Low Input Breeds: search for the ideal laying hen for organic and free range systems

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Since 1960 the majority of commercial layers are housed in cages. Non-cage housing started to appear again from 1980 onwards and increases in importance. It is questionable if birds bred to perform in cages are also suited for free range housing. We examined the performance of current genotypes in free range systems (organic and conventional) by an inventory among laying hen farmers in Switzerland, The Netherlands and France (325 flocks on 275 farms) and organised workshops with farmers to discuss their ideas on breeding goals ('the ideal hen') for free range systems.

Farm size differs between the two systems and the three countries. Egg production in organic systems is lower and mortality higher compared to free range. The difference is most pronounced in The Netherlands and almost non-existent in France. In France both organic and free range hens had treated beaks, in Switzerland none of the birds had treated beaks. In The Netherlands free range birds have treated beaks, organic birds not (Table 1).
In Switzerland and The Netherlands brown, white and silver hens were kept and in France only brown hens. In total there were more than 20 different genotypes: 10 'brands' of brown hens (1 – 51 flocks/brand), 3 brands of white hens (4-28 flocks/brand), and 4 brands of silver hens (3-15 flocks/brand). In Switzerland one brown genotype is favoured, in The Netherlands another one and in France a third one. In Switzerland there were quite a number of White flocks (CH 35, NL 7), while the silvers were much more kept in The Netherlands (CH 5, NL 32). In Switzerland there were 73 mixed flocks (brown and white, brown and silver, white and silver).

The Brown+White mixed flocks produced significantly worse than all other groups. In organic systems the Silver hens were not significantly different from the Brown ones, but produced less than all other groups. In general differences in production can be attributed to the differences in mortality. The White hens perform quite well in free range and organic systems. These results are confounded with country: the white hens were predominantly present in Switzerland and the silvers in The Netherlands. Yet, the general picture is lower production per hen housed and higher mortality in organic systems compared to free range systems and lower production per hen housed and higher mortality among the Silvers (Table2).

There was no relation between flock size and production or mortality. In smaller flocks these traits were more variable than in larger flocks. The farmers indicated longevity and adaptability as most important characteristics, besides behaviour: curious, but calm, good nesting behaviour and not prone to trooping/smothering. The ideal hen has a good eating capacity and probably should be a bit heavier than current genotypes to cope with the stress in free range systems. Adaptability and fast recovery after a dip in production were considered more important than a high peak production.

We continue with farm visits to get more insight in differences between genotypes and GxE interactions and with a network of farmers, that are interested in experimenting with different genotypes and give feed back to the breeding company on performance of the flock in a standardized way.

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Table 1. Number of farms, number of flocks, flock size, average age at transfer of pullets to the layer house, beak treatment, housing system, egg production per hen housed and mortality (%) up to 60 weeks of age, estimates of feather cover and percentage of hens outside per country and system.

System	Switzerland		France		The Netherlands	
	Free range	Organic	Free range	Organic	Free range	Organic
N farms	35	91	31	11	48	57
N flocks*	52	102	26	10	71	57
Flock size	3.093[a]	1.635[a]	7.577[b]	4.682[ab]	17.625[c]	8.077[b]
min-max**	500-8014	500-2000	1700-18000	2298-9000	1500-45050	330-18350
Age transfer (wk) ***	18.3	18.0	17.7	17.6	17.6	17.2
N flocks intact beaks***	52	102	0	0	0	51
N flocks touched beaks***	0	0	13	2	0	0
N flocks trimmed beaks***	0	0	13	8	69	0
N flocks in aviaries***	52	100	1	1	40	28
N flocks in floor housing***	0	2	24	9	31	27
N eggs	244.1[a]	241.9[a]	247.0[a]	245.4[a]	244.9[a]	231.0[b]
Mortality (%)	5.9[a]	6.6[a]	4.9[a]	4.7[a]	6.6[a]	12.0[b]
Feather cover (score)****	0.71[ab]	1.11[abc]	0.35[a]	0.9[abc]	0.96[bc]	1.35[c]
Hens outside (%)	ND	69[c]	29[a]	35[a]	25[a]	54[b]

[a,b,c] Figures with different letters within lines differ significantly (P<0.01) Statistical analysis of flock size, egg production, mortality, feather score and % hens outside is done on a flock basis.

* Some farms had more than 1 flock. Not all farmers provided data on beak treatment or housing equipment.

** Minimum and maximum flock size per country and system. *** Data not subjected to statistical analysis

**** Scores: 0: no birds with a bad feather cover, 1: <25% birds with a bad feather cover, 2: > 25% birds with a bad feather cover. ND No data available

Table 2. Eggs/hen housed (N) and mortality (%) until 60 wk of age by genetic group

	White	Brown	Silver	Brown+Silver	Brown+White	White+Silver
Eggs/hen housed						
Free range(N)	248.7^{c}	246.2^{c}	237.8^{bc}	248.0^{c}	200.0^{a}	NP
Organic (N)	243.5^{c}	239.1^{bc}	227.2^{b}	254.3^{c}	240.8^{c}	243
Mortality						
Free range(%)	5.2^{bc}	5.8^{bc}	9.8^{bcd}	5.5^{abc}	1.0^{a}	NP
Organic (%)	3.5^{ab}	8.0^{bc}	13.4^{d}	9.6^{bcd}	7.1^{bc}	10.4

^{a,b,c} Figures with different letters between rows and within lines 1-2 and 3-4 respectively differ significantly ($P<0.01$). NP: Not present