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Run management for organic layers

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Abstract

Layer runs are often bare and loaded with nutrients and with infectious stages of helminths. Various management strategies are recommended in order to better distribute the hens in the run, thereby preventing local accumulation of droppings and related problems. However, little is known about the impact of those strategies.

A series of on farm experiments has been performed in order to test the effects of flock size and of artificial structures on the dispersal of the hens in the run. Further studies evaluated the effects of mowing and run size as well as rotational use of runs on turf quality, nutrient load in the soil and on the infection of the hens with internal parasites.

As a summary, introducing structures or applying a rotational management scheme improves run use and facilitates mowing, thus improving turf quality in the run in front of the henhouse. However, the expected reduction of helminth infections and nutrient accumulation has not been observed.

Key words: laying hen; outdoor run; internal parasites; nutrient accumulation

Introduction

Organic layer farms have become more numerous in recent years. In these systems, hens benefit from access to a free range area. However, management of a hen run is a difficult task, since hens tend to remain near the henhouse, where droppings accumulate. Consequently, this area is often bare and loaded with nutrients (particularly phosphorus and nitrogen) and with infectious stages of the two main helminth parasite species of poultry (*Ascaridia galli* and *Heterakis gallinarum*). Various management strategies are recommended in order to better distribute the hens in the run, thereby preventing accumulation of nutrients in the soil as well as parasitic infections of hens. This paper summarises results of several on farm experiments with different run management regimes carried out by the Research Institute of Organic Agriculture in the past years.

Material and Methods

A series of on farm experiments has been performed in order to test the effects of flock size and of artificial structures on the dispersal of the hens in the run. A first study examined possible effects of a roofed sandbath on numbers of hens using the run and their distribution in the run on an organic poultry farm with 8 flocks of approximately 500 animals. Each flock was observed with and without roofed sandbath during three days by means of eight scan samples per flock and day. Impacts of weather conditions could be eliminated because always half of flocks were with and half without structure at the same time. See Zeltner & Hirt (2003) for further details.

A further study focused on the effects of mowing and run size on turf quality and on infection of the hens with internal parasites. This experiment conducted at four sites in Switzerland investigated the transmission and infectivity of *A. galli* and *H. gallinarum* on outdoor runs with two different stocking rates. Additionally, the influence of a simple management practice (mowing of the run) on helminth transmission was studied. Three run types were created on each site: runs C served as control (stocking rate 10 m^2 /hen, no management), runs B corresponded to runs C but were managed (10 m^2 /hen, management). In runs A stocking rates were doubled compared to control runs (5 m^2 /hen,

no management). During two subsequent layer flocks, a set of parasitological parameters (faecal egg counts FEC, helminth prevalence, worm burdens in hens and in tracer animals, helminth eggs in soil) as well as parameters describing the run vegetation were determined. Heckendorn *et al.* (2009) give a detailed description of animals, materials and methods used.

Two additional on farm experiments have been carried out to investigate the effect of rotational use of the hen run vs. continuous use and the effect of wood chips in the run area close to the pop holes with regard to worm burdens determined in layers at slaughter, turf quality, and nutrient load in the soil. In each run turf quality was assessed on four predefined surfaces of $1m^2$ along one compartment; soil samples were taken beside the observation surfaces for the assessment of turf quality. The study was repeated in two vegetation periods on the same farm (rotational vs. continuous use) or in two parallel flocks on the same farm (wood chips vs. bare soil). These experiments will be described into more detail by Maurer *et al.* (*in prep.* 2012).

Results

Effects of artificial structures

Hens with roofed sandbaths did not use the free range area more frequently than hens without structure. On average, 22% of the hens were in the free range (average with roofed sandbath: 22.5%, without: 21.5%). However, hens in runs with a roofed sandbath used the more distant quarter of the run (where the sandbath was situated) more frequently (average 9.4%) than hens without structure (average 4%; $P<0.01$). The roofed sandbaths were used as shelter and as sandbathing area: 4% of the hens in the hen run were in (0.6%) or no more than 1 m away from the sandbath (3.4%).

Effects of stocking rate and mowing

Increased stocking rate (runs A) led to a larger proportion of bare soil and to a reduction of the average vegetation height. In runs with a lower stocking rate (B and C), the proportion of bare soil did not increase during the experimental period. Irrespective of the run type, numbers of helminth eggs in the soil decreased significantly with an increasing distance to the hen houses, while the percentage of ground coverage as well as vegetation height increased. However, across runs the correlation between the percentage of ground cover and the values of eggs per gram soil between runs was very low ($r^2 = 0.0007$, $P = 0.95$) indicating a non-causal relationship. Significant differences in FEC were found in the second flock ($P<0.001$): FEC of hens in managed runs B were 24 % lower ($P<0.05$) than those of the control animals. Although not significant, the corresponding helminth prevalence in the animals was lower (-9.7 %) in hens from managed runs as well. Hens from runs with a high stocking rate (A) had significantly higher FEC than hens from control runs (C). Management (n.s.) and higher stocking rates (- 62 %, $P<0.05$) decreased the worm burdens in hens of the second flock. Similarly, tracer animals from runs with a high stocking rate (A) had significantly higher FEC than tracers from runs B and C in two tracer series. This was not reflected in the worm burdens. Overall, the stocking rate of hens in the outdoor run seemed not to alter transmission patterns of *A. galli* and *H. gallinarum* and repeated mowing of runs did not reduce helminth infections. Lower stocking rates, however, led to a substantial improvement of the run vegetation.

Effects of rotational run management and wood chips in front of the layer house

Nitrogen and Phosphorous contents in soil were similar in permanently and rotationally used runs; they were usually higher close to the house than in distant regions. Both nutrients did not accumulate over the observation period.

Rotational use of the runs led to an improved vegetation cover and turf quality. The main effect was a lower proportion of bare soil in front of the henhouse, but not in more distant regions. Correspondingly, there was a higher plant uptake of nitrogen and lower N_{min} contents in the summer sample of the rotationally used run. In both years, however, N_{min} was still frequently higher than plant demand on intensive pastures (120 kg N/ha for 6 grazing cycles; Flisch *et al.*, 2009) or even

on intensively managed turf grass. Covering the area in front of the house with chips did not reduce bare areas. However, removing and composting wood chips after use removes 0.03 - 0.2 kg N and 0.06 - 0.6 kg available P/ton of chips (DM) from a heavily loaded area and makes those nutrients available for use in crop production.

There was no significant effect of the two management regimes on worm burdens (*A. galli, H. gallinarum, Capillaria spp.*) at the end of the laying period.

Discussion

Effects of run management measures on helminths are generally overestimated because of epidemiological particularities of the helminth species involved. However, rotational use improves run quality. Flocks should not be divided into too small groups; otherwise rotationally used lots become too narrow for mechanical work. Separations of lots should not be extended to the house, but to a permanently used run in front of the house. This run should be covered with material that allows the hens to scratch and dust-bath. The material must be cleaned or replaced for increased hygiene and reduced nutrient leaching. Inorganic and organic materials such as pea gravel or wood chips fulfill these requirements. In addition, hens should be provided with sufficient shelters e.g. roofed sand baths distributed especially in the more distant parts of the run. To some extent these measures prevent the area close to the house from damage due to locally high stocking rates in commercial organic egg production.

Suggestions to tackle the future challenges of organic animal husbandry

Managing large organic layer flocks remains a challenge. Problems are easily visible in the runs, which are often unevenly used with locally overused bare areas. Mobile housing would reduce this damage, but is rarely used for large flocks. Based on the positive effects on turf quality and manageability we recommend rotational run management, enough natural and/or artificial shelters and a permanently used all-weather run for large free-range layer flocks kept in permanent houses. Organic regulations should enable this.

References

Flisch, R., S. Sinaj, R. Charles & Richner, W. (2009) Grundlagen für die Düngung im Acker- und Futterbau. *Agrarforschung*. 16: p. 1-97.

Heckendorn, F., Häring, D.A., Amsler, Z. & Maurer, V. (2009) Do stocking rate and a simple run management practice influence the infection of laying hens with gastrointestinal helminths? *Veterinary Parasitology* 159(1): 60-68.

Maurer, V., Amsler, Z., Perler, E. & Heckendorn, F. (2009) Poultry litter as a source of gastrointestinal helminth infections. *Veterinary Parasitology* 161: 255-260.

Maurer, V., Hertzberg, H., Heckendorn, F., Hördegen, P. & Koller, M. (2012 in prep.) Effects of run management on vegetation, nutrient accumulation, and internal parasites in laying hens.

Zeltner, E. & Hirt, H. (2003) Effect of artificial structuring on the use of hen runs in a free range system. *British Poultry Science* 44: 533-537.

Zeltner, E. & Hirt, H. (2008) Factors involved in the improvement of the use of hen runs. *Applied Animal Behaviour Science* 114: 395-408.