Free-range behaviour and laying performance of table egg hens

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With the aid of a new transponder technology, the free-range behaviour and laying performance of 272 Lohmann Silver hens were tested simultaneously. Lohmann Tierzucht GmbH, together with the Bavarian State Research Centre for Agriculture and Institute for Agricultural Engineering and Animal Husbandry, investigated electronic pop holes (EPH) and funnel nest boxes (FNB).

These systems made it possible to automatically record each separate visit to the free-range area as well as the egg number by every single hen in the flock.

The hens were housed in an aviary with an adjoining winter garden at the Thalhausen experimental station (Technical University of Munich).

Tagged with transponders

To identify each single hen in the EPH and FNB, every hen was tagged with a transponder on one leg. During the whole investigation period of one year, the winter garden was continuously accessible for the hens.

28 day laying period	Laying performance (%)	Heritability (h^2)	Standard error
1	18.6	0.23	0.14
2	78.2	0.09	0.11
3*	39.0	0.13	0.12
4	84.7	0.20	0.13
5	93.9	0.05	0.10
6	94.2	0.15	0.12
7	93.3	0.19	0.13
8	80.4	0.15	0.12
9	93.6	0.19	0.14
10	91.5	0.45	0.16
11	90.9	0.09	0.10
12	85.7	0.34	0.17

Table 1. Laying performance, heritability and standard error for each 28 day laying period.

The frequency of passages (number of passages between the inside and the outside area) and the duration of stay in the free-range area of each hen was recorded daily.

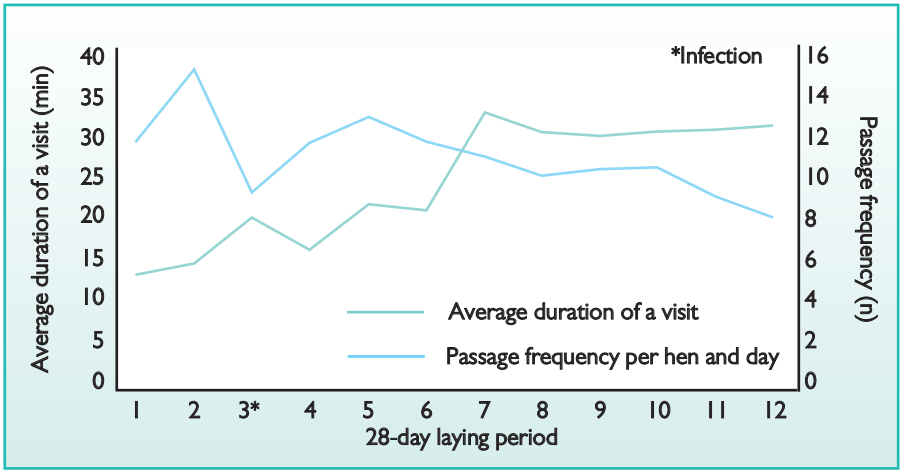
A large fraction of the hens (35%) did not use the winter garden at all. They were not even once registered at one of the four EPH throughout the whole year. The percentage of hens that used the winter garden (at least once in a 28 day period) increased during the observation period.

As soon as a hen was familiar with the winter garden, she visited the free-range area nearly every day.

Expected effects, like a reduction of the share during autumn and winter, were not found. The highest number of passages through the EPH was registered in the second laying period (15 passages per hen and day). Thereafter, the frequency decreased from a level of 13 passages in the fifth laying period to eight passages in the twelfth laying period.

The average length of stay in the winter garden showed an antagonistic trend to the frequency of passages. At the beginning of the observation period, the average visit to the winter garden had a duration of 14 minutes, whereas from laying period seven to the end of the observation, a single stay took an average of more than 30 minutes.

Fig. 1. Average length of stay for a single visit and average passage frequency into the winter garden per hen and day (only hens which paid visits to the winter garden were used for this evaluation).



Variation from hen to hen

The number of passages and the duration of stay in the winter garden showed a big variation from hen to hen. There were some hens which returned to the barn after a short glance into the winter garden, whereas others stayed nearly day and night outside.

Most of the passages through the EPH were registered in the morning between 6am and 8am as well as in the afternoon

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between 4pm and 5pm The average stay in the winter garden per hen and day was about 2.5-4.0 hours. At four o'clock in the morning, the artificial light in the barn was switched on and at 8pm, it was switched off. From 8am onwards, the hens were looking intensively for the FNB to lay their eggs.

The laying performance of the hens were calculated for each 28 day laying period, beginning with the first correct registered egg in the FNB.

A bacteria infection in the third laying period caused the very late peak of the laying performance (94.2%) in the sixth laying period. The laying performance stayed on a slightly lower level thereafter, with a drop to 86% during the twelfth laying period.

The estimated heritabilities for the egg number were generally at a low level, varying from one laying period to the next.

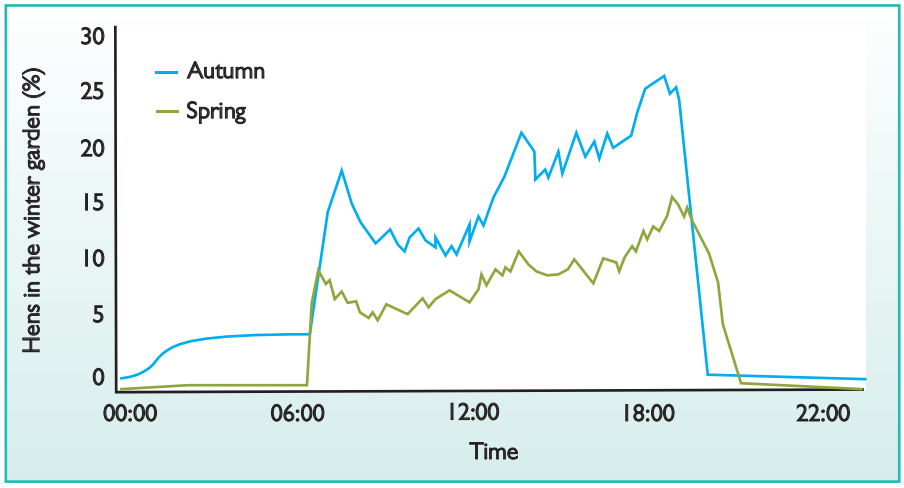

Fig. 2. Passages of frequency during the day and season.

Genetic correlations

Genetic and phenotypic correlations were estimated for the traits: frequency of passages, length of stay in the winter garden and laying performance. A highly positive correlation between the frequency of passages and the length of stay were expected and validated by the close relationship between both traits.

Negative genetic correlations were estimated between both parameters for the ranging behaviour and the laying performance.

Only a slightly negative trend could be found in the correlation between the traits: frequency of passages and laying performance, whereas a moderate negative correlation (rg = -0.34) was detected between the traits: length of stay in the winter garden and laying performance.

Until now, no literature could be found which describes the correlations between the two free range parameters (frequency of passages and length of stay) and the laying performance, as in this investigation. Therefore, the EPH and FNB first showed the possibility to simultaneously record the free-range behaviour and egg number for each hen in a group housing system, with a justifiable effort under field conditions.

The analysis showed interesting information and very promising results for layer breeding which should be confirmed in further investigations. Furthermore, it is being reviewed how the recorded data could be integrated into the current breeding programme to improve and sustain the nest and free-range acceptance. ■