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Estimation of the human factor in the form of litter size regulation for the weaning results in mink

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Abstract: *Estimation of the human factor in the form of litter size regulation for the weaning results in mink.* Results of studies on farm animals indicate that proper human behavior may bring about better parameters with respect to animal breeding. The aim of the study was to attempt to establish whether mink breeding efficiency is influenced by undertaking measures with a view to regulating litter size. Each time the regulation of litters resulted from a direct decision of employee, hence it can be treated as the effect of a human factor. Data derived from evaluation cards for standard-colored one-year female mink (1,500 cards in total) were compared by two teams (team A: 748 cards, team B: 752 cards, respectively). During the initial inspection of each litter the number of young live born kits was counted and the employees decided whether to introduce measures with respect to regulating litter size (either add or subtract kits) or whether to leave the litter as is, sans intervention. The evaluation of the number of weaned kits has allowed us to compare both teams with respect to the resulting breeding efficiency, as well as evaluate the efficiency of the regulatory measures (modeling) themselves with respect to litter size. The analysis of the received results did not show the existence of the influence of the human factor, which is the modeling of litters on the rearing results. The obtained results indicate that in both teams employees approached in a similar manner the decision regarding the need to model litters. The possibility of making such conclusion is indicated by comparable weaning results received in both teams, both in the group of modeled and non-modeled animals. When compared teams, team A obtained better results ($P = 0.047$), however, in none of the analyzed subgroups compared teams (A and B) were found statistically significant differences in weaning results.

Key words: mink, litter size regulations, breeding efficiency, human factor influence

INTRODUCTION

Multiple studies on breeding farm animals have confirmed that improper human behaviour may limit productivity. There also exists an opposite relationship: proper behaviour toward animals may result in better performance indicators. This has been confirmed in the studies of i.a. Barnett et al. (1992) and Cransberg et al. (2000) with respect to poultry; Hemsworth et al. (1986) and Gonyou et al. (1986) with respect to breeding swine; Breuer et al. (2000) with respect to cattle.

Such studies also pertained to mink. In their studies, Seremak et al. (2011) have demonstrated the influence of the human factor on the breeding efficiency of mink kits: it was different for groups of animals overseen by different teams.

The aim of the present study was to establish whether it is possible to speak of the influence of the human factor, which is the procedure of regulating the litter size, on the efficiency of mink weaning results.

MATERIAL AND METHODS

The material of the study consisted of the breeding cards of breeding-stock standard-color female mink, collected on a farm located in central Poland. A total of 1500 evaluation cards were collected. They belonged to one-year female minks housed in ten enclosures. For each enclosure, about 150 evaluation cards were selected at random for the purpose of the calculations. The animals were taken care of by two teams, each of which oversaw five enclosures. This allowed us to establish whether the human factor influences breeding efficiency. Table 1 presents the arrangement of the experiment.

The evaluation cards contained the following information:

- The number of born kits in a litter established during the first control.
- The number of dead kits in a litter established during the first control.
- The number of live kits in a litter established during the first control.
- The number of kits added to the litter.
- The number of kits subtracted from the litter.
- The number of reared (weaned) nestlings from a single litter.

The experiment paid significant attention to the efficiency of adding kits to a litter or subtracting them from, or the so-called issue of "modeling" litters.

The litter-modeling measure consisted of subtracting a number of the kits when concerns arose that the mother may not be able to feed her offspring, as well as adding additional kits when determining that the mother will be able to feed them. A positive result of the modeling process was announced when the female mink weaned a number of mink equal to or larger than the number of her live born offspring. A negative result of the modeling process was announced when following modeling, the female lost kits in the rearing stage.

Each female mink was assigned to one of the four following groups:

1. Unmodeled litter, no losses in rearing
2. Unmodeled litter, losses in rearing
3. Modeled litter, positive result
4. Modeled litter, negative result

Such a division allowed us to evaluate the efficiency of the modeling process both within teams, as well as between them. The analysis of results only took into account results which could have been influenced by the direct actions of the overseers themselves, hence it did not take into account the issue of stillborn kits.

The statistical analysis of the results was performed using the Statistica 13.1

TABLE 1**.** The arrangement of the experiment

Team	Number of enclosures	Number of female mink
A	5	748
B	5	752
Total in the experiment	10	1,500

program. The normality of the distribution was checked by the Shapiro-Wilk test, and then the U Mann Whitney test for the χ^2 quality variables was used. The ones with $P \leq 0.05$ were considered significant results.

RESULTS AND DISCUSSION

Table 2 presents the indicators of mink rearing with respect to the teams overseeing the animals.

The average number of born, live kits in a litter obtained for both compared groups falls within the scope established by other authors (Bis-Wencel et al. 2006, Dziadosz et al. 2010, Brzozowski et al. 2012, Konopka et al. 2013).

The analyzed indicators (number of born kits, number of kits born live, number of weaned kits) are characterize by similar variability in the case of both teams (on a level of 30%), which points to the existence of a possibility to improve their values by holding systematic breeding work.

The survivability rate for mink in the rearing stage has turned out to be larger in the case of enclosures overseen by team A. This group resulted in 158 more weaned kits, a significant improvement over the results of team B (Table 2).

In order to determine whether such differences pertain to modeled or unmodeled litters, the efficiency of the modeling measures was compared for both teams. The results are presented in Table 3.

Using modeling measures (adding or subtracting kits) is always an interference with respect to the natural life rhythm of the female mink. For this reason, it is extremely crucial to account for the experience of the personnel and

TABLE 2. Indicators of mink breeding in the compared teams

Team	Number of litters	Number of born kits in a litter x (v)	Number of living kits in a litter x (v)	Number of weaned kits in a litter x (v)
A	748	6.87 (28.5)	6.57 (28.7)	5.70[a] (29.0)
B	752	6.90 (31.4)	6.47 (32.4)	5.47[a] (33.6)

x – average value for the group, v – coefficient of variation, a, a – differences between rows in a column are statistically significant on a level of $P = 0.047$.

TABLE 3. Indicators of mink breeding in the compared teams with respect to litter modeling measures

Undertaken measures	Number of litters		Average number of living kits in a litter x (v)		Average number of weaned kits in a litter x (v)	
	Team A	Team B	Team A	Team B	Team A	Team B
No litter modeling	556	562	6.85 (22.6)	6.72 (25.3)	5.78 (29.1)	5.57 (31.9)
Litter modeling	192	190	5.76 (42.9)	5.69 (45.9)	5.49 (28.3)	5.18 (37.2)

x – average value for the group, v – coefficient of variation their assessment of whether or not resort to modeling. It may as well turn out that needless disruption of the females and premature decisions to model the litter may be counterproductive to the goal at hand and may, in effect, lower breeding efficiency. On the other hand, it may turn out that failing to undertake modeling measures will lead to a reduction in the number of reared kits.

By way of comparing both teams, we did not identify statistically significant differences with respect to the values of rearing indicators in groups of litters which have undergone modeling, despite the fact that team A has achieved overall better breeding efficiency. After summing up the number of young offspring obtained, it turns out that the team A modeled 192 litters and obtained 1054 young weaners, while the team B from 190 litters obtained 984 young weaners. Although, there were 70 young offspring less in this group, the difference was statistically insignificant ($P = 0.136$).

Differences in breeding efficiency for unmodeled litters were also statistically insignificant ($P = 0.711$). Leaving litters sans intervention in this case turned out to be a decision which generated better results. This observation seems to confirm the thesis that modeling is done in situations when the female has too many or too few young. This is indicated by the observation that both the average number of live born and average rearing results were higher in non-modeled litters than in modeled ones, in groups of animals serviced by both teams. This may be the result of the fact that more numerous litters are usually the ones being modeled, in which mink with less body mass may be observed, and which usually display less vitality. For this reason, kits from such litters may be less developed and more prone to all negative environmental influences (Houbak and Malmkvist 2008, Hunter 2008).

In order to establish differences between breeding efficiency within modeled and unmodeled litters, we have performed an evaluation of the efficiency of modeling litters for both teams (Table 4).

Comparing breeding efficiency for both teams with respect to both modeling measures and their efficiency points to team A obtaining better results each single time, although, the results did not differ statistically significantly.

TABLE 4. The efficiency of modeling litters in the compared teams

Undertaken measures	Effect of the measures	Number of litters		Average number of living kits in a litter x (v)		Average number of weaned kits in a litter x (v)	
		Team A	Team B	Team A	Team B	Team A	Team B
No litter modeling	no losses	227	225	6.50 (29.9)	6.33 (23.9)	6.50 (23.8)	6.33 (23.9)
	losses	329	337	7.09 (21.2)	7.01 (25.3)	5.28 (30.2)	5.00 (33.6)
Litter modeling	positive effect	142	128	4.96 (40.5)	4.67 (53.2)	5.56 (27.6)	5.33 (37.3)
	negative effect	50	62	7.79 (33.85)	7.46 (28.7)	5.30 (30.3)	4.87 (45.29)

x – average value for the group, v – coefficient of variation

Litter controls are performed at the earliest convenience following birth and it is then when people make decisions on further measures. In the analyzed material, members from both teams equally chose not to take modeling activity (subtracting kits from too numerous litters or adding kits to smaller litters).

CONCLUSION

To summarize it can be stated that the performed analysis of the obtained results did not show the existence of the influence of the human factor, which is the modeling of litters on weaning results. The obtained results indicate that in both teams employees approached in a similar manner the decision regarding the need to model litters. The results of the study also point to the fact that human influence on breeding efficiency may be the result of the conscious decision to refrain from taking modeling measures with a view to changing litter size. The possibility of making such conclusion is indicated by comparable weaning results in both teams, both in the group of modeled and unmodeled animals. When compared teams, team A obtained better results ($P = 0.047$), however, in none of the analyzed subgroups (modeled and unmodeled) compared teams (A and B) were found statistically significant differences in weaning results.

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Streszczenie*: Ocena wpływu czynnika ludzkiego w postaci zabiegu regulacji liczebności miotu na wyniki odchowu u norek.* Wyniki badań na zwierzętach gospodarskich wskazują, że właściwe postępowanie człowieka może przyczynić się do uzyskania lepszych wskaźników użytkowości. Celem przeprowadzonych badań była próba sprawdzenia, czy na wyniki odchowu norek mogą mieć wpływ dokonywane zabiegi regulacji wielkości miotów. Każdorazowo regulacja miotów wynikała z bezpośredniej decyzji obsługi, stąd można ją traktować jako efekt czynnika ludzkiego. Porównywano dane z kart oceny jednorocznych samic odmiany standard (1500 kart), którymi zajmowały się dwie brygady (brygada A: 748 kart, brygada B: 752 karty). Przy pierwszej kontroli każdego miotu liczono liczbę młodych żywo urodzonych i pracownicy podejmowali decyzję, czy dokonać zabiegu regulacji wielkości miotu (dołożyć bądź zabrać szczenięta) czy też pozostawić miot bez ingerencji. Ocena liczby młodych odsadzonych pozwoliła porównać obydwie brygady pod względem uzyskanych wyników odchowu, a także ocenić efektywność przeprowadzonego zabiegu regulacji (modelowania) wielkości miotu. Przeprowadzona analiza uzyskanych wyników nie wykazała istnienia wpływu czynnika ludzkiego, jakim jest zabieg modelowania miotów na wyniki odchowu. Uzyskane wyniki wskazują, że w obydwu brygadach pracownicy w podobny sposób podchodzili do podjęcia decyzji, co do konieczności dokonania modelowania miotów. Na możliwość postawienia takiego wniosku wskazują porównywalne wyniki odchowu uzyskane w obydwu brygadach, zarówno w grupie zwierząt modelowanych jak i niemodelowanych. Przy porównywaniu brygad lepsze wyniki odchowu uzyskała brygada A (P = 0,047), jednak w żadnej z analizowanych podgrup (modelowanych i niemodelowanych) porównywanych brygad A i B nie stwierdzono statystycznie istotnych różnic wyników odchowu.

Słowa kluczowe: norki, regulacja wielkości miotu, wyniki odchowu, wpływ czynnika ludzkiego

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