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# Results of the Animal Needs Index (ANI-35L) compared to animal-based parameters in free-range and organic laying hen flocks in Austria

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## Abstract

*The aim of this study was a comparison of Animal Needs Index (ANI) data, derived from annual inspections by a control agency, with data collected from 164 selected on-farm flocks concerning feather damage, injuries, egg production, mortality, bodyweight, foot pad dermatitis, keel bone deviations and reactions towards humans (eg flock showed marked avoidance when the observer walked through the hen-house [yes/no]).*

*Analysis of data showed a low number of significant correlations with total ANI scores and category scores: 1) Locomotion, 2) Social interaction, 3) Flooring, 4) Light, air and noise and 5) Stockmanship. Correlations found were low and total ANI score showed only a positive correlation with egg production at week 52. Category 3 scores correlated positively with egg production at week 70 and negatively with the percentage of hens with featherless areas and total pecking injuries. Category 5 scores showed positive correlations with egg production at week 52 as well as week 70 and negative correlations with mortality at week 52, the percentage of hens with featherless areas, pecking injuries < 0.5 cm and total pecking injuries.*

*Flocks showing marked avoidance had a lower total ANI score and lower category 3 and category 5 scores.*

*In conclusion, welfare-related animal-based parameters are poorly reflected by the ANI-35-L/2001. To assess animal welfare more adequately, animal-based parameters have to be considered additionally in a welfare assessment scheme.*

**Keywords**: *animal-based parameters, animal health, Animal Needs Index (ANI), animal welfare, laying hen, on-farm welfare assessment*

## Introduction

Assessing on-farm animal welfare has received much scientific and public attention during recent years, as consumers increasingly regard animal welfare issues as an important component of overall product quality (Blokhuis *et al* 2003). This is especially true for labels which refer to animal welfare as a key feature, and organic livestock production. In both cases, consumers not only expect that housing conditions and management at the farms are above minimum standards set by animal welfare legislation, but also, that animals actually experience good welfare. In order to assess the level of welfare, different approaches have been chosen, which take into account environmental (or resource) based parameters or animal-based parameters, or a combination of both (Johnsen *et al* 2001). In Austrian label and organic egg production (at present approximately 470 farms with 770,000 hens) not only the compliance with label standards is controlled, but also the animal needs index ANI 35L/2001 for laying hens (Bartussek 2001) is used to control and certify farms. The main part of this index contains environmental and management factors; only three parameters are animal related. The index is based on 5 category scores: 1) Locomotion, 2) Social interaction, 3) Flooring, 4) Light, air and noise and 5) Stockmanship, all of which are added up to give the total ANI score. Single parameters are weighted with regard to their putative importance for welfare. A compensation between different areas is possible. EFSA (2005) identified the following indicators of impaired welfare in laying hens: injurious or feather pecking, foot pad dermatitis, keel bone deviations and fractures, increased mortality, low productivity, and an impaired human animal relationship leading, for example, to excessive reactions of the hens to the presence of humans. The aim of this study was to investigate whether the ANI has the potential to predict the occurrence of these indicators.

## Materials and methods

From 2002 to 2005, 124 free-range and organic flocks which had problems with injurious pecking or feather pecking were visited. For comparison, data from 40 flocks without these problems were collected. Twenty hens per flock were caught at random and bodyweight, feather condition, injuries, keel bone deviations and foot pad dermatitis were assessed using a scoring system based on



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**Table 1 Spearman correlations ($r_s$) between some animal-based parameters and ANI scores.**

| Conditions (%) | Category scores | | | | | Total ANI score |
|---|---|---|---|---|---|---|
| | 1 Locomotion | 2 Social interaction | 3 Flooring | 4 Light, air and noise | 5 Stockmanship | |
| Feather damage | 0.00 | 0.08 | -0.19* | 0.01 | -0.16* | -0.09 |
| Featherless areas | 0.04 | 0.09 | -0.23** | -0.09 | -0.27** | -0.15 |
| Pecking injuries < 0.5cm | 0.00 | 0.04 | -0.19* | -0.13 | -0.32** | -0.18* |
| Pecking injuries ≥ 0.5cm | 0.00 | 0.16* | -0.17* | -0.04 | -0.19* | -0.04 |
| Total pecking injuries | 0.01 | 0.08 | -0.20** | -0.10 | -0.32** | -0.16* |
| Footpad dermatitis | -0.06 | -0.14 | -0.02 | 0.03 | 0.09 | -0.04 |
| Keel bone dermatitis | -0.13 | -0.14 | -0.15 | 0.05 | 0.14 | -0.09 |

* $P \leq 0.05$, ** $P \leq 0.01$.

the one developed by Gunnarsson *et al* (1995). Additionally, egg production (% per hen housed) at weeks 52 and 70, mortality until weeks 52 and 70 as well as the behaviour of the flock (flock showed marked avoidance when the observer walked through the hen-house [yes/no], birds were staying close during catching [yes/no], flock flew up while catching [yes/no])were recorded.

### Statistical analysis

Correlation of data collected during farm visits with total ANI and category scores, which were derived from controls of the flock by the control agency, were calculated (Spearman). Average bodyweights of flocks were transformed into classes below, within or above the limits established by the breeding companies. Relationships between bodyweight or the reactions towards humans and ANI scores were tested via the Wilcoxon test. For all analyses the SAS program package version 8 was used (SAS 1999).

## Results

Analysis of data, in general, showed only low correlations with total ANI scores and category scores.

Total ANI score correlated with egg production in the 52nd week of age ($r_s = 0.33$, $P = 0.002$), but in regard to all other parameters, no significant correlations were found (Table 1).

Category 3 scores (Flooring) showed a negative correlation with the percentage of hens with featherless areas and total pecking injuries (Table 1) and a positive correlation to egg productivity at week 70 ($r_s = 0.36$, $P = 0.039$). Points given in category 5 (Stockmanship) correlated negatively with the percentage of hens with featherless areas, pecking injuries ie < 0.5 cm and total pecking injuries (Table 1). Furthermore category 5 scores showed significant correlations with egg production at week 52 ($r_s = 0.22$, $P = 0.045$) and week 70 ($r_s = 0.40$, $P = 0.018$) as well as with mortality at week 52 ($r_s = -0.26$, $P = 0.008$).

No significant relationship could be found between bodyweight and ANI scores (Wilcoxon).

Total ANI score ($P = 0.023$), category score 3 ($P = 0.046$) and 5 ($P = 0.022$) were significantly related to marked avoidance when the observer walked through the hen-house.

## Discussion

Although total ANI points were above 28 in 95% of cases, which would result in such houses being classified as 'very suitable with respect to welfare', the welfare of the flocks measured on the basis of animal-related parameters was often impaired. Serious welfare impacts from feather and injurious pecking, keel bone deviations and foot pad dermatitis were only therefore reflected to a lesser extent by ANI results. The results of this study using data derived from free-range laying hen flocks are in line with Mollenhorst *et al* (2004) who found no significant correlation between animal-based parameters and ANI-200 scores within deep litter housing systems. One explanation could be the different weighting of parameters within the ANI and the possibility of compensation for deficits in one area with better conditions in another. Nevertheless, epidemiological investigations into the multifactorial origin of feather and injurious pecking (Pötzsch *et al* 2001; Bestman & Wagenaar 2003; Nicol *et al* 2003; Niebuhr *et al* 2005) showed only a few significant links regarding the possible influence of environment and management factors on farm. Elevated fracture rates in laying hens housed in alternative systems have been described lately by Wilkins *et al* (2004) using a palpation method comparable to the one used in this study. Foot pad dermatitis also appears to be a common problem (Wang *et al* 1998). In these two cases it is still not clear to what extent environmental and management factors contribute to these welfare problems (Wang *et al* 1998; Wilkins *et al* 2005). It is therefore questionable, whether a scheme like the ANI will be able to replace direct collection of data on feather damage, injuries, keel bone damage and foot pad dermatitis and the other indicators assessed during this study.



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## Conclusion and animal welfare implications

For laying hens housed in alternative systems, experience has shown that ANI-35-L/2001 is a suitable tool for helping farmers to identify areas which are worth improving in their housing systems. In order to assess animal welfare of laying hens on farms with alternative systems, animal-based parameters have to be included additionally into a welfare assessment scheme.

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