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Laying hen performance in different production systems; why do they differ and how to close the gap? Results of discussions with groups of farmers in The Netherlands, Switzerland and France, benchmarking and model calculations.

Leistung von Legehennen in unterschiedlichen Produktionssystemen – wo liegen die Unterschiede und wie kann man sie reduzieren? Resultate von Gruppendiskussionen mit Legehennenhaltern in den Niederlanden, der Schweiz und Frankreich, Vergleich von Eckdaten und Modellrechnungen.

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Introduction

Laying hens are kept in different systems, among which loose housing systems (non-cages) are of increasing importance. The EU recognizes as none-cage systems the following categories (EC, 1999):

- Barn systems: hens are kept in houses that might have multiple tiers (aviaries) with nest boxes and perches. The floor is covered with litter material. There is a maximum of 9 hens per m^2 usable area.
- Free range systems: inside identical to barn systems, but access to a pasture of 4 m^2 per hen is provided.
- Organic systems are a specific form of free range systems, according to the requirements of organic production (EC, 2008). Inside no more than 6 non beak-trimmed hens per m^2 usable area are kept, and the hens have access to a pasture like free range hens. Besides, the hens receive feed according to organic standards. The feed ingredients are grown without synthetic fertilizers, no free amino acids are added to the feed and genetic modified soya is not used either.

The systems differ in performance and production costs.

Production costs are lowest in barn systems, intermediate in free range systems and highest in organic systems. Partly this is caused by differences in stocking density and feed costs, but the systems also differ in average mortality and/or productivity and feed consumption per hen housed. Mortality in organic systems tends to be higher than in non-organic systems (Stokholm et al., 2010, Leinonen et al., 2012, Leenstra et al., 2012). In organic and free range systems feed consumption is higher as a consequence of extra locomotion and of thermoregulation at lower temperatures due to outside access, and lower density of hens in the house in organic systems. Feather loss might also contribute to higher feed consumption (van Krimpen et al., 2012), although feather condition of organic and free range hens tends to be better than for hens kept in barn systems (Sherwin et al., 2010). In general, management of free range and organic hens is more complicated and requires more skills than management of hens kept inside (Weerd et al., 2009). Despite the higher production costs, organic and free range production are increasing compared to other systems in most European countries, because of societal preference for free range systems and the willingness to pay higher prices for eggs from such systems.

For organic and free range egg production, the same genotypes are used as for other production systems (LEENSTRA et al., 2012). However, it might be that organic and free range systems require a different type of bird for optimal productivity and survival. Also the differences in performance between systems might be solved by specific management procedures, nutrition included. Due to the ban on traditional cage housing in the EU from 2012 onwards a number of farmers shifted to non-cage systems and experience with such systems is increasing. In Switzerland, non-cage systems for layers are obligatory since 1992 and free range systems are more common for already a prolonged period. In France there is a long tradition of egg production under the Label Rouge label, a more specified form of free range egg production (Label Rouge, 2002).

Free range and organic egg production systems are quite complex. Many factors and their interactions influence ultimate performance of a flock, be it economically, in relation to animal welfare or other criteria. Almost each farm has a unique combination of location, climate, management during rearing, breed, feed, and management in the laying period. Due to this complexity, it is difficult to do controlled experiments with outdoor systems on research stations that can be translated integrally to the field situation. Moreover, applying on-station group sizes relevant for field situations is hardly possible for economic reasons. As group size is an important factor in social interactions and the occurrence of feather pecking (RODENBURG and KOENE, 2007) results obtained on station might not always be transferrable into practice. Stimulating cooperation between farmers among each other, as well as with breeding and rearing companies might be a better investment to obtain information on optimal management conditions for non-cage systems than on-station experiments. Collecting best practices (see e.g. FEATHERWEL, 2013) and developing methods to analyse field data, collected and reported by farmers and/or researchers (NICOL et al., 2003, DRAKE et al., 2010, SHERWIN et al., 2010, BRIGHT et al., 2011) might be an effective tool for improving technical and economic performance of non-cage housed laying hens.

The EU-financed project Low Input Breeds (www.lowinputbreeds.org) provided the opportunity to examine the effects of genotype and management on performance of free range and organic laying hens in a field situation. To get more insight in the effect of strain and management factors on the productivity of outdoor housing systems, discussions with groups of farmers keeping free ranging hens were initiated in France, Switzerland and The Netherlands. Thereby the ideas and opinions of farmers on how to deal with free ranging hens – with a focus on the type of hen required – were identified and compared with performance data from a web-based management program summarising field data and model calculations.

Methodology

The data for this paper were received from workshops, benchmarking of performance data and model calculations.

Workshops with farmers

In The Netherlands all farmers with organic or free range laying hens were invited to participate in a workshop on ‘Requirements to the hen’ by an article in the Dutch poultry journal. This journal is read by nearly all poultry farmers. In Switzerland farmers were invited through egg traders and the organic egg producers association (IG Bio-Ei Suisse) and in France by producer’s organizations for free range and organic eggs. Workshops were held between May and November 2010. In The Netherlands there were 31 participants divided over three workshops. In Switzerland four workshops were organised for a total of 78 persons (3 small workshops with 5 to 9 participants, and a larger one with 4 groups of 13 to 15 participants). In France 40 participants were divided over two workshops. Farmers with organic or free range hens were the majority among participants, but in most workshops also an egg trader and a representative from a breeding or from a rearing organisation were present.

All workshops had the same format and started with an introduction on the European Low Input Breeds project, followed by a presentation of the results of an enquiry among farmers with organic and free range laying hens (LEENSTRA et al., 2012) and by an introduction to laying hen breeding. The results of this enquiry indicated that many different genotypes are used in free range and organic production. In general, production is higher and mortality lower in free range compared to organic systems. However, the differences between the systems were more pronounced in The Netherlands than in Switzerland and France (LEENSTRA et al., 2012).

After this introduction participants were asked to indicate the main themes they wanted to discuss and then to list for themselves positive and negative aspects linked to these themes. Animal health, production and behaviour were chosen in all groups. One group added 'rearing'. The individual lists were compiled and discussed by the group. The workshops were semi- structured and discussion was stimulated by the moderators.

The results of the discussion were summarized by the moderators and the participants could comment on the written report.

Benchmarking via a web-based management program and modelling

To put the results of the discussions into perspective, the results from the workshops were compared with aggregated performance data available from Dutch farms that use voluntarily the web-based farm management package of Agrovision (www.agrovision.com). The number of farmers that utilise such a system is increasing. Agrovision publishes average data per management system and those were available for The Netherlands over the period 2008/2009–2012/2013 (AGROVISION, 2014).

With model calculations the nutritional requirements of different types of laying hens were simulated, whereas feed was optimized to meet their requirements. More specific, it was explored if heavier hens might be profitable in free range or organic systems. A simulation model ('Bedrijfswijzer Pluimvee'), described by VELLINGA et al. (2013) was used to calculate the nutrient requirements for maintenance and egg production. Based on these requirements and the feed intake capacity of the hens, an optimal feed for three different types of hens (called 'standard', 'heavier' and 'dual purpose') under two different conditions (organic and conventional) was calculated. 'Standard' laying hens have a standard body weight and a standard egg production. 'Heavier' hens have a higher body weight and a standard production. 'Dual purpose' hens have a higher body weight and reduced egg production.

From energy and protein requirements for these virtual hens, standard and organic diets were optimized with the program Bestmix (Release 3.22.121) (ADIFO, 2014). This program also calculates feed costs.

Results and Discussion

Workshops

Table 1 gives an overview of aspects mentioned by individual participants at the start of the discussion. The three workshops in The Netherlands, the four workshops in Switzerland and the two workshops in France differed only in details from each other in the aspects mentioned. There was one exception on this pattern: in The Netherlands and Switzerland farmers emphasized that a very high peak production was not favourable, as they experienced this as a risk for laying persistency, which they thought to be more important. In France there was clear emphasis on a high peak production. Egg quality parameters (e.g. uniformity, shell strength and colour, Haugh units) were mentioned frequently in all countries. This reflects the situation on the market for organic and free range eggs, which are predominantly sold as table eggs.

Table 1. Results from workshops with farmers with free range and organic hens, egg traders and rearing organisations on what aspects are important for hens in free range and organic systems.

Wichtige Eigenschaften von Legehennen in Freiland- und ökologischer Haltung: Resultate von Gruppendiskussionen mit Tierhaltern, Eierhändlern und Aufzuchtorganisationen.

Positive properties	Negative properties
Related to PRODUCTION	
Laying persistency (high persistency is more important than a high peak production) (NL and CH) High production peak (F).	Large egg size
Uniform eggs (size and shell colour)	High peak production (NL and CH)
Possibility to manage egg weight (by nutrition, light)	Sensitivity for changes in shell colour due to natural light
Shell quality (strength and colour)	High mortality
Egg quality, high Haugh Units for shelf live	High feed intake
Hen should maintain sufficient body weight	Too many double yolk eggs
Related to BEHAVIOUR	
Exploring, curious hen, that wants to use the whole range and forage	Smothering behaviour
Good nesting behaviour	Fearful
Quiet and social	Aggressive among each other and towards humans
Stress resistant	Damaging behaviour
Hen with a positive attitude	
Related to ANIMAL HEALTH	
Robustness, fast recovery, hen takes care of itself	Sensitivity to Infectious Bronchitis and E. coli
Good intestinal flora, digestion	Intestinal problems
Less vaccinations	Sensitivity to fowl mite and other parasites
Strong bones	
Good feather cover	

'Fearfulness', defined as 'hens that panic or stay nervous for a prolonged period after unexpected events', was indicated as a negative trait. 'Fearfulness' is different from smothering behaviour, another negative trait mentioned, although fear can lead to panic, which can cause smothering (BRIGHT and JOHNSON, 2011).

'Robustness' was considered a very important characteristic for free range and especially for organic hens. Farmers defined robust hens as 'hens that keep on eating, also if something bothers them', recover fast after they had a dip in production and more concretely as 'hens that are heavier and have more body reserves than current layers'. Compared to conventional free range farmers, organic farmers preferred heavier hens. This might be caused by the restrictions to the organic diet, in which no added free amino acids are allowed. Organic feed ingredients with an amino acid pattern that enables optimal production are quite rare and rather expensive. It is therefore difficult to optimize an organic diet that meets the requirements of highly productive laying hens, and often organic diets have a very high overall protein content (DEKKER et al., 2011). This might affect digestion and kidney function of the hens in a negative way. A healthy gut is an important barrier to infections and this might influence vulnerability to diseases. Heavier hens have a higher maintenance requirement, but because of their high feed intake capacity they are able to deal with a diet with lower contents of amino acids relative to energy content. For such a diet, feed ingredients with a lower protein content can be utilized and this might be cheaper and healthier for the hens.

Two of the three groups in The Netherlands and all groups in Switzerland indicated that they wanted to explore the possibilities to rear the males for human consumption. Killing day-old cockerels was seen as unethical and a threat to the consumer perception of free range and organic production. Farmers emphasized that a dual purpose bird, of which the males have a good growth potential and the females have good egg production characteristics, might solve the problem of killing day-old cockerels, provided there is a market for the cockerels, whereas the laying hens could also be profitable, due to the changed nutritional requirements.

One group in The Netherlands added rearing and management during rearing as a new topic for the discussion. During rearing, the hens should be housed in a system and fed with a type of feed that is comparable to the system and the diet during the laying period. Most laying hens are housed in aviaries, so the pullets should be familiarized with such a system. Moreover, the hens should be trained to eat sufficiently and to go outside and forage. One of the farmers aimed at a body weight of at least 1800 g before transfer, while body weights at transfer of 1500 – 1600 g are currently the standard. Rearing was not a particular issue in Switzerland, because pullets are generally reared in aviaries and organic layers also have access to a free-range area during rearing.

Benchmarking in The Netherlands

Farmers utilise more and more so-called 'management programmes' to record performance data of their flocks. Such programmes allow for benchmarking, provided sufficient farmers participate. Table 2 shows the results of such a management programme in The Netherlands for the period 2008/2009 up to 2012/2013 for different housing systems (AGROVISION, 2014). AGROVISION does not report on variation between flocks. The data are based on 200 – 300 flocks per year, and the number of farmers that participate is increasing. The number of participating farms with organic or free range production increased rapidly, just as the number of farms with barn housing, while the number of farms with cage housing was reduced significantly. However, the number of organic farms in the data base is still small compared to the other housing systems. Consequently the average results might be less reliable.

Table 2. Average production data for different laying hen systems in The Netherlands. Data from Legmanager (AGROVISION, 2014).

Wichtigste Eckdaten aus unterschiedlichen Produktionssystemen in den Niederlanden. Daten von „Legmanager" (AGROVISION, 2014).

N flocks	Organic	Free range	Barn	Cage
2008/2009[1]	14	38	132	62
2009/2010	23	59	154	94
2010/2011	29	54	190	62
2011/2012	42	62	225	22
2012/2013	42	49	174	11
Age at slaughter (weeks)				
2008/2009	77	72	75	86
2009/2010	76	74	78	80
2010/2011	74	76	77	81
2011/2012	75	80	82	89
2012/2013	76	77	82	89
% egg production (per hen housed)				
2008/2009	78.8	86.8	87.5	88.2
2009/2010	84.4	88.4	88.6	89.4
2010/2011	86.9	87.6	89.1	89.4
2011/2012	88.2	88.5	88.8	89.4
2012/2013	88.0	88.8	89.3	89.9
Feed conversion kg feed/kg eggs				
2008/2009[1]	2.55	2.35	2.28	2.05
2009/2010	2.51	2.27	2.21	2.02
2010/2011	2.34	2.24	2.18	2.04
2011/2012	2.40	2.31	2.21	2.03
2012/2013	2.29	2.22	2.17	2.00
Mortality (%)				
2008/2009	15.4	11.9	11.2	9.2
2009/2010	20.9	13.3	11.1	8.4
2010/2011	13.1	11.6	8.8	10.2
2011/2012	9.1	10.9	10.0	10.2
2012/2013	7.9	9.7	9.0	8.8

[1]2008/2009: flocks finished in 2009, but most of them were started in 2008. All the same for the other years.

It is likely that in 2008/2009 many farmers only had minimal experience with free ranging hens. Moreover, rearing organisations had to build up experience in how to raise hens for specific laying systems.

The workshops were held in 2010. Up to 2010 average mortality among organic hens was quite high and higher than in other systems (Table 2). In later years, mortality among organic hens dropped to levels comparable to the other systems. In the enquiry in 2009 (LEENSTRA et al., 2012) organic farms in The Netherlands also reported high mortality, especially among silver hens. Often this could be attributed to smothering behaviour. Reasons for the relative improvement in performance of free range and organic hens might be that both, farmers and rearing organisations, gained experience with those systems. In particular, hens are prepared better during rearing for the laying period in a free range or organic system by nutrition, rearing systems in which the hens learn to use the 3-dimensional space of aviaries and additional vaccinations, for example against *Erysipelotrix*, a bacterial infection that can cause high mortality among laying hens.

The production period for the loose housed hens is shorter than for cage housed hens. This is probably related to the high quality specifications of table eggs. Eggs from organic, free range and barn housing usually are sold as table eggs, while eggs from cage systems are sold as eggs for the processing industry. At the end of lay the increased egg size is an advantage for the processing industry, while it is a disadvantage for table eggs in most countries, as very large eggs have a limited market as table egg, and risks for shell quality problems increase.

The differences in total egg production between systems are only partly explained by the different slaughter ages. Also the rate of lay is lower for loose housed hens, than for hens in cages. In non-cage systems some of the floor eggs are never found and thus not recorded, while in cage systems all eggs can be registered. However, across the reported years, the differences in performance between organic production and free range and barn production in terms of egg production and feed utilisation for egg production appear to become smaller.

Model calculations

The results of the model calculations are summarised in Table 3.

Table 3. Simulation study on optimal dietary composition and economic result for (a) standard hens, (b) hens with the same egg production, but a higher body weight and (c) dual purpose hens (heavier, but lower egg production) for conventional diets and for organic diets.

Simulationsstudie zur optimalen Futterzusammensetzung und zur Wirtschaftlichkeit von (a) herkömmlichen Legehennen (b) Legehennen mit gleicher Legeleistung jedoch höherem Lebendgewicht und (c) Zweinutzungshennen (höheres Lebendgewicht, tiefere Legeleistung) bei konventioneller und ökologischer Fütterung.

		Conventional diets			**Organic diets**		
	Unit	**Standard**	**Heavy birds**	**Dual purpose**	**Standard**	**Heavy birds**	**Dual purpose**
Dietary characteristics							
Energy value	MJ/kg diet	11.8	11.8	11.8	11.8	11.8	11.8
Crude protein	g/kg diet	163	154	148	183	171	162
Dig. Lysine	g/kg diet	6.7	6.2	5.9	7.9	7.6	7.0
Dig. Methionine	g/kg diet	3.3	3.0	2.8	3.0	2.8	2.6
Dig. Methionine + Cysteine	g/kg diet	5.8	5.4	5.1	5.7	5.3	5.0
Other amino acids	%	100	93	88	100	93	88
Price	€/100 kg	38.80	38.23	37.97	48.23	44.43	43.29
Performancecharacteristics							
Starting weight (18 wk)	Kg	1.6	1.8	1.8	1.6	1.8	1.8
Finishing weight (72 wk)	Kg	2.1	2.5	2.5	2.1	2.5	2.5
Eggs produced	nr	300	300	250	300	300	250
Egg mass	Kg	18.7	18.7	15.55	18.7	18.7	15.55
Feed intake	g/d	110	118	110	110	118	110
Feed consumption	Kg	41.7	44.5	41.5	41.7	44.5	41.5
Feed conversion ratio	Kg/kg	2.23	2.38	2.66	2.23	2.38	2.66
Environmental characteristics							
Nitrogen-excretion	g/year	756	761	710	888	885	799
TAN[1]-excretion	g/year	576	583	543	687	683	622
Financial characteristics							
Feed costs	€/100 kg egg	79.79	84.02	93.39	93.18	97.65	106.48
Gross margin (Income egg/meat – feed costs)	€/100 kg egg	74.52	70.42	54.37	92.04	93.71	78.21

[1]TAN: total ammonium nitrogen

The economically most important parameter is the gross margin (income from eggs and spent hen minus feed costs). This is most favourable for standard hens with a conventional diet. Heavier hens consume more feed and a lower protein (nitrogen) content is sufficient for covering their requirements. Due to the use of free amino acids in conventional diets, the reduction in nitrogen content had only a limited effect on the feed costs. For organic diets, where free amino acids are not allowed, this is different. The organic diet for heavier hens (with a lower nitrogen content) is so much lower in price than the organic standard diet that gross margin is markedly increased, even after correction for the extra feed intake. However, this is only valid if egg production is not affected. If a dual purpose breed is simulated (lower egg production and higher body weight, as a result of a cross between layer strains and broiler breeder dam strains), for both conventional and organic production feed costs are increased compared to the more productive hens ('standard' and 'heavier'), as the dual purpose hens require more feed per kg of eggs. As a consequence, egg income and gross margin of dual purpose breeds are significantly reduced compared to standard hens. The excretion of nitrogen (an important indicator for environmental burden) was not increased in the heavier or dual purpose hens due to the lower nitrogen content of the diet.

Thus, for organic systems a heavier hen might have economic advantages, provided egg production is not reduced. In such a case raising the brothers of the hens for meat production can become more profitable, although the gap in productivity (production costs) for meat between cockerels and (organic) broilers still will be large. A creative solution for this is being practised by the German 'Bruderhahn Initiave' (www.bruderhahn.de/), where a higher egg price compensates for the production costs of the males. From a purely economic point of view, a dual purpose breed, being a cross between layer strains and broiler breeder dam strains, will not be recommended.

Overall discussion and conclusions

From the aggregated data on performance in different systems in The Netherlands it can be concluded that it is crucial to learn how to manage hens in outdoor systems. The aggregated data show that very likely education of farmers in management practices was important to reduce mortality among organic laying hens in The Netherlands. Another reason for the reduced mortality might be a different choice of breeds and different selection schemes. Most breeding companies started with selection techniques that allow for selection against feather pecking and cannibalism and for a more social behaviour of the hens, a.o. by group selection, where survival and performance of pen mates is included in the selection index (RODENBURG and TURNER, 2012). Mortality and egg production per hen housed are negatively correlated (LEENSTRA et al., 2012), consequently lowering mortality will increase productivity per hen housed, also without an increase in egg production per hen present.

The model calculations indicate that in organic systems feed costs (not feed quantity) might be reduced with a heavier hen. 'Heavier hens' was one of the requirements mentioned by the farmers. They presumed such hens to have more body reserves and consequently being more 'robust', although to our knowledge this opinion is not supported scientifically. A heavier bird would be an advantage for raising cockerels, one of the other demands of farmers, to prevent killing of one-day-old males. However, only in the organic egg production and with current feed ingredients, feed and egg prices a heavier hen will be economically feasible, while raising the cockerels will require more feed per kg poultry meat than raising organic broilers. Poultry meat from cockerels will be more expensive than from organic broilers. Also, it is not yet clear how big a market for cockerels, with their more 'skinny' appearance than broilers, might be.

Improvements in rearing, management and the attention in breeding programs for social behaviour for all layer genotypes have taken place recently. These improvements appear to be sufficient to close the gap in productivity between systems that cannot be explained by the extra locomotion and environmental stress that are inherent to free range systems.

The ecological footprint of a system with heavier hens and raising of cockerels will be worse compared to specialized layers and broilers. Adapting feed composition to the requirements of heavier hens and slower growing cockerels might reduce this gap in the future.

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Summary

Free range and organic systems expose the laying hen more to unexpected events and adverse climatic conditions than barn and cage systems. In France, The Netherlands and Switzerland the requirements for a hen suitable to produce in free range and organic systems were discussed with farmers. The farmers preferred for these systems a more 'robust' hen, more specifically defined as a heavier hen with good eating capacity.

Benchmarking of flocks in a web-based management program in The Netherlands from layer flocks finished in 2008 – 2013 indicated that in earlier years indeed mortality among organic and to a lesser extent free range hens was higher than among barn or cage hens. Feed conversion (kg feed/kg eggs) is higher, but the gap is closing.

Improvements in management of the hens during rearing and in the layer phase in free range and organic systems seem to be important. Breeding companies take behaviour and performance in non-cage systems into account in their selection programs.

Heavier hens need a diet with a lower protein to energy ratio. From model calculations we concluded that in organic systems a heavier hen might be economically profitable, as total feed costs are lower for the heavier hen then for a hen with a lower body weight requiring a diet with a high protein content. For conventional free range hens this is not the case as then the protein content can be adapted by synthetic amino acids.

Field studies and cooperation between farmers and breeding organisations will have to show if a strain of heavier hens will be successful in the rather small organic market.

Key words

Laying hens, free range, organic, egg production, opinion of farmers

Zusammenfassung

Leistung von Legehennen in unterschiedlichen Produktionssystemen – wo liegen die Unterschiede und wie kann man sie reduzieren? Resultate von Gruppendiskussionen mit Legehennenhaltern, Vergleich von Eckdaten und Modellrechnungen.

Legehennen in Freiland- und zertifizierten ökologischen (biologischen) Produktionssystemen sind, verglichen mit Tieren in Käfig- und Bodenhaltung, öfter ungünstigem Klima und wechselnden Bedingungen ausgesetzt. In Frankreich, den Niederlanden und der Schweiz diskutierten Gruppen von Legehennehaltern deshalb über die speziellen Anforderungen an eine Henne in Freiland- und ökologischen Systemen. Übereinstimmend wünschten sich die Legehennenhalter für diese Systeme eine ‚robustere' Henne, die sie als etwas schwerer und mit einer guten Futteraufnahme beschrieben.

Der Vergleich von Eckdaten aus einem niederländischen Internet-basierten Herdenmanagementprogramm zeigt, dass zu Beginn des erfassten Zeitraums (2008–2013) die Mortalität von ökologischen und – etwas weniger ausgeprägt – von Freilandhennen höher war als diejenige von Hennen in Boden- oder Käfighaltung. Ebenfalls war die Futterverwertung (kg Futter/kg Eimasse) schlechter. Die Unterscheide reduzierten sich jedoch im erfassten Zeitraum.

Von besonderer Bedeutung für diese Entwicklung scheinen die laufend realisierten Verbesserungen bei der Aufzucht der Legehennen zu sein. Zudem wurden in der Legehennenzucht vermehrt auch Verhalten und Leistung in Bodenhaltungssystemen berücksichtigt.

Schwerere Hennen brauchen Futter mit einem niedrigeren Protein: Energieverhältnis. Modellrechnungen lassen darauf schliessen, dass in ökologischen Produktionssystemen schwerere Hennen wirtschaftlich sein können, da ihre totalen Futterkosten dadurch tiefer sind als diejenigen einer leichteren Henne mit höheren Ansprüchen an den Proteingehalt. Dies gilt aber nicht für konventionelle Freilandhennen, da dort der Proteingehalt mit dem Zusatz freier Aminosäuren angepasst werden kann. Feldstudien und ein enger Austausch zwischen Tierhaltern und Zuchtorganisationen werden zeigen, ob sich schwerere Hennen auf dem immer noch eher kleinen ökologischen Markt behaupten können.

Stichworte

Legehennen, Freilandhaltung, ökologische Produktion, Eierproduktion, Diskussionen mit Landwirten

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