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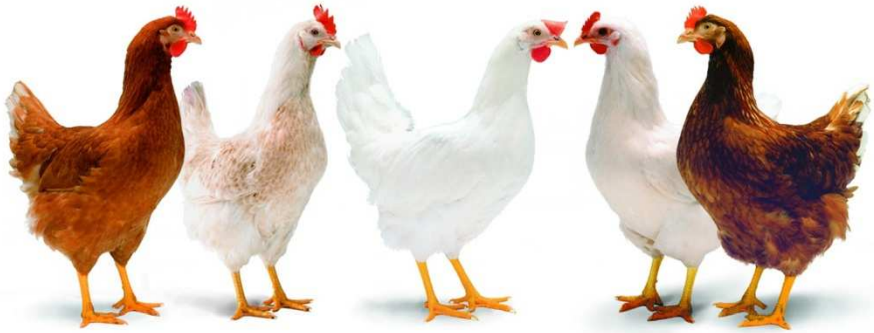
Welcome



Selecting layers on individually recorded behaviour and performance data in group housing systems

Dr. Wiebke Icken

Individual laying performance tests in cages

traditional laying performance tests are done in single bird cages

- easy to record the relevant traits of each single hen (egg number, egg quality traits)
- potential disadvantage for hens that are housed in alternative housing systems (genotype-environment interactions)
- no recording of further important traits like nest acceptance

Individual laying performance tests in floor housing

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Trap nest

- very costly in terms of labour and time
- the locked trap nests influence the nesting behaviour

Transponder based

- recording nest performance data
- additional behaviour traits (nest, free-range)

„Weihenstephan Funnel Nest Box“

+

„Electronic Pop Hole“

Weihenstenphan Funnel Nest Box

Transponder - antenna mechanism

individual data recording of each single hen in a group housing system

Nest traits

- nest acceptance
- duration of stay in a nest box
- exact oviposition time
- egg number
- egg quality traits

Data recording at the experimental station of the TU-Munich

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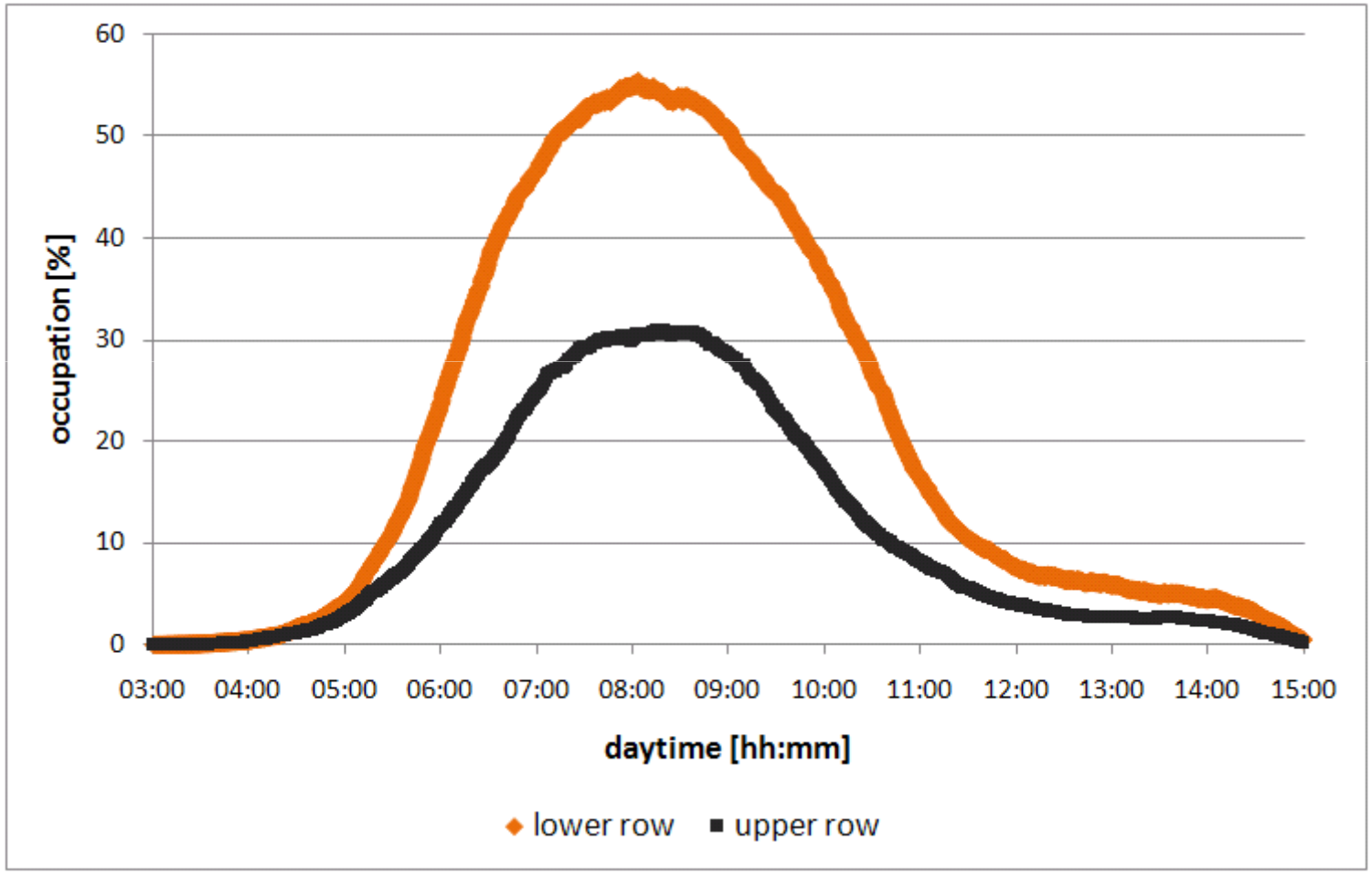
- 48 or respectively 72 Funnel Nest Boxes and 4 Electronic Pop Holes
- 4 flocks of one brown layer strain
- 241 to 483 pedigreed hens per flock (limited by the number of FNB which was extended for the last flock) ➞ total number of tested hens: 1214
- recording length five month each

Occupation of the lower/upper nest boxes during the day



Average values for nesting behaviour and laying performance – per flock

flock	number of hens	time spent in nest box [min]	oviposition time [hh:mm]	laying performance [%]
1	247	31	07:51	70
2	241	32	08:15	67
3	243	26	08:58	80
4	483	26	08:25	77

Average values for nesting behaviour and laying performance – per laying period

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28-day laying period	oviposition time [hh:mm]	time spent in the nest [mm]	laying performance [%]
1	8:47	27	60
2	8:22	29	79
3	8:04	28	82
4	8:05	27	84
5	8:31	27	78

Heritabilties for nesting traits

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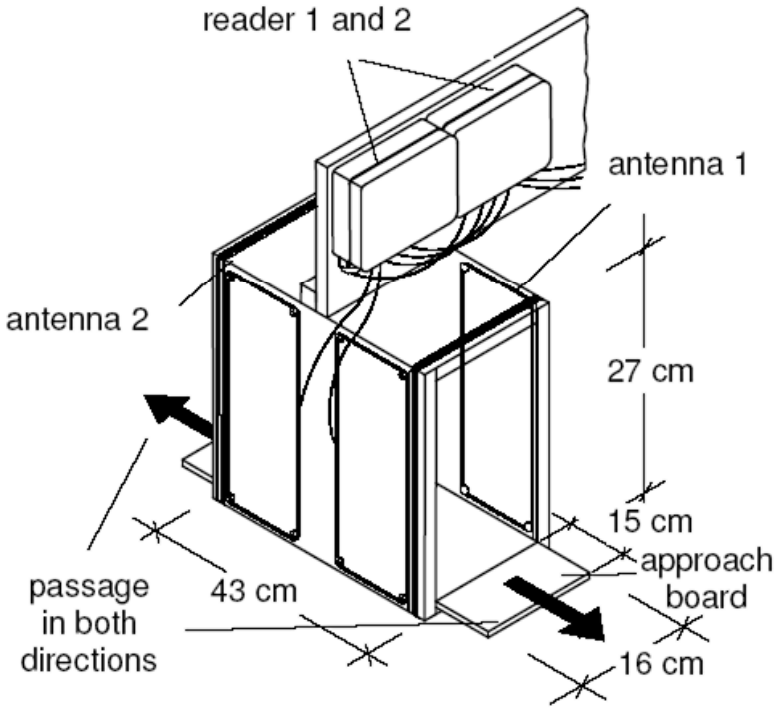
28-day laying period	oviposition time	time spent in the nest	laying performance
1	0.22	0.19	0.52
2	0.30	0.24	0.31
3	0.20	0.23	0.07
4	0.14	0.28	0.16
5	0.08	0.11	0.16

Conclusion - NEST

- individual laying performance testing in group housing systems is possible with the FNB
- the important trait nest acceptance is automatically recorded with the daily number of nest eggs
- the FNB provides additional information about the oviposition time and the duration of stay with useful genetic parameters

Electronic Pop Hole



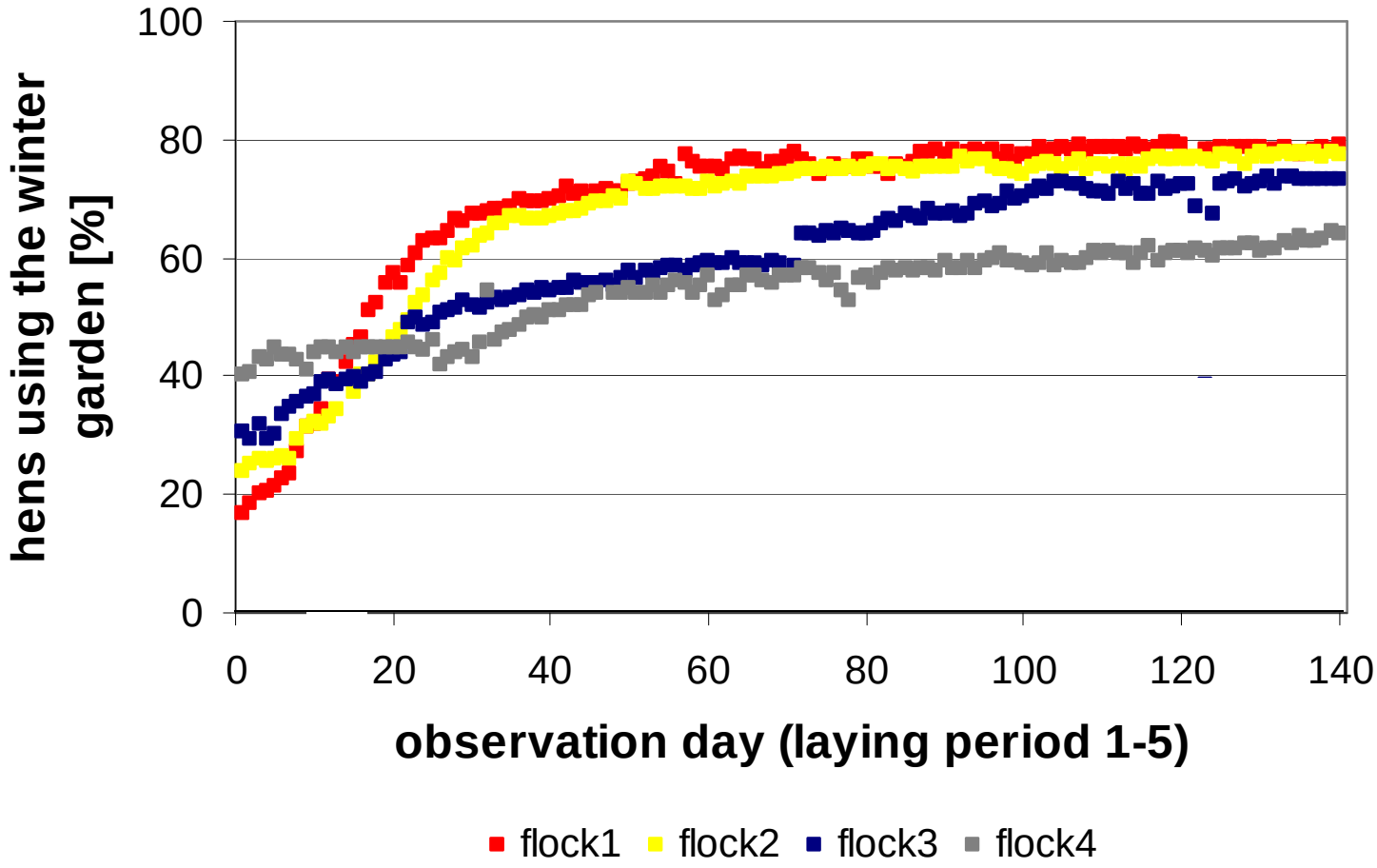
Recorded free-range behaviour traits

- the direction of passage
- the entree and end of each visit
- the duration of stay in- and outside
- the frequency of passages per hen and day

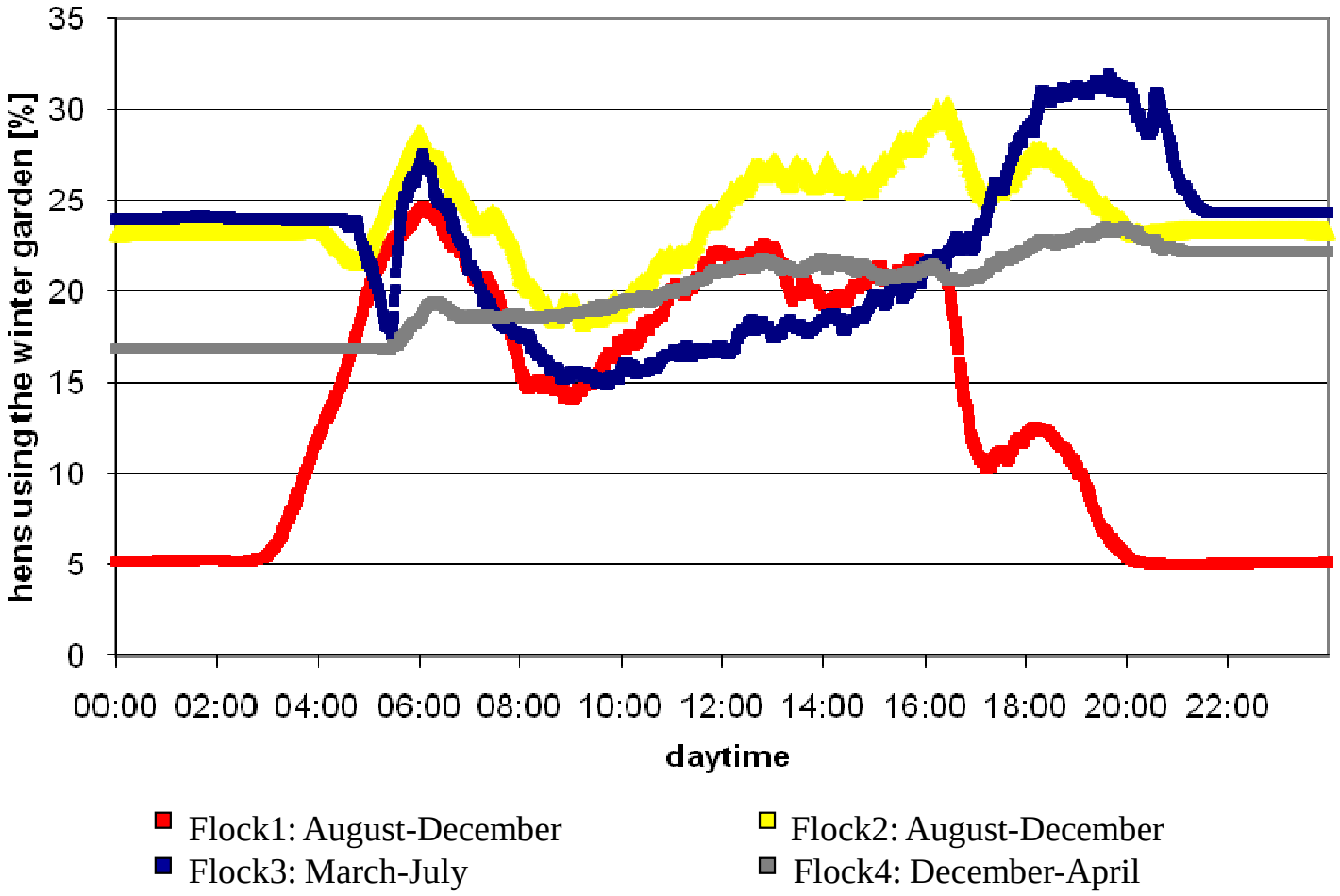
Utilisation of the winter garden

- 13% to 19 % of the tested hens never used the winter garden
- the number of hens which used the available winter garden varied a lot within observation period
- from the day on when a hen went out once she normally used the winter garden every day - familarisation!

Utilisation during observation period



Utilisation during the day



Average values for ranging behaviour traits

28-day laying period	time spent in the winter garden per hen and day [hours]	number of visits to the winter garden per hen and day
1	3.0	7
2	4.8	12
3	5.8	12
4	6.0	12
5	6.1	11

Heritabilities for ranging traits

28-day laying period	time spent in the winter garden per hen and day		number of visits to the winter garden per hen and day	
	h^2	SE	h^2	SE
1	**0.41**	0.05	**0.31**	0.04
2	**0.44**	0.05	**0.35**	0.05
3	**0.50**	0.05	**0.32**	0.05
4	**0.48**	0.05	**0.40**	0.05
5	**0.36**	0.05	**0.44**	0.05

Conclusion - ranging

- the fraction of hens that used the winter garden daily was in all flocks below 100 %
- the hens went out several times a day
- a genetic predisposition for the ranging behaviour of laying hens was shown by the estimated heritabilities for the two traits, length of stay and frequency of passages to the winter garden
- further development made it possible to install wide electronic pop holes where several hens can go through at the same time

➡ the first flock is being tested now

Relationship between nesting and ranging behaviour

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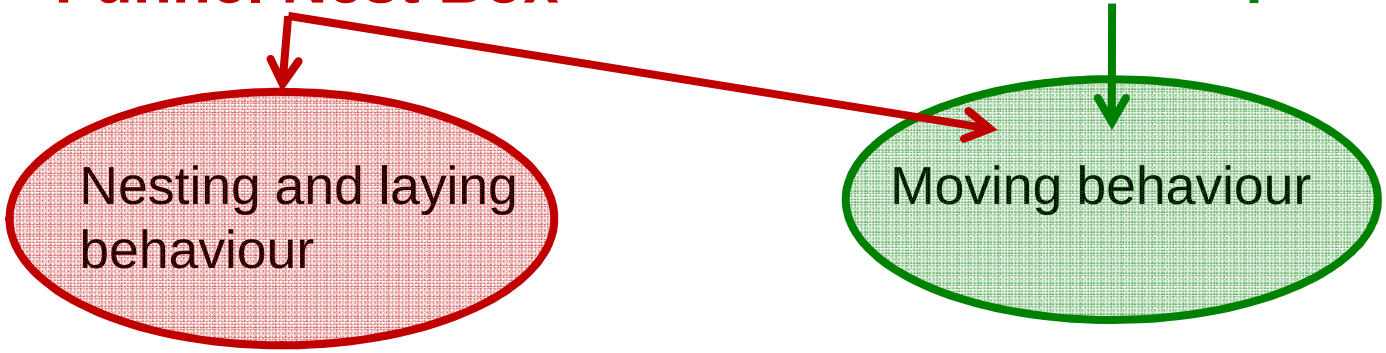
- Oviposition time
- duration of nest visit
- eggs per nest box
- assignment „egg - hen“

- time spent in the winter garden
- frequency of winter garden visits

Funnel Nest Box

Electronic Pop Hole



+ laying performance

+ usage of the free-range area

Heritabilities and genetic correlations for performance and nesting behaviour traits

laying performance	time spent in the nest	oviposition time	
0.40	+0.35 **0.26**	+0.25 +0.65 **0.19**	**period 1**
0.07	+0.44 **0.49**	-0.63 +0.22 **0.32**	**period 2-5**

Heritabilities and genetic correlations for performance and ranging traits

laying performance	time spent in the winter garden per hen and day	number of visits to the winter garden per hen and day	
0.39	-0.59 **0.64**	+0.37 +0.12 **0.34**	**period 1**
0.10	-0.75 **0.64**	+0.45 +0.11 **0.54**	**period 2-5**

In the near future

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- this preliminary information of the tested flocks were taken into account in the selection process.
- another 24 nest boxes were installed to test a higher number of hens and get more reliable genetic parameters
- potential unfavourable correlations between these behaviour traits and other selection criterions have to be further analysed