Alternative housing systems for breeding does

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Three Graces

The three Zsolts

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SHORT HISTORY

At Roman time rabbits lived in large spaces enclosures called "leporaria" .

Initially, rabbits (adult and young) were kept in groups, often together with other animals in stables.

The beginning of housing rabbit does in hutches was about in the 15th and 16th century. At the beginning of the 17th century the rabbit does were also kept in individual boxes.

Due to several problems, housing rabbit does in groups was finished in France in the late 1970's

The first alternative housing system (housing the rabbit does in group near-to-nature surroundings) was published by Stauffacher (1992).

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What does it means:

housing the rabbit does in group near-to-nature surroundings?

Is it means

living under the similar conditions as European wild rabbit?

What do we know about living of the European wild rabbits?

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Europen wild rabbit

Are they happy?

Are they living under comfortable conditions?

What do we know about their welfare?

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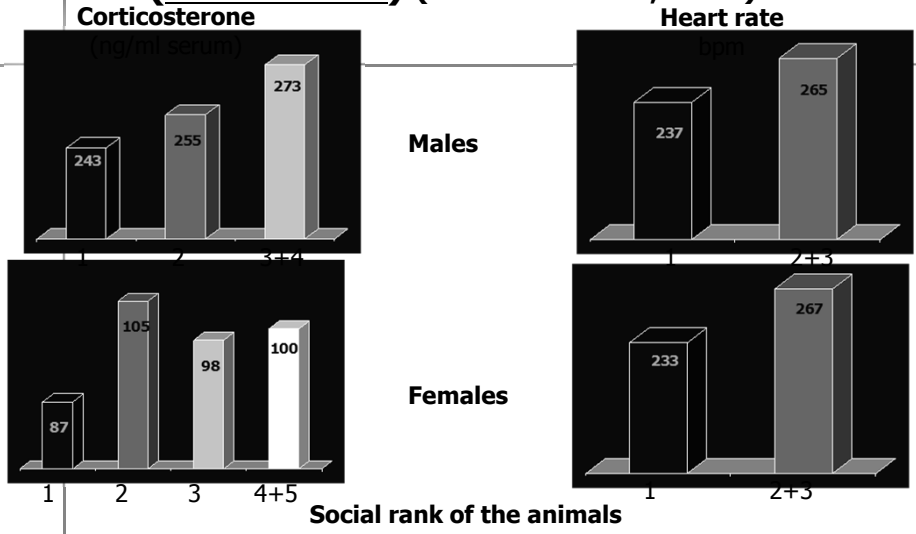
Effect of social ranks of corticosterone level and heart rate of males and females (wild rabbits) (von Holst et al., 1999)



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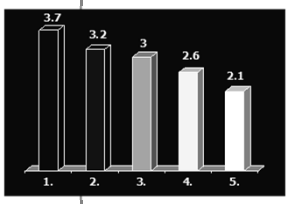
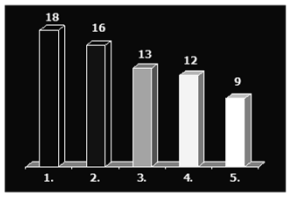
Note: Group-housed domestic rabbits live also under stress

Effect of rank order on performance of wild rabbit does
(von Holst et al., 2002)

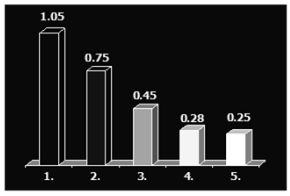
Number of litters



Number of kits born



Number of progenies at age of 1 year



Social rank of rabbit does

Note: Domestic rabbit does also form dominance hierarchy.

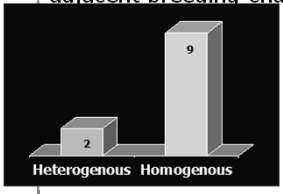
Infanticide (killing of newborn animal) in European wild rabbits
(Rödel et al., 2008)

Litter mortality by infanticide occurred in 5-6% of all litters.

In 68% of the cases of infanticide, the kits were found dead with the typical wounds caused by the incisors of rabbits.

In 17% of the infanticide, another female built a new nest and gave birth inside the chamber within the following day.

In another 36% of cases, another female of the group gave birth in an adjacent breeding chamber (30-50 cm apart) within the same burrow.



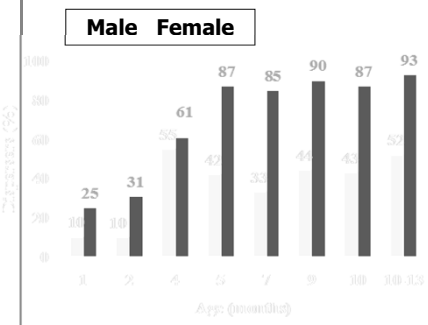
The infanticide was 7% higher in groups where the age structure was more HOMOGENOUS compared to the groups with a more HETEROGENOUS age structure.

Note: Infanticide is also known in domestic rabbit. 8
In group-housing systems homogenous groups are formed.

Dispersing

Between 36-72% of males and 8-30% of females breed in warrens in which they were not born.

In Australia 1-2
In England 2-4
} months old rabbits are the most common dispersers



PERCENTAGE OF ANIMALS (MALES, FEMALES) THAT HAD LEFT THE NATAL TERRITORY (Künkele and von Holst, 1996)

Note: Farmed rabbits do not have the opportunity for dispersing. **They have to live under the conditions provided.**

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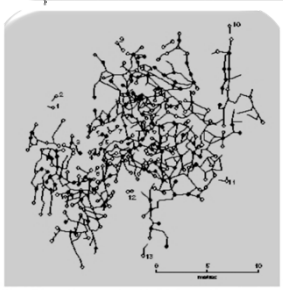
Why do some species of animals live in group?



Group-living of prey animals is mainly rooted in predation risk.

RISK OF PREDATION

There is not predator in rabbit house.

PREDATOR

Rabbit VS snake most viewed.mp4

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Are wild rabbits feeling happy?

The mortality rate is about 70-90% till the age of 1 year because of

- **predation**
- **disease (mixomatosis, RHD)**
- **weather (cold, rainy, dry)**
- **shortage of feed**
- **hunting**
- **etc.**

These situations are far from animal welfare!

Why do some people want to copy the natural condition for housing rabbits?

Group-living of wild rabbits

BENEFITS	COSTS
Decrease the risk of predation	**Increased competition among group members** (aggressiveness)
•**Reduced predation risk** -**many eyes** -**dilution effect** -**alarm calls**	-**for food** -**for nest sites** (females compete to gain access to nest sites) -**for mates** (males compete to gain access to females)
•**Cooperative construction of warrens** -**safe from predators** -**protection against climatic variability** -**nest sites** -**thermoregulatory huddling**	**Subdominant females (higher stress)** -**bred less frequently** -**lower kindling rate** -**smaller litters** -**higher kits' mortality** -**shorter lifespan**
•**Territory for the group** Adults being highly constrained by green food whereas juveniles are mainly limited by refuge availability	Defence of territory by dominant male Increased **probability of infection** with parasites and diseases **Visibility of predators** **Vigilance**

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Animals form groups when the benefits of group-living exceed the costs.

GROUP HOUSING

OF RABBIT DOES

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Contents lists available at ScienceDirect

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Housing of rabbit does:

Group and individual systems

A review

Zs. Szendrő and J. I. McNitt

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EXPERIMENTS:

THE RABBIT DOES WERE CONTINUOUSLY TOGETHER

In these systems 4-8 does without or with 1 buck are housed in a pen.

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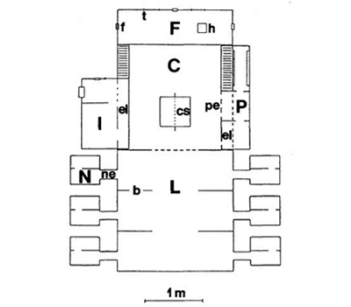
Stauffacher housing system(1992)



C	central area	b	blind
F	feeding area	cs	central structure
I	isolation cage	el	raised resting place
L	bedded nesting area	f	pellet feeder
N	nesting box	h	hay rack
P	pup area	ne	tunnel-like nest entrance
		pe	entrance to pup area
		t	drinker

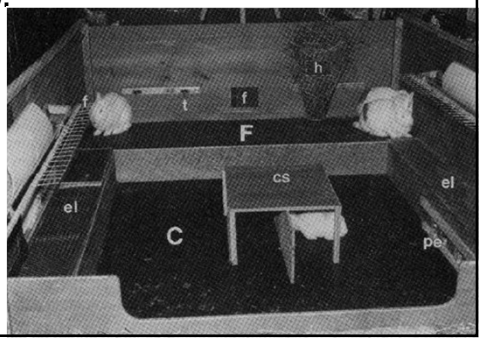
Figure 1 Rabbit housing system for breeding groups

9m^2: 4 does and 1 buck

Areas for feeding, for breeding, for kits

Different enrichments

There was no control (single-caged) group.



Performance of does in Stauffacher system

- **High fertility rate (89%),**
- **average litter size (8.4 kits/litter),**
- **suckling mortality 16%,**
- **in case of 8% two does kindled into the same nest-box,**
- **aggressive conflicts leading to injury were rare.**

Nobody has been able to replicate these results!

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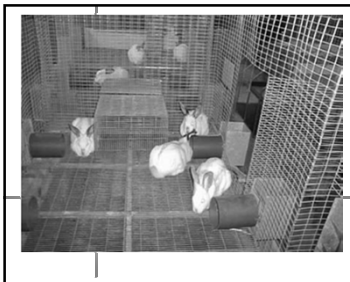
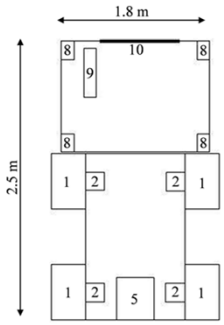


Does housed single or four rabbits per cage

(Mirabito et al., 2005)



4 does/pen

1 = nest box

2 = tunel-like nest entrance

5 = raised platform

8 = feeder

9 = hay rack

10= drinkers

Rearing future does together was not successful, because it resulted a high incidence of fighting and injuries.

One-third of the rabbits were culled for these reasons.

AI, a 42-day reproduction rhythm and free nursing was applied.

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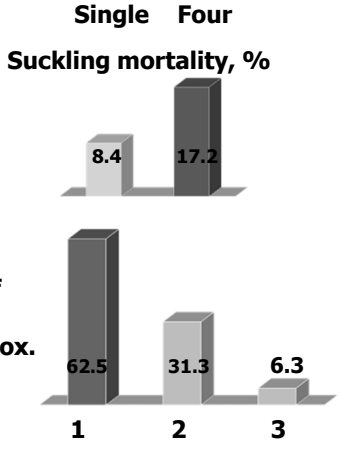
Performance of does housed single or four rabbits per cage

(Mirabito et al., 2005)

There were no differences in kindling rate and litter size.



Percentage of parturition of one, two and three does occurred in the same nest box.

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Does housed single or four does per group

(Szendrő et al., 2012)

Group housing n = 16

- 4 pens (n = 16 does)
- size of pens: 7.7 m^2
  deep litter: 2.8 x 1.5 m
  plastic net: 2.8 x 1.25 m
- 4 nest boxes per pen
- feeder 40 cm
- 1 hay feeder
- 4 nipple drinkers
- 1 tube for hiding

Group: 4 does and 1 buck

Natural mating

VIER PFOTEN - Österreich 17. Oktober 2000

Mindestanforderungen für die Bodenhaltung von Kaninchen zur Fleischgewinnung

According to the recommendation of Four paws

Housing individually

(Szendrő et al., 2012)

R33 group, n = 18

- AI at 2 days after kindling (33d rhythm).
- free nursing,
- weaning at 28d.

R42 group, n = 16

- AI at 11 days after kindling (42d rhythm),
- free nursing but 3d before AI controlled nursing,
- weaning at 35d.

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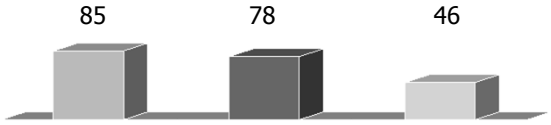
Comparison of performance of individually and group-housed rabbit does

(Szendrő et al., 2012)

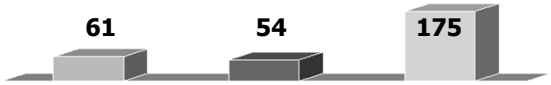
Individually housed AI at 11d | Individually housed AI at 2d | Group housed

Kindling rate, %



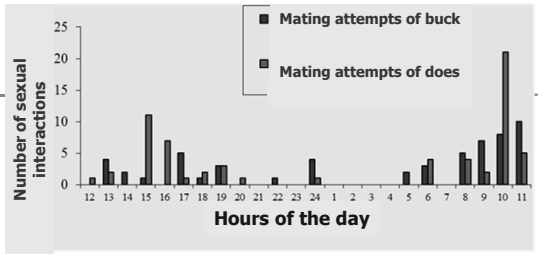
Kindling rate of group-housed does was the lowest because of the stress (aggressive behaviour)

Corticosterone, nmol/g



Sexual activity of the buck and does

(Mikó et al., 2014)



Number of sexual attempts among the buck and does

	Buck	Doe1	Doe2	Doe3	Doe4
Doe1	10/4*		1	0	1
Doe2	31/6*	7		4	2
Doe3	9/1*	2	14		0
Doe4	6/0*	8	11	2	

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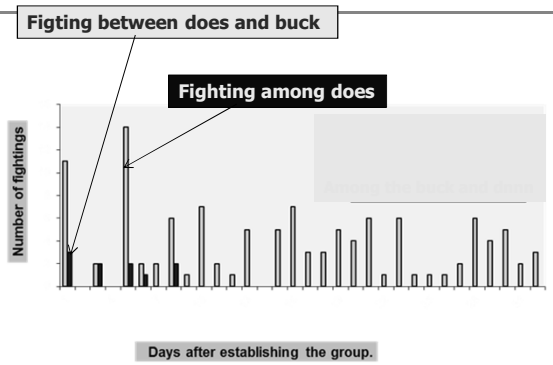
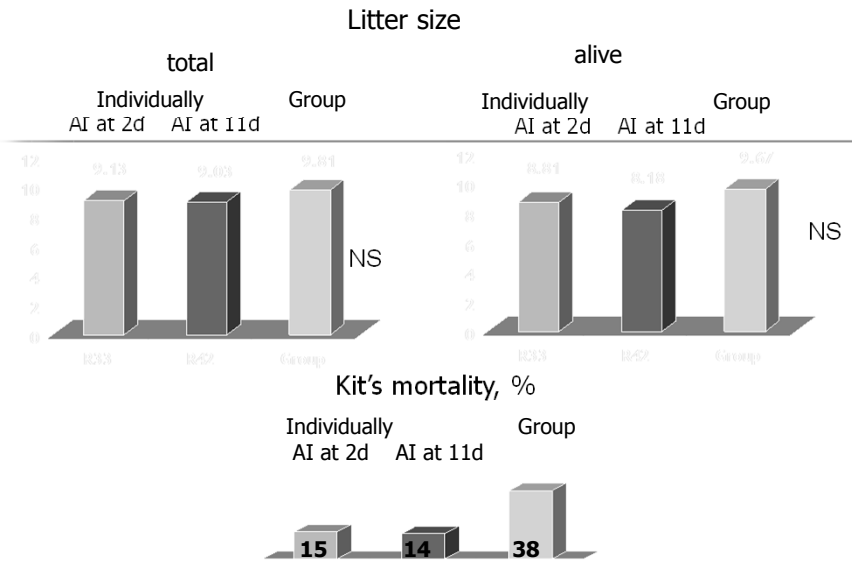
Number of fightings during the first month after establishing the group

(Mikó et al., 2014)



The oldest doe attacked the most times the other rabbits (59, 30 and 3 times). The mentioned doe attacked even the buck 4 times. The other rabbit does have initiated attacks 16 times in total.

(Szendrő et al., 2012)

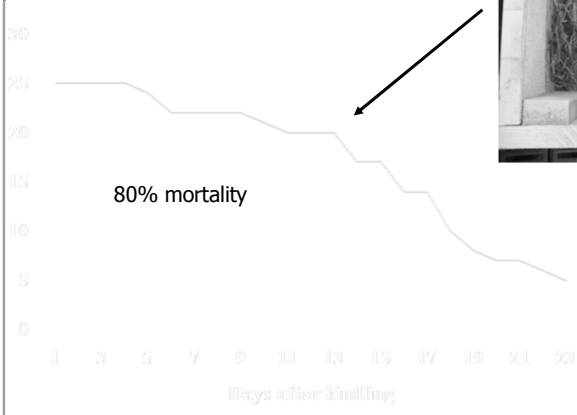


The reason of high mortality in group-housed rabbits is the agressiveness.

In 18% of the parturition two does occurred in the same nest box.

(Szendrő et al., 2012)

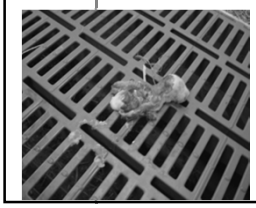
2 litters, 25 kits

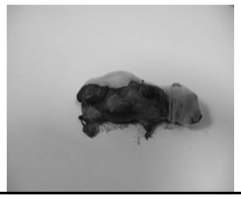


Kits outside of nest box (Szendrő et al., 2012)

Biting

Dead





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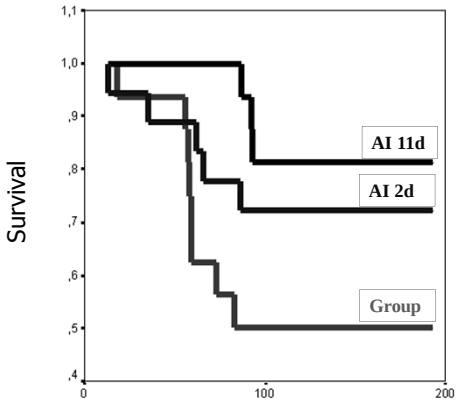
Survival of does of individually and group-housed rabbit does

(Szendrő et al., 2012)

Survival of does, %

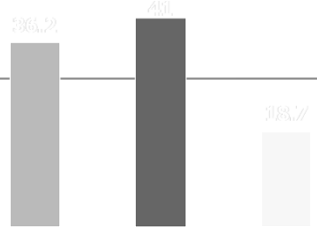


Days

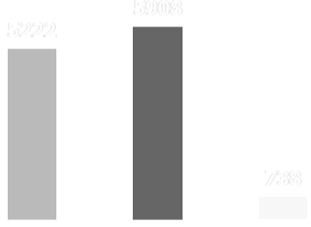
Number of weaned rabbit per doe per year

(based on the number of does at the begining of the experiment)

(Szendrő et al., 2012)



Number of weaned rabbits per year per 100 m^2



R-33 R-42 Group

(Szendrő et al., 2012)

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Main problems of group housing of rabbit does:

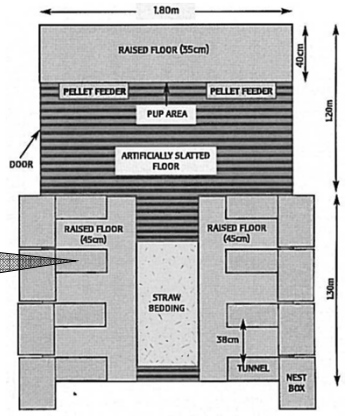
- higher rate of agressivity,
- more frequent of fighting among does,
- higher level of stress,
- higher frequency of injured rabbits (does and kits),
- more litter in a nest box (double littering),
- high mortality of suckling rabbits,
- shorter survival of does,
- problems with replacement and introduction of new does in groups,
- labour-intensive,
- its productivity is lower compared to individual housing (pseudopregnancy),
- its production costs are higher than in regular individual housing system.

A new group-housing system was developed in the Netherlands.

Group-housing system in the Netherlands
(Ruis és Coenen, 2004)

Clips in the ear of doe

8 does in a group



Tunnel-like link to nest box, including a door to be operated by the doe

Because of some problems

- **deep litter was changed to plastic slat**
- **instead of using natural mating AI was applied**

Group-housing system in the Netherlands
(Rommers et al, 2006)

	Individually	Group
Kindling rate, %	**84.2**	**55.6**
Litter size		
total	**8.9**	**8.4**
alive	**8.4**	**7.7**
at weaning	**8.9**	**6.6**
Suckling mortality, %	**7.4**	**10.1**
Weight of kits, g		
at 14 d	**241**	**233**
at weaning	**841**	**720**
Injured rabbits, %		
Exp.1.		**21.0**
Exp.2.		**16.8**

The system is good against double littering but a new problem is the low weight of kits at weaning.

The low kindling rate is connected with pseudopregnancy.

Group housing in Switzerland

(Andrist et al., 2013)

On average 132 (35-138) does are kept per farm (n=28 farms).

Does are housed in group of 8 (5-9).

Three methods are used:

- Does are **mated naturally**, the buck is usually introduced for 10 days a **33 days reproduction rhythm** (n=11 farms)**.**
- Nowadays, breeders start to apply **artificial insemination** with **33-day reproduction rhythm** (n=4 farms) or
- **42-day reproduction rhythm** (n=13 farms):
  - In the 42-d group does are being held **single** from the 30th day of pregnancy until 12 days after birth.
  - During this isolation phase does are kept in a separated compartment with a nest within their group (against double littering and pseudopregnancy). While visual, olfactory and acoustic contact is still possible.

GROUP	INDIVIDUAL	GROUP	INDIVIDUAL

Reproductive performance

Kindling rate: 61% (50-74%); naturally: 64%, AI: 60%

Litter size: 9.6 (8-12)

Suckling mortality: 15% (4-25%)

Aggressiveness - lesions

Lesions occurred on all farms; 33% of animals had at least one lesion. More severe injuries: 9%.

Occurence of lesions sorted by score

Group-living of farmed rabbit when rabbit does are continously together

BENEFITS	COSTS
Living in group: -social behaviour **Larger pens:** -larger possibility for moving	**Increased competition among group members (aggressiveness, fights):** -for mating (males compete to gain access to females, only in case of natural mating), -for nest sites (females compete to gain access to nest sites), -more litter in a nest box (double littering). **Sub-dominant females (higher stress):** -bred less frequently (in case of natural mating), -lower kindling rate (high rate of pseudopregnancy), -smaller litters, -higher kit mortality, -shorter lifespan. **Work and income:** -labour-intensive, -its production costs are higher than in regular individual housing system.

SEMI-GROUP HOUSING OF RABBIT DOES

GROUP	SINGLE	GROUP	SINGLE	GROUP	SINGLE	GROUP	SINGLE

The aim is to avoid the double kindling and pseudopregnancy.

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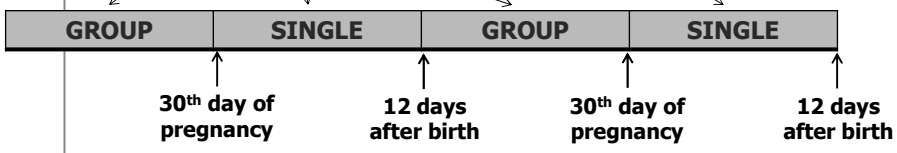
Group housing in Switzerland

(Andrist et al., 2013)

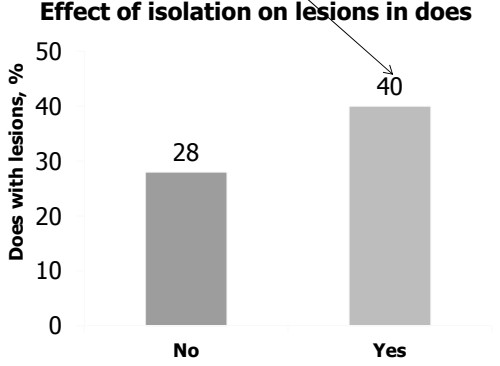
42-day reproduction rhythm:

- Does are held **single** from the 30th day of pregnancy until 12 days after birth.During this isolation phase does are kept in a separated compartment with a nest within their group (against double littering and pseudopregnancy). While visual, olfactory and acoustic contact is still possible.
- Does are in **group** from 12-day of lactation till some days before the next littering.



30th day of pregnancy | 12 days after birth | 30th day of pregnancy | 12 days after birth

According to all the producers of farms with isolation phase, there were a lot of agonistic interactions when the does were **regroupped**



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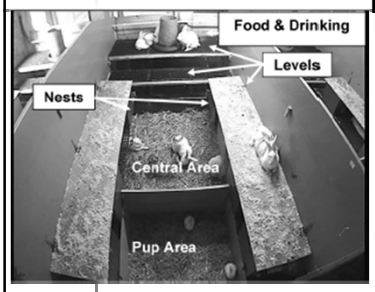
ARE THERE ANY POSSIBILITY TO DECREASE THE AGRESSIVENESS, THE RATIO OF INJURED RABBITS?



Regrouping rabbit does in a familiar or novel pen

(Graf et al., 2011)

Two unfamiliar rabbits were intoduced into a group of rabbits either in the group's **familiar pen** or in a **novel** disinfected **pen**.

General activities were not affected by the method of regrouping. Also, treatment **had no effect on the number and duration of agonistic interactions**. However, the numbers of injuries **on the first day after regrouping** were increased in rabbits regrouped in a novel pen.

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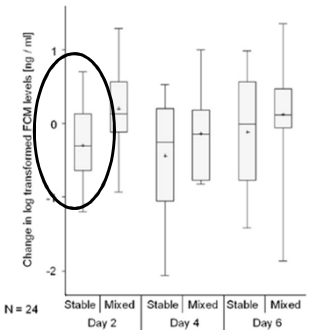
Effect of group stability

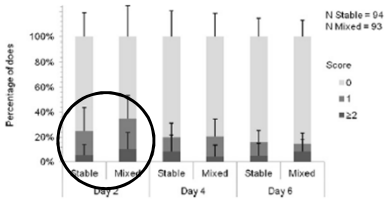
(Andrist et al., 2012)

The group composition before and after the 12 days isolation period **remained the same (stable).** In the other groups two or three does were replaced after the isolation phase by **unfamiliar does (mixed)**.

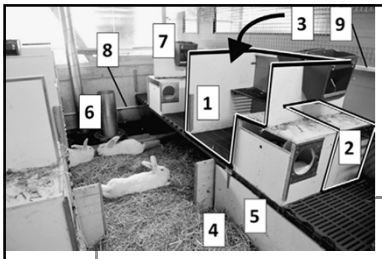
Faecal corticosterone metabolites



Lesions percentage of does with new lesions on days 2, 4, and 6 after regrouping.



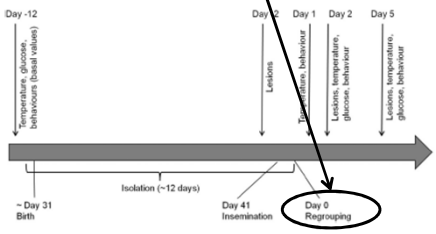
It was recommend to keep the group composition of rabbit does stable as long as possible rather than mixing the does after each isolation phase. 44



Masking odour when regrouping rabbit does

(Andrist et al., 2044)

In the experiment, the fur of does was sprayed with either **alcohol** or **vinegar** to mask the pre- existing group odours, or with **water** shortly before regrouping.



Masking the group odour with alcohol or vinegar

had little effect on lesions, stress and agonistic interactions

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SEMI-GROUP HOUSING SYSTEM IN BELGIUM

Housing systems.

- Top: a semi-group pen divided into four **individual units** (as used from 3 days before kindling to 8 days after kindling),
- middle: a semi-group pen with **grouped does** (as used from 18 days after kindling to 3 days before next kindling), small holes into the nest boxes,
- bottom: a row of individual cages.

AFTER WEANING

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A new group-housing (combi-park) system

(Rommers et al., 2011)

Individual wire cages, with an elevated platform:

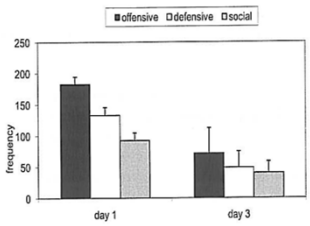
- 8 individual cages were connected by holes that could be opened or closed by covers.
- Does were housed **individually** during the first two weeks after kindling, and from 14d after parturition until a day before the following parturition, does were housed in **groups** of eight. By opening the holes, does could move more freely throughout the eight cages.

Performance of does housed in combi-park (semi-group)system or individually (Rommers and de Jong, 2011)

Groups	Combi-park system			Individual housing
AI, days after kindling	11	15	18	
Kindling rate, %	79.6	82.1	89.3	83.9
Born alive/litter	11.0	11.3	11.0	11.8
Litter size at weaning	8.2	8.4	8.5	8.9
Body weight at weaning, g	953	950	958	1009
Uniformity, %	45.9	45.8	53.8	61.3
Loss before weaning, %	14.2	9.7	9.4	7.7
Injured kits	0.6	2.6	1.3	0.2

The performance of does in the two systems were **similar**, regardless of the time of insemination (11, 15 or 18 days after kindling) in combi-park system.

Aggressive behaviour of rabbit does in group housing system after opening the doors among the cages (Rommers et al., 2011)



Total frequency of offensive, defensive and social behaviour in 24h on d1 and d3 after placing the does in the group: d1:148, d3: 51

On both days 45% of the behaviours were offensive, 30% defensive, 25% social.

On both days 84% of the offensive behaviour consisted of attacks and fights.

It can be concluded that the lay-out of the tested group housing system is insufficient and may evoke aggression because does have to pass through each other's territory to move through the system.

Effect of hiding places, straw and territory on aggression

(Rommers et al., 2014)

Does were housed individually until 18 days of lactation. From day 18 of lactation, four multi-parous does with their kits were housed in a group until 35 days of lactation.

All combinations of the following factors were randomly assigned: hiding places (platform and PVC pipe), straw and territory (i.e. familiarity with the cage before grouping).

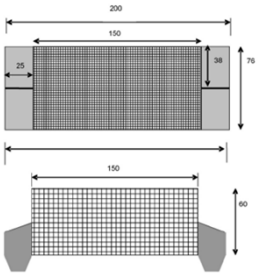
There were no differences in skin injuries between treatments. Overall **52% of the does had injuries**. The percentage of does that had **severe injuries ranged between 13% and 39%.**

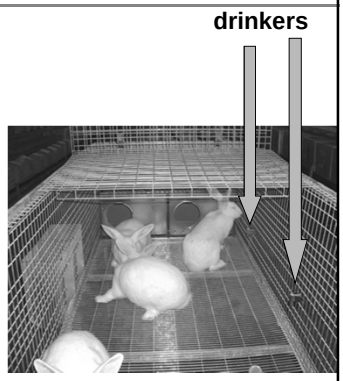
In conclusion, does do not defend a territory within a group pen. Hiding places can help to reduce severe skin injuries. However, the high amount of does with skin injuries merits further study.

Does housed single or four animals per cage

(Mugnai et al., 2009)

Four does per cage

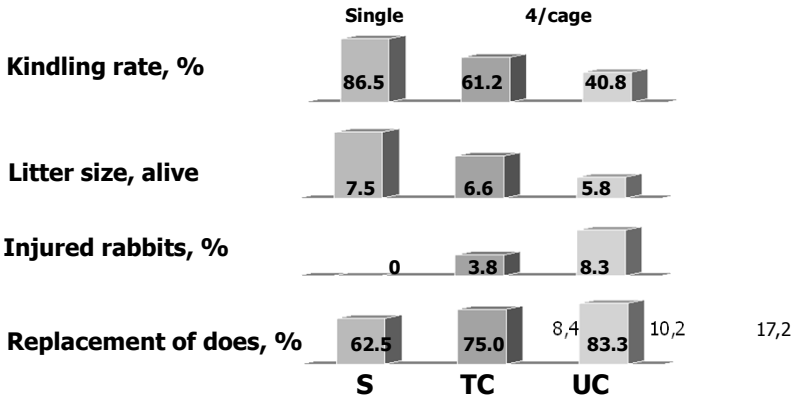




The pregnant does were housed in groups 5 days prior to kindling, then after weaning they were artificially inseminated in individual cages. Before kindling nest boxes were opened, but controlled nursing was performed.

Performance of does housed single or four animals per cage

(Mugnai et al., 2009)



TC = trained group: During the first 2 days in the new location, does were trained to go into their own nest, by putting the same doe into the same nest and holding them inside for 10 min.

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UC = untrained group

Disadvantages of group-housing can be reduced by

- housing of does in enriched pens,
- training the does for using their own nest box,
- using clips in the ear of doe to open their own nestbox,
- introducing buck in the group for a short time (e.g. 10 days),
- changing natural mating to artificial insemination,
- isolation of does in a separated compartment between birth and 2 weeks after kindling,
- housing the does individually during the first two weeks after kindling (combi-park system),

- **BUT THE MAIN PROBLEMS OF GROUP-HOUSING WERE NOT COMPLETELY SOLVED!**

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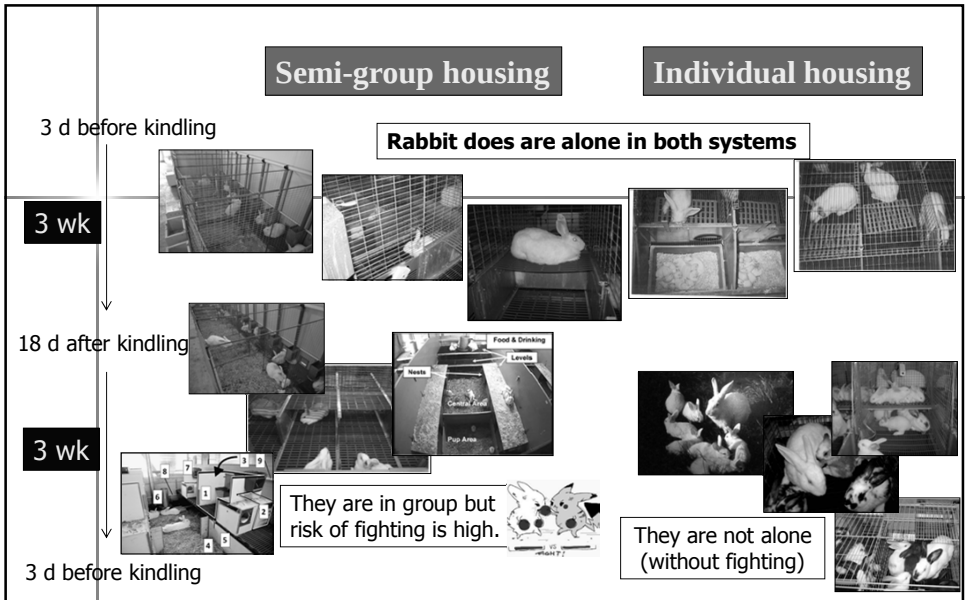
Benefits and costs of semi-group housing of rabbit does

Benefits	Costs
Living in group: **-social behaviour** **Larger pens:** **-larger possibility for moving**	**Increased competition among group members (aggressiveness):** **-after each regrouping the frequency of fighting, injured rabbits are high. <u>THIS IS THE MAIN PROBLEM IN THESE SYSTEMS.</u>** **Sub-dominant females (higher stress):** **-lower productivity,** **-shorter lifespan.** **Work and income:** **-labour-intensive,** **-its production costs are higher than in regular individual housing system.**



It is a basic question WHAT DOES IT MEAN TO LIVE ALONE? In semi-group housing systems does are individually caged when they are alone (kits are in the nest box), however they are in group after teir kits leave the nest box. But in this period the individually housed does also are not alone, they are together with their kits.

Welfare indicators

(Hoy and Verga, 2006)

Main welfare indicators for rabbits are:

- **no or low mortality, - HIGH (kits and does)**
- **low or unavoidable morbidity, - HIGH**
- **physiological parameters in the species-specific standard, - HIGH STRESS HORMONE**
- **species-specific behaviour, - AGGRESSIVENESS**
- **productive and reproductive performance on a good level - LOWER**

Examining the „five freedoms" (FAWC), the group-housing system of rabbit does violate the animals' well-being several times (higher mortality, pain, stress and injuries, stress).

CONCLUSIONS

Similar problems can be seen in European wild rabbits and group housed domesticated rabbits.

Disadvantages of group-housing of does are much more than advantages.

Group-housing of rabbit does is contrary to welfare.

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In **Switzerland** group housing systems are generally used.

Housing regulations of rabbits in Belgium : Step by step

Maertens, 2013)

STEP 1: **from 2013 off**

Does: enriched welfare cages or enriched park system

STEP 3: **from 2021 off**

All **does** have to be housed in enriched park systems.

On condition that: research in Belgium and abroad has demonstrated that "equal" production can be obtained in park systems (evaluation in 2015)

The Netherlands follow the same way as Belgium.

And the market?

Something else, as you know I was not 100% in agreement with your review paper about (group) housing of rabbits. However, after all our experiments I am now more in line with your opinion. Although (semi) grouphousing is possible even with good performance … the advantages related to animal welfare are limited and the disadvantages are more clear. So the balance is … negative even for semi-grouphousing.

Rabbits live in group as a kind of security against predators and not because they are social animals. Now I agree with this (your) opinion.

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My opinion about living alone or in group

It is better to live in a small flat or house alone,

than to live in a castle with some other people and receive some slaps in the face every day.

INDIVIDUAL-HOUSING OF RABBIT DOES

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Benefits and costs of individually housed domestic rabbit does

Benefits	Costs
– No aggressiveness (stress and injuries) – No competition for nest sites (infanticide, injuries of kits) – Lower mortality of kits – Better body condition – Higher productivity – Lower probability of infections – Longer lifespan	– Less space for movement – Restricted behavioural repertoire – Less opportunity for social contact

We have to reduce the disadvantages in individual-housing system.

WALLS OF THE CAGE

Wire net		Solid metal sheets	
↑	Kindling rate	↓	Gacek (2002)
=	Kindling rate	=	Szendrő (2005)
=	Litter size	=	Szendrő (2005)
↓	Total litter loss	↑	Szendrő (2005)

In case of solid metal sheets, does are frightened, since they are only able to notice a person when she/he is very near (above) the cage.

Wire-net walls allow rabbit does to have visual and olfactory (social) contact with their neighbours.

SIZE OF CAGE

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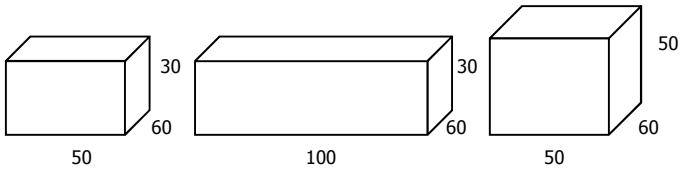
Performance of does depending on the size of cage

(Rommers and Meijerhof, 1998)



Litter size				
total	9.9	10.7	10.9	NS
at weaning	7.4	7.6	7.6	NS
Suckling mortality, %	8.4	11.0	11.8	NS
Days between kindlings	46.5	46.0	46.3	NS

Housing the does in larger cages had no effect on their performance, but they had more place for moving.

Effect of size and enrichment of does' cage on performance of does

(Mirabito et al., 2005)

0.34 m^2 (38x65 cm) With / Without platform	0.45 m^2 (46x73 cm) With / Without platform	0.59 m^2 (60x73 cm) With / Without tube

Kindling rate	**NS**
Litter size	**NS**
Suckling mortality	**NS**
Weight gain of suckling rabbits	**NS**
Behavioural patterns	**NS**

Housing the does in larger cage or enriched with platform or tube had not effect on their performance, but they had more possibility for moving.

Housing of young does in different sized cages

(Bignon et al., 2012)

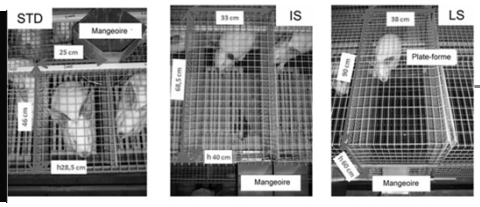
Three cage sizes were compared:

-standard, 25 x 46 x 28.5 cm (STD);

-intermediate, 33 x 68.5 x 40 cm(IS);

-large 38 x 90 x 60 cm with a platform of 35 x 25 cm at 30 cm (20% of ground area) (LS).

All cages were equipped with floor mats.



Les trois types de cages de futures reproductrices testées par Bignon *et al.* (2012)

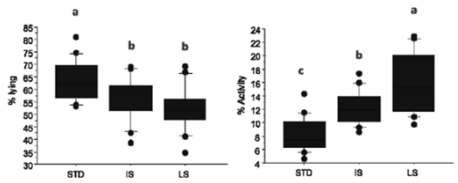


Figure 1: Lying and active (standing, sitting, moving) behaviour of young does according to cage size

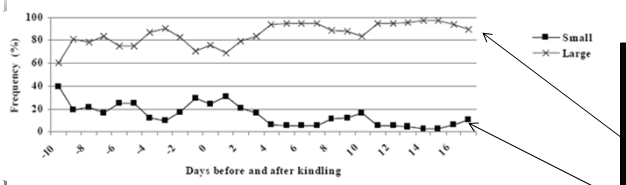
As cage size increased, does became more active. Both the intermediate and the large cages limited the time spent lying compared to the standard cage.

<u>Cage size had little influence on productive performance</u>. The intermediate size could be recommended.

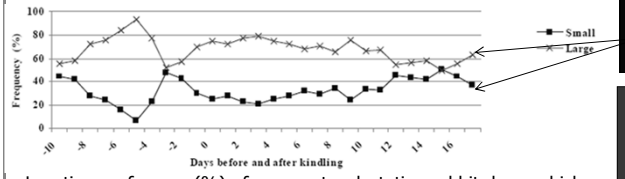
FREE CHOICE OF RABBIT DOES BETWEEN CAGES OF DIFFERENT SIZE

(Mikó et al., 2012)

The non-pregnant rabbit does spent 37 % and 63 % of their time in small and large cages, resp. Cage preference seemed to be proportional to the cage sizes (1/3 and 2/3), thus cage choice may be considered as random.



Location preference (%) of pregnant or lactating rabbit does, which kindled to the nestnbox of **small cage**



Location preference (%) of pregnant or lactating rabbit does, which kindled to the nest box of **large cage**

When parturition took place in the nest box of the small or in the large cage, compared to the expected values (33.3% and 66.6%), the cage preferences were 14 and **86%,** and 30 and **70%,** resp.

<u>Does preferred staying more frequently in the other cage than that of the place of kindling.</u>

Nursing behaviour

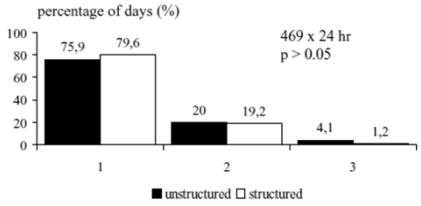
(Selzer et al., 2004)

Number of nursings a day in dependence on size and structure of cages

Size of cages	Unstructured cages	Structured cages
Standard size	1.37	1.32
Double size	1.26	1.24
Three-times larger	1.25	1.11
	NS	P<0.05

Structure:
- tunnel to nest bokx
- gnawing stick
- hay - daily

Percentages of days with different number of nursing events in dependence on structure of cages.

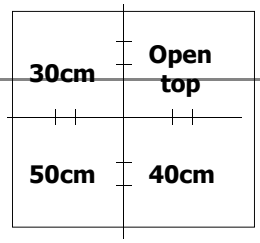


There was a moderate tendency to decrease the nursing activity with increasing cage size and the presence of an enrichment tunnel at the entrance to nestbox.

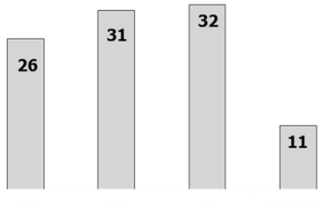
FREE CHOICE OF RABBIT DOES BETWEEN CAGES WITH DIFFERENT HEIGHT

Experimental plan

(height of cages)



Preference of rabbit does (%)
(random preference = 25% / cage)



Rabbit does do not like staying in open-top cage.
A 40 cm high cage seems to be comfortable.

FLOOR OF THE CAGE

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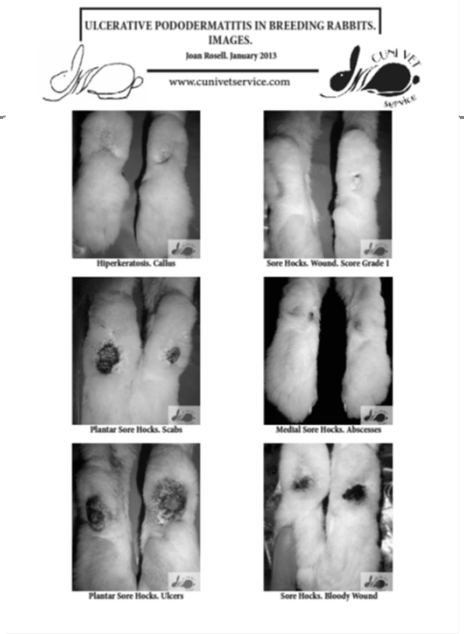
The most serious problem is the

SORE HOCK
footpad injuries
pododermatitis



Occurence of sore hock on farms in Spain and Portugal

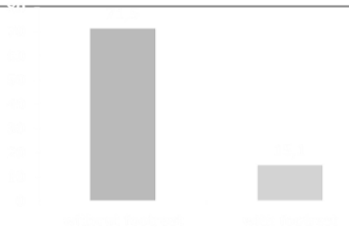
(Rossel, 2003)

	Mean, %	Range, %
Does	10.4	0-42.5
Bucks	5.8	0-33.3

Incidence of sore hock (%)

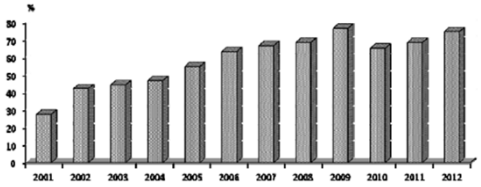
(in the fifth lactation)

(Rossel and de la Fuente, 2009)



Evolution of the percentage of farms using footrests

(Rossel and de la Fuente, 2013)



Occurence of sore hock

(Rossel and de la Fuente, 2013)

Footrest	Occurence, %
Yes	4.9
No	13.7

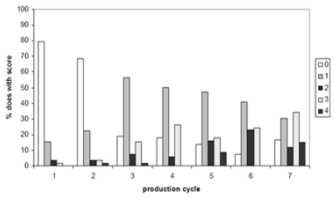
Percentage of does with different scores for the sore hock

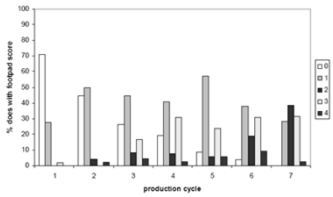
(De Jong et al., 2008)

2 mm wire floor

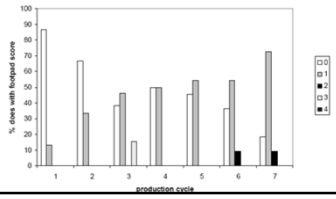
Without footrest

3 mm wire floor





3 mm wire floor with footrest

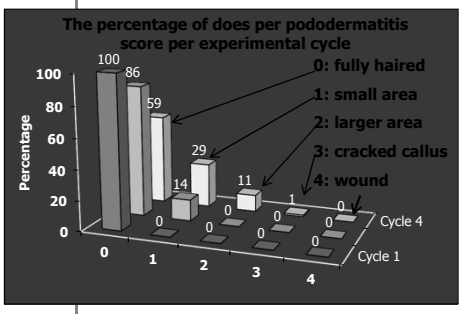


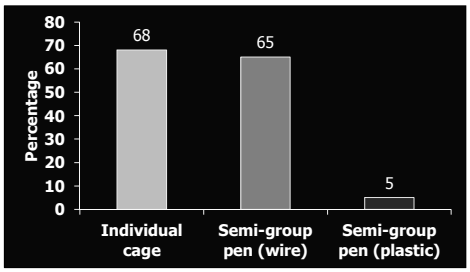
Effects of semi-group housing and floor type on sore hock

(Buijs et al., 2014)

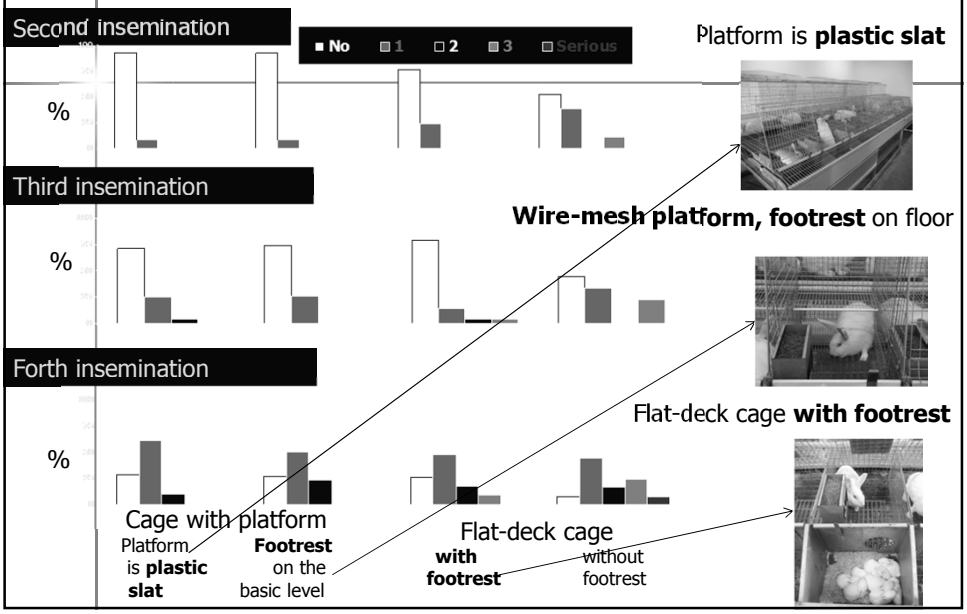
Three types of housing:

- individual cage housing on wire floor with plastic footrest,
- semi-group housing on a wire floor with plastic footrest,
- semi-group housing with a fully plastic slatted floor.





Effect of housing system on sore hock on rabbit does (Matics et al., 2011)



CONCLUSION

Installation of a slatted footrest on the wire-mesh plays a significant role in the prevention of sore hock and improve the welfare.

CAGES WITH ELEVATED PLATFORM

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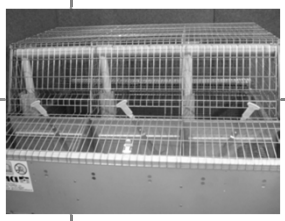
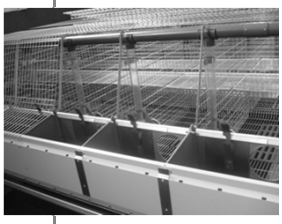
Cage with platform for rabbit does



Theoretical advantages of the platform:

- larger floor size (two levels),
- larger moving possibility,
- escaping of does from their kits after leaving the nest box.

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Cage with or without platform
(Mirabito et al., 1999)

Height: 29 cm (without platform) Height: 2x29 cm (with platform)

- There were not no differences in reproductive performances.

Time spent on platform (during the light period)

Does non-lacting	**Does lactating (2nd wk)**	**Does after leaving the nest box**	**Kits (28-35d)**
27%	**20%**	**35%**	**16%**

Platforms do not appear to be means for does to escape from the young and rest unmolested. When the does leave the platform kits want to nurse.

Choice between the two levels
(Mirabito, 2002)

After nursing kits were moved into another cage.

Does and kits were in the same cage.

Time spend on the platform (between 3-5 wk**)**

12-16%

32-42%

The presence of kits caused higher occupation of the platform.
But the presence of platform did not affect the nursing attempts.

Choice of platform depending on the size of cage and its enrichment
(Mirabito et al., 2004)

38 x 65 cm (0.25 m^2)

With platform Without

46 x 73 cm (0.34 m^2)

With platform Without

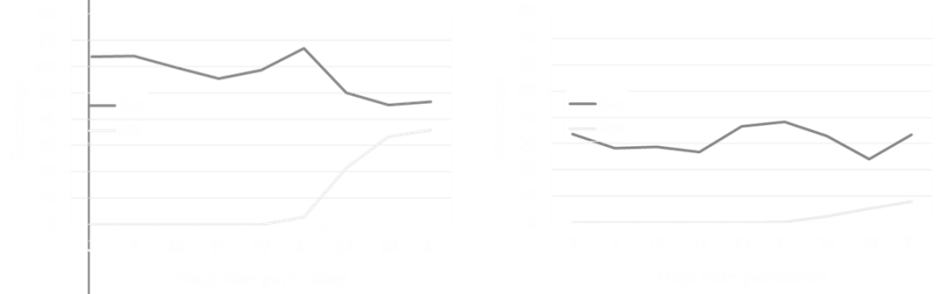
- **The does in the smaller cage spent less time on the platform than those in the larger cage.**
- In the smaller cages does did not jump on the platform to prevent nursing events, while in the larger cages does escaped to the plarform when kits tried to suckle.

Cage with platform is not an ideal system to reduce the freqency of nursing attempts.

Choice of platform of does and their kits depending on its type
(Mikó et al., 2012)

The platform is plastic net

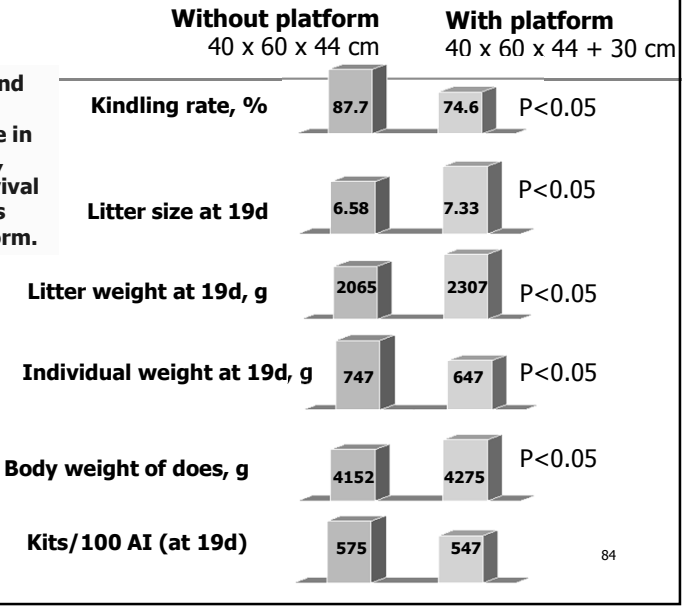
The platform is wire net



The preference of platform depended on its material and the kits occupied it.

Performance of does housed in cages with or without elevated platform (Barge et al., 2008)

Mirabito et al. (1999) and Mirabito (2002) did not observed any difference in kindling rate, litter size, suckling mortality, survival of does between groups with and without platform.



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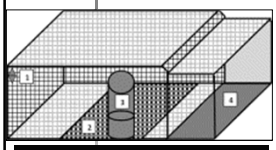
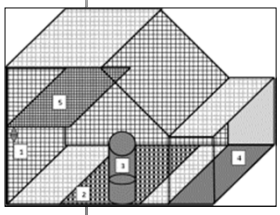
Effect of alternative cages on performance of does

(Alfonso-Carillo et al., 2014)



1: drinker, 2: foot mats, 3: feeder 4: nest, 5: platform



Type of cages did not effect on

- **doe body weight and condition,**
- **mortality,**
- **fertility,**
- **litter size**

Traits	Conventional	Alternative	P-value
Fertility, %	92.9	90.4	0.339
Doe mortality, %	13.8	15.5	0.845
Total born	11.6	11.7	0.872
Litter size at 21 d	8.83	8.90	0.633
Litter weight at 21 d, g	2981	3140	0.002
Feed intake (3-21 d), g/d	370	383	0.053
Feed conversion ratio (3-21 d)	3.21	3.05	0.011

- Litter weight at 21 day was higher by +4.2% and

- feed conversion ratio between 3 and 21 day was higher by 5%

in group housed in alternative than in conventional cages.

Rabbit does' performance in flat-deck cage vs. cage with platform

(Mikó et al., 2014)

	Flat-deck	With platform	P
Weight of does, kg	4.24	4.30	NS
Kindling rate, %	75.3	75.6	NS
Litter size			
total	11.5	11.6	NS
alive	10.9	11.1	NS
at 21d	9.2	9.2	NS
Litter weight at 21d	**3.51**	**3.72**	**0.002**
Individual w at 21d, g	**385**	**409**	**0.001**
Suckling mortality, %			
0-21 d	7.2	6.0	NS
0-35 d	**10.1**	8 **8.0**	0.05

CONCLUSIONS

- The floor surface can be increased by platform.
- Platform gives possibility for does to escape from the „suckling kits" but the frequency of nursing attempts does not change.
- The performance of does increase only slightly.
- The platform may cause hygiene problems:
  - if it is made of solid floor, manure can accumulate on it,
  - if it is made of wire net, droppings and urine fall onto the kits, feeders and drinkers.

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other

ENVIRONMENTAL ENRICHMENTS

than

elevated platform

footrest

etc.

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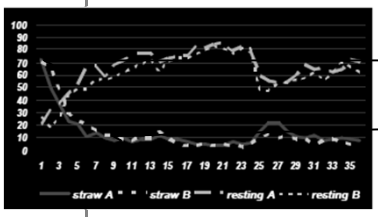
STRAW AS AN ENTERTAINMENT

(López et al., 2004)



~~More than~~ **70%** of the does were occupied with the straw immediately after its distribution, but ~~the frequency decreased up to~~ **10%** after the first hour of straw being made available to them.

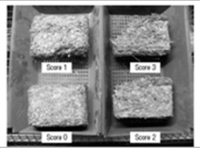
It was concluded that there was no effect of the distribution system on the interactions rabbit-straw but the offering of straw enriched the behaviour repertoire.

CAGE ENRICHMENT

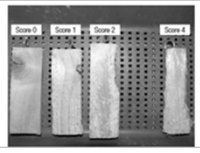
Hang on the roof

straw or compressed wooden block

(Rommers et al., 2014)



pressed wooden block



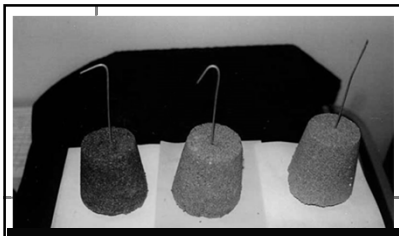
pine wooden stick

Five different treatments were tested:	**Consumption score**
- control (C)	
- pinewood stick (Pine),	**1.0**
- straw in a plastic bin (Straw),	
- compressed wooden block (Ply)	**1.45**
- combination of straw and a pinewood stick (Straw+Pine).	**0.5**

More does were occupied with Straw and Ply than with Pine.

In does of Straw+Pine group, the pinewood was barely touched and straw was preferred.

It was concluded that straw and wooden block were used by the animals as enrichment material to gnaw or chew on. The materials remain attractive for the 2 lactations. The pinewood stick (hanging on the roof of the cage) was rarely used.



Gnawing blocks as cage enrichment and dietary supplement for does

(Maertens et al., 2013)

The 3 different blocks had the same basal components (wheat, molasses and oligoelements), but additionally

-wood mash ,

-wood mash+chicory pulp

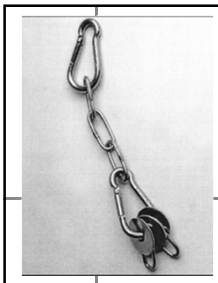
-wood mash and inulin syrup.

Performance rates in does and fatteners were not improved with the presence of a gnawing block

	Control	Wood mash	Chicory pulp	Inulin syrup	P-value
Weight of does, kg					
parturition	**4.30**	**4.02**	**4.15**	**4.06**	**<0.05**
28 d	**4.59**	**4.27**	**4.49**	**4.39**	**<0.05**
Block consumption,g/d		**11.0**	**6.8**	**4.4**	**<0.001**

The tested gnawing blocks were intensively used and high amounts of intake were observed, especially with the soft wood mash enriched blocks.

Based on the consumption pattern and behaviour, these gnawing blocks could be considered as cage enrichment and those with the chicory pulp best fulfilled the objective of a suitable gnawing material.



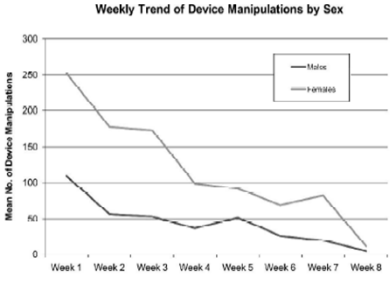
UNUSUAL ENRICHMENT

Stainless-steel rabbit rattles on spring clips

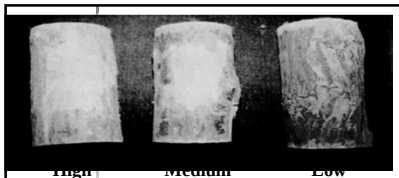
(Johnson et al., 2003)

An 8-week study was performed to evaluate the effect of an environmental enrichment device, stainless-steel rabbit rattles on spring clips, on individually housed rabbits.

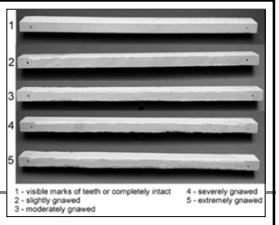
No significant differences were found between study and control rabbits in body weights, food consumption, and hematologic parameters.



Interaction with enrichment devices decreases over time.



High consumption Medium Low



Wood stick: *Robinia Pseudoacacia* (length: 24 cm – diameter: 8 cm)

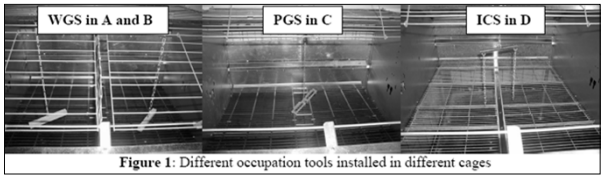
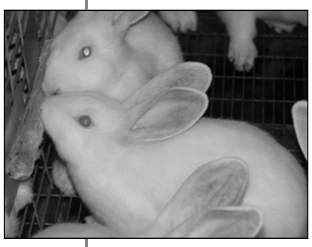


Figure 1: Different occupation tools installed in different cages



In growing rabbits gnawing sticks made of soft wood with about 3 cm diameter and fixed on the cage wall are one of the best enrichments to reduce the injures on body caused by aggressiveness.

CONCLUSION

all aspect of individually housed does

Considering all aspects of housing systems, it can be concluded that individual-housing of does in enlarged and enriched cages (platform, footrest, gnawing stick) may meet with the requirements of animal welfare and demands of rabbits, farmers and consumers.

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Welfare depends on who is the winner!

95

Welfare?

Memories from Indonesia

Thank you for your attention!

A. Finzi

L. Maertens

96

Thank you for your kind attention!

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