

Some Productive Traits of the Native Breeds of Greenleg Partridge and Yellowleg Partridge Hens

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The preservation of the biodiversity of hens is a part of a large-scale protection of the biodiversity of livestock in Poland and it is of great importance for the protection of cultural heritage left for the next generations. The selection towards the improvement of production features in species used in intensive production leads to the depletion of the gene pool, which in the future may hinder the achievement of genetic progress. In many highly developed countries, no conservation breeding was carried out at the right time, which resulted in the loss of many native breeds. In Poland since the 70-ties of the 20th century, conservative breeding was carried in parallel to pedigree breeding covering the breeds and hens at risk of extinction, including Greenleg Partridge and Yellowleg Partridge hens (Węzyk et al., 1998). In this way, a collection of 11 breeds/families covered by the protection programme has been achieved, which has also been entered into the world list of animals threatened with extinction (World Watch List, 2000). The oldest indigenous breeds of hens are Greenleg Partridge and Yellowleg Partridge hens, which were initially used for egg production and meat. Along with the inclusion of these breeds into the protection program, the work on improving functional traits was abandoned. The purpose of the protection program is to reduce the occurrence of undesired inbreeding and the effect of genetic drift in small populations of hens, and in the case of fortuitous events, the protection of the herd against extinction. It is also important to maintain the existing genetic variability and preserve specific features for individual populations. The replacement of birds takes place with the use of rooster rotation and random matings in the reproduction of subsequent generations. Therefore, the values of traits result mainly from genetic properties of a given breed and changing environmental conditions over the years (www.izoo.krakow/bioroznorodnosc).

The purpose of the study was to analyse the development of functional traits of two native breeds in the years 2015-2017, which seems to be interesting in reference to the specifics of the breeding program, according to which these hens are maintained.

Materials and methods

The subject of the research were Greenleg Partridge hens (Z-11 symbol) and Yellowleg Partridge hens (Ż-33 symbol), maintained at the National Research Institute of Animal Production (the farms in Chorzelow and in Aleksandrowice) in 2015-2017. The data source were the results of performance assessments of hens collected in the farm records. Time trends of the values of individual production features are presented in the form of linear regression equation:

$$y = a + b_t,$$

where:

t = time expressed in years,

a - the constant of regression, i.e. the point of intersection of the straight line with the Y axis,

b - regression coefficient, denoting the rate of increase or decrease of a given feature.

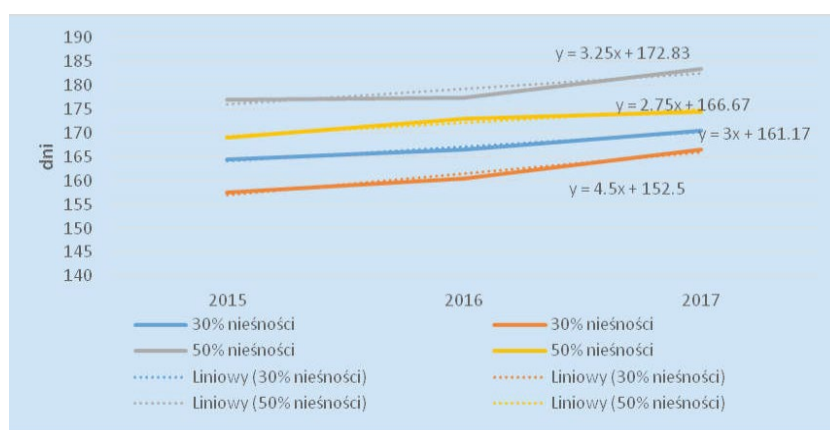
The results and their discussion

As evidenced by the documentation of the farm in ZD Chorzelow, Greenleg Partridge hens are the most widespread breed in the small herd and ecological maintenance because in the spring all the eggs from these hens are put into the hatching apparatus, and the obtained chickens are sold to numerous

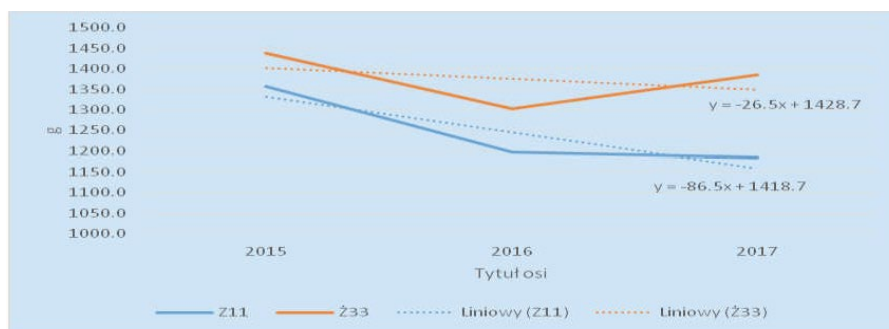
customers all over the country. The analysis of hen production features revealed disturbing trends in their development in years 2015-2017. As it results from the values of the directional coefficient in the derived regression equations, in the discussed period the sexual maturity of the hens was delayed on average from 2.75 to 4.5 days, both when reaching 30- and 50-percent egg production (Fig. 1).

The Yellowleg Partridge hens reached 30% of egg production on day 166 and 50% of egg production on day 174 while Greenleg Partridge hens, on day 170 and day 183, respectively). In the studies of Cywy-Benko (2002), carried in the years 1991-2000, these coefficients were even worse and varied considerably from year to year.

In these studies, age at the time of reaching 30% egg production in Yellowleg Partridge hens was 167-200 days, and in Greenleg Partridge hens - 174-193 days.



30% egg production; 50% egg production
 Linear (30% egg production); Linear (50% egg production) days
 Figure 1. Age of hens at 30% or 50% egg production

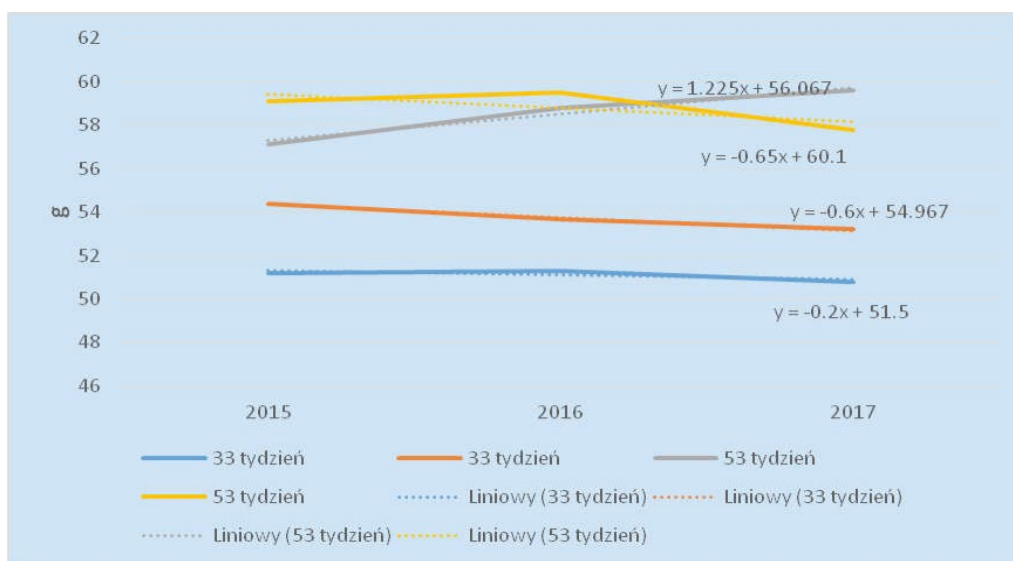


Linear (Z11); Linear (Ż33)
 Figure 2. Body weight of hens at 20 weeks of age (g)

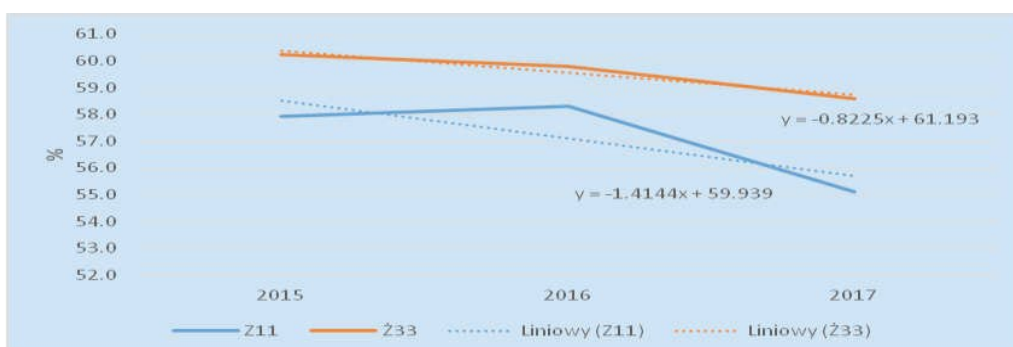
There was a decrease in the weight of 20-week-old Z-11 hens on average by 86.5 g/year, and the Ż-33 hens by 26.5 g/year (Fig. 2). There was a slight downward trend in egg mass, with the exception of eggs from Z-11 hens laid in the 53rd week of age (Fig. 3). In the research carried by Krawczyk and Calik (2010) the weight of the egg showed a downward trend both in weeks 33 and 53. The breeding documentation shows that for the weight of the hens of both breeds, a high coefficient of variation, amounting to $V > 10\%$ is observed, which means a large diversity of hens in the herd in terms of this feature. The average body weight of Z-11 hens in the years 2016-2017 was below 1200 g and was lower by approximately 300 g as compared to 1990-2000 (Cywa-Benko, 2002). In the research by Krawczyk and Calik (2010) carried in years 2004-2008, the average body weight of Z-11 hens was about 70 g higher and for Ż-33 by about 60 g higher as compared to the results presented in this study and showed

a slight upward trend. Therefore, one should think about elimination of hens with the lowest body weight in this group, which would stop the downward tendency of this feature. In herds where selection is not carried, body mass and egg mass are shaped by the genotype, and, as Hazary et al. (2000) and Ünver et al. (2001) observe, these characteristics are highly inheritable ($H^2 > 0.5$).

In the analysed period there was also a negative egg production trend, especially in Z-11 hens. It is worth mentioning that the hatchability level in the discussed breeds is much lower as compared to laying hens from product stocks maintained in intensive production (Evaluation results ..., 2010; Fig. 4).

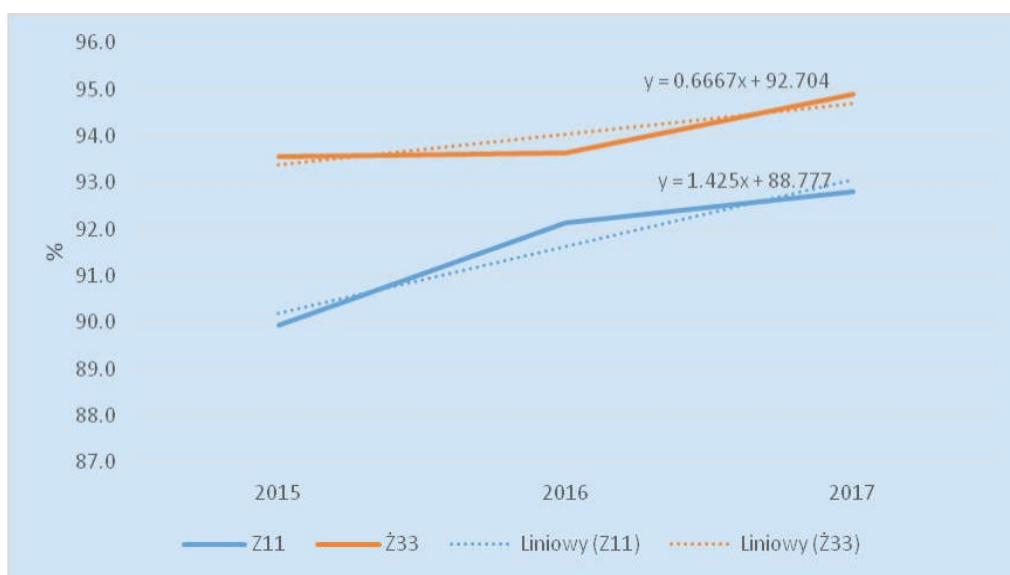


33 wk; 53 wk; Linear (33 wk); Linear (53 wk)
 Figure 3. Weight of eggs (g) laid at 33 and 53 wk of age

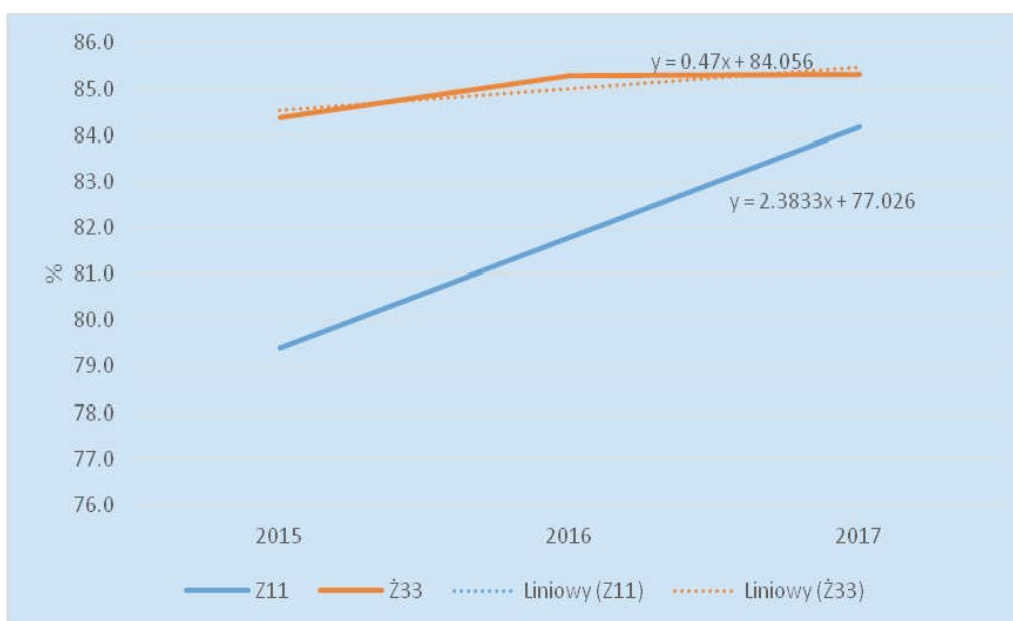


Linear (Z11); Linear (Z33)
 (%) Figure 4. Egg production during 20–56 wk of age (%)

The results presented at Fig. 5 indicate that in the analysed period, as in the case of research by Krawczyk and Calik (2010), Greenleg Partridge hens achieved good results of fertilisation, demonstrating in this respect a slight upward trend. As compared to commercial stock, fertilisation of eggs showed lower values, but hatching of eggs (Fig. 6) remained at a similar level (Evaluation results..., 2010).



Linear (Z11); Linear (Z33)
Figure 5. Egg fertility of Z-11 and Z-33 hens (%)



Linear (Z11); Linear (Z33)
Figure 6. Hatchability results for eggs from Z-11 and Z-33 hens (%)

Summary

In years 2015-2017, Greenleg Partridge and Yellowleg Partridge hens showed a tendency to decrease egg production, body weight of chickens and egg weight, and increase in the age of sexual maturity among laying hens. It has been found that the hatchability results are at a good level and show an upward trend.

The results of the carried analysis indicate the need to undertake actions improving certain production features, in particular, the maturity age and egg production as the level is shaped not only by the genotype, but also by environmental conditions. Low egg yield decreases the profitability of chicken farms and may discourage farmers from buying them.

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SOME PRODUCTIVE TRAITS OF THE NATIVE BREEDS OF GREENLEG PARTRIDGE AND YELLOWLEG PARTRIDGE HENS

Summary

The aim of the study was to analyse performance traits in two native breeds of hens in the years 2015–2017, which may be interesting due to the specific characteristics of the hens' breeding programme. The experiment involved Greenleg Partridge (line Z-11) and Yellowleg Partridge hens (line Ż-33). Performance data collected for these hens on a farm were analysed. During the study period, laying performance, body weight, egg weight and age of sexual maturity tended to decrease. Hatching results were good and showed an upward trend. The results of this analysis show the need to take action to improve some productive traits, in particular early maturity and laying performance, the levels of which are determined not only by genotype but also by the environment.

Key words: laying hens, native breeds, productivity, time trends



Greenleg Partridge hen (Photo J. Krawczyk)



Greenleg Partridge hen (Photo J. Topczewska)