ACTA SCIENTIARUM POLONORUM *Acta Sci. Pol., Zootechnica 7 (2) 2008, 31–38*

THE INFLUENCE OF BIRTH DATE AND LITTER MATING ON PRODUCTION TRAITS OF POLAR FOXES

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Abstract. In the paper, the analysis of the influence of the birth date and the delivery sequence on the production traits of blue polar foxes is presented. The investigations were performed on the animal farms in the kujawsko-pomorskie voivodship within the years 2003 – 2005. The following numbers of foxes were analyzed: in total 1252 individuals, on farm A – 845 individuals and on farm B – 407 individuals of foxes. It was shown that the date of birth of a fox puppy, depending on the year and the farm, encloses within the period between May 9th and 21st. An early date of birth had an advantageous influence on the number of delivered and the brought up fox puppies from one litter. There is no unambiguous influence of the time of birth on the size of an animal (in cm).

Key words: correlation, date of birth, polar fox, production traits

INTRODUCTION

When choosing replacement animals for an action of a herd replacement – the following parameters should usually be taken into account: the summative license evaluation of a sort/type, a repeatability of litter numbers and a birth date of animals [Kuźniewicz and Filistowicz 1999].

Many authors have recently shown that the earlier the birth date, the more advantageous the influence on the growth and development of young animals is observed. This problem has been discussed by Polish authors e.g. Maciejowski [1972], Sławoń and Woliński [1975], Jeżewska and Maciejowski [1983] as well as Kubacki [1989] in Poland and, abroad, by Starkov [1953].

Ocetkiewicz and Wojtacha [1976] indicate that the early delivery increases a single cost of fur production which, in consequence, can have a negative influence on the profitability of breeding/farming of a particular animal on a particular farm.

The goal of the investigations was to determine the influence of the birth date and the delivery sequence on the production traits of blue polar foxes.

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MATERIAL AND METHODS

The data collected during the investigations concern the blue polar foxes kept on two breeding farms in the kujawskie-pomorskie voivodship within the years 2003–2005. The analyses were performed on the basis of the following data: in total 1252 foxes, on the first farm A 845 individuals were analyzed (i.e. 284 male and 561 female foxes), whereas on the second farm B 407 individuals (i.e. 87 male and 320 female foxes), respectively.

The assessment of a sort/type of the young foxes was made according to the obligatory template of assessment, prepared by the Headquarters of Animal Breeding Bureau [The exterior evaluation pattern of polar foxes 1998]. In every research year, the assessment was performed by the same licensed judge. The animals, in each year of research, were bred in similar conditions (cages in pavillions) and they were bred in an identical way in particular breeding periods.

The following parameters were analyzed: the birth date (expressed by a day counted from April 1st), the number of items in a litter, the size of an animal (cm) and the total number of points (pkt) received during a license procedure. The average value (x) of the investigated trait and the variability coefficient (V_X) were calculated. The values of the phenotype correlation coefficients were calculated by means of the program Stanisz [1998]. The significance of the correlation coefficients was determined for two significance levels $p \leq 0.01$ and $p \leq 0.05$.

RESULTS AND DISCUSSION

The average time of birth of fox puppies (Table 1) on both farms related to the whole research period (years 2003–2005) was approximately mid May i.e. on farm A – May 14th and on farm B – May 14th. The average time of birth of fox puppies in particular years was differed considerably and it was within the period between May 9th and 21st , depending also on the particular farm. In case of farm A, these differences were statistically essential.

The previous investigations of Maciejowski [1972] and Kubacki [1989] performed on blue polar foxes showed a positive influence of the birth date on the number of puppies delivered and weaned up from a particular litter.

The analyzed animals usually originated from relatively abundant litters (on the average, from 10.26 items up to 12.08 animals). In breeding practice, it is a recommendation that, for further breeding, animals originating from abundant litters, with early dates of birth (i.e. before May 15th) have to be chosen [Sławoń and Woliński 1975]. However, in the eastern part of Poland, animals from later litters i.e. before May 20th are also acceptable.

Moreover, Cholewa [1978] as well as Jeżewska and Maciejowski [1983] showed in their investigations that it is reasonable to take for further farming the animals which originate from early litters.

The length of a body (size) measured in centimeters (within the research years) on both farms differed essentially or highly essentially. It was observed that an average body length on both farms, depending on an investigated year, was within the range from 64.73 cm to 66.95 cm. The calculated variability coefficient was uniform and on a relatively low level (2.42–3.45 %) which indicates satisfactory homogenization of this feature on both investigated farms.

Table 1. Production parameters of blue polar foxes for farms A and B within the period 2003–2005
Tabela 1. Parametry użytkowe lisów polarnych niebieskich z fermy „A" i „B" w latach 2003–2005

Farm Ferma	Year Rok	n	Birth date (counted from April 1), days Termin urodzenia (liczony od 1 kwietnia), dni		Litter mating – Pochodzenie z miotu number of puppies born, person z liczby szczeniąt urodzonych, osobniki		number of puppies weaned, person z liczby szczeniąt odsadzonych, osobniki		Animal's size, cm Wielkość zwierzęcia, cm		Total score, points Suma punktów, pkt	
			$\bar{x}$	V_x	$\bar{x}$	V_x	$\bar{x}$	V_x	$\bar{x}$	V_x	$\bar{x}$	V_x
A	2003	334	51^{A} (21 May)	17.24	10.75	25.21	8.27	36.03	66.22^{AB}	3.03	18.67^{A}	4.00
	2004	404	39^{AB} (9 May)	22.82	10.40	26.99	8.80	31.98	65.03^{AC}	3.07	18.44^{AB}	4.20
	2005	107	49^{B} (19 May)	26.52	10.26	27.12	8.42	28.91	66.95^{BC}	2.82	18.88^{B}	4.76
	Total	845	45 (15 May)	24.59	10.52	26.,32	8.54	33.30	65.75	3.21	18.59	4.27
B	2003	133	43 (13 May)	27.54	12.08	30.49	9.79^{A}	24.83	64.73^{A}	2.72	19.06	4.22
	2004	120	–	–	11.85	23.63	10.18^{B}	27.10	65.08^{B}	2.42	18.94	4.41
	2005	154	44 (14 May)	19.71	10.97	30.,07	8.30^{AB}	30.37	65.86^{AB}	3.45	19.16	4.25
	Total Suma	407	44 (14 May)	23.55	11.59	28.68	9.34	28.27	65.26	3.04	19.04	4.35

A, B, C – differences which are highly essential, for $p \leq 0.01$.
A,B,C – różnice statystycznie wysoce istotne przy $p \leq 0,01$.

The average sum of points for two farms was within the range from 18.44 points to 19.16 points, which is recognized as a high level result.

The calculated correlation coefficients between the birth date and numbers of animals per litter ($r_{1.2}$) for the analyzed farms, for the entry "in total", were within the following values: from -0.091^{x} (Table 2) to -0.273^{x} (Table 3). A similar level of correlation coefficients between the birth date and the number of farmed puppies was obtained $r_{1.3}$ (respectively: -0.249^{xx}, -0.087). It means that the numerous litters and better breeding of fox puppies was observed in case of earlier birth dates. Former investigations [Jeżewska and Maciejowski 1983, Kubacki 1989, Kubacki 2002a] showed a similar relation of the influence of the early birth date of female foxes on their fertility and better breeding of puppy foxes.

The presented correlation coefficients between the date of birth and the size of an animal (measured in cm) differed significantly depending on an analyzed farm. Especially, on farm A – the value of correlation coefficient ($r_{1.4}$) was positive and statistically essential (from 0.141^{x} to 0.337^{x}), however, on farm B – it was within the range: 0.098 to 0.353^{xx}. It means that the early dates of birth of puppies on farm B have positive influence on the size of animal (measured in cm). In case of farm A, where an influence of the date of birth was not observed, this fact can be explained by some compensation of growth during the development within the particular breeding periods. Kubacki [2002b] shown that the polar foxes (of Finnish type), independently of the percentage of Finnish origins in their blood, during the period of shaping and maturity of fur hair, should be more intensively bred despite different efficiency of weight gain during different periods of breeding.

Ślaska [2002], analyzing an influence of the date of litter of female foxes on the final mass of raccoon dogs, body did not prove any essential differences in the body mass of their offspring.

Korhonen and Harri [1985] claim that the daily mass increases of raccoon dog puppies were positively correlated with the dates of their birth ($r = 0.78$), which means that the later the puppies were delivered, the faster their mass increased.

The highest correlation coefficients were observed between the number of delivered puppies and the number of weaned animals (from $r_{2.3} = 0.624^{xx}$ to $r_{2.3} = 0.709^{xx}$). In all cases the results were highly essential from the statistical point of view.

The big number of puppies originating from litters had a negative influence on the size of animals (in cm). Similar relationships were observed for polar foxes by Filistowicz et al. [1999] and also for raccoon dogs by Ślaska [2002]. However, Kenttämies [1986] observed that silver foxes originating from small litters (1–3 items) obtained slightly bigger assessment confirmation in comparison to animals originated from numerous litters.

Table 2. Correlation coefficient for blue polar foxes from farm A
Tabela 2. Współczynniki korelacji lisów polarnych niebieskich na fermie A

Year Rok	Trait Cecha	Birth date, days Termin urodzenia, dni (1)	Litter mating – Pochodzenie z miotu		Animal's size, cm Wielkość zwierzęcia, cm (4)	Total score, points Suma punktów, pkt (5)
			number of puppies born, person z liczby szczeniąt urodzonych, osobniki (2)	number of puppies weaned, person z liczby szczeniąt odsadzonych, osobniki (3)		
2003 (n = 334)	1	●	– 0.103	– 0.308^{XX}	0.141^{X}	0.100
	2		●	0.630^{XX}	– 0.140^{X}	– 0.088
	3			●	– 0.058	0.028
	4				●	0.218^{XX}
	5					●
2004 (n = 404)	1	●	– 0.098^{X}	– 0.094	0.257^{XX}	0.099^{X}
	2		●	0.704^{XX}	– 0.071	– 0.010
	3			●	– 0.055	0.015
	4				●	0.354^{XX}
	5					●
2005 (n = 107)	1	●	– 0.246^{X}	– 0.423^{XX}	0.337^{X}	0.015
	2		●	0.699^{XX}	– 0.123	0.018
	3			●	– 0.294^{X}	– 0.014
	4				●	0.163
	5					●
Total 2003 – 2005 (n = 845) Razem 2003 – 2005 (n = 845)	1	●	– 0.091^{X}	– 0.249^{XX}	0.391^{XX}	0.161^{XX}
	2		●	0.672^{XX}	– 0.092^{X}	– 0.021
	3			●	– 0.099^{X}	0.001
	4				●	0.295^{XX}
	5					●

x – correlation coefficient – essential for $p \leq 0.05$; x – współczynnik korelacji istotny przy $p \leq 0,05$.
xx – correlation coefficient – highly essential for $p \leq 0.01$; xx – współczynnik korelacji wysoce istotny przy $p \leq 0,01$.

Table 3. Correlation coefficient for blue polar foxes from the farm B
Tabela 3. Współczynniki korelacji lisów polarnych niebieskich na fermie B

Year Rok	Trait Cecha	Birth date, days Termin urodzenia, dni (1)	Litter mating – Pochodzenie z miotu		Animal's size, cm Wielkość zwierzęcia, cm (4)	Total score, points Suma punktów, pkt (5)
			number of puppies born, person z liczby szczeniąt urodzonych, osobniki (2)	number of puppies weaned, person z liczby szczeniąt odsadzonych, osobniki (3)		
2003 (n = 133)	1	●	– 0.427^{XX}	– 0,136	– 0.098	0.092
	2		●	0.624^{XX}	– 0.089	– 0.128
	3			●	– 0.186^{X}	– 0.126
	4				●	– 0.013
	5					●
2004 (n = 120)	1	●	–	–	–	–
	2		●	0.709^{XX}	– 0.181^{X}	– 0.047
	3			●	– 0.176^{X}	– 0.088
	4				●	0.117
	5					●
2005 (n = 154)	1	●	– 0.022	– 0.003	– 0.353^{XX}	– 0.021
	2		●	0.627^{XX}	0.008	– 0.055
	3			●	0.056	– 0.074
	4				●	0.143
	5					●
Total 2003 – 2005 (n = 407) Razem 2003 – 2005 (n = 407)	1	●	– 0.273^{XX}	– 0.087	– 0.165^{XX}	0.024
	2		●	0.626^{XX}	– 0.102^{X}	– 0.089
	3			●	– 0.176^{XX}	– 0.096
	4				●	0.080
	5					●

x – correlation coefficient – essential for $p \leq 0.05$; x – współczynnik korelacji istotny przy $p \leq 0,05$.
xx – correlation coefficient – highly essential for $p \leq 0.01$; xx – współczynnik korelacji wysoce istotny przy $p \leq 0,01$.

Analyzing the total sum of points obtained on farm B during the license procedure for the investigated animal population – no clear relationship between the birth date and litter mating influencing on their usability/production traits was observed. However, on farm A, a positive influence of the animal size (cm) on the final sum of points achieved during the license procedure was observed.

CONCLUSIONS

Based upon the performed analysis it was shown that on the investigated farms in kujawsko-pomorskie voivodship in Poland the foxes were delivered in mid May. It was obtained that an early deliver has a positive influence on numbers and better breeding of fox puppies. However large/numerous delivery litter (from which originated a particular fox puppy) has a negative influence on a size of an animal (measured in cm).

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WPŁYW TERMINU URODZENIA ORAZ POCHODZENIA Z MIOTU NA CECHY UŻYTKOWE LISÓW POLARNYCH

Streszczenie. W pracy podjęto próbę określenia wpływu terminu urodzenia oraz pochodzenia z miotu na cechy użytkowe lisów polarnych niebieskich w dwóch wybranych fermach zwierząt futerkowych w województwie kujawsko-pomorskim. Badania przeprowadzono w latach 2003–2005. Analizie poddano 1252 lisów w tym: na fermie A – 845 osobników, a na fermie B – 407 osobników. Wykazano, że średni termin urodzenia szczeniąt lisów w zależności od roku i badanej fermy wystąpił między 9. a 21. maja. Wcześniejszy termin urodzenia korzystnie wpłynął na liczbę urodzonych i odchowanych szczeniąt w miocie. Nie wykazano natomiast jednoznacznego wpływu terminu urodzenia na wielkość zwierzęcia (w cm).

Słowa kluczowe: cechy użytkowe, korelacje, lis polarny, termin urodzenia

Zaakceptowano do druku – Accepted for print: 14.03.2008