

Preliminary studies on the relation between polar vixens' temperament type and the values of selected physiological indicators and cortisol level in the blood serum

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Abstract: *Preliminary study on the relation between polar vixens' temperament type and the values of selected physiological indicators and cortisol level in the blood serum.* The aim of this study was to examine whether there is a correlation between temperament type of polar foxes females, determined with the behavioral tests, and the level of selected physiological indicators and the level of cortisol in blood serum. In the result of conducted studies, there were no differences found between the number of breaths or the number of heartbeats in animals of different temperament types. It was found a higher body temperature in vixens with aggressive temperament compared with the vixens of trustful temperament. The difference was statistically significant ($P < 0.05$). The level of cortisol in the blood serum of aggressive and fearful foxes was higher compared with trustful animals. The observed trend was statistically confirmed ($P < 0.01$). In conclusion it can be said that the study of body temperature and the cortisol level in a blood serum of vixens can be a complementary method to evaluate its suitability as a breeding animals. Full verification of observed dependencies requires confirmation from greater material.

Key words: blue fox, females, temperament, physiological parameters, cortisol

INTRODUCTION

Polar foxes belong to this group of farm animals, which is in the phase of domestication. Lack of full domestication manifest their distrust of human and, consequently, affect the results of use. If we want to achieve better results in this area, we need to know as much about the criteria that allow you to select from breeding individuals guaranteeing the best indicators of use. This criterion is the temperament of animals. Animals trustful, with a balanced temperament are considered best suited to the farm conditions, and the level of physiological parameters (heart rate, respiration rate, body temperature) conforms physiological for this species (Hansen 1993, Pedersen 1996, Mononen et al. 1999). The breeding results of animal distrusted (aggressive, fearful) are worse than trusted (Kaleta 1982, Brzozowski et al. 1999, Gacek 1999, Zoń et al. 1998). On the other hand, Filistowicz et al. (2003) and Przysiecki et al. (2010) in their study found no clear impact of the type of

temperament polar vixen on the results of their reproduction.

The aim of this study was to examine whether there is a correlation between temperament type of polar foxes females, determined with the behavioral tests, and both: the level of selected physiological indicators and the level of cortisol in blood serum. The confirmation of such relationship would give breeders an additional opportunity to identify trustful animals which potentially better suit for breeding herd.

MATERIAL AND METHODS

The study was conducted at The National Research Institute of Animal Production, Experimental Station Chorzelów on polar foxes. Polar fox females at the age of 1–3 years were selected for the study. Using the “test of hand” (Kaleta 1982, Gacek 1999), animals were divided into experimental groups, depending on their temperament:

- A – clear aggressive animals (15 vixens);
- T – clear trustful animals (16 vixens);
- F – clear fearful animals (10 vixens).

The examination was conducted in August during *anestrus* period. The body temperature, the pulse and the number of breaths were measured. The study was conducted on the treatment table. After 3–4 min after the capture of the animal and placed on the treatment table, rectal temperature was measured. The pulse rate, expressed in the number of heart beats per 1 minute, was measured by the touch of the chest under the left front limb. The number of breaths was determined on the movements of the abdominal wall at the inhalation and exhalation

of the animal in a minute. Blood samples for determination of cortisol was collected from brachial vein. The concentration of cortisol in the blood serum was tested by radioimmunoassay using a set of cortisol (ORION DIAGNOSTICA) for measurement range of 0–2.000 nmol/l with a sensitivity of 4–7 nmol/l.

The methods based on statistical analysis of variance (SPSS 2006) were used for the evaluation received results.

RESULTS AND DISCUSSION

The obtained results concerning analyzed indicators are presented in the Table.

No significant differences between the heart rate and the number of respiration, depending on females temperament type were observed. The results also indicate the lack of relationship between the estimated parameters and the temperament (Bakken et al. 1994). The parameters are consistent with the physiological norms for that species (Pedersen 1996, Mononen et al. 1999).

It was found a statistically significant difference between the body temperature of aggressive and trustful foxes (Table). The temperature of animals classed as aggressive was higher than trustful of 0.66°C (these differences were statistically significant at $P < 0.05$). Similar relationships were described by Zoń et al. (1998). They also observed an increased body temperature of aggressive foxes relative to the trustful animals.

It was also observed a higher level of cortisol in the blood serum of females classified as aggressive, especially when compared with trustful foxes: this difference was statistically significant at level 0.01. It was also observed statis-

TABLE. The value of selected physiological measurements and cortisol level in blood serum in polar vixens with different temperament

Indicator	Group of vixens					
	aggressive		trustful		fearful	
	\bar{x}	<i>SD</i>	\bar{x}	<i>SD</i>	\bar{x}	<i>SD</i>
Heart rate per min	89.13	11.28	83.62	8.59	87.20	11.32
Number of respirations per min	39.20	5.00	39.62	4.08	39.00	5.68
Body temperature (°C)	40.57 ^a	0.79	39.91 ^a	0.56	40.22	0.78
Cortisol level (nmol/l)	119.53 ^A	38.77	74.19 ^{AB}	18.33	108.31 ^B	26.74

a – statistical differences significant at level $P < 0.05$.

A, B – statistical differences significant at level $P < 0.01$.

tically significant difference between trustful and fearful females ($P < 0.01$). The observed results confirms thesis presented by Kowalski (1996), that the fearful animals have an increased levels of corticoids in blood serum. Aggressive and fearful animals are considered to be less adapted to the farm environment and adaptive processes do not run with them in an optimal way (Kowalski 1998).

The values obtained are within the norms considered to physiologically correct for the blue foxes, comprised between values of 49.9 and 140.9 nmol/l (Rekila 1997, Mononen et al. 1999). According to these authors, the difference in the level of cortisol may be related not with the temperament, but with seasonal changes in animal physiology.

CONCLUSION

To summarize it can be concluded that the obtained results indicate the existence of relationship between foxes temperament, specified by using behavioral tests, body temperature and the level of cortisol in the blood when comparing foxes aggressive and fearful with trustful.

The applied parameters may be useful as an additional method for assessing temperament foxes; however, full verification of the observed dependences requires confirmation from greater material.

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- Streszczenie:** Wstępne badania nad zależnością między temperamentem samic lisów polarnych a wartościami wybranych wskaźników fizjologicznych i poziomem kortyzolu w surowicy krwi. Celem badań była próba określenia, czy istnieje zależność między typem temperamentu lisic polarnych, określonym na podstawie testów behawioralnych, a poziomem wybranych wskaźników fizjologicznych i poziomem kortyzolu w surowicy krwi. W wyniku przeprowadzonych badań nie zaobserwowano różnic między liczbą oddechów i tętnem u samic o różnym typie temperamentu. Stwierdzono wyższą temperaturę ciała u samic o agresywnym typie temperamentu w porównaniu do samic ufnych (różnica istotna na poziomie $P < 0,05$). Poziom kortyzolu w surowicy krwi u lisów agresywnych i bojaźliwych był znacznie wyższy w porównaniu do zwierząt ufnych (różnica istotna na poziomie $P < 0,01$). Podsumowując badania, można stwierdzić, że określenie temperatury ciała oraz poziomu kortyzolu w surowicy krwi lisic może być uzupełniającą metodą oceny przydatności samic jako zwierząt hodowlanych. Pełna weryfikacja zaobserwowanych tendencji wymaga ich potwierdzenia w badaniach na liczniejszym materiale.
- Słowa kluczowe:* lisy polarne, samice, temperament, parametry fizjologiczne, kortyzol

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