



Comparison of high and medium yielding laying hen in an organic system

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Background

The high yielding hen has, through many generations, been selected for high performance on the base of their production capacity measured in individual cages. Thus little attention has been paid to her genetically based ability to behave well in larger flock of hens. The result of such breeding policy is a high yielding hen, but it seems that she has lost some of her ability to have social relation with many hens in large flocks. In free-range systems with large flocks, including organic farming systems, too many cases have been observed in which hens have started to perform feather pecking that ended with an unacceptable high rate of cannibalism.

The market share of organic farmed eggs in Denmark, has during the years 1996-1998 increased from nought to 12%. – In 1998 the market shell-egg from non-caged hens was 40%.

Thus the question has been raised many times during the last few years: is there breeding material available that is better suitable for free range production?

A small scale Danish Hatchery “Hellevad” has bred a New Hampshire line ever since 1960 under floor condition and with a mild selection pressure on laying traits, later (1981) they continued the female line (White Leghorn) of the former “Skalborg” hen. These two lines their crosses and the most sold stock for brown-shelled eggs ISABrown were compared in an organic environment.

Material and Methods

Hatching eggs from the New Hampshire (NH), the White Leghorn (WH) and their crosses (WL x NH) from “Hellevad”, and ISABrown were received and hatched, and the chickens reared in the conventional system at the Research Centre Foulum. The 1-d-old chickens were vaccinated against MD, but otherwise no prophylactic treatment was used and they were not beak trimmed.

At 16 weeks of age (ultimo July), the pullets were placed in the organic environments in 24 “Eco cottage” each on 8 m² indoor area and with access to 200 m² grassy field, such a unit will inhouse 40 hens. The “Eco Cottage” had wall and floor of pine wood, and electric power was installed to give light and to ensure the supply of drinking water during the winter. The floor was littered with chopped wheat straw. The interior was equipped with 6 nests and with perches and the feed was supplied from hopper feeder.

As the WL pure line did not deliver enough hatching eggs only 3 replicates were placed while 6, 7 and 8 replicates were placed for respectively WLxNH, NH and ISABrown, with 30 hens per replicate. During 6 month to the age of 43 weeks the

hens were tested for laying traits, mortality and some behaviour trait. Indoor there was 16 h light throughout the experiment. Ventilation and temperature was given by the climate. A pelleted complete feed ration with 80% of the ingredient, organic grown, were fed ad lib. The ration contained 10 MJ metabolisable energy per kg and 13,8% crude protein. Data is given per replicate and analysed by a model which contained the genetic group and the means is presented as Least Square means due to the unbalanced nature of the data.

Results

In the table is presented the major traits regarding egg production, feed conversion and mortality as LS-means for the various lines.

Traits	NH	WL	WL x NH	ISA-Brown	P< ¹
Rate of Lay, %	63.0 ^c	74.0 ^b	70.1 ^b	84.9 ^a	0.0001
Rate of lay, during January	54.2 ^c	67.2 ^b	61.4 ^{bc}	81.4 ^a	0.0001
Nos. of eggs, Hen placed 16-43 weeks	86.6	102.7	107.2	128.0	
Nos. of eggs, Hen placed 40-43 weeks	11.3 ^b	14.9 ^{ab}	14.2 ^{ab}	16.0 ^a	0.0156
Age at first egg, weeks	21.9 ^{ab}	22.5 ^a	20.7 ^b	19.0 ^c	0.0019
Egg weight, g	54.7 ^c	58.3 ^{ab}	57.0 ^b	59.3 ^a	0.0001
Feed conversion, kg feed/kg eggs 16-43 weeks	4.50 ^a	3.35 ^b	3.77 ^b	2.73 ^c	0.0001
Total Mortality, %	13.8 ^a	6.7 ^b	3.9 ^b	19.9 ^a	0.0199
Mortality-cannibalism, %	1.4 ^b	0.0 ^b	1.1 ^b	16.0 ^c	0.0001

^{a-c} Estimates in a row with no common superscript differs significantly (P<0.05)
¹ Probability for F-values for effects of lines in the ANOVA

The New Hampshire lines had a low yield and a mortality due to other causes than cannibalism which is above the acceptable, while the White Leghorn line performed reasonable well although the general mortality is a bit high. The crosses between these two lines had a high viability, but unfortunately not a yield which brings its up to the standard of ISABrown which in turn had a much to high cannibalism.

It is remarkable that even during December/January in which we had temperature down at -20 the laying pattern does not seems to be disturbed.

Conclusion

ISABrown was clearly the best layer also in an organic system in which the sulphur amino acids in the diet was below the requirement, but they performed an unacceptable behaviour regarding cannibalism that makes them unacceptable under the organic concept.

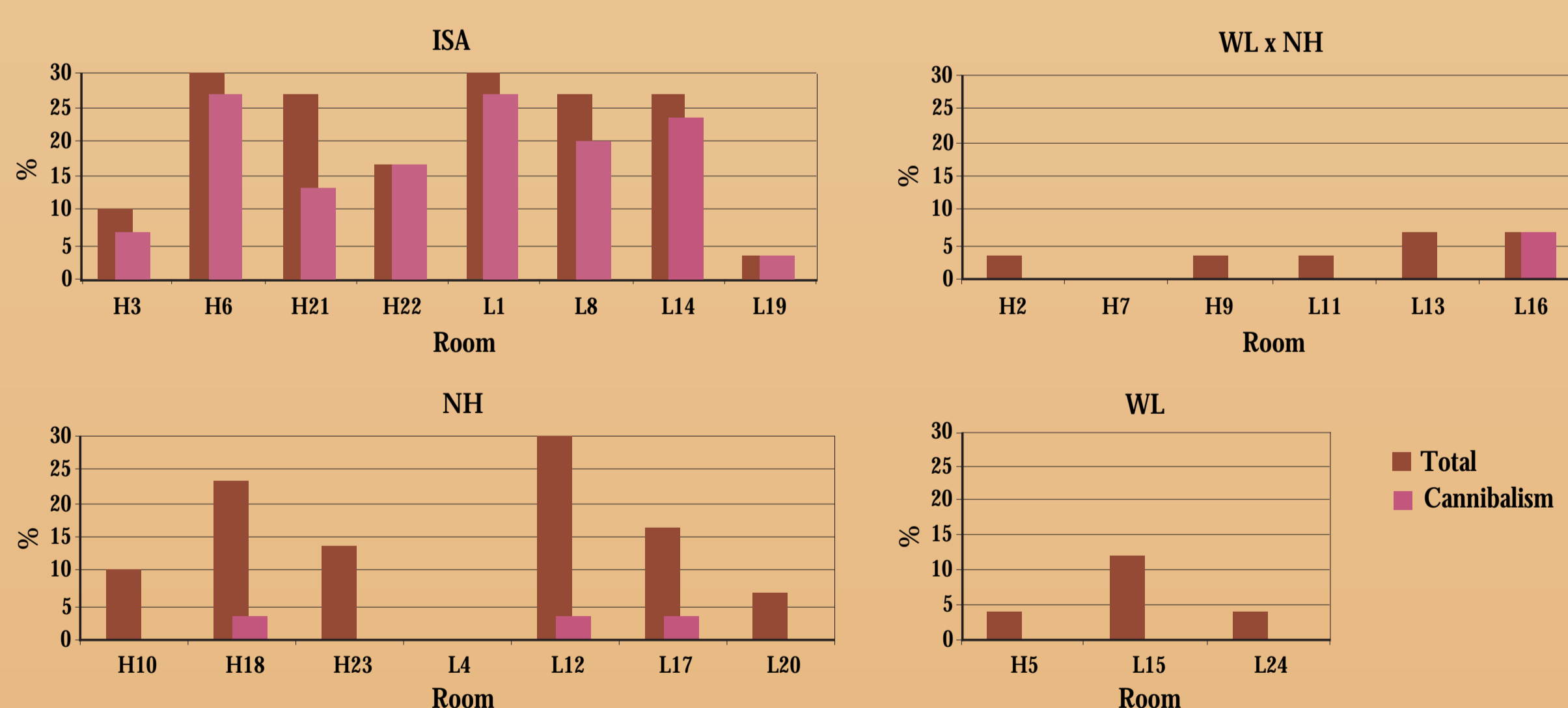


Figure 1. Mortality based on individual replicate for each of the four breeds/crosses

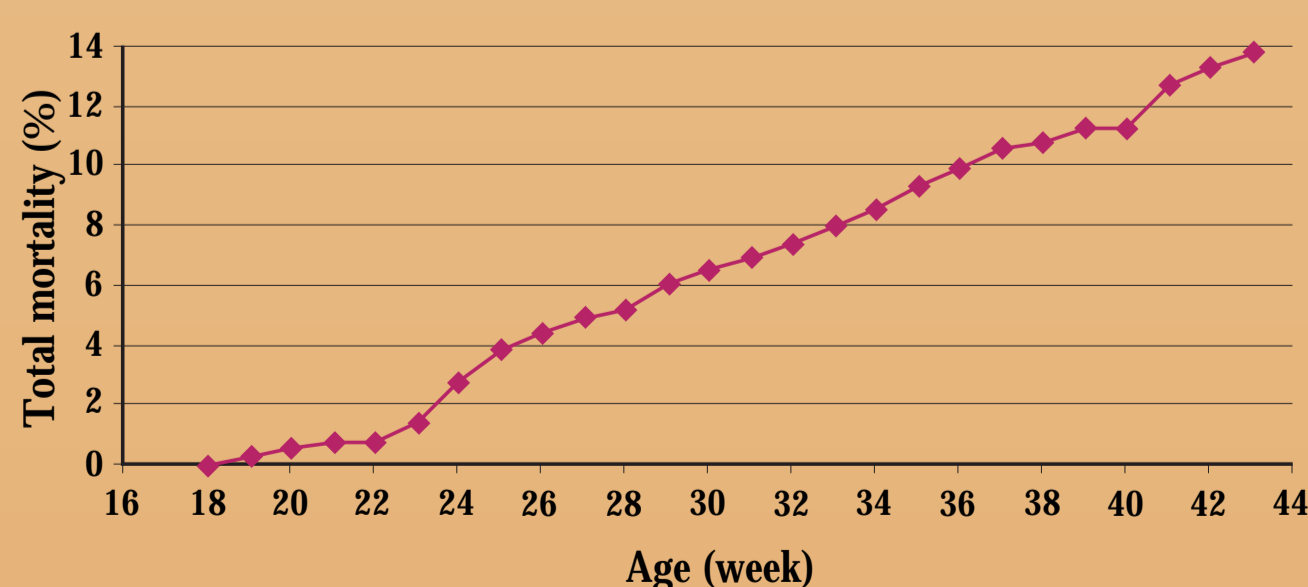


Figure 2. Total mortality cumulated over time for the four breeds/crosses

