ORIGINAL PAPER

ANALYSIS OF BODY TYPE EVALUATION OF DIFFERENT COLOR VARIANTS OF FARMED MINK (*MUSTELA VISON* SCH.) AGAINST CURRENT EVALUATION STANDARD

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ABSTRACT

The aim of the study was to comparatively analyze the body type traits in mink of different color variants, over a period of a few years, compared against the current mink evaluation standard. The mink were managed on mink farms located in northwestern Poland. The analysis covered the years 2011–2018. A statistically significant effect of color variant, year of assessment and farm, on which the license took place, was found. The highest average grades for the type were achieved by the mink in 2014, while the color variant achieving best grades was Standard mink. Sapphire mink attained a similar rating. The variability of the assessment of the mink type, measured by the coefficient of variation, ranged within 24.86–33.99%, depending on the adopted criterion. The mink with grade B were characterized by the highest percentage share among the tested animals. These represented 45% of all mink assessed.

Key words: mink, type traits, color variant, variability

INTRODUCTION

The history of mink farming is over one hundred years old, and intensive work on adapting these animals to farm conditions has been going on for 90 years. Ongoing selective breeding has produced over 200 coat-color variants of mink which are farmed today, with new variants still emerging every now and then [Piórkowska 2018].

Most Polish farms manage several different varieties of mink, however – as reported by Jeżewska-Witkowska et al. [2014] – brown-color variants prevail. An upward trend is also visible in White Hedlund, Cross, and Sapphire varieties. Also, despite a clear decline observed lately, the Standards are still the largest group of mink bred and farmed in Poland [Święcicka et al. 2016].

Coat quality and body size are the most important goals of fur-bearing animals farming, and mink is no exception. There are not many reports in the literature that compare the quality of coat in different mink color variants using licensing assessments collected over a long period of time. It should also be emphasized that there are no reports that characterize the variability and changes in

the course of assessments, or that would document an increase or decrease in the phenotypic progress in terms of the current mink evaluation standard [KCHZ 2010]. Hence this research analysis, which we think may cotribute to the knowledge in this area.

The aim of the study was to comparatively analyze the body structure traits in mink of different color variants, taking into account differences in individual years (depending on the breeding farm), compared against the current mink evaluation standard [KCHZ 2010].

MATERIAL AND METHODS

The study is an analysis of different coat-color variants of mink kept in the northwestern part of Poland in breeding mink farms. All the studied farms were well-equipped and fit to both breeding herd management and offspring rearing. The analysis involved mink body traits assessed during the licensing according to the new evaluation standard [KCHZ 2010]. In 2010, the numerical grading scale was replaced by letter-marked grades and now the phenotype rating is expressed by the letters A, B+, B or

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C. The current mink evaluation standard specifies the requirements of each class in great detail. A mink receives one cumulative grade for all the traits. Mink of a grade A, B+, and B are intended for further breeding. Those with a grade C should be culled from the breeding herd [KCHZ 2009].

The following assumption was made: animals that received grade A were assigned the grade 5 in the calculations, B+ received grade 4, B grade 3 and C grade 2 (Polish school grade scale was used for the purpose).

The evaluation was carried out in 2011–2018, on nine mink farms (numbered 1 to 9), on a total of 241,004 mink belonging to eight color variants (Table 1).

Statistical parameters of the herd were estimated in accordance with the commonly accepted principles. Each trait was analyzed against a constant mathematical model, using analysis of variance, testing the significance of the factors: year of assessment, farm (farmer) and color variant:

$$Y_{ijkl} = \mu + a_i + b_j + c_k + e_{ijkl}$$

where:

Y_{ijkl} − trait level,
μ − population average,
a_i − effect of color variant,
b_j − effect of the license year,
C_k − effect of farm (farmer),
e_{ijkl} − random error.

Statistical computations were performed using the SAS package [SAS 2014]. The descriptive statistics include arithmetic means, standard deviations, standard error and coefficients of variation. The significance of differences between means was tested using the post-hoc Tukey HSD test [SAS 2014].

RESULTS AND DISCUSSION

ANOVA of mink evaluation results showed a statistically highly significant effect of farm, color variant and year when the evaluation took place. Also other authors [Kołodziejczyk and Socha 2006, Felska-Błaszczyk et al. 2008, Ślaska et al. 2009, Święcicka et al. 2011, Kołodziejczyk et al. 2013 and Seremak et al. 2013] report that the sources of variation we analyzed often show a significant or highly significant effect on the utility traits of fur animals. The utility traits in question are reproductive parameters and those related to coat quality [Dziadosz et al. 2010].

Tables 2–4 present the statistical characteristics (means, standard deviations, standard error and coefficients of variation) of the general evaluation of the body shape depending on the license year, color variant and

the farm on which the assessment was made. The coefficient of variation of the attained grades ranged from 24.86 to 33.99%. Standard mink were characterized by the highest coefficient of variation, and also the highest average score (Table 2). A similar level was achieved by Sapphire mink, while the average of other color variants differed significantly from the results of gained by the Standard and Sapphire mink. These results seem to confirm those reported by Socha and Markiewicz [2003], who claim that both Standard and Sapphire mink were characterized by good parameters of fur quality and a high general assessment score. Similar results were obtained by Kołodziejczyk and Socha [2008] regarding the assessment of mink of selected color variants. Here also Standard mink achieved good grades. The average overall grade for Standard mink was 18.5 points, which may correspond to class B+ or even A.

Sapphire mink variant does not belong to those commonly bred in our country. Animals of this variety largely come from imports, hence the higher average overall rating in Sapphires may somewhat point to the need to intensify breeding work in this direction, so that native animals can match the quality of coat mink bred abroad.

There were no significant differences between the average grades for Pastel, Pearl and White Hedlund mink. These averages were at a very similar level, respectively, 2.84, 2.85 and 2.82 (Table 2). Palomino mink was characterized by the lowest average rating.

The coefficient of variability in the assessment grades by individual color variants ranged from 28.75 to 33.99%. The Standards exhibited the highest variability (Table 2).

When it comes to the year of assessment, the best results were recorded for minks assessed in 2014 (Table 3). The mean obtained by the animals differed statistically significantly from the mean obtained by the animals in the remaining years of assessment. It should be noted that the year of the license had a statistically significant effect on the results and each the means differed significantly from each other (Table 3).

Better grades obtained by mink in 2014 may indicate a particularly beneficial effect of environmental factors on the body size and coat quality. According to Gugołek [2017], the most important environmental factors include: care, nutrition and housing conditions. The author further emphasizes that nutrition is responsible for fur density and the overall coat quality.

One of the many factors influencing the quality of fur is the work flow and management of the farm. The farmer's responsibility is to create appropriate housing conditions, provide proper nutrition, and to ensure that good husbandry and veterinary care are provided [Zieliński and Ślaska 2015]. According to Nabożny [2015], fur density is a result of the conditions that prevail on the farm, because the coat has a heat-insulating func-

Table 1. Number of mink under evaluation in relation to color variant and year of license

Tabela 1. Liczba ocenianych norek zwierząt z uwzględnieniem odmiany barwnej norek i roku oceny

Color variant – Odmiana barwna	n	License year – Rok oceny	n
Pastel – Pastel	157966	2011	29783
Pearl – Perła	44540	2012	43840
Black Cross – Krzyżak	1997	2013	26708
White Hedlund – Biała Hedlunda	4918	2014	29331
Palomino – Palomino	9305	2015	38620
Sapphire – Szafir	15978	2016	28960
Platinum – Platyn	5100	2017	27260
Standard – Standard	1200	2018	16502
Total – Łącznie	241004	Total – Łącznie	241004

tion, and whether it fully utilized depends – according to Fish et al. [2002] – on the environment of the animal's habitat. This is confirmed by Święcicka et al. [2011], who point to the fact that the proper microclimate on the farm is a factor determining the quality of the coat.

The conducted research shows that the best parameters of the assessed traits, and thus the best average body rating, were characteristic for animals from farm No. 3. This average was statistically significantly different from the others (Table 4). The mink from farm number 7 achieved the lowest average grade.
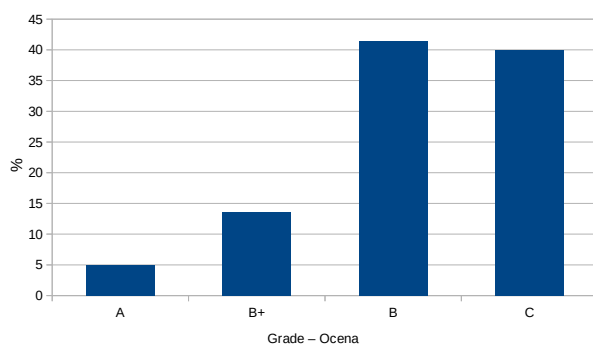

Fig. 1. Percentage of evaluated mink in each grade

Rys. 1. Udział ocenianych norek (w %) w poszczególnych klasach oceny w analizowanym okresie

Fig. 2. Number of mink in each grade by calendar year

Rys. 2. Udział ocenianych norek (w szt.) w poszczególnych klasach oceny z uwzględnieniem roku kalendarzowego

The results are not used here to judge which of the studied farms is the best one. Our observations, however, may by a hint the farmers that breeding work should be intensified and animal welfare should be taken into account more seriously. It is known that every farmer treats their animals in a very individual way. If the farmer ignores the negative signs and neglects the housing quality and welfare conditions, this will translate into the quality of the final product, which in turn may jeopardize the profitability of the farming effort.
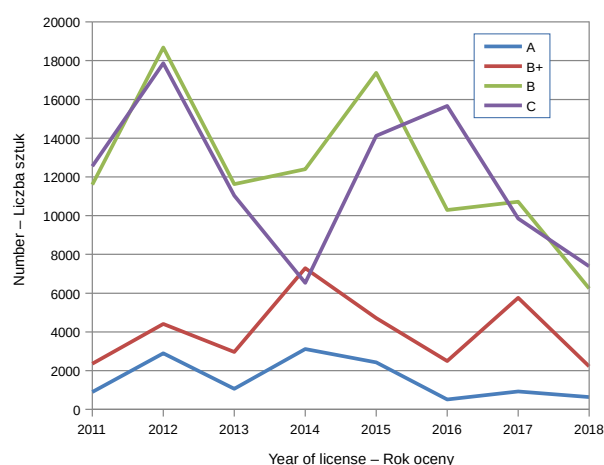
Fig. 1 presents the percentage distribution of mink by evaluation grade. The mink with grade B were most common and represented 41.5% of studied population. Slightly fewer, 39.9%, were mink with grade C. Also in the research of Zawiślak et al. [2016] on the assessment of fur-bearing animals, most mink received grade B. The proportion of this grade ranged between 31 and 36%. On the other hand, the share of animals in class A reached 20.6% on average, which was four times higher than in our research. Unfortunately, this indicates that the number of animals with an excellent appearance and very good condition, as well as a dense, elastic and silky coat has decreased, despite an intensive breeding effort aimed at improving the body shape. The reason for this may be not so much a decrease in the quality of the coat of these particular mink, but rather a more restrictive as-

Table 2. Statistical description of mink type evaluation in relation to color variant

Tabela 2. Charakterystyka statystyczna oceny pokroju norek z uwzględnieniem odmiany barwnej

Color variant – Odmiana barwna	N	x̄	SD	SE	V
Pastel – Pastel	157966	2.84[a]	0.843	0.002	29.62
Pearl – Perła	44540	2.85[a]	0.833	0.004	29.26
Black Cross – Krzyżak	1997	2.75[b]	0.789	0.018	28.75
White Hedlund – Biała Hedlunda	4918	2.82[a]	0.904	0.013	32.03
Palomino – Palomino	9305	2.65[c]	0.770	0.008	29.11
Sapphire – Szafir	15978	2.93[d]	0.918	0.007	31.31
Platinum – Platyn	5100	2.74[b]	0.822	0.012	29.96
Standard – Standard	1200	2.98[d]	1.012	0.029	33.99

a, b, c… – means marked with different letters differ significanlty at P ≤ 0.05.
a, b, c… – średnie oznaczone różnymi literami różnią się istotnie przy P ≤ 0,05.

Table 3. Statistical description of mink type evaluation in relation to license year

Table 3. Charakterystyka statystyczna oceny pokroju norek z uwzględnieniem roku oceny

License year – Rok oceny	N	x̄	SD	SE	V
2011	29787	2.69[a]	0.763	0.005	28.32
2012	43840	2.83[b]	0.861	0.004	30.49
2013	26708	2.78[c]	0.797	0.005	28.69
2014	29331	3.24[d]	0.916	0.005	28.29
2015	38620	2.88[e]	0.851	0.004	29.54
2016	28960	2.58[f]	0.722	0.004	27.98
2017	27260	2.92[g]	0.838	0.005	28.72
2018	16502	2.77[c]	0.827	0.006	29.90

a, b, c… – means marked with different letters differ significanlty at P ≤ 0.05.
a, b, c… – średnie oznaczone różnymi literami różnią się istotnie przy P ≤ 0,05.

Table 4. Statistical description of mink type evaluation carried out on selected mink farms

Tabela 4. Charakterystyka statystyczna oceny pokroju norek, przeprowadzonej w wybranych fermach hodowlanych

Farm – Ferma	N	x̄	SD	SE	V
1	56880	2.67[a]	0.744	0.003	27.90
2	27394	3.01[c]	0.873	0.005	29.02
3	24604	3.25[d]	0.938	0.006	28.85
4	27976	2.66[a]	0.725	0.004	27.22
5	11050	3.14[b]	0.984	0.009	31.37
6	4540	3.10[b]	0.985	0.015	31.74
7	26738	2.62[e]	0.796	0.005	30.44
8	842	2.64[ae]	0.655	0.023	24.86
9	60980	2.85[f]	0.825	0.003	28.90

a, b, c… – means marked with different letters differ significanlty at P ≤ 0.05.
a, b, c… – średnie oznaczone różnymi literami różnią się istotnie przy P ≤ 0,05.

sessment criteria applied by the licensing referees. This, in turn, is dictated by the high standards set by the auction houses. The coat characteristics and body size have a strong impact on the final price of the pelt [Zieliński et al. 2016], so these traits are of great economic importance. As Wierzbicki [2005] stated, breeders of fur anim-

als should focus on the genetic improvement of the body size and the quality of their coat. Both features have a significant share in the overall volatility of the price and, according to Wierzbicki [2005], these are 60% for pelt size and 28% for coat quality. In assessing the coat, the referees take into account hair density, length, elasticity and silkiness [KCHZ 2009].

Analyzing the distribution of mink in individual assessment classes over the period of time, a downward trend can be seen not only within class A, but in all assessment classes (Fig. 2). This is due to the decreasing number of mink breeding herds. According to the National Center for Animal Breeding [KCHZ 2018], in 2017 the number of females of breeding herds decreased by 6118 heads compared to 2016. The decreasing number of fur animals on farms does not apply to mink only, but also other species such as red and polar foxes, nutria or polecats [KCHZ 2018]. This is probably related to the growing number of attacks of radical animal-rights groups on farms specializing in fur-bearing animals [Jakubowski 2017].

CONCLUSIONS

1. A statistically highly significant effect of the color variant, year of assessment and farm, on which the license took place, on the results of type evaluation was observed.

2. The most favorable year of evaluation was 2014. At that time, the animals achieved the highest grades for coat, which allowed obtaining the highest average overall grades of the mink types.

3. Variation in the assessment of the mink type, measured by a coefficient of variation, was in the range 24.86–33.99%, depending on the year of licence, the color variant and the farm on which the assessment was carried out. Standard mink showed the highest variation and the highest average type rating. Similar results were achieved by Sapphire mink.

4. A statistically significant influence of the farm (breeder) on the assessment of animal habit was demonstrated. Among the analyzed farms, the best results were recorded on farm No. 3, which may indicate that the animals on that farm were kept in very good conditions, and in addition the breeder effectively conducts breeding work to improve the type traits.

5. The mink with grade B had the highest percentage share among the tested animals. They represented 45% of all mink assessed. A small percentage of grade A animals may indicate a more restrictive assessment by the licensing referees. This, in turn, is dictated by more demanding expectations of auction houses regarding the size and quality of skins.

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ANALIZA OCENY CECH POKROJU RÓŻNYCH ODMIAN BARWNYCH NORKI HODOWLANEJ (*MUSTELA VISON* SCH.) W ŚWIETLE AKTUALNEGO WZORCA OCENY

STRESZCZENIE

Celem pracy była analiza porównawcza oceny cech pokroju norek różnych odmian barwnych na przestrzeni kilku lat, według nowego wzorca oceny. Zwierzęta do badań pochodziły z ferm, znajdujących się w północno-zachodniej Polsce. Badania obejmowały lata 2011–2018. Stwierdzono statystycznie wysoko istotny wpływ odmiany barwnej, roku oceny oraz fermy, na której dokonywano licencji na cechy pokroju u norek. Najwyższymi średnimi oceny pokroju charakteryzowały się zwierzęta w 2014 roku, zaś odmianą barwną o najlepszych wynikach oceny były norki standard. Zbliżonymi wartościami cechami pokroju odznaczały się zwierzęta odmiany szafirowej. Zmienność oceny pokroju norek mierzona współczynnikiem zmienności, zawierała się w przedziale 24,86–33,99%, w zależności od przyjętego kryterium. Największym udziałem procentowym wśród badanych zwierząt charakteryzowały się norki z kategorią B. Stanowiły one 45% wszystkich poddanych ocenie norek.

Słowa kluczowe: norki, cechy pokroju, odmiana barwna, zmienność

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