Ethological investigation on moulting laying hens in organic farming

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From an ethical point of view a longer life for laying hens is desired. Then, hens can be used for a longer period and less male chicks would have to be killed at the age of one day. In large flocks of laying hens moulting has to be induced to prevent social instability in the flock. A method was investigated in order to moult laying hens without too much stress for the hens. The chosen method with daily access to a winter garden had no detectable negative effect on the behaviour of the hens. The moulting succeeded in improving egg quality and plumage condition.

KEYWORDS: laying hens, moulting, ethology, organic farming

Introduction

Organic egg farmers mainly rely on the same hybrids, breeding techniques and production schemes as conventional egg producers. This includes annual replacement of the laying hens. However, from an ethical point of view a longer life for laying hens is desired, not only because the hens can be used for a longer period but also less male chicks would have to be killed at one day of age. Birds have to moult their plumage from time to time. During this time they hardly take in any food and stop laying. This laying interval presents a recuperation period for the egg producing organs of the hen. After moulting, egg production is again higher and the egg quality is improved [1, 2]. In large flocks of laying hens moulting has to be induced to prevent social instability in the flock otherwise moulting could result in feather-pecking or even cannibalism.

Certain organic label organisations believe that the induction of a moult with food and light restriction might be too stressful for the hens. Therefore, the Swiss organic regulations [4] forbid the induction of moulting. The following experiments were performed to provide information about the influence of moulting on the behaviour of hens.

Preliminary study

In a preliminary study we carried out three different methods of inducing moulting with the following main differences. In method 1, the hens were in the poultry house all day, light was reduced to 6 hours per day and they could only eat bran (limited to 30 g per hen per day). In method 2, the hens had access to a wintergarden during daytime, light was reduced to 8 hours per day and they had unlimited access to bran. In method 3, the hens had access to a wintergarden and a hen run during daytime, light was not reduced and beside unlimited access to bran they got 30 g of oats per hen per day. In each method four groups of 60 to 75 hens were moulted. Behaviour, plumage condition and egg quality was recorded before and after moulting.

The preliminary study showed that all three methods resulted in a moult. However, hens of method 3 did not moult synchronously. The hens moulted with method 2 were the least aggressive and had the best plumage of all groups. They also seemed to have moulted without too much stress. In a follow-up study, we therefore tested method 2.

Method

On eight organic farms with flock sizes of 250 - 500 laying hens were moulted according to the method developed in the preliminary study. The method included a reduction of the lighting period and feeding restrictions for 14 days whereas water and shell limestone were accessible unlimited every day. The chosen method also included daily access to a winter garden but no access to the hen run for 24 days (Table 1). Moulting was induced at week 63 to 68. Differences in behaviour, plumage condition and egg quality before (basis), on day 15 (middle; without egg quality investigation) and 73 days after induction of moulting (end) were tested with the Wilcoxon paired t-test. For the behavioural investigation the categories moving, passive behaviour, feeding, foraging and comfort behaviour were recorded in 12 scan samples on three points of time (basis, middle, end) with an interval of 20 minutes. Additionally, all occurrences of feather pecking was recorded twice during 30 minutes per point of time (feather pecking interaction per 30 minutes and per 50 hens). To determine the condition of the hens their weight was measured and the plumage condition was scored from 1 to 4 (1: intact plumage, 2: some defective feathers, 3: broken feathers, 4: featherless parts). To identify the egg quality we tested the hight of the egg white (Haugh Units) and the resistance of eggs for breaking (kp).

Results

The induced moulting had no negative effect on the behaviour of the hens. After the moulting phase, there was no more feather pecking than before and most other behavioural elements were also performed at the same frequency. However, there was less passive behaviour after the moulting phase than before ($N=8$, $T=3$, $p<0.05$) (Tab. 2). In the middle, there was more comfort behaviour than at basis ($N=8$, $T=3$, $p<0.05$)

and less foraging behaviour (N=8, T=1, $p<0.05$) and moving (N=8, T=2, $p<0.05$). The weight of the hens decreased from 1926 g (basis) to 1625 g (middle) but increased again to 1913 g at the end. This resulted in no significant difference from the basis to the end recording (N=8, T=15, ns). Plumage condition was improved from an average score of 2.3 (basis) to 1.6 (end) (N=8, T=0, $p<0.05$). The method succeeded in improving egg white quality from 81.5 Haugh Units to 86.4 Haugh Units (N=8, T=1, $p<0.05$) and egg-shell strength from 3.49 kp to 4.00 kp (N=8, T=1, $p<0.05$). The egg weight increased significantly from 67.7 g (basis) to 69.9 g (end) (N=8, T=0, $p<0.05$).

Discussion

In the behaviour, there were only minor differences from basis to end recording. The less frequent occurrence of passive behaviour could be due to a revival effect of moulting leading to a more active behaviour.

During moulting (middle) the hens were occupied more frequently with comfort behaviour. At this date of recording the hens started to change their plumage which induced intensive preening movements to remove loose feathers. Webster [3] supposed that the more frequent preening activity is in correlation with the sensibility of the skin shortly before regeneration of feathers. Therefore, there was probably less time available for foraging and moving.

The desired positive effects of a moult, improving egg quality, egg production and plumage condition, could be achieved with the chosen method. The better egg shell strength is supported by the findings of Al-Batshan et al. [1] who detected an increased shell thickness after a moult.

Concerning the weight, the hens recovered fast. With the chosen method the stress for the hens seems to be reasonable. However, minor adaptations may be necessary with more experiences with the method.

With an adaptation of the feeding regime to the longer live of the hens, it would be probably possible to reduce the egg weight after moult. Additionally it might be possible to open the hen run directly after the period of feeding restrictions (day 17).

Conclusion

The positive effects of this moulting method justify the remaining stress to which the hens are exposed. According to these results we assume that induced moulting under defined conditions is ethically reasonable. The discussion is therefore open to lift the ban for induced moulting in organic farming in Switzerland.

Acknowledgement

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References

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Table 1 Moulting method.

day	light (hours)	laying hen food (g/hen and day)	bran	shell limestone (g/hen and day)	wintergarden	hen run
1-2	8	-	-	3	open	closed
3-14	8	-	ad. lib.	3	open	closed
15-16	9	50	-	3	open	closed
17	9	ad. lib.	-	3	open	closed
18 -20	10	ad. lib.	-	3	open	closed
21 - 23	11	ad. lib.	-	3	open	closed
24 - 26	12	ad. lib.	-	3	open	open
27 - ???	14*	ad. lib.	-	3	open	open

* further increase up to 16 hours if desired

Table 2: Frequency of behaviour: average of the 8 farms in percent of occurrence (Standard deviation)

behavioural category	**basis**	**middle**	**end**
Moving	1.3 (1.6)	0.1* (0.1)	0.7 (0.6)
Feeding	19.8 (6.2)	24.6 (11.9)	23.4 (5.8)
Foraging	17.5 (7.2)	6.5* (4.6)	18.4 (7.1)
comfort behaviour	8.9 (4.2)	16.1* (5.9)	9.5 (4.9)
passive behaviour	49.5 (7.0)	49.5 (14.3)	44.3* (8.7)
drinking	2.9 (1.6)	3.3 (1.5)	3.7 (1.1)

* in comparison with the basis recording significant difference ($p<0.05$)