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### *Seasonal Fluctuations of the Behavioral Activity, Nutritional Requirements, and Weight of Pallas' Cats [Felis (Otocolobus) manul manul].*

It's not a full text, only the facts that have a matter for the theme of the article. Translated from Russian by Alina Baranova.

Manul (Pallas cat) belong to *Felidae* family, genus *Felis*, subgenus *Otocolobus* (Novikov, 1956), species *Felis manul*, and it has three subspecies (Heptner, Sludsky, 1972; European Studbook for Pallas' Cat, 1997):

- siberian (*F. (Otocolobus) manul manul* Pallas, 1778)
- middle-asian (*F. (Otocolobus) manul ferrugineus* Ognev, 1928)
- tibetan (*F. (Otocolobus) manul nigripectus* Hodgson, 1842),

Next paragraph is about Pallas cat's status in IUCN Red List of Threatened Animals. Another paragraph is about its behavior: the main strategy – hiding in relief features, if it does not help Pallas' cat would run away and hide in some rocks or in the den, or use any suitable cover. But Pallas' cat can't run too long and after some time of pursuing it will stop, turning against the pursuer (The Red Book of USSR, 1984).

One of the most important characteristic of the vital functions and health of the Pallas' cat is its activity. In many ways the activity of Pallas' cat is determined by the conditions of the outside environment.

Activity of Pallas' cat has a seasonal characteristic. At the end of the autumn and in the beginning of the winter we can observe a kind of passivity in animal's behavior. Perhaps it's bound up with a quantity of the laid-down snow and the presence of the crust of ice over snow. Pallas' cat obviously avoids the friable-snow areas with the deep 15-20 cm. Such a kind of cover makes difficulties for moving and feeding: Pallas' cat has short legs and massive body and put a big pressure on the snow. At the same time the presence of the ice over snow makes impossible for Pallas' cat to hunt for rodents. This circumstance explains the habitat of Pallas' cat in highland hilly deserts, semi-deserts and steppes with rocky outcrops, sometimes at a height about 1000-1500 meters (Heptner, Sludsky, 1972).

The feeding base of Pallas' cat represents by little rodents, picas, birds, nesting on the ground. Pallas' cat hunt mostly by watching for the prey near its burrows or hiding behind the stone, or grabbing the rodents in their burrows (Heptner, Sludsky, 1972). There were some reports, that hunting Pallas' cat can leave its den and go away for 1 km. But daily moving of Pallas' cat is not so wide – the density of its feeding plot is very high (Heptner, Sludsky, 1972).

High risk of full disappearance of *Felis manul manul* (Siberian) in wild makes the breeding captivity works to be more important.

The author of this article has done observation for Pallas' cat in the Breeding Station of the Moscow Zoo for five years. Middle-Asian Pallas' cats (*F. (Otocolobus) manul ferrugineus*) have been kept in the Moscow Zoo since 1997.

Pallas' cats are placed in cages. The cages look like a block of a two opposite aviaries, connected to each other by a shared corridor. Size of each aviary is 8 x 1,8 x 3 m. In every aviary there is a few cantilever shelf fixed on the high of the 1,6 meters above the ground; using them the animal can observe its surroundings. Also there are vertical and horizontal trunks of the trees, which Pallas' cat can use to claw and as a ladder. Besides there are some wood houses in size 1,15 x 0,52 x 0,63 meters, with nest chamber.

The ration of Pallas' cat in the Moscow Zoo consists only of the fresh killed forage animals: rat, mouse, quail and little size guinea-pig. For realization of the hunter instinct we give them full-body animals. That's how Pallas' cat can realize its normal feeding instinct: at first Pallas' cat "plays" with its prey, throws up, chases it and catches sometimes. For old, sick cats and kittens less a one-month age we give disemboweled prey with a part taken-off skin. It is necessary because of insufficiently peristalsis of the gastrointestinal tract of the animals.

Pallas' cat begins to eat the rodent mainly from its head; but the gastrointestinal tract, tail and clutches stay untouched. The bird is eaten as a whole. Adult cats drink milk reluctantly, except the

females while they have lactation. Also adult cats badly eat the forage with vitamins and minerals as an additional feed.

In captivity the Pallas' cat has a seasonal activity as in wild. In summer cats like to stay in aviary also at the day time, but in winter cats are slow-moving, mostly like to stay in cover.

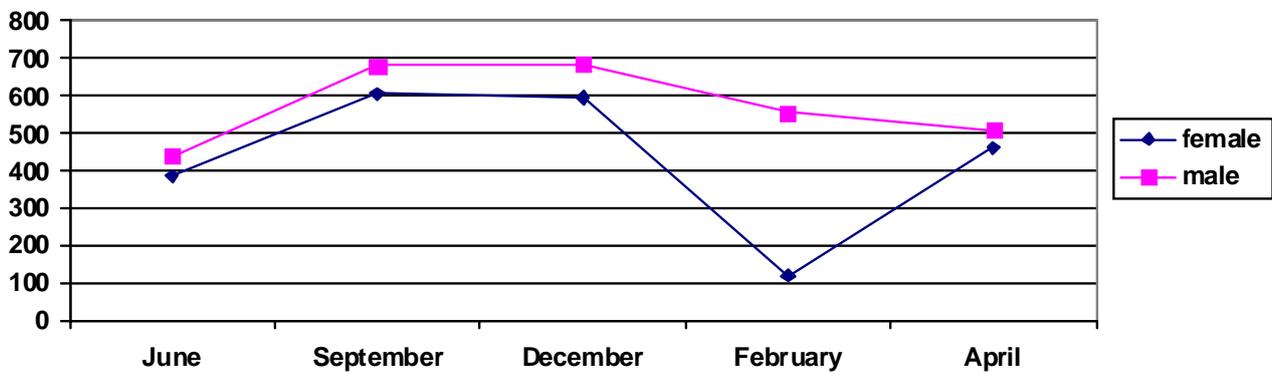
Based on the observations in the Breeding Station in the Moscow Zoo the seasonality is tracing as in activity, as in average daily foraging and weigh changing.

**Table 1.** Average daily foraging by females (n = 11)

month	June	September	December	February	April
Forage quantity, g	386	606	595	120	460

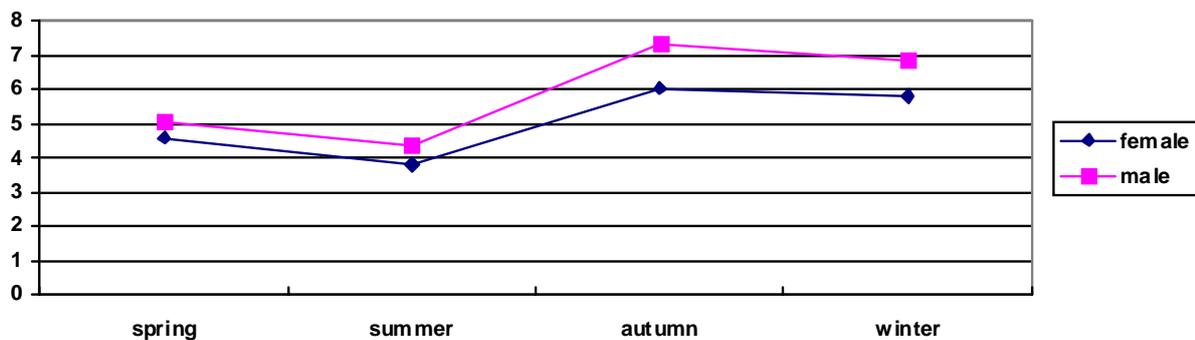
**Table 2.** Average daily foraging by males (n = 9)

month	June	September	December	February	April
Forage quantity, g	438	681	684	555	506



**Table 3.** Middle weight indexes of the Pallas cat in four seasons (F, n= 11; M, n=9)

Sex	Spring	Summer	Autumn	Winter
Female	4,6	3,8	6,05	5,8
Male	5,06	4,38	7,33	6,84



At the end of the summer – in the autumn the weight of Pallas' cat intensively increases. It's connected with a physiology feature of this species – fat accumulation. It might be an adaptation of the organism for the thermoregulation that helps to bring down the heat emission and energy expense in

winter. At the end of the winter (in February), after the heat we can observe some decrease of the cat's weight. At the end of the spring – in the summer Pallas' cat has the least body weight and the fat reserve. And this dynamic clearly is tracked through all examined years.

When the heat ends, the necessity in forages obviously lower for females, then for males, although the cat's weight decreases nearly parallel for females and males. But in the middle of the spring cat's weight increases anew and stays at this level till the end of the summer. Males have a weight decrease gradually. In the spring-summer period this index stays almost at the same level for the males and females.

Observations of Pallas' cats at the Moscow Zoo's Breeding Station demonstrated seasonal changes in the activity of the animals, as well as in daily food consumption and weights of the cats. Feeding features, seasonal dynamics of body weight and nutritional requirements are important factors affecting physiological condition of Pallas' cats, which are not active, especially in winter. Survival rate of this species depends on the availability of rich in calories food items, which proves to be most important in such a critical season as autumn, when their fat resources, or energetic potential, is increasing.

Source: Carnivores and marine mammals in artificial environment: Proceedings of Moscow Zoo, 2006.