METHODS OF DISINFECTION, INSECT PEST
AND RAT EXTERMINATION APPLIED
IN ANIMAL BREEDING IN ECOLOGICAL FARMS

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Abstract: The present work deal with issues of disinfection, disinfestation and deratisation (DDD) which are used in organic farms during the rearing of animals. It presents main objectives of organic farming and legal basis and the comparison of organic and conventional agriculture. There were analyzed the treatments witch are carried out during disinfection, disinfestation and deratisation in organic farms and their desirability, relevance, and where are applied. There were presented methods of the pest prevention and their advantages. The farmers from organically farms were polled to confront with their knowledge of the real state of DDD. DDD methods were examined which are the most popular and which are the least and why. There were identified the most imported pests and how often there are carried out.

Keywords: organic farms, disinfection, disinfestation, deratisation, rearing of animals

Introduction

There are favourable conditions for food production in ecological farming in Poland. It is paradoxically associated with a poorer development of agriculture as compared with the older 15 EU member countries. Supporting substances like fertilisers and plant protection chemicals are used in Poland in smaller amounts than in western countries.
Small farms of an area between 1 and 15 ha constitute 91.5% of all farms in our country [1]. Such farm area supports the development of ecological production since the labour costs are not that high. Traditional, not very modern production methods are used in small farms. Therefore, transformation to ecological farming is more efficient and simpler there. Further development of ecological farming in Poland may help manage over million hectares of permanent grasslands, barren lands and fallows. Moreover, after accession of Poland to the EU, ecological farmers may get subsidies from agro-environmental programmes amounting as much as 1800 PLN per hectare. But first of all, the European Union hosts 400 million of consumers interested in certified ecological products. One of the biggest problems of ecological agriculture is the control of pests present during food production, processing and storage. A large set of chemical means is used for this purpose in conventional farming. These means are, however, not allowed in certified ecological farms. An additional problem arises in the breeding of animals which need living conditions most similar to the natural. Therefore, the methods of disinfection, insect pest and rat extermination should be best recognised to apply them in the most effective way [2–11].

Material and methods

The study was based on a survey performed in 37 ecological farms. The survey was addressed to farmers, owners of certified ecological farms. Apart from plant production, animals were bred in every surveyed farm.

The questionnaire contained 25 questions and was totally anonymous. Depending on questions being asked, the questionnaire was divided into 4 parts. The main focus of the first was on farm characteristic including location, size and bred animals. The second dealt with the issues of disinfection, pest control and pests against which these measures were applied. The last two parts of the questionnaire contained questions on the knowledge of pest control, other pests not included in the questionnaire; there was also place left for comments.

The aim of this paper was to estimate the methods used in disinfection and in insect and rat extermination by farmers from ecological farms and to find out which methods were most popular and why. The pests most often present in a given farm were also examined. Next problems included the ways of control of particular species and the efficiency of applied control methods.

Measures applied by farmers themselves were distinguished from those performed by qualified persons with the consideration of farmers’ knowledge on the pest control methods. The frequency of control measures was checked. Additionally, the characteristic of ecological farms, their size, plant and animal production and location in the country area were determined.

Results and discussion

Surveyed farmers had their ecological farms situated mainly (57%) in Podlasie province. Less farms were located in Mazovia province (18%), in Malopolska and
Lubelskie provinces (13% in each) in Kujawy-Pomerania and Lower Silesia provinces (11%) and in Lodz province (1%). Most studied farms were situated in north-eastern Poland. Only 57.14% of surveyed farms had certificate confirming ecological type of farming. Part of farms (14.3% of the total) just qualified to obtain such certificate. In the remaining farms animals were bred conventionally with the use of pest control and fodder not only from ecological plant crops. Most farms had an area from 1 to 20 ha with the domination of farms between 6 and 10 ha of area among surveyed farms. According to the Main Statistical Office, most ecological farms in Poland fell within the range of 5–10 ha of croplands and all farms occupied an area of 2194 ha with the mean area of 26.78 ha [12]. Apart from plant production, animals were also bred in the studied farms. Poultry breeding dominated in 56% of farms, in 43% farms cattle breeding was the dominating type of animal production. Breeding horses, pigs, sheep and goats was less numerous. Some questioned persons mentioned rabbits as other bred animals. These data are confirmed by results of the Main Statistical Office for the year 2008 – animal production in most ecological farms is focussed on poultry and cattle breeding. This is because breeding poultry and cattle according to the ecological principles is easier than breeding pigs. A market for sheep and goat products is much smaller in Poland. Therefore, these animals constituted 6.1% and 5.7% of production in ecological farms.

Questions about the nuisance of particular pests were put in the questionnaire. These questions enabled to check which pests were most frequent and what control measures were applied. Most troublesome in surveyed farms were rodents (mice, rats and voles). They posed a problem in 81% of farms. The next were insects (in 71.4% of farms). Tederko [13] found that insects and rodents caused large losses in both food production and processing. It has been estimated that mice and rats eat and destroy globally the amount of food necessary to feed 200 million people. Other factors mentioned by farmers were bacteria, protozoa, fungi and feral animals approaching the farms.

Basic method of pest control which is simultaneously the cheapest and safest is prophylactics. In the modern approach, disinfection and pest extermination do not mean simple liquidation of pests but a complex action protecting farm objects against pests [14]. Farmers’ care of appropriate hygienic and sanitary status of animals. proper assessment of infestation, provision of the insect tightness in farm buildings and using chemical and biological preparations only if necessary are important issues here. Farmers in 76.2% farms counted on sanitary and hygienic measures consisting in maintaining the buildings clean because frequent and accurate cleansing disturbs pests and removes the source of their food. Proper storage and regular removal of wastes decreases the living place for insects and rodents and hampers the development of pathogens [15]. From among studied farms only 14.3% hired the pest control firms, most farmers (85.7%) applied the control measures themselves.

Extermination of rodents and other animals is performed in 85% of surveyed farms. In 47.6% farms these actions are made every two weeks and in 38.1% once or twice a year. Extermination of rodents is directed first against mice, then against rats, moles and voles. Rodent control measures performed in farm buildings leave from 5 to 15% of pest populations [16–18]. The 100% efficiency in catching rats and mice is possible to
achieve only in small rooms with the use of mechanical traps. In larger buildings the efficiency of this method is smaller [17, 18]. Spring traps but also traditional methods of keeping cats and dogs were most often used to control rodents.

It is a common belief that rats are more harmful than mice in agriculture and food processing industry. In fact, it is quite opposite. These rodent live a nocturnal and hidden life and hence are often neglected by farmers. It is often so that the total extermination of rats is followed by mass appearance of mice which inhabit the areas formerly occupied by other rodents [18].

Foxes, stray dogs and sparrows pose a problem to farmers. Birds may, under some circumstances, be unwanted pests, sources of infections and a reservoir of mites and insects living in their nests and on their bodies. Nearly 40 species of mites and blood-sucking insects may be found in bird nests surrounding human settlements. Economic losses resulting from birds nesting in farm buildings arise from the contamination of products and raw materials with faeces and feathers. Insect and mite control is one of the most common actions in farms. Losses caused by these pests are large and their control is difficult for many reasons [19–21]. High viability and rapid reproduction of pests, their fast adaptation to new conditions and resistance to many toxic or expansion-limiting means make the control difficult. Actions undertaken against unwanted insects were reported by 85.7 % of surveyed persons. Flies, most common insects in our surrounding, were considered most annoying (76.2 % farms) pests. They live in apartments but also in piggeries and cowsheds where they reproduce massively. Domestic fly (*Musca domestica*) does not bite or suck blood but is particularly troublesome during mass appearance since it feeds on sweat, excretions of mucous membranes, blood and effusion fluids from human and animal wounds [22]. They may also be the disease vectors when sitting on food products, faeces and carrion.

The next annoying insects were mosquitoes, black flies, fleas, store house pests, gadflies, wasps, German cockroaches, lice and ticks [2, 5, 23]. Due to their expansiveness and reproduction potential insects are hard to control. Among ecological control methods the most common is flypaper which was used in 71.4 % of surveyed farms. Other method consists in using mosquito nets. The efficiency of any control method is assessed based on the number of dead insects found after application or the number of living insects in buildings 7 to 14 days later [24]. The efficiency of insect control was assessed by the surveyed persons with the use of flypapers and UV lamps [25]. The control measures were undertaken once a month in 23.8 % of farms and less frequently in 42.9 % of farms.

Disinfection was applied by most (95.2 %) farmers but four fifth of them did it sporadically; probably because they underestimated the relationship between hygienic conditions of the production, health quality and stability of the final product. Only disinfectants accepted by the EU may be applied in ecological farms. Slaked lime is among such means. It was used in 66.7 % of farms, particularly those having European certificates. Lime is a highly germicidal and fungicidal substance and protects from biological corrosion. It is used to disinfect cellars, stables etc. When disinfection is used as a regular prophylactic measure its effect is hard to assess. The method may lead to some errors like using the means inactive against viruses. Another problem is the use of
doses smaller than recommended (probably from economic reasons) which may immunize some microorganisms [26]. Pest control methods used in ecological farming are based on measures long used by farmers. These methods were developed long ago, when chemicals now used in conventional agriculture were not known. This way ecological farming starts to refer to methods used by our ancestors to obtain the product of high gustatory and nutritive value. The methods used by respondents were the traps for rodents and flypapers as well as liming and boiling as an effective and cheap method of disinfection. Most farmers do not hire professional firms for pest control because of high costs and because farmers prefer to perform such measures themselves when they observe the highest pest density.

Conclusions

1. The pest control methods most often used were spring traps for mice and flypapers.
2. Farmers identified most troublesome rodents against which they direct most control measures in their farms.
3. Pest control measures in certified farms are mainly based on traditional, environmental friendly methods. They are appropriately modified and adopt recent achievements of science and technology.

References

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Słowa kluczowe: rolnictwo ekologiczne, dezynfekcja, dezynsekcja, deratyzacja, chów zwierząt