

THE USE OF DOMESTIC CATS IN THE CONTROL OF THE BLACK RAT, *RATTUS RATTUS*, IN A SWINE-FARM: A CASE HISTORY

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The abundance of black rat was estimated by night-watching during six months in a large swine-farm (having a capacity: 8000 animals). The average index of abundance was 1750 rats (mean from July to February).

In February six domestic cats (*Felis lybica f. catus*), of which were 2 males and 4 females, were introduced. These cats, 4 to 6 months old, had been specially prepared (e.g. they got through inoculation procedure against toxoplasmosis, etc.). The presence and health state of the cats and the abundance of rats were regularly registered. During 27 months, rat numbers declined gradually down to the index of abundance of 6 rats. Two cats (females) in good health were present at this time. The effect of rodent control was estimated as 99,7 %.

Introduction

At present, protection of various buildings against rodents is practised by the rodenticides in Czechoslovakia. Since our previous searching confirmed that rodents, especially in agriculture practice and food industries are always destroyed using the pellet baits, we suppose that it is reason for a phenomenon recorded on various places in our country, i.e. black rats (*Rattus rattus*) avoid these pellets including those prepared from highly active ingredients (e.g. brodifacoum and bromadiolone). A copious food supply and minimum of rodent-proof barriers are very favourable conditions for a development of numerous populations amount to thousands of specimen, for example in some pigsties having a large capacity. Thus, using of predators has been suggested. Recently, influence of avian and mammalian predators on population cycles in small mammals, especially voles, has been intensively studied and debated (ERLINGE et al. 1983, KORPIMÄKI 1985, 1986, HANSSON 1987, 1988).

Synantropic rodents have been settled in such habitats where their predators are not able to live for a long time ("protected umbrella for prey" in terms of TOMIALOJC 1982). Therefore, a lower rate of rodent mortality compared to enormous natality gives cause for a rapid growth of density over "economic acceptabilited limit". So introduction of predators for limiting rodent numbers in some buildings is assumed. Unfortunately, results of these introductions are not always predictabled reliably.

Introduction of predators into some buildings of agricultural production and food industries poses many problems, such as:

1. choice of available predator for these specific conditions
2. presence of predator in the premises of food production and processing in the light of hygiene and veterinary surgery.

In view of habitat type and moving of the rats to top room by climbing, attention was given to domestic cat (*Felis lybica f. catus*).

Capability of domestic cats for effective fighting with some rodents was known in ancient Egypt, when the cats were used for this purpose (MEEHAN 1984). Cats should be assumed to have no importance in destroying rodents in the time when highly selective and effective rodenticides have been applied. CHITTY (1954) reported a good experience in protection of docks' stores by cats; he knew object of food industry, being free from Norwegian rats, while these rodents were very numerous in its vicinity. The author monitored 34 farms inhabited by cats, of which 14 were free from Norwegian rats in the course of three consecutive years (significant impact of cats was found in half of farms). FIGALA (1962) monitored a significant impact of cats on lower activity of rats in slaughterhouse. LEYHUSEN (1982) assumes that a weaker cat is afraid of Norwegian rat, so cats prey chiefly on younger specimen. Analogically, CHILDS (1986) described a strong predation pressure by cats on young or immature rats and he concluded that this impact is evident.

The presence of cats in some buildings causes some risks, especially possibility of infection by contagious matter, e.g. toxoplasmosis and rabies. According to MATOUCH (1989), domestic cat is not considered to be very sensitive to rabies, because it is nearly 100,000 times more resistant than red fox. In 1983-1987, cats participated in cases of rabies only by 2.7 % in Czech Republic. Protection from rabies can be carried out using the regular inoculation. Nevertheless, great epidemiological importance in introducing of cats has an excretion of *Toxoplasma gondii* oocysts by these cats. After first infection, an immunity was found in cats so that it is kept away from repeated excretion of oocysts after reinfection (PEJŠE et PEJŠOVÁ 1987). Since this infection including above-mentioned excretion stage of oocysts is connected with first hunting, young specimen (i.e. up to age of 6 months) are dangerous.

In this paper, our intention is to:

1. verify a possibility of tenacious settling that is carried out in less favourable conditions and in greater age of cats than just after weaning
2. estimate an influence of high population density in rats on settling by cats
3. find an impact of predation pressure by cats on rats
4. conclude on conditions that are possible in our country, in the view of hygiene and veterinary surgery.

Material and methods

In the fattening station of pigsties studied, abundant population of black rat has been established before our experiment. Doubled walls made from asbestos-cement panels filled by the insulating materials and unaccessible lofts over the halls allow for rats to move undisturbedly and rearing the young. In this object, there are four halls for 6.000 pigs totally. These halls, 2500 m² in an area, are halved by barriers. In an administrative and technical building, occurrence of rats was not found. Above-mentioned object is surrounded by the fields and rural areas, however the fourth side is formed by the walls of drier in which the rat population reached only a low density. Deratization has been carried out in this object by two ways:

1. by granulated bait TALON
2. by bait prepared from granulated fodder for pigs and brodifacoum concentrate as a mixture.

Both bait types were taken in by rats only for a short time.

Intensity of deratization precaution against rats was measured using invoices for deratization. Abundance of rats was estimated by night censuses: all halls were controlled visually and present rats were counted between July, 1987 and August, 1989.

Before own introduction, cats were fed by raw sheep meat to cause an excretion of the *Toxoplasma gondii* oocysts what can be proved by examination of cat ordure. All cats were inoculated against rabies and delivered of helminths. Six specimen of domestic cat (European unstarred short-haired type) were introduced on February 27th, 1988. Colouring and behaviour type were recorded for each specimen. Two females and one male (from one brood) were nine months old, two females and one male of 5.5 months. Their occurrence in the object under study was regularly recorded.

As a control, introduction of the cats into new-built fattening station of pigsties, similar to that studied was carried out. In this second object, the occurrence of rats was not found, however it is situated in the area of their occurrence. For late lack of understanding of veterinary surgeons, this part of experiment was terminated (the cats were destroyed by them).

For the topic introduction, an acclimatization cage (1.5 x 1.5 x 1.5 m) was built in one of halls. From this cage, a short step-ladder led to an aperture in the loft. These apertures were cut in the flooring panel of every hall and they were furnished by the same short step-ladders. The lofts have been unaccessible to man. The co-workers who provided both regular and full-value feeding for introduced cats and control visually their health were selected for every object.

Results

The cats were hold in the acclimatization cage for two days. After opening this cage, they nearly immediately climbed a loft. During the first week, the cats were observed in the neighbouring halls. Female 2F came back to its place of birth from a distance about 4 kilometers and she did not get a footing in the new place. Of other cats, females 1F and 4F, were recorded most frequently, even in 1990. Male 3M was occasionally found in 1989, younger 6M dispersed in neighbouring object. Since both these females had the

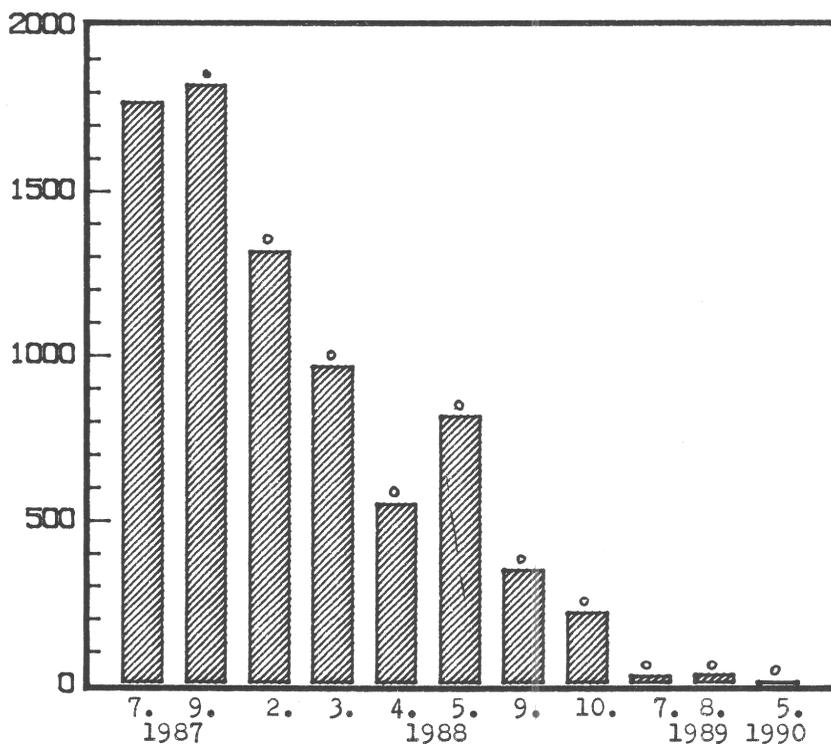


Figure 1. Numbers of rats (*Rattus rattus*) in the fattening station of pigsties near Razice, between 1987 and 1990, influenced by domestic cat predation.

X - months of investigation
 Y - numbers of rats
 cats • - free living penetrated
 o - introduced

Numbers showed high significant decline ($r_s = - 0.983$
 $p \ll 0.01$, Sperman rank correlation).

young, only two females were alive from these broods in 1990: nevertheless one specimen was found dead only. Thus, at least three cats (largely females) have been lived in the object studied for keeps.

Feeding of cats was good in the beginning, but then it made worse. The fact that cats preyed on rats was confirmed by finding many rat remains during the rearing cats' offspring. Fig. 1 shows the values of abundance in the rat population studied.

The values of an intensity of deratization precaution are given in the table I.

Table I. Intensity of deratization in the object studied (in %) as costs for deratization

year	1986	1987	1988	1989
intensity	100	139	105	64

Discussion and conclusions

Methods used were not aimed to monitor the individual cats but their total numbers in the object studied between 1987 and 1990. In spite of unfavourable conditions (e.g. hard noise, cement flooring in the halls, dusty microclimate), several cats have been lived in the object for keeps. The predation pressure on rat population is suggested to be highly significant, because deratization was not able to decline the numbers of rats. Costs of deratization precaution were relatively high in 1986 and 1987, nevertheless, the influence on the rodent population density was minimal. After the introduction of cats, the sharp decline in rats was found up to very low numbers in summer 1989 (see Fig. 2). These results supported those by DANIEL (1978) and CHITTY (1954). Good results in using of cats for mice control in hatcheries were reported by ANONYMUS (1989). During our experiment, declining number of young was found in rat population under study. Specimen coloured in type "aguti" were more frequent than black rats (only 10 % of rats were black coloured).

In conditions of agricultural practices, there is a possibility to provide a special preventive treatment before introduction (rabies, toxoplasmosis, delivering of helminths). The problems are connected with high quality care of cats in the objects, i.e. regular full-valuable feeding and health care of cats, especially of new born. To prevent shyness in cats for possibly treatment, frequent personal contacts by man are recommended. If the deratization is carried out in the same time as introduction, it is necessary to avoid using the baits made of substances that are dangerous for cats (e.g. warfarin).

Acknowledgement

My sincere thanks are due to Mrs. Marie Pichova for her valuable help during introduction of cats.

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**UTILISATION DE CHATS DOMESTIQUES DANS LA LUTTE CONTRE
LE RAT NOIR (*RATTUS RATTUS*) DANS UNE FERME PORCINE :
L'HISTOIRE D'UN CAS**

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Résumé

La population moyenne en rats noirs a été mesurée de nuit pendant six mois dans une grande ferme porcine (capacité : 8.000 têtes). Le taux de la population était de 1.750 rats (moyenne établie de juillet à février).

En février, six chats domestiques (*Felis catus*), 2 mâles et 4 femelles, ont été introduits. Ces chats, âgés de quatre à six mois, avaient été soigneusement préparés (ils avaient, par exemple, été vaccinés contre la toxoplasmose, etc.). La présence et l'état de santé de ces chats ont été notés en même temps que la population des rats.

Ce taux a régulièrement diminué, du taux moyen mesuré au départ jusqu'à seulement 30 rats après 18 mois. Trois chats (1 mâle et 2 femelles) en bonne santé étaient encore présents à ce moment.

L'effet de l'introduction des chats dans la lutte contre les rongeurs a été de 98,3 %.