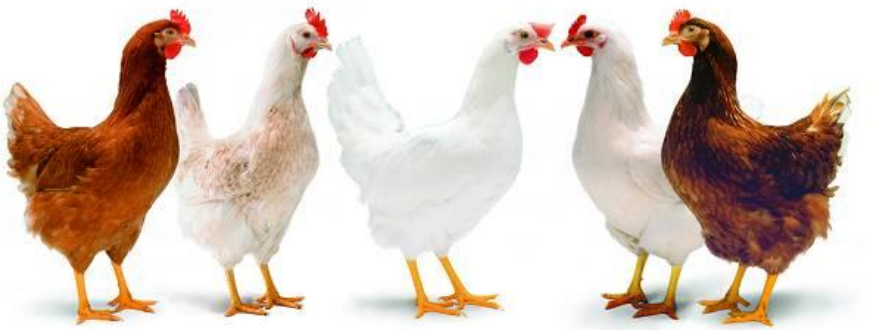
LOHMANN TIERZUCHT



Welcome

Genotype Environment Interaction:

Breeding layers with different requirements for varying housing systems

Presented by: Prof. Dr. R. Preisinger

30th PSS Glasgow, September 2011

Egg production

LOHMANN TIERZUCHT

- Cages
- Floor and aviary systems
  (barn eggs)
- Free-range
  (organic)

Difference in housing and feeding.

Performance testing

- Single bird cages
  (most favourable environment)
- Group cages
- Family/colony cages
- Cage-free (floor)
- Range

Laying mortality in different housing systems

	floor		aviary		cage
	without range	**free range**	**without range**	**free range**	
No. flocks	46	50	8	30	172
mean	**12.9**	**14.0**	**15.1**	**17.8**	**8.2**
best 10 %	4.6	6.1	2.3	7.2	3.6

Comparison of RST results in different environments

LOHMANN TIERZUCHT

Strain	Mortality, %		Egg Number		Egg Weight		FCR		Ranking of IOFC	
	cage*	floor**	cage	floor	cage	floor	cage	floor	cage	floor
A	2.0	0.8	322	300	66.0	66.6	1.94	2.25	1	1
B	5.0	10.3	327	294	63.7	64.2	2.06	2.40	3	2
C	2.1	9.2	312	281	63.4	63.2	2.21	2.56	4	3
D	1.0	18.3	323	260	63.8	62.6	1.99	2.51	2	4
Average	**2.5**	**9.7**	**321**	**284**	**64.2**	**64.2**	**2.05**	**2.43**		

Testing environment

Recording and selection have to be conducted in an environment that resembles the production environment as close as possible (less G X E)

Target:

Testing in the field under commercial conditions with transponder identification.

A hen in three phases

LOHMANN TIERZUCHT

Entering the nest

Occupancy

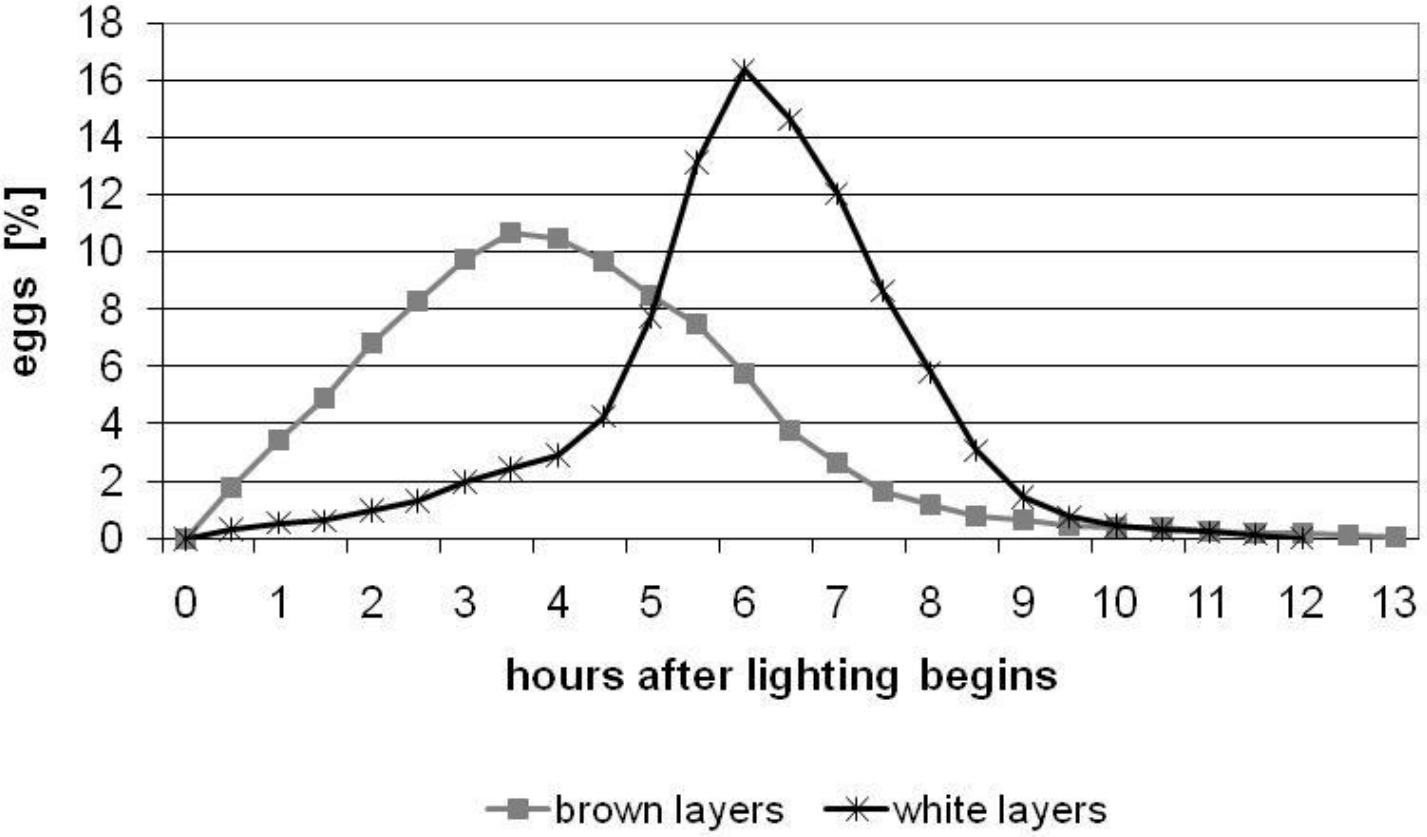
Exit

Selection criteria for nesting behaviour

LOHMANN TIERZUCHT

- Nest acceptance
  (saleable eggs in the nest)
- Oviposition time
- Duration of stay in the nest

Distribution of oviposition time during the day for two different strains



Average ovipositon time and duration of stay in the nest for brown and white layers

trait	brown layer	white layer
oviposition time	08:00	09:45
duration of stay with oviposition	30 min	45 min
duration of stay without oviposition	10 min	28 min

Percentage of hens in different time interval categories and corresponding laying performance

LOHMANN TIERZUCHT

flock	mean time interval of laying sequences [hh:mm]							
	< 24:00		24:00 bis 24:15		24:15 bis 25:00		>25:00	
	hens [%]	rate of lay [%]	hens [%]	rate of lay [%]	hens [%]	rate of lay [%]	hens [%]	rate of lay [%]
1	3	70	70	79	22	70	3	43
2	22	79	63	80	12	67	2	27
3	20	63	57	72	18	58	4	24
4	9	57	74	72	11	67	1	9

Heritabilities (diagonal) and genetic correlations for the trait number of saleable nest eggs

LOHMANN TIERZUCHT

		egg number in laying period 1 to 2		egg number in laying period 3 to 5	
flock		**cage**	**FNB**	**cage**	**FNB**
1a*	**cage**	**0.26**	+ 0.97	**0.10**	+ 0.44
1b*	**FNB**		**0.15**		**0.63**
2a*	**cage**	**0.29**	+ 0.56	**0.14**	+ 0.18
2b*	**FNB**		**0.31**		**0.29**
3a**	**cage**	**0.39**	+ 0.94	**0.11**	+ 0.22
3b**	**FNB**		**0.38**		**0.12**

* brown layer
** white layer

Shell quality

- Egg weight
- Shell-breaking strength

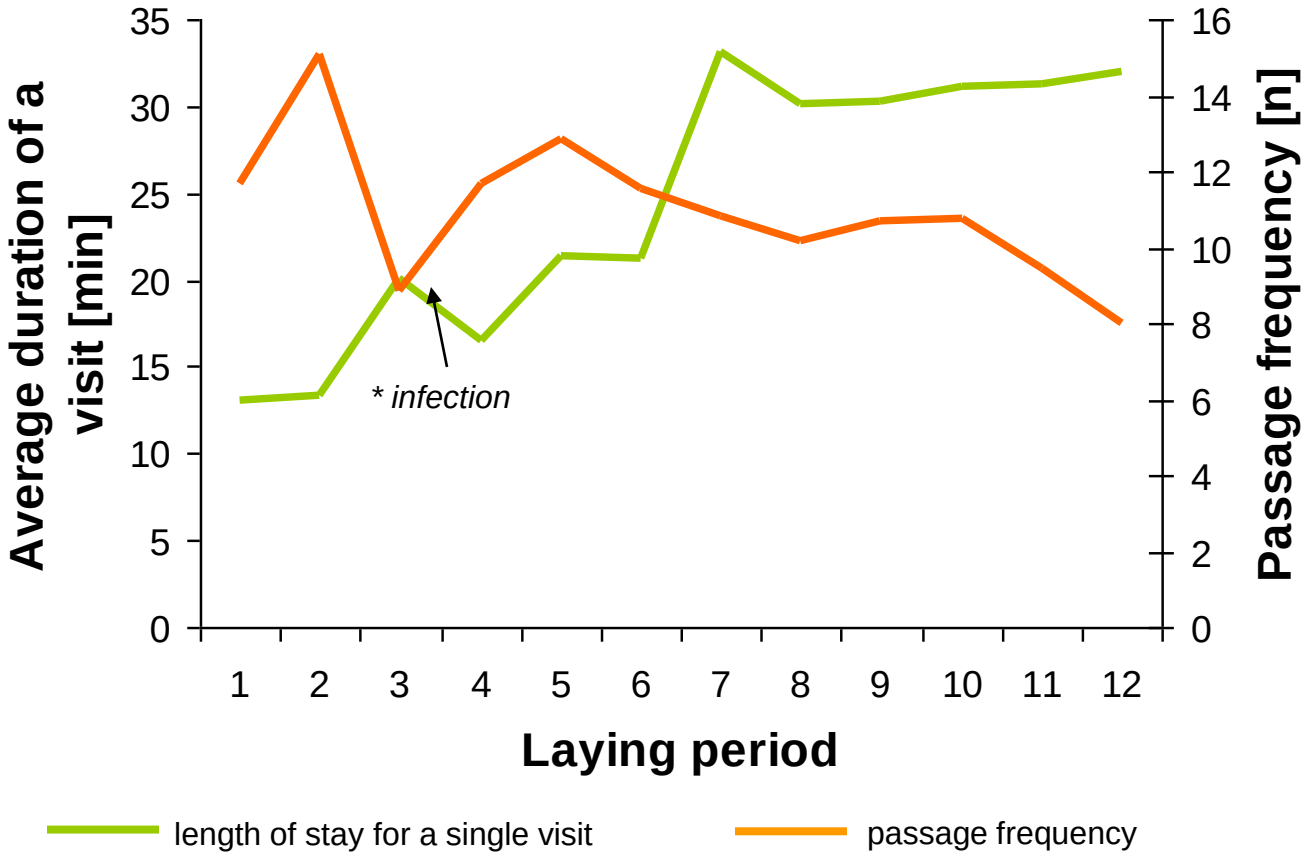
Heritabilities (diagonal) and genetic correlations for the egg quality traits

		breaking strength		egg weight	
flock		**cage**	**FNB**	**cage**	**FNB**
1a*	**cage**	**0.32**	+ 0.37	**0.72**	+ 0.78
1b*	**FNB**		**0.32**		**0.47**
2a*	**cage**	**0.41**	+ 0.79	**0.67**	+ 0.99
2b*	**FNB**		**0.38**		**0.69**
3a**	**cage**	**0.32**	+ 0.68	**0.71**	+ 1.00
3b**	**FNB**		**0.41**		**0.48**

* brown layer
** white layer

Average length of stay for a single visit and average passage frequency into the winter garden per hen and day

(for this evaluation were only hens used which paid visits to the winter garden)



Heritabilities for length of stay and frequency of passages into the winter garden

LOHMANN TIERZUCHT

28-day laying period	length of stay in the winter garden per day	frequency of passages into the winter garden
	h^2	h^2
1	0.08	0.09
2	0.10	0.15
3	0.04	0.00
4	0.21	0.16
5	0.19	0.18
6	0.10	0.14
7	0.14	0.18
8	0.21	0.30
9	0.32	0.44
10	0.22	0.32
11	0.28	0.45
12	0.29	0.49

Genetic correlations, heritability estimates and phenotypic correlations

LOHMANN TIERZUCHT

	Laying performance	Frequency of passages	Length of stay in the winter
Laying performance	**0.16**	-0.08	-0.34
Frequency of passages	+0.08	**0.24**	0.82
Length of stay in the winter garden	+0.07	+0.86	**0.24**

Genome wide selection

LOHMANN TIERZUCHT

- Performance testing continues
- Has to be established in all lines
  (4 white and brown egg lines)
- For pure line and cross line performance
- Selection within male full sibs

Summary

LOHMANN TIERZUCHT

- Testing in different environments (cages/floor/free-range)
- Selection based on different data sources (phenotypic and genomic)
- Selection for pure and cross line performance
- G X E of low magnitude in layers

LOHMANN TIERZUCHT

Thank you for your attention.

Do you have any questions?