EasyFix™ Rubber Products

EasyFix™ Slat Rubber System

DLG-Test report 5603

DLG SIGNUM TEST 06/06 passed

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Short description

- black profiled slat rubber mats
  18 to 22 mm thickness, with rippled wedges/studs underneath
  (height approx. 50 mm, length approx. 45 mm, width approx. 35 mm);
- with integrated sloping profile on the surface
  (height of the middle of the surface is 22 mm and at the gap 18 mm);
- surface with a diamond-shaped pattern;
- bottom side without any profile;
- fitted as single mats.

(Technical data: see page 6)

German Agricultural-
Society e.V. (incorporated society)
DLG Test Centre

Assessment - summarised

Test criterions	Test result	Assessment value
Suitability	suitable as contact single or double slat surface for cattle stables	
Technical criteria		
Resistance to wear and tear	**durability and ageing (test stand trials)**	
abrasion test	good wear resistance	+
continuous tread load	no lasting deformation	++
surface	no appreciable wear	+
bottom side	no appreciable wear	+
acid test	no alterations to the surface	+
Measurements adherence	no noteworthy changes in length or width	+
deformations	none	++
Handling, laying		
D.I.Y. laying	simple	+
fixation	stable and reliable	+
installation instructions	short and comprehensible	o
Surface cleanability		
soiling	gaps	o
	stepping surfaces	o
cleaning	no problems	+
high pressure cleaner	10 cm minimum clearance when using a flat jet nozzle	+
	30 cm clearance when using a rotary dirt turbo nozzle	+
warranty and recycling	5 years with linear depreciation	
	mats are taken back by manufacturer	+
Animal related criteria		
Behavioural observations		
movement behaviour	increased activity	+
comfort and heat behaviour	pronounced	+
Slip resistance		
slip resistance during slide pulling tests	good	+
foothold	good	+
Claw appraisal		
mechanical-traumatical findings	positive influence	+
shape of the hoof wall	standing over in more than 50% of claws	+
Deformability and elasticity		
in new state	2.25 mm, good	+
after continuous tread load	2.20 mm, good	+
Toxicological innocuousness		
	certified by the manufacturer	o

Evaluation range: ++/+/ o /-/-- (o= standard)

Test results

I. Suitability

The EasyFix™ Slat Rubber System is suitable as surface covering for gap floors consisting of single or twin slat beam elements or large units up to 1.10 m width in cattle stables.

II. Technical criteria

Wear resistance, durability and ageing
In a standardised abrasion test during which the surface was grinded with an emery cloth (granulation 280) and a grinding pressure of 500 N (= 8,1 N/cm^2 surface pressure), the abrasion depth after 10,000 double strokes amounted to 0.8 mm, this corresponds to approximately 4% of the mat thickness. Of the ground surface (61,5 cm^2) 1.8 grams were rubbed off. The minor abrasion depth and the slight grit implicate a good wear resistance of the mats. After continuous stepping strain on a test stand using a steel hoof (footprint 75cm^2) and after 250,000 alternating loads at 5,000 N (corresponds with approximately 500 kg) no noteworthy abrasion (surface and bottom) and no damage to the rubber slats was detected. No lasting deformation was observed. An acidic test in the style of DIN 51 958 using lactic acid showed no alterations, neither signs of swelling or softening or destruction of the mats.

Measurement adherence
During the test period no noteworthy change in length or width was observed over the period of the practice test subject to correct installation. No deformations took place.

Handling, laying
The handling and laying instructions are short and comprehensible. Condition for a smooth application of the EasyFix™ Slat Rubber System is that the slat rubber mat exactly fits the single or twin beam elements present in the stable. This requires taking the exact measurements of the slats installed (gap width, surface area). The supplier should take the necessary measurements. The laying of the mats can be done easily by D.I.Y.. After the mats have been laid onto the single or twin beams, the rippled wedges on the bottom of the mats are hammered into the underlying gaps. This fixation of the mats has proven to be stable and reliable.

Cleaning/soiling
Cleaning of the mats has shown to be no problem. During test stand trials using a high-pressure cleaner (approximately 145 bar during 1 minute) damages to the mats only occurred when the minimum clearance fell below 30 cm applying a rotary dirt turbo nozzle respectively 10 cm applying a flat jet nozzle. Moisture (urine and faeces) may accumulate underneath the mats. This can't be avoided. When cleaning and disinfecting the mats only those products should be used which the manufacturer has recommended. Before and after the installation of the mats the soiling of the surface area was tested. Per aisle the soiling of 16 gaps and 16 tread areas was assessed and documented by photographs. The soiling of the gap areas as well as the tread areas was evaluated. In addition the temperature of the environment and the relative humidity was measured. The evaluations were made in a period of 4 weeks before and after the installation during three different days. The assessment was made according to the evaluation schematic shown in table 1. The soiling of the gap and the tread areas did not increase after installing the EasyFix™ Slat Rubber System.

Table 1: Soiling evaluation schematic

Tread area (height of faeces layer > 1cm)	**Gap area**
1. Tread area at least 75% free	1. Gap at least 75% free
2. Tread area at least 50% free	2. Gap at least 50% free
3. Tread area at least 25% free	3. Gap at least 25% free
4. Tread area completely closed	4. Gap completely closed

Warranty and recycling
The manufacturer allows a warranty of five years with linear depreciation according to his warranty conditions. In case of absorption of charges the manufacturer takes the mats back subject to prior cleaning. A written accord of the manufacturer concerning the taking back of mats is on hand.

Table 2: Claw appraisal schematic

Appraisal of hoof wall	
Ü (1-3*)	hoof wall standing over
R (1-3*)	round wall
mechanical-traumatical findings	
DS	double sole
D	pressure point
R 6	laminitis (provoked by pressure stress)
RSG	abscess of the sole at typical pressure point of the hoof
KSG	abscess of the sole
WD	white line defect
LW	loose hoof wall
WL	lesion of hoof wall
rot	rotating claw (claw is being lifted at forefront by
	change in sinew
	1. cause at inner claw
	2. cause at outer claw
SD	defect at toes/forefront
infectious/other findings	
F	sepsis, 1. diffuse
	2. corrugation in V-form resp. layered
	3. exposure of the sciera *(lat.)* (←leather skin)
R	laminitis, 1-3 sub acute form
	4-5 chronic & chronically recurring (laminitis claw)
Z	inter-toe phlegmone (nail bed inflammation) / panaritium *(lat.)*
M	Mortellaro's disease / dermatitis digitalis *(lat.)* (severity grade 1-3)
Li	limax (tylome → inter-toe bulge)
VK	enlargement of claw, hind legs outer claw, frontlets inner claw
ZW	wound, inflamed occurrence of the inter-toe skin
* 1-3 describes the pro-rata length of the affected wall in thirds of the total length	

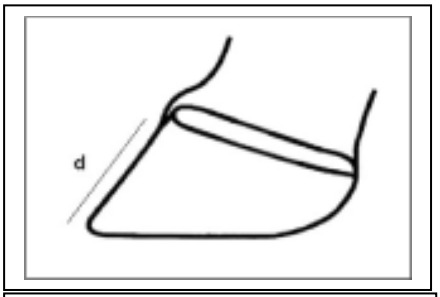
III. Animal related criteria

Behavioural observations
The observations concerning the behaviour took place in a test farm containing about 50 dairy cows of the "Deutsche Rotbunte" race kept in rest boxes.

Movement behaviour
After installing the mats the motional activity of the cows has increased significantly. The motion sequence is easy and relaxed. By direct observation of ten animals selected at random step lengths of 62 to 85 cm were observed whilst moving easily and evenly. The average step length had increased minimally in comparison with the animals in the farm used as a reference. Because of the increased motional activity slipping occurs without noticeable curtailing of animal behaviour. Posture of the head whilst moving was observed in twenty animals. A difference was made between high (angle between neck-withers-line and the prolonged back line smaller than 20°) and low (angle larger than 20°) position of the head. 70% of the animals observed showed a high and 30% a low position of the head. The high head position speaks for a secure and relaxed motion sequence.

Comfort and heat behaviour
During a period of one hour 10 active dairy cows were observed, which neither rested in their rest boxes nor fed at the troughs. 9 times a licking of the rear part was observed whilst the animals were standing securely on three legs. The heat behaviour was decidedly pronounced shown by numerous mounts. The mounting as well as the mounted dairy cows stood without slipping securely on the mats. After installing the mats on the test farm it was observed that individual animals were lying down in the aisle. In the case of not ideally arranged rest boxes the risk of animals lying in the aisle increases.

Claw appraisal
During the trial period on the test farm a claw care and appraisal was conducted three times on all cows. Only the cows (34 animals), which were subject to all three tests, were included in the analysis. The findings were recorded according to appraisal schematic (see Table 2). At the time of the first appraisal, which was conducted 2 weeks prior to the installation of the mats, the animals were kept on a concrete slat surface. Three months after the installation the second appraisal was conducted and a third one after a further six months. During the claw appraisal the dorsal wall length (see picture 3) was also measured.



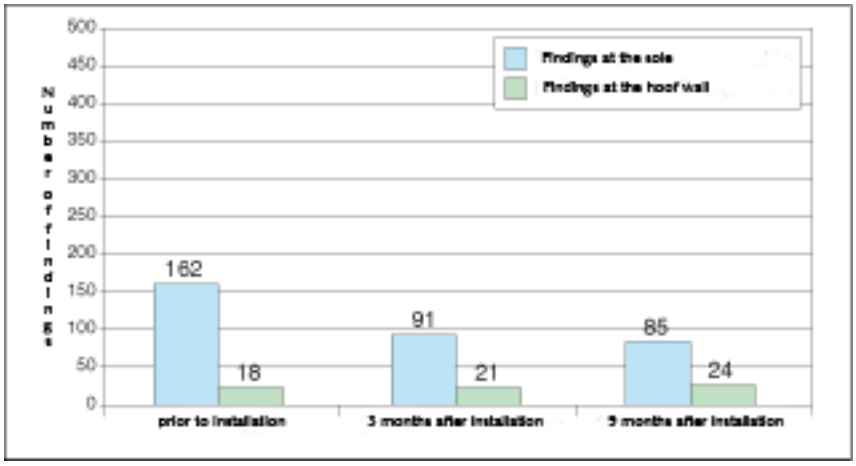
Picture 3: Dorsal hoof wall length

Claw findings

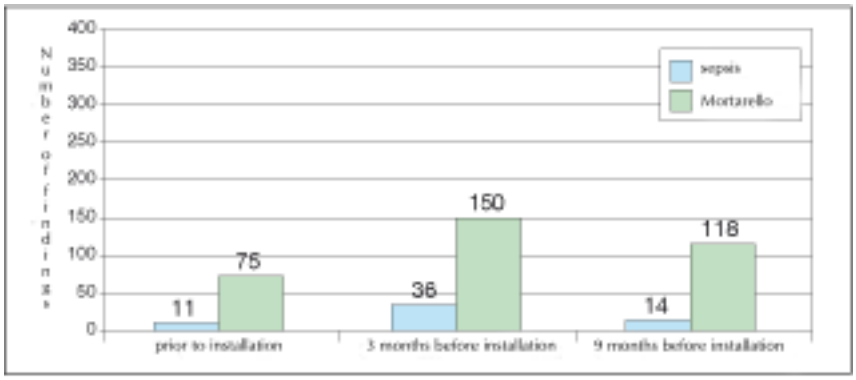
The number of mechanical-traumatical findings in the 34 appraised animals of the particular appraisal date is shown in the following graph (picture 4). Before installation of the mats 180 mechanical-traumatical findings were recorded in the test farm relating to 100 cows. In principal all findings were collected from each claw so that one claw could have more than one finding. After installation of the EasyFix™ Slat Rubber System 109 mechanical-traumatical findings were observed after nine months. A positive influence on the reduction of the mechanical-traumatical findings is shown. The development of the number of findings of infections (only decay and Mortarello) relating to 100 animals is shown in the following graph (see picture 5). Before installation of the mats on the test farm 86 findings of infections relating to 100 cows were observed. One claw could have more than one finding. Nine months after installation of the EasyFix™ Slat Rubber System 132 findings of infections were observed. From the figures of the graph one can deduct that apart from the covering of the aisle other factors have an influence in relation to the findings of infections.

Shape of the hoof wall

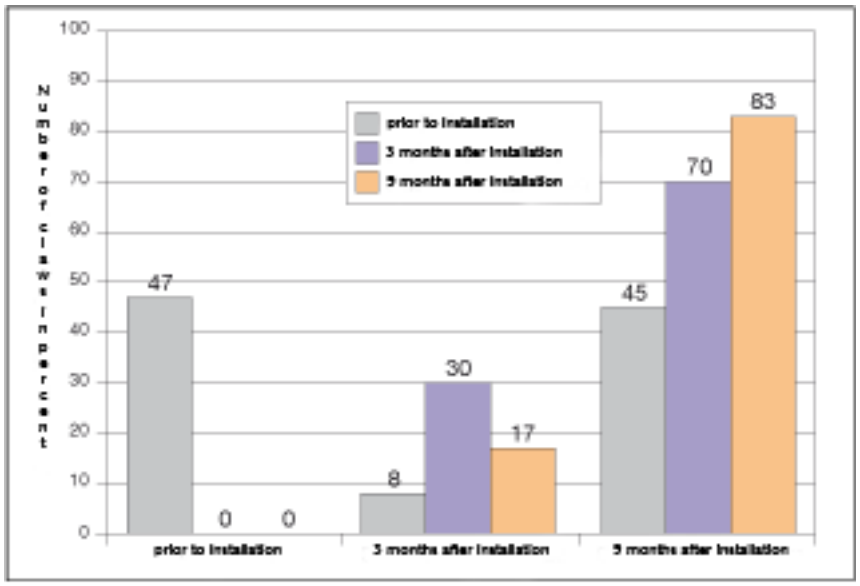
The effects of the treading area surface in relation to the shape of the hoof wall are shown in the following graph (picture 6). Prior to the installation of the mats a round shape was observed in 47% of the claws. Nine months after starting usage of the EasyFix™ Slat Rubber System mats it was observed that 83% of the claws checked had standing over hoof walls.



Picture 4: Number of mechanical-traumatical finds



Picture 5: Number of findings of infections



Picture 6: Shape of the hoof wall, prior to, 3 months after and 9 months after installation

Dorsal hoof wall length
After having kept the animals for 6 months on the EasyFix™ Slat Rubber System mats, the medial length increase of the dorsal hoof wall amounted to 0.9 cm. Therefore, claw trimming is recommended twice a year.

Slip resistance
Slide pulling tests using a round plastic foot (with a contact area of 75 cm^2) and with a velocity of 20 mm/s showed a good slip resistance on the dry or wet mat surface in mint condition. After 3 months usage in practice the slide pulling tests were repeated in at least 12 areas of the stables (at least three areas per aisle).
The measured friction coefficients (μ) all surpassed the minimal value of μ = 0.45 which speaks for a good foothold. At the manufacture of the EasyFix™ Slat Rubber System mats a silicone form release agent is used which interferes with the foothold at the beginning. This silicone film disappears after a few days.

Deformability and elasticity
Ball indentation tests in new condition of the EasyFix™ Slat Rubber System mats using a steel foot (footprint 75 cm^2) and an indenting pressure of 2,000 N (corresponding to approximately 200 kg) the indentation depth amounted to 2.25 mm. The elasticity was measured after using a continuous tread load of 250,000 alternating loads of 5,000 N. After this extended time test the indentation depth of the steel foot decreased from 2.25 mm to 2.2 mm (medial values from 3 measurements taken in each case). This shows that the elasticity decreases only minimally.

Toxicological innocuousness
The manufacturer has certified the toxicological innocuousness.

IV. Survey result

A survey held in 13 agricultural enterprises, which have used the EasyFix™ Slat Rubber System mats for up to, three years have confirmed the test results.
These farms have in total used 3,264 m^2 of these tread surface covering mats. The laying was done as internal labour in 78% of the farms. 100% of the persons surveyed indicated that the installation had been simple and practical to realize.
The soiling of the rubber slat mats after installation has been rated unchanged by 92% of the persons surveyed.
In all farms a decided change of the animal behaviour (head position and more active heat behaviour) could be noted. In three farms single cows are laying down in the aisles after installation of the surface covering mats.
In 90% of the farms there is a decrease of the mechanical-traumatical claw findings. A change of the claws (hoof wall, length of dorsal hoof wall) has been noted in 36% of the farms.
All persons surveyed have stated a good to very good opinion about the EasyFix™ Slat Rubber System mats. All would buy it again if the necessity should arise.

Specification and technical data (values measured)

Sizes available

length of slat	
width of slat	1.6 m, 1.9 m, 2.2 m
tread area	127 mm, 140 mm, 152 mm, 170 mm

Warranty
5 years,
linear depreciation

Main measurements and weight (single mat)

length of slat	max. 2.2m
width of slat	254 to 340 mm
thickness	18 to 22 mm
weight per m^2	approx. 21.2 kg

Test

The DLG SignumTest is based on the technical measurements on the test stands of the DLG Test Centre as well as individual tests, behavioral observations, claw findings and a survey among test farms.

The tests carried out on test stands included examinations of deformability and material hardness using a ball indentation test, durability tests of elasticity using alternating loads, examinations of abrasion resistance in an abrasion test using an emery cloth, examinations of slip resistance with the aid of slide pulling tests and examinations of the resistance of the surface against acid according to DIN 51 958.

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