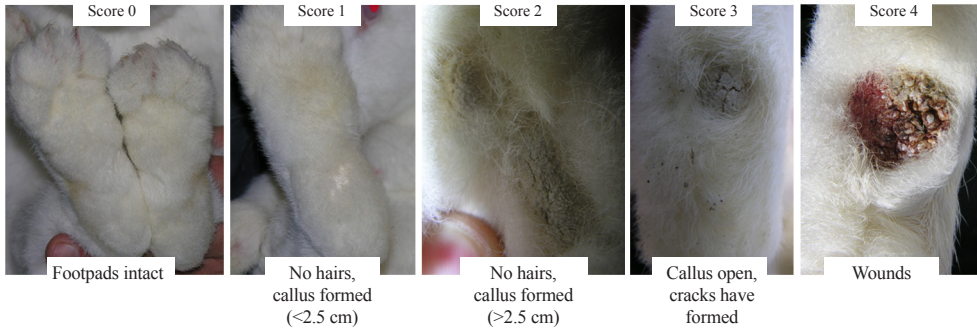


Figure 1: Footpad scoring according to Rommers and Meijerhof (1996).

Together with the scoring of the footpads, it was recorded if the plastic mats were damaged by gnawing and for all cages it was scored if the wire floors were clean or dirty. Does with footpad score 4 were removed for welfare motives. All observations were performed by the same person.

Statistical Analysis

The footpad scores were analysed using the following 3 classes: 0= intact footpads, 1= footpads with callus and ≤ 2 and 2= footpads with callus >2 cm, cracks or wounds, as the number of observations with score >2 was too limited (n=13) for proper analyses. Footpad scores were analysed for NOMAT and MAT using Proc Logistic procedure of SAS (1990; SAS, Inc., Cary, NC, USA) with farm, parity number, floor type and the interaction between parity number and floor type as main factors. Differences in the number of does per parity were tested using the Proc Life test procedure from SAS.

RESULTS AND DISCUSSION

Figure 2 shows the total number of does during the experiment on NOMAT and on MAT for the 5 production cycles; starting with the nulliparous does (parity number 0). Because non-pregnant does were excluded from the experiment after 1st insemination, the number of does in the experiment declined rapidly at later parities. However, there is no significant difference in decline in the number of does over the parities between MAT and NOMAT.

Table 1 shows the results for the different floor types per parity averaged for the 5 farms for NOMAT and MAT, respectively. There were differences between farms ($P<0.0001$), parity numbers ($P<0.0001$) and floor types ($P=0.033$). Some farms had higher scores at earlier parities than others, which can

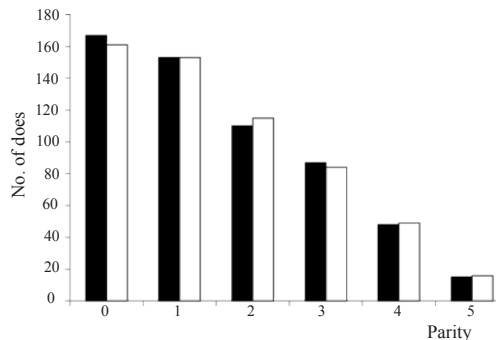


Figure 2: Number of does per parity on the 3 mm wire floors, without (■) and with (□) plastic mats, scored in 5 reproduction cycles with 25 cages per floor type at 5 commercial rabbit farms in the Netherlands (parity 0 are nulliparous does).

probably be explained by management differences between individual farmers. An interaction was found for parity number and floor type ($P=0.003$); the footpad scores on the wire floors increased more rapidly than on the wire floors with plastic mat. In parity 4, the footpad score of MAT is higher (0.43) than in the other parities on MAT. Forty-three percent of the does on MAT in parity 4 had footpad score 1, whereas in the other parities less than 20% of the does on MAT had a footpad score >0 . No specific explanation can be given for this.

As shown in Table 1, footpad scores became more severe at older ages. Although it was started with primiparous (at the beginning of the experiment) and nulliparous does (during the experiment), sometimes does even started with a callus (3.2% of the does). On the NOMAT, intact footpads were observed in 85% of the does during the second parity and this declined to 13% in the 5th parity. After the 2nd parity, footpad scores increased, which means that the percentage of does with injured footpads increased and their welfare was impaired.

On the MAT, footpad condition was much better. In the 5th parity, 81.3% of the does still had intact footpads. On all 5 farms, footpad scores for the wire floor with plastic mat were significantly ($P=0.033$) lower as compared to footpad scores for the wire floors without plastic mats, although the severity of footpad injuries differed between individual farms. The average score \pm standard deviation, for all observations performed, was 0.32 ± 0.54 and 0.17 ± 0.43 for NOMAT and MAT, respectively. The total number of does that were removed in the experiment due to injured footpads was low. In total of the 5 cycles, 4 does and 1 doe were removed with score 4 for NOMAT and MAT, respectively. The majority of does had been excluded from the experiment because they were not pregnant and for that reason were removed to another location in the house.

In the course of the 5 cycles surveyed on 5 farms, NOMAT and MAT cages were not dirty. In total, 3.4 and 2.4% of the wire floors (for NOMAT and MAT, respectively) had some manure adhering to the wire or plastic mats. In only a few cases (2 and 1 floors for NOMAT and MAT, respectively), manure had blocked the holes of the wire or mats for only a small area ($<5\%$) of the total floor space.

On the MAT hardly any damage was observed to the mats. In total, 1% of the mats had some teeth marks, due to gnawing on the plastic material.

It was expected that footpads would be better on MAT as compared to NOMAT floors. The results of this experiment support this hypothesis. Thus, plastic mats are a relative simple and cheap measure to improve rabbit welfare. In the present experiment, fewer cracks and wounds

Table 1: Average footpad scores per parity \pm standard deviation for does housed on 3 mm wire or on 3 mm wire with plastic mat ($P=0.033$) scored in 5 reproduction cycles with 25 cages per floor type at 5 commercial rabbit farms in the Netherlands (Parity 0 are nulliparous does).

Parity	No. of does	Wire floor	No. of does	Wire floor with plastic mat
0	161	0.04 ± 0.23	167	0.04 ± 0.19
1	153	0.14 ± 0.46	153	0.16 ± 0.38
2	110	0.40 ± 0.61	115	0.27 ± 0.54
3	87	0.68 ± 0.59^a	84	0.20 ± 0.46^b
4	48	0.75 ± 0.60^a	49	0.43 ± 0.50^b
5	15	1.13 ± 0.64^a	16	0.19 ± 0.40^b
Average		0.32 ± 0.54^a		0.17 ± 0.43^b

^{ab} Differences between the treatments within a parity ($P < 0.05$).

were observed on the 3 mm wire floor as compared to the pilot study (de Jong *et al.*, 2008). This may be due to the fact that new 3 mm wire floors had a rough surface at the outset, which was the case in the pilot study, whereas in this second experiment the wire floors were more worn and had smoother surfaces.

The results of the NOMAT indicate that does might have decreased welfare after 2 parities, when footpad injuries became more common (34% of the does had footpad score ≥ 1 in the 3rd parity). According to Drescher and Schlender-Böbbis (1996) welfare is decreased when calluses are present on the footpads (score 1, 2, 3 in the present experiment). Although we are not completely sure that does with score 1 suffer from pain and thus have a decreased welfare, footpads with calluses indicate a risk for higher footpad scores (open calluses, cracks, wounds) and thus indicate a risk for rabbit health. It may be clear that footpads with scores 4 cause pain and decrease welfare.

CONCLUSION

This experiment indicates that footpad injuries decreased on 3 mm wire floors with plastic mat as compared with 3 mm wire floors without a mat. Plastic mats thus prevent footpad injuries in rabbit does.

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