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Behavioural adaptation of domestic animals on the example of different breeds of domestic cat (*Felis silvestris catus* L., 1758)

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Abstract. The excessive increase in the anthropogenic burden on wildlife, namely the uncontrolled use of natural resources, including deforestation, mining, wasteful nature management systems, a decrease in biodiversity due to intensive agricultural development, and more recently, war, affect the living conditions of both wild and domestic animals. In the new realities of the modern world, pets, losing their usual natural environment, are forced to either adapt to changes or cease to exist. *The purpose of the study* was to investigate the level of adaptation of the body (*Felis silvestris catus* L., 1758) of domestic cats in home conditions. Long-term methods were used to achieve this goal: daily visual observation, time budget, followed by the analysis of data on greater animal activity. The behaviours of cats were evaluated on a six-point scale: imitation of hunting – active play using toys



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(5 points) and territory inspection, jumping, scratching claws (4 points); communication with the owner – food search and bunting (3 points); self-cleaning – passive walk, toilet (2 points); rest – state of light sleep or napping (1 point), state of deep sleep (0). The selected samples were compared statistically using Kendall's rank correlation coefficient. It is established that intra-breed and inter-breed differences in the duration of behavioural acts of obligate and facultative behaviours are largely determined by the temperament and character of the animals under study. The daily activity of cats of different breeds is described, which is determined by the imposition of the influence of genetically determined cycles on specific character traits and is formed during selection breeding. It is statistically proved that there is a substantial consistency between the traits under study in animals with different temperaments. If the temperament is similar, behaviour and motor activity do not correlate with each other, and the differences in the behaviour and activity of male and female purebred cats are poorly expressed. It is substantiated that the results obtained can serve as a basis for understanding the problems and difficulties that arise in purebred cats in the process of adaptation to life together with humans and, thereby, provide an understanding of the main manifestations of behavioural adaptation of domestic animals.

Keywords: ethology; adaptation; behavioural acts; crossbred cats; purebred animals

INTRODUCTION

The excessive increase in the anthropogenic burden on wildlife, namely the uncontrolled use of natural resources, including deforestation, mining, wasteful systems, reduced biodiversity due to intensive agricultural development, and more recently, war, affect the living conditions of both wild and domestic animals. People, realising their unity with nature, rethink their attitude to it. Understanding that pets with different breed characteristics have specific environmental needs to achieve a good quality of life requires investigating their ability to adapt, including from the standpoint of behavioural adaptation. This determines the relevance of the chosen study subject and the feasibility of its development.

Notably, a person, even faithfully caring for their pets, often has superficial knowledge and understanding of their behaviour. The solution to this problem is possible only if both general theoretical issues and the ethology of animal adaptation to the environment are comprehensively investigated, at least at the level of systems of interrelated behavioural acts. Recently, a substantial number of papers have been devoted to the examination of pet behaviour. The adoption of an evolutionary and adaptive approach to investigating mechanisms and processes of behaviour development is becoming increasingly popular in various fields of knowledge, including ethology, behavioural ecology, and adaptive evolution. Since all levels of organisation in the body are united by behavioural traits, it can be stated that there is a unity in the evolution of behaviour, morphology, physiology, and immunology of animals in the process of creating a unique functional phenotype (Natoli *et al.*, 2022). Although even today, most papers are reduced to stating the characteristic morphological and ethological features of purebred animals (Pusis, 2021).

A study by M. Salonen *et al.* (2019) identified variations in behavioural responses to genetic and environmental components and proved the presence of substantial genetically determined variations in breed populations. J. Faure and E. Mills (2014) also considered the genet-

ically determined individual reactions of the animal body to the effect of various environmental factors to prevent or minimise negative consequences. According to P. Jensen (2017), this is especially true for rare animal breeds that are able to maintain genetic diversity and thus guarantee them an appropriate level of viability.

According to the findings of Japanese researchers (Nagasawa *et al.*, 2020), the cohabitation of pets with humans has a positive effect on physiological and psychological health, including improving the mood of the owner. In relation to animals, physical communication is a common and necessary factor for building a good relationship with the owner, ensuring a fairly high quality of life for the animal. However, the relationship between the health benefits provided by the presence of a cat in the home, characteristic behaviour, and behavioural responses of cats requires further study.

Thus, by rethinking the human relationship with domestic and other animals, researchers (Tarazona *et al.*, 2020) are increasingly promoting the transition to the concept of unity and integrity of living nature, embodied through the narrative: one health, one well-being, and one biology, as prerequisites for global change based on the observance of ethics of actions, considering the consequences of human activity.

Researchers pay considerable attention to the examination of the applied importance of ethology for agriculture both in Ukraine and in the world. Ethologists identified many aspects of animal behaviour that can be used in agricultural production and veterinary medicine (Doilydov, 2021; Suprovych *et al.*, 2022). Therewith, more and more often in the literature by Dohertya (2016), A. Trouwborst (2020), a warning about the negative impact of domestic cats, as representatives of predatory animals of invasive fauna, on the abundance and biodiversity of wildlife, is noted (Krauze-Gryz, 2018; Loss, 2017).

In the new realities of the modern world, domestic animals, losing their usual natural living conditions, are forced to either adapt to changes or cease to exist

(Calvert, 2013; Loss, 2018). Actually, this why is the reason to investigate the natural adaptation of animals comes to the fore.

The purpose of this study is to investigate the level of adaptation of the body of domestic cats (*Felis silvestris catus* L., 1758) in home conditions.

MATERIALS AND METHODS

The study dates back to the spring-summer-autumn seasons of 2019-2022. The examination of species-specific behaviour of crossbred representatives of different domestic cat breeds (*Felis silvestris catus* L., 1758) was conducted by observing: a four-year-old female Siamese cat (SIA♀); a five-year-old female Persian Chinchilla (PER♀), a three-year-old female (BRI♀), and a six-year-old male (BRI♂) of the British Shorthair breed; a six-year-old female Siberian cat (SIB♀).

The age of animals was determined according to the classical method of N.P. Zapadnyuk (1983) considering the EMS code (Easy Mind System), namely the system created by the International Federation of felinology (FIFe) for easy identification of purebred cats (Breed standard, 2023).

The examination of the behaviour and temperament of cats was conducted using long-term methods of daily visual observation (Shevchyk, 2021) (observing the behaviour of cats during the day once a month under the usual conditions of keep and daily routine, a total of 5-7 observations of each of the cats per year) and the time budget method, followed by the analysis of data on greater daily animal activity (Nagasawa, 2020; Paliy, 2010). The time budget, namely the daily list of behavioural acts, was timed using ethograms (catalogues) for each breed.

The point scale for classifying behavioural acts is developed based on the recommendations: G. Katzen (2008), L.V. Krushynskiy (Dotsenko, 2019). The following criteria for evaluating the activity of animals, expressed in points (on a six-point scale) are selected: imitation of hunting – active play using toys (5 points) and territory inspection, jumping, scratching claws (4 points); communication with the owner – food search and bunting (3 points); self-cleaning – passive walk, toilet (2 points); rest – state of light sleep (1 point), state of deep sleep (0).

Comparison of the selected samples was conducted statistically, using Kendall's rank correlation coefficient, which characterises the measure of consistency between the ranks (where rank is the degree of difference) of two random variables (namely, a point assessment of the daily activity of cats) (Bakhrushin, 2011).

When justifying the conclusion, it was proceeded from the statement: if the Kendall's correlation coefficient ($|\tau|$) is less than the critical point (T_{cr}) – the rank correlation between the qualitative characteristics of the two samples is insubstantial. If $|\tau| > T_{cr}$ – there is a substantial rank correlation between the qualitative features of samples. If $|\tau| > T_{cr}$ – there is a substantial rank correlation between) is equal to "0" – there is no rank correlation. For the calculation, the Microsoft Excel programme of the Microsoft Office suite was used. The reliability of the obtained results was checked using the Student's t-criterion. The observation was conducted in accordance with ethical standards and recommendations for the humanisation of work with laboratory animals, which are reflected in the "European Convention for the protection of vertebrates used for experimental and other purposes" (1999), and the requirements of the bioethics Commission of I. Horbachevsky TNMU of the Ministry of Health of Ukraine (protocol No. 14 of 23.11.2021).

The study is a fragment of the individual R&D "Fauna of the Western region of Ukraine: biological classification, state of diversity, ecology, genetics, protection, educational and methodological aspects of teaching" (state registration number 0121U107913) (2021). The results are published for the first time.

RESULTS

Like all animals, cats are characterised by a certain temperament, specific behavioural characteristics, and different environmental needs. In fact, these properties ensure the adaptation to achieve a good quality of life for the animal.

The identified dependence of cat behaviour on the temperament in sanguine cats showed a tendency to reduce the duration of facultative behavioural responses compared to innate ones (SIA♀: 10.33±0.71 (43.0%); 13.67±0.66 (56.96%); $p < 0.01$) (SIB♀: 11.57±0.27 (48.58%); 12.33±0.27 (51.38%); $p < 0.1$) (Table 1).

Table 1. Manifestation of various forms of behavioural reactions of purebred cats

No.	Breed	n	Temperament	Duration of acts of obligate behaviour		Duration of acts of optional behaviour	
				hours	%	hours	%
1	SIA♀	7	sanguine	13.67±0.66	56.96	10.33±0.71 ²	43.0
2	SIB♀	7	sanguine	12.33±0.27	51.38	11.57±0.27 ¹	48.58
3	BRI♀	7	melancholic	10.66±0.51	44.42	13.29±0.50 ²	55.54
4	BRI♂	5	melancholic	11.40±0.46	47.50	14.20±0.33 ³	59.17
5	PER♀	7	with features of both sanguine and melancholic	11.71±0.27	48.58	12.31±0.33 ¹	51.38

Note: ¹ $p < 0.1$; ² $p < 0.01$; ³ $p < 0.001$

Source: compiled by the authors

In melancholic cats, this ratio is diametrically opposite (BRI♀ ($p<0.01$) and BRI♂ ($p<0.001$) – obligate reactions (BRI♀: 10.66 ± 0.51 (44.42%), BRI♂: 11.40 ± 0.46 (47.50 %)), optional (BRI♀: 13.29 ± 0.50 (55.54%), BRI♂: 14.20 ± 0.33 (59.17 %)).

Persian kittens are usually sanguine. With age, depending on the conditions of the keep, the temperament may remain unchanged, or acquire the traits of both sanguine and melancholic, and the ratio of the duration of obligate (11.71 ± 0.27 (48.58%)) and facultative reactions (12.31 ± 0.33 (51.38%)) tends to equalise ($p<0.1$).

Analysis of the duration of behavioural acts of both behaviour forms between purebred cats showed ten-

dentious differences in pairs of sanguine cats (SIA♀ and SIB♀), melancholic cats (BRI♀), and Persian cats (PER♀) ($p<0.1$). While in pairs: sanguine-melancholic (SIA♀ and BRI♀; SIB♀ and BRI♀), sanguine animals and representatives of the Persian breed (SIA♀ and PER♀; SIB♀ and PER♀) the difference in the temperament of animals causes statistically substantial differences in both obligate and facultative behaviours (at to $p<0.05$).

A vivid manifestation of the innate behavioural acts of purebred cats is sleep and rest. In a Siberian cat, the duration of sleep and napping increases from 4.40 ± 0.22 (18.3%) (days of greatest activity) to 8.6 ± 0.46 (35.8%) (at rest) ($p<0.01$) (Table 2).

Table 2. Manifestation of innate behavioural acts in cats of different breeds

No.	Breed	n	In active state				At rest			
			sleep and rest		self-cleaning and toilet		sleep and rest		self-cleaning and toilet	
			hours	%	hours	%	hours	%	hours	%
1	SIA♀	5	9.60 ± 0.46^3	40.0	6.0 ± 0.75	25.0	11.0 ± 0.63^3	45.8	6.6 ± 0.61	27.5
2	SIB♀	5	4.40 ± 0.22^1	18.3	6.0 ± 1.33	25.0	8.6 ± 0.46^1	35.8	3.4 ± 0.46	14.2
3	BRI♀	5	6.60 ± 0.46^2	27.5	3.2 ± 0.72	13.33	9.4 ± 0.46^2	39.2	4.0 ± 0.40	16.7
4	BRI♂	5	6.60 ± 0.36^3	27.50	3.00 ± 0.63^1	12.50	8.20 ± 0.52^3	34.17	4.20 ± 0.33^1	17.50
5	PER♀	5	8.80 ± 0.33^3	36.7	3.2 ± 0.59	13.33	7.4 ± 0.46^3	30.8	3.6 ± 0.36	15.0

Note: $p<0.1$; $^1p<0.01$; $^2p<0.001$; $^3p<0.05$

Source: compiled by the authors

A similar pattern is observed in British Shorthair females. The females (BRI♀) spend 6.60 ± 0.46 (27.5%) hours sleeping and resting in an agitated state, and at rest, the duration of these behavioural acts increases to 9.4 ± 0.46 (39.2%) ($p<0.001$). For the male (BRI♂), changes occur within the range of 6.60 ± 0.36 (27.50%) to 8.20 ± 0.52 (34.17 %) ($p<0.05$), for Siamese cats – from 9.60 ± 0.46 (40.0%) to 11.0 ± 0.63 (45.8%) hours ($p<0.05$). In the Persian cat that is best adapted to home conditions, as it moves from an agitated state to a state of rest, the duration of sleep and rest decreases from 8.80 ± 0.33 (36.7%) to 7.4 ± 0.46 (30.8%) hours ($p<0.05$). Such differences in the duration of innate behavioural acts (namely, the predominance of obligate behaviour

at rest over the agitated state of the animal) are explained by genetic characteristics, and therefore by the adaptation of the body of the animal. It is due to the selection and domestic maintenance of animals that interbreed differences in the duration of the described behavioural acts are not reliable ($p<0.1$).

Acts of optional behaviour: communication with the host – begging for food and bunting were more pronounced on days of increased activity of animals (BRI♀: $p<0.05$; BRI♂: $p<0.01$; PER♀: $p<0.01$), while in a Siberian female, which, due to its affectionate nature, was quite actively looking for the attention from the owner at rest, SIB♀: 5.40 ± 0.46 (22.5%) versus 3.40 ± 0.22 (14.2%) of the agitated state of the animal ($p<0.001$) (Table 3).

Table 3. Manifestation of acquired behavioural acts in cats of different breeds

No.	Breed	n	In active state						At rest					
			communication		exploration of territories		imitation of hunting		communication		exploration of territories		imitation of hunting	
			hours	%	hours	%	hours	%	hours	%	hours	%	hours	%
1	SIA♀	5	1.60 ± 0.36	6.7	6.60 ± 0.83^3	27.5	1.40 ± 0.22^3	5.8	1.80 ± 0.18	7.5	2.40 ± 0.36^3	10.0	4.60 ± 0.36^3	19.2
2	SIB♀	5	3.40 ± 0.22^3	14.2	4.40 ± 0.46	18.3	4.00 ± 0.63	16.7	5.40 ± 0.46^3	22.5	4.40 ± 0.22	18.3	3.40 ± 0.22	14.2

Table 3, Continued

No.	Breed	n	In active state						At rest					
			communication		exploration of territories		imitation of hunting		communication		exploration of territories		imitation of hunting	
			hours	%	hours	%	hours	%	hours	%	hours	%	hours	%
3	BRI♀	5	9.40± ±0.36 ²	39.2	6.80± ±0.72	28.3	1.80± ±0.18	7.5	2.80± ±0.44 ²	11.7	6.80± ±0.52	28.3	2.0± ±0.28	8.3
4	BRI♂	5	10.60± ±0.61 ¹	44.17%	4.40± ±0.36 ²	18.33%	2.00± ±0.40	8.33%	3.00± ±0.49 ¹	12.50%	5.60± ±0.36 ²	23.33%	2.40± ±0.61	10.00%
5	PER♀	5	6.60± ±0.61 ¹	27.5	1.40± ±0.22	5.8	3.80± ±0.52 ³	15.8	3.80± ±0.44 ¹	15.8	1.20± ±0.18	5.0	7.80± ±0.18 ³	32.5

Note: ¹p<0.01; ²p<0.05; ³p<0.001; p<0.1

Source: compiled by the authors

On the other hand, in Siamese females, exploration of territory – walking around the apartment, exploring, jumping, and scratching their claws – was more pronounced in the state of agitation (SIA♀: p<0.001). While a statistically substantial predominance of the duration of this behavioural act at rest was established for a male of the British breed (BRI♂: p<0.05).

Imitation of hunting in the form of playing was substantially more often recorded at rest in experimental animals (SIA♀ and PER♀, p<0.001). The identified differences in this behaviour in the Siberian female and the British Shorthair breed are unreliable (p<0.1). In-

terbreeding differences in the duration of behavioural acts are largely determined by the personal factors of animals. If at rest these differences are statistically substantial (from p<0.001 to p<0.01), then in the agitated state they are more often tendentious (p<0.1).

In general, studies of the daily dynamics of behavioural responses showed a fairly long time of activity of animals under study (4-5 points) in the morning (from 6:00 to 9:00), in the afternoon (from 13:00 to 15:00, no higher than 3-4 points), and a short flash of activity (3-5 points) – in the twilight hours (19:00-20:00). As a rule, outbreaks of activity are short and rarely reach 5 points (Fig. 1).

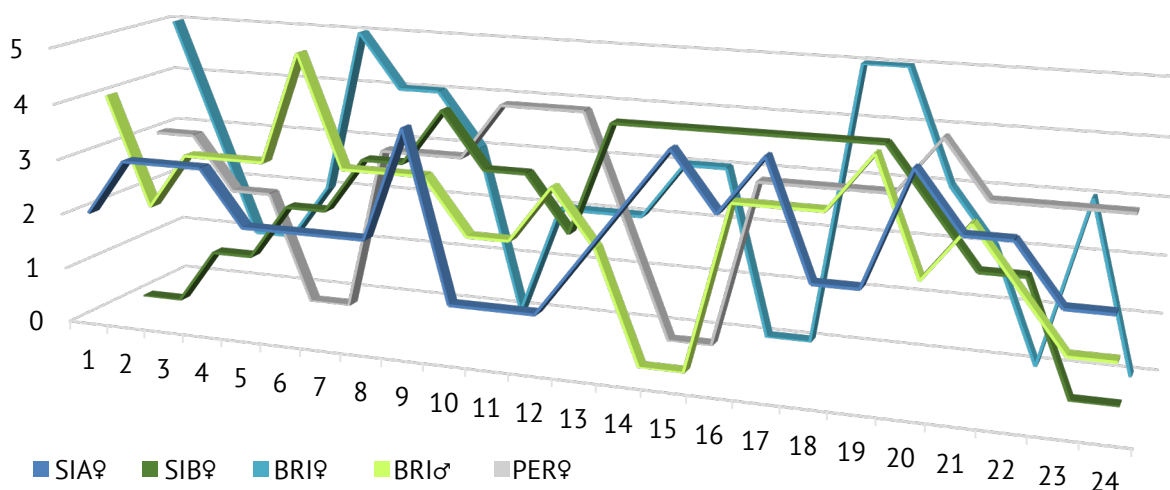


Figure 1. Daily activity of purebred cats

Source: compiled by the authors

A decrease in activity (in the range of 1-3 points) was recorded for 9:00-12:00. Cats sleep and rest (0-1 points) quite often, namely in the morning – (from 5:00 to 7:00 and from 10:00 to 12:00) and in the evening 22:00-24:00. Genetically close Siberian and Persian cats also sleep in the afternoon for one hour (15:00-16:00 and 17:00-18:00, respectively), and the British Shorthair – at night (0:00-4:00). On average, according to the

point score (2-3 points), acts of behaviour of purebred cats most often occur at night (1:00-4:00). In the morning (8:00-9:00), they can alternate with napping (SIA♀), and in the evening (21:00-24:00) – with sleep (BRI♀ and SIB♀), as well as with napping (PER♀). Statistical analysis was performed using Kendall's rank correlation coefficient to verify the relationship between the frequency of short-term cycles of cats of different breeds (Table 4).

Table 4. Assessment of the reliability of the frequency of occurrence of short-term cycles of cats of different breeds (based on Kendall's rank correlation coefficient)

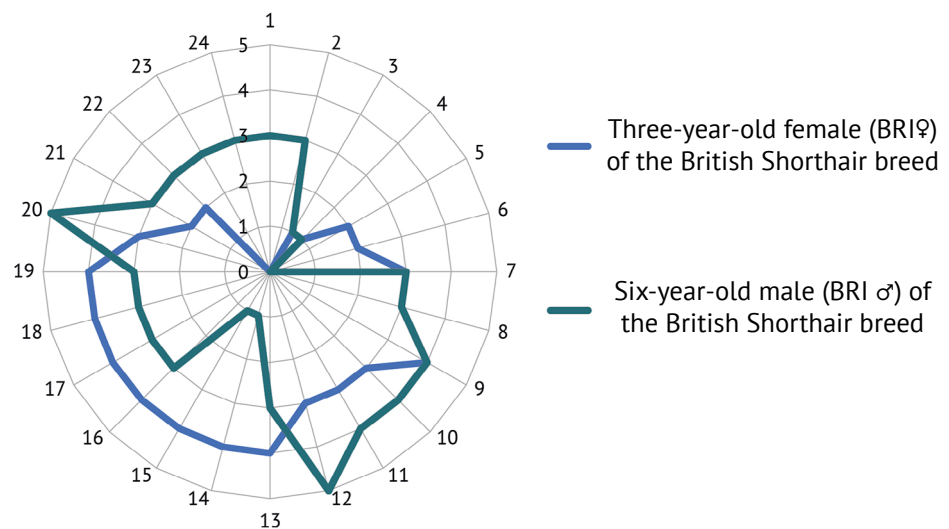
	SIA♀	BRI♀	SIB♀	PER♀	BRI♂	Tkr
SIA♀	1	0.37**	0.1*	0*		
BRI♀		1	0.32**	0.27*	0.4*	
SIB♀			1	0.36**		0.29
PER♀				1		

Note: for all the examined pairs, the Student's criterion $p < 0.05^*$ – coincidence of temperament; $**$ – temperament is different

Source: compiled by the authors

Observations of animals with different temperaments showed a predominance of the factual value of the rank correlation coefficient (τ) compared to the critical value (T_{cr}), which allowed concluding that there is a substantial consistency between the traits under study. In a pair of shorthair cats of the Siamese (SIA♀) (sanguine cat) and British Shorthair (BRI♀) (melancholic cat) breeds ($0.37 > 0.29$; $p < 0.05$). A similar pattern is observed when comparing the frequency of short-term rhythms of fairly active, mobile, and freedom-loving cats of the British Shorthair and Siberian (SIB♀) breeds (sanguine cat) ($0.32 > 0.29$; $p < 0.05$). As well as cats of Siberian and Persian breeds (PER♀) (animals with sanguine and melancholic traits) the factual value of the rank correlation coefficient (τ) was also more than the

critical (T_{cr}) ($0.36 > 0.29$; $p < 0.05$). On the other hand, in a pair of "Siamese – Persian" cats, the rank correlation coefficient is zero, that is, the ranking of the frequency of manifestation of short-term rhythms is linearly independent (they do not reliably correlate with each other). Pronounced proximity to zero of the absolute value of the correlation coefficient in the "Siamese – Siberian" pair ($0.1 < 0.29$; $p < 0.05$) and less than the actual value of the rank correlation coefficient (τ) compared to critical (T_{cr}) in the "British – Persian" pair ($0.27 < 0.29$; $p < 0.05$) suggests a slight correlation between the traits. A comparison of the sexual characteristics of the manifestation of the main behavioural acts and synchronisation of daily cycles was conducted in pairs (BRI♀ and BRI♂) (Fig. 2).

**Figure 1.** Daily activity of purebred cats

Source: compiled by the authors

Both males and females spend six hours a day sleeping and napping (25.0%). For the female, deep sleep lasts at night (from 23:00 to 4:00), and for the male – in the morning (5:00-6:00). In addition, the sleep phase in the male was recorded both at night (3:00-4:00) and during the day (14:00-15:00). The phases of the greatest activity (4-5 points) in both sexes coincide in time. For the female, these indicators were detected

in the morning (at 9:00), from lunch (13:00) to twilight (19:00), and for males, such activity was recorded in the morning during 9:00-12:00 and in the evening at 20:00. Average activity (3 points) in animals of both sexes was recorded during daylight hours. For the BRI♀ female (7:00-8:00; 10:00-12:00) and in the evening at 20:00. And for the BRI♂ male (7:00-8:00; 16:00-19:00), in the evening and at night (21:00-2:00).

In accordance with the points assessment of the activity of animals of the British Shorthair breed in the pair BRI♀ and BRI♂, the results obtained were confirmed statistically. When the values of Kendall's rank correlation coefficient are 0.4 and the critical point is $0.29|\tau| > T_{kr}$ ($p < 0.05$). Therefore, the reliability of the correlation between the manifestation of behavioural acts and the synchronisation of the daily activity of these animals is confirmed.

The results obtained, which characterise the temperament and character of cat breeds, differ little from those described in the literature. Active, mobile cats of the Siamese, British, and Siberian breeds are very freedom-loving and, moreover, British females do not like excessive affection, often show waywardness, demonstrate aristocracy with all their appearance. Siamese cats are aggressive and vindictive, often showing jealousy. The Siberian like to climb and play hunting. But cats of the Persian breed prefer a slower pace of life, a calm atmosphere, and an affectionate attitude. More often they move on the ground and are not tend to climb trees. These cats enjoy playing with toys, but also enjoy a relaxing rest in a secluded place (Cosgrove, 2022; Crowley, 2019).

According to the data of M. Mendl *et al.* (2010), it was confirmed that the dependence of the duration of behavioural responses and animal activity is determined genetically (i.e., depending on temperament). And according to the opinion (Stamps *et al.*, 2010) – it is formed under the influence of an external stimulus or environmental conditions at the time of manifestation of a behavioural act.

In an extended review of cats, Travník *et al.* (2020) identified the main parameters of temperament, namely: activity, courage, friendliness, aggressiveness, openness, impulsivity, and dominance. However, according to M. Arahori *et al.* (2016,) little attention is paid to investigating the genetic basis of cat temperament. Although the papers of L. Stella and S. Croney (2019) partially confirmed expectations that animals with a proactive behaviour style (active and brave) will show higher motor activity. Instead, those with reactive responses to the stimulus (passive or fearful behaviour styles) are characterised by low motor activity.

Based on the results obtained and according to (Stella *et al.*, 2019), it is possible to state a decrease in the duration of innate acts of behaviour from lively, active representatives of the Siamese and Siberian to the slow aristocracy of the British Shorthair breed. Regarding the duration of acquired behavioural acts, there is an increase in the indicator between the Siamese, Siberian, and British Shorthair breeds. In lazy Persian cats, innate and acquired behaviours tend to align.

Only based on studies aimed at assessing the genetic correlation of heredity and temperament traits of animals (activity level, ability to contact people and others), the authors (Salonen *et al.*, 2019) stated differences in behaviour between breeds with different temperaments. The results of this study showed unreli-

ability ($p < 0.1$) of differences in the behaviour of breeds with the same temperament, whereas in animals with different temperaments, they were statistically substantial ($p < 0.05$) for both behaviours.

In addition, the studies conducted by S. Mikkola (2021) established the existence of a relationship between the genetic characteristics of the breed and the behaviour with personal factors (the nature of the condition) of the animal. The identified predominance of the duration of innate behavioural acts (sleep and rest) – at rest, acts of optional behaviour – on days of increased activity of animals is offset by the integration (Dotsenko, 2019) of conditional and unconditional reflexes as part of unitary behavioural reactions (self-cleaning and toilet). Certain differences in behaviour both within the breed and between different breeds are genetically determined and are formed as a result of the adaptation of the animal body to certain living conditions.

The realisation that observing the behaviour of cats over relatively long intervals provides greater efficiency in creating a behaviour model as a reflection of the personality of the animal (Stella *et al.*, 2019) prompted a statistical comparison of the selected samples using Kendall's rank correlation coefficient (Bakhrushin, 2011).

The observation of animals with different temperaments demonstrated a predominance of the factual value of the rank correlation coefficient (τ) compared to the critical value (T_{cr}), which allowed concluding that there is a substantial consistency between the traits under study (Trouwborst, 2020). The results of the study once again proved that the behaviour and motor activity of animals with the same temperament do not correlate with each other. According to the points assessment of the activity of animals of the British Shorthair breed (in BRI♀ and BRI♂ pair), the authenticity of correlations of the manifestation of behavioural acts and synchronisation of the daily activity of the animals, due to specific breed characteristics formed during breeding under the influence of humans, can be certified.

CONCLUSIONS

The research on the adaptation of purebred cats, from the standpoint of the manifestation of the main forms of behaviour, behavioural acts, and daily cycles, confirmed their dependence on the genetic characteristics of the breed, personal factors of the condition of the animal, and the effect of an external stimulus or environmental conditions at the time of occurrence.

A decrease in the duration of innate behavioural acts and an increase in the duration of acquired behavioural acts were identified from lively, active representatives of the Siamese and Siberian to the slow British Shorthair breed. In lazy Persian cats, obligate and facultative behavioural responses tend to equalise ($p < 0.1$).

The dependence of cat behaviour on temperament is was established. Sanguine cats showed a tendency to reduce the duration of facultative behavioural responses

compared to innate ones ($p < 0.1$). While in melancholic cats, this ratio is diametrically opposite ($p < 0.01$). Differences in the behaviour of breeds with the same temperament are unreliable ($p < 0.1$), while in animals with different temperaments, they are statistically substantial ($p < 0.05$) for both behaviour forms.

The identified predominance of the duration of innate behavioural acts (sleep and rest) – at rest, acts of optional behaviour – on days of increased activity of animals is levelled by the integration of conditional and unconditional reflexes in the composition of unitary behavioural reactions (self-cleaning and toilet). Statistical analysis of verification of the frequency of occurrence of individual short-term cycles of cats of different breeds showed the presence of substantial consistency between the traits in animals with different temperaments, while the behaviour and motor activity of animals with the same temperament do not correlate with each other.

Noticeable differences in the behaviour and activity of male and female purebred cats are poorly expressed because the temperament and character of these animals are determined by specific breed characteristics that were formed during breeding under the influence of humans. That is why this requires further research.

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CONFLICT OF INTEREST

None.

REFERENCES

- [1] Arahori, M., Hori, Y., Saito, A., Chijiwa, H., Takagi, S., Itov, Y., Watanabe, A., Inoue-Murayama, M., & Fujita, K. (2016). The oxytocin receptor gene (OXTR) polymorphism in cats (*Felis catus*) is associated with "Roughness" assessed by owners. *Journal of Veterinary Behavior*, 11, 109-112. doi: 10.1016/j.jveb.2015.07.039.
- [2] Bakhrushin, V.E. (2011). *Methods of data analysis: A study guide for students*. Zaporizhzhia: KPU.
- [3] Bioethics Commission of Ternopil National Medical University. (2021). Retrieved from <https://www.tdmu.edu.ua/wp-content/uploads/2021/12/bioetyka-skan-1.pdf>.
- [4] Breed standards. (2023). Retrieved from http://fifeweb.org/wp/breeds/breeds_prf_stn.php.
- [5] Calvert, A.M., Bishop, C.A., Elliot, R.D., Krebs, E.A., Kydd, T.M., Machtans, C.S., & Robertson, G.J. (2013). A synthesis of human-related avian mortality in Canada Avian. *Conservation and Ecology*, 8(2), article number 11. doi: 10.5751/ACE-00581-080211.
- [6] Cosgrove, N. (2023). Top 11 most aggressive cat breeds. Retrieved from <https://petkeen.com/most-aggressive-cat-breeds/>.
- [7] Crowley, S.L., Cecchetti, M., & McDonald, R.A. (2019). Hunting behaviour in domestic cats: An exploratory study of risk and responsibility among cat owners. *People and Nature*, 1(1), 18-30. doi: 10.1002/pan3.6.
- [8] Doherty, T.S., Glenc, A.S., Nimmod, D.S., Ritchie, A.G., & Dickman, K.S. (2016). Invasive predators and global biodiversity loss. *PNAS*, 113(40), 11261-11265. doi: 10.1073/pnas.1602480113.
- [9] Dotsenko, V.V. (2019). *Zoopsychology*. Kharkiv: MVS of Ukraine.
- [10] Doylidov, V. (2021). Ethological methods for selection of young pigs for herd replacement. *Scientific Horizons*, 24(1), 22-28. doi: 10.48077/scihor.24(1).2021.22-28.
- [11] European convention for the protection of vertebrate animals used for experimental and other scientific purposes. (1999). Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A21999A0824%2801%29>.
- [12] Fauna of the Western region of Ukraine: Biological classification, state of diversity, ecology, genetics, protection, educational and methodological aspects of teaching. (2021). Retrieved from <https://nddkr.ukrintei.ua/view/rk/e9936d659692a672e05c8a087cf1798a>.
- [13] Faure, J.M., & Mills, A.D. (2014). Improving the adaptability of animals by selection. In *Genetics and the Behavior of Domestic Animals* (pp. 291-316). London: Academic Press. doi: 10.1016/B978-0-12-394586-0.00008-1.
- [14] Jensen, P. (2017). *The study of animal behaviour and its applications* (3rd ed.). CABI Books. doi: 10.1079/9781786391650.0003.
- [15] Katzen, G.B. (2008). *Katzen: Verhalten, Pflege und Haltung. Rassen*. Munich: Bassermann Verlag.
- [16] Krauze-Gryz, D., Gryz, J., & Żmihorski, M. (2018). Cats kill millions of vertebrates in Polish farmland annually. *Global Ecology and Conservation*, 17, article number e00516. doi: 10.1016/j.gecco.2018.e00516.
- [17] Loss, S.R., & Marra, P.P. (2017). Population impacts of free-ranging domestic cats on mainland vertebrates. *Frontiers in Ecology and the Environment*, 15(9), 502-509. doi: 10.1002/fee.1633.

- [18] Loss, S.R., Will, T., Longcore, T., & Marra, P.P. (2018). Responding to misinformation and criticisms regarding United States cat predation estimates. *Biological Invasions*, 20, 3385-3396. doi: [10.1007/s10530-018-1796-y](https://doi.org/10.1007/s10530-018-1796-y).
- [19] Mendl, M., & Harcourt, R. (2000). *Individuality in the Domestic Cat: Origins, Development and Stability*. Cambridge: Cambridge University Press.
- [20] Mikkola, S., Salonen, M., Hakanen, E., Sulkama, S., & Lohi, H. (2021). Reliability and validity of seven feline behavior and personality traits. *Animals*, 11(7), article number 1991. doi: [10.3390/ani11071991](https://doi.org/10.3390/ani11071991).
- [21] Nagasawa, T., Ohta, M., & Uchiyama, H. (2020). Effects of the characteristic temperament of cats on the emotions and hemodynamic responses of humans. *PLoS ONE*, 15(6), article number e0235188. doi: [10.1371/journal.pone.0235188](https://doi.org/10.1371/journal.pone.0235188).
- [22] Natoli, E., Litchfield, C., & Pontier, D. (2022). Coexistence between humans and 'misunderstood' domestic cats in the anthropocene: Exploring behavioural plasticity as a gatekeeper of evolution. *Animals*, 12, article number 1717. doi: [10.3390/ani12131717](https://doi.org/10.3390/ani12131717).
- [23] Palii, A.A. (2010). *Differential psychology*. Retrieved from <https://symboldrama.if.ua/wp-content/uploads/2020/03/a.a-palij-dyfyrencziana-psyhologiya.pdf>.
- [24] Pusi, E. (2021). *15 best american cat breeds*. Retrieved from <https://www.thesprucepets.com/american-cat-breeds-4845523>.
- [25] Salonen, M., Vapalahti, K., Tiira, K., Mäki-Tanila, A., & Lohi, H. (2019). Breed differences of heritable behaviour traits in cats. *Scientific Reports*, 9, article number 7949. doi: [10.1038/s41598-019-44324-x](https://doi.org/10.1038/s41598-019-44324-x).
- [26] Shevchyk, L.O., Kravets, N.Ya., & Grod, I.M. (2021). The effect of stress on the hematological indicators of rats *Rattus norvegicus f. domesticus* in the conditions of the biological experiment. *Medical Perspectives*, 1(21), 69-77. doi: [10.26641/2307-0404.2021.1.227735](https://doi.org/10.26641/2307-0404.2021.1.227735).
- [27] Stamps, J., & Groothuis, T.G. (2010). The development of animal personality: Relevance, concepts and perspectives. *Biological Reviews*, 85(2), 301-25. doi: [10.1111/j.1469-185X.2009.00103.x](https://doi.org/10.1111/j.1469-185X.2009.00103.x).
- [28] Stella, J., & Croney C. (2019). Coping styles in the domestic cat (*Felis silvestris catus*) and implications for cat welfare. *Animals (Basel)*, 9(6), article number 370. doi: [10.3390/ani9060370](https://doi.org/10.3390/ani9060370).
- [29] Suprovych, T., Suprovych, M., Lighter-Moskalyuk, S., Trach, V., & Tokarchuk, T. (2022). Sickness rate of service dogs in cynological centers of Ukraine. *Scientific Horizons*, 25(6), 32-45. doi: [10.48077/scihor.25\(6\).2022.32-44](https://doi.org/10.48077/scihor.25(6).2022.32-44).
- [30] Tarazona, A.M., Ceballos, M.C., & Broom, D.M. (2020). Human relationships with domestic and other animals: One health, one welfare, one biology. *Animals*, 10, article number 43. doi: [10.3390/ani10010043](https://doi.org/10.3390/ani10010043).
- [31] Travník, I.d.C., Machado, D.d.S., Gonçalves, L.d.S., Ceballos, M.C., & Sant'Anna, A.C. (2020). Temperament in domestic cats: A review of proximate mechanisms, methods of assessment, its effects on human-cat relationships, and one welfare. *Animals*, 10, article number 1516. doi: [10.3390/ani10091516](https://doi.org/10.3390/ani10091516).
- [32] Trouwborst, A., & Somsen, H. (2020). Domestic cats (*Felis catus*) and european nature conservation law – applying the eu birds and habitats directives to a significant but neglected threat to wildlife. *Journal of Environmental Law*, 32(3), 391-415. doi: [10.1093/jel/eqz035](https://doi.org/10.1093/jel/eqz035).
- [33] Zapadnyuk, I.P., Zapadnyuk, V.I., Zakharia, E.A., & Zapadnyuk, B.V. (1983). *Laboratory animals. Breeding, maintenance, use in the experiment*. Kyiv: Vishcha school.

Етологічна адаптивність домашніх тварин на прикладі різних порід kota свійського (*Felis silvestris catus* L., 1758)

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Анотація. Надмірне зростання антропогенного навантаження на живу природу, а саме неконтрольоване використання природних ресурсів, включаючи вирубку лісів, видобуток корисних копалин, марнотратні системи природокористування, зменшення біорізноманіття через інтенсивний розвиток сільського господарства, а останнім часом – війна, впливають на умови існування як диких, так і свійських тварин. У нових реаліях сучасного світу домашні тварини, втрачаючи звичне природне середовище, змушені або адаптуватися до змін, або припинити своє існування. *Метою роботи* було вивчення рівня адаптивності організму kota свійського (*Felis silvestris catus* L., 1758) в домашніх умовах утримання. Для досягнення мети застосовували довготривалі методи: добового візуального спостереження, бюджету часу, з подальшим аналізом даних більшої активності тварин. Поведінку котів оцінювали за шестибальною шкалою: імітація полювання – активна гра з використанням іграшки (5 балів) та огляд території, стрибки, точіння кігтів (4 бали); спілкування з господарем – «пошук їжі» та «лащення» (3 бали); особиста гігієна – пасивна прогулянка, туалет (2 бали); відпочинок – стан «лінивої дрімоти» (1 бал), стан глибокого сну (0). Порівняння обраних вибірок здійснювали статистично, з використанням коефіцієнта рангової кореляції Кендала. Встановлено, що внутрішньо-породні та міжпородні відмінності тривалості поведінкових актів облігатної та факультативної форм поведінки в значній мірі визначається темпераментом та характером піддослідних тварин. Описано добову активність кішок різних порід, що визначається накладанням впливу генетично обумовлених циклів на специфічні риси характеру і формується в процесі селекції порід. Статистично доведено наявність значної узгодженості між досліджуваними ознаками у тварин з різним темпераментом. За умови подібності темпераменту, поведінка та рухова активність між собою не корелюють, а відмінності у поведінці й активності самців і самок породистих котів виражені слабо. Обґрунтовано, що отримані результати можуть послужити підґрунтям для розуміння проблем та складностей, що виникають у породистих кішок в процесі адаптації до життя поряд із людиною і, тим самим, забезпечать осмислення основних проявів етологічної адаптивності домашніх тварини

Ключові слова: етологія; адаптивність; поведінкові акти; неплемінні коти; породисті тварини
