

# Electronic identification of laying hens

*For behavioural investigations on layers in alternative housing systems with outdoor access, a recording unit was developed with which the movement direction of individual hens in a movement section from the interior of the house to the outdoor access or vice versa could be recorded. The automatic identification and registration system is based on electronic signals from each hen emitted by a transponder fitted in an identification mark affixed to the wing, a special identification unit and PC software for receiving the data, processing and evaluating it. With the help of this system behavioural parameters regarding position and length of time at each position could be automatically recorded and documented.*

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## Keywords

Electronic animal identification, laying hens, new housing systems, animal behaviour, automatic registration

The EU ban on conventional cage housing for layers from 2012 [1] is leading to more the developments in alternative housing systems. The main aim here is to create a system which allows hens to more fully realise their species-specific behavioural traits. This includes the chance of outdoor access to a natural ventilation scratching area (hen run) or to a field. In planning the optimum design for an outdoor run, it is important to have data on the individual bird behaviour as to visit frequency outdoors and the length of time of outdoor visits. Currently, however, behavioural observations can only be carried out with a high labour input. Adding to the difficulties are the facts that hybrid layers are genetically, as well as phenotypically, very difficult to identify one from the other. Thus analyses of individual bird behaviour are only possible through additional marking of the animal. Here, the application of electronic identification systems can make behavioural research much easier.

## Registration system for outdoor behaviour

An automatic registration system was developed and tested to enable information over the behaviour of layers in alternative forms of housing with outdoor access to be reliably collected without high labour input. For individual identification the layers were fitted with an electronic transponder (ISO-FDX-B-Transponder from Allflex Europe S.A., 11 mm • 2.1 mm). These transponders were fitted into a plastic identification mark from Diehl Ident GmbH (model DPW101). Pressing the mark together produced a C-form clip with a catch allowing the mark to be affixed through the wing. In this way measurements could be taken without affecting the movements of the hen. 70 hens from a total flock of 700 were thus marked on the left wing. The layers were kept in aviary housing (Volito GmbH) with round-the-clock unlimited access to a naturally ventilated hen run.

To enable the investigation of the hens' use of the run, an identification system was integrated into the access pop hole between building and run. The pop hole was decreased in size so that only one hen at a time could pass through (*figure 1*). To register the direction of travel, antennas were attached to each si-

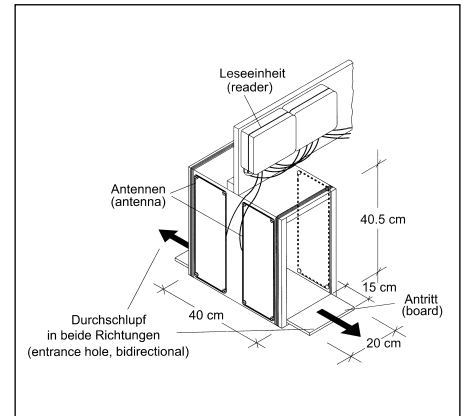


Fig. 1: Identification unit for hens integrated in the entrance hole

de of the pop hole. Thus the individual direction through the pop hole for each hen could be identified by the sequence of the recordings. Each antennae comprised a transit antennae complemented with two side antennae. This was to help ensure high identification reliability. The antennae were so designed that the identification area could not overlap so that each single passage direction could be reliably recorded. Used as receiver station was an ISO-compatible receiver (type DSE500 formerly from Diehl Ident GmbH, now Hotraco BV, Netherlands). The identification procedure at the pop hole was recorded by a specially-developed PC program (hen/identification and data recording program HID) whereby the receiver sent data to the PC via data bus (RS 485) in a time scale of 200 ms. The raw data received was stored and classified in a rational data bank (MS Access) within the PC. To get information rapidly over hen behaviour, the recording software was extended with an evaluation program. In this way, the operator was able to identify for every hen over a defined period the time, each journey, the location, the length of time at the location and the frequency of visits to the run. Additionally, the recorded data could be exported for further evaluation.

## First results

The results were presented based on the example of the movements of ten hens with data taken from a period of observation of six consecutive days. Regarding visit frequency

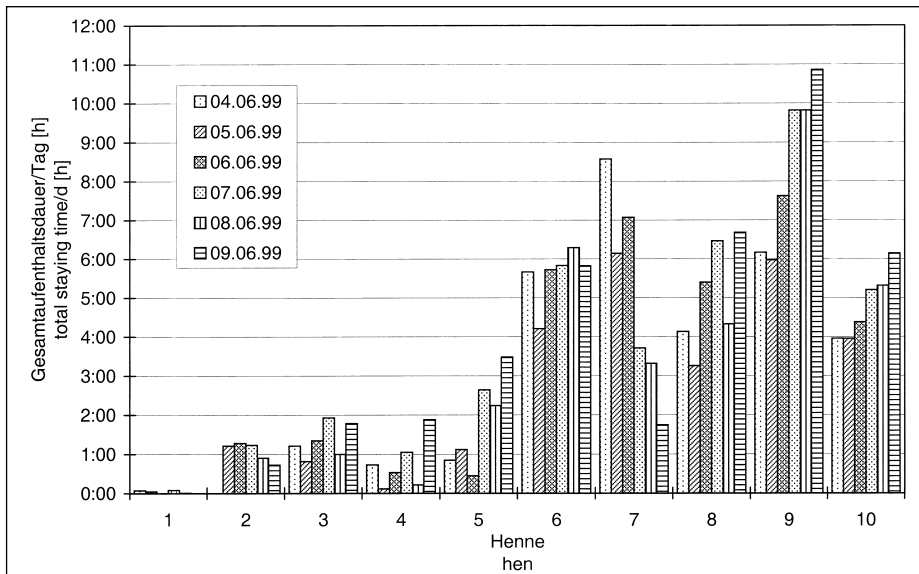


Fig. 2: Total daily staying time of the hens in the outdoor yard

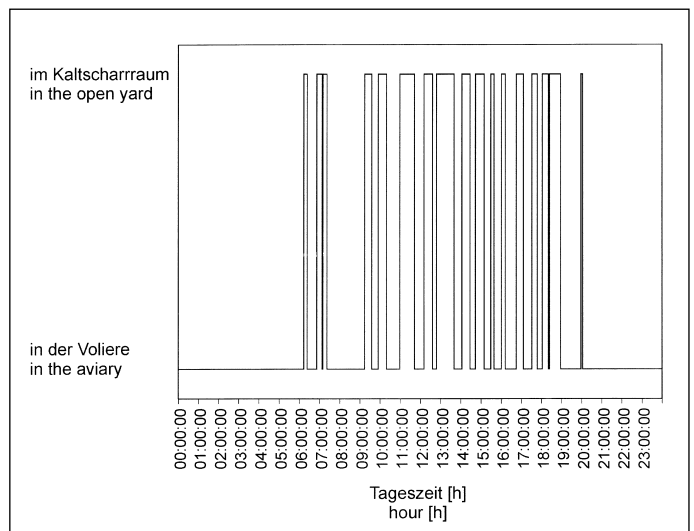
and length of stay in the run, it was shown that the hens had very different individual behaviour. Visit frequency varied from 0 to 22 per hen and day whereby each hen showed an individual behavioural pattern (table 1).

The observations of the visit lengths per day also clearly showed very different individual behaviour. It can be seen from figure 2 that the length of visit in the run varied between a few minutes and eleven hours.

Around the same visiting time was registered for hen 10 which had an average 17 visits/day as for hen 6 which achieved only half this visiting frequency. During 8.6, on the other hand, hen 2 had around the same length of visiting time in the run with only one visit as had hen 3 which exceeded hen 2's visiting frequency by a factor of almost eight. The time spent per single visit varied between 2 and 45 minutes whereby the average length of visit in the run for the ten hens was around 20 minutes.

The presentation of the behaviour in the outside run over the whole of the day is very helpful for the detailed study of activity behaviour. For instance on 4.6.1999 hen 9 paid

Fig. 3: Visiting frequency and duration of hen no. 9 in the outdoor yard



a short visit to the run as early as between 6.15 and 7.20 am. Between 9 am and 8 pm there followed more and longer visits (figure 3).

The results presented indicate that an automatic observation of behaviour is possible via a registration system. The chosen attachment system for the transponder in the form

of a wing mark showed itself to be a suitable system for electronic identification of layers. From the raw data in the data bank on the recorded movements it was apparent that the total proportion of incompletely recorded identifications was 0.8%. Thus a very high identification reliability of 99.2% was achieved.

### Conclusions

With the help of electronic bird identification and the utilisation of suitable pop holes as well as appropriately programmed software, behavioural investigations helping in the utilisation of outdoor access by layers could be easily carried out. With its identification accuracy rate of over 99% the total system displayed a high reliability which has the possibility of being further improved through additional optimising. Thus electronic iden-

tification allows layer behavioural investigations which would be almost impossible to execute using other methods. This can serve as a starting point in the improvement of the most different alternative housing systems.

### Literature

- [1] NN: Mehr Schutz für Legehennen in der EU. Agrarpolitische Mitteilungen, 5/99
- [2] Artmann, R. und H.-W. Rauch: Den Hennen auf der Spur. Landtechnik 51 (1996), H. 5, S. 286-287

Transponder No.	Hen No.	Number of visits on each day						Visits/day Ø
		4.6	5.6	6.6	7.6	8.6	9.6.	
1565568	1	3	1	0	1	1	0	1,0
28357	2	0	1	2	2	1	1	1,2
29539	3	7	7	6	7	8	12	7,8
1292272	4	7	2	7	10	4	18	8,0
1473341	5	9	8	5	10	7	12	8,5
105968	6	6	8	8	12	9	11	9,0
123929	7	14	13	8	5	11	4	9,2
140134	8	10	11	14	16	19	18	14,7
12970	9	17	16	12	15	19	14	15,5
18943	10	13	14	15	19	22	21	17,3
Total visits		86	81	77	97	101	111	92,2

Table 1: Frequency of hen visits in the outdoor yard