

# Clinical Examination of the Control Red Chicken Mites *Dermanyssus Gallinae*

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## Abstract

Laboratory trials of the preparations give limited, preliminary efficacy information to *Dermanyssus gallinae* (De Geer, 1778). It is only under the realistic conditions of clinical trials that it is possible to obtain a final picture of the effectiveness of *D. gallinae* control. We recommend the following elements of clinical trials: 1. basic farm and facility data; 2. Important technological elements (such as: type of production, complexity of cages and equipment, capacity, length of exploitation, etc.); 3. weather condition: temperature (year period), and, if necessary, humidity; 4. hygienic conditionality.; 5. initial intensity and extent of infestation; 6. laboratory tests: basic biological efficiency (for all substances) and hemoresistance (for substances creating resistance); 7. application: the moment of application (before or during exploitation), concentration and dose; description of the mode of performance; control; 8. adaptation by behaviour (observation on the farm); 9. length of the object's break; 10. biosecurity: outside (infestation of a new, young flock, infestation of cage transport) and within the farm; 11. control: method and periodicity, with a final clinical assessment over a period of one year (one exploitation); 12. undesirable effects, disorders, complications, side effects; 13. the rest.

**Keywords:** clinical examination, control, poultry red mite.

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## 1. Introduction

Medicines information can be obtained from various sources. However, there is a key question their quality and bias [1]. This critical thinking has a universal value, but it can be applied in the specific case of control of poultry red mites, especially when you consider the overall picture of current practices. Poultry red mite *Dermanyssus gallinae* (De Geer, 1778) is the most important ectoparasite of poultry. The overall results of previous control *D. gallinae* were unsatisfactory [2, 3]. This is evidenced toxicological human risk [4-6], significant health poultry problems [7-11], economic damage and their tendency [12,13], a

high prevalence of *D. gallinae* [8,14] and others. Laboratory trials of the preparations give limited, preliminary efficacy information to *Dermanyssus gallinae*. It is only under the realistic conditions of clinical trials that it is possible to obtain a final picture of the effectiveness of *D. gallinae* control. Drug testing is carried out in stages. The goals of Phase III clinical examinations are as follows: 1. Demonstrate of efficiency; 2 demonstrate the relative effectiveness; 3. demonstrate situations in which special benefits; 4. Finding the optimal dose; 5. Finding shortcomings, disadvantages, side effect of treatment, both in absolute and relative terms. In Phase IV clinical examinations, application of the drug, we get the key information [1]. To make this happen, a clinical examination should be properly conducted.

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From that reason goal of our work are to contribute of improvement and standardization of clinical examination of control *D. gallinae*.

## 2. Materials and methods

For clinical examinations is used a new generation of the inert substances, an aqueous oil emulsion P 547/17. Its non-toxicity, efficacy was achieved in the laboratory and in the clinical conditions, a very prolonged action [15-22], and the developed technology of application in the prevention of (the preparation of objects in front of the settlement flocks) make this formulation extremely current control of *D. gallinae*. Experiential factors suggesting important clinical tests and analysis thereof through practical examples (5).

Factors and norms for evaluation of clinical examination control of *D. gallinae*:

1. Basic information about farm and building: number of establishments, capacity, work organization and other data relevant to the control of *D. gallinae*;

2. Important technological elements, such as: type of production, and complexity of equipment and cage, capacity, duration of exploration, and other relevant control data of *D. gallinae*. Categorization and labelling, the complexity of the environmental conditions: + (opportunities), - (disadvantages to a lesser extent, acceptable), - (a significant impact on effects), --- (unacceptable, a decisive impact);

3. Environment characteristics: temperature, humidity, other specifics. Influence of ambient opportunity is different in a) in the facility preparation; b) during operation. Categorizing temperature conditions: temperature for a period of fallowing: - (below -1); - (0-4) + (5-15), ++ (16-20) +++ (21-24), ++++ (25 and above); In service for assessment of treatment is respected season.

4. Hygienic conditionality: - (not applicable), - (acceptable while reducing the effect), + (acceptable) ++ (very good), +++ (flawless);

5. Initial intensity and extensity of infestation. Methodological corresponds to the control [23-26];

6. Laboratory tests: a basic biological efficacy of (all substances) and chemotherapy resistance (the resistance of the substance created);

7. A treatment: application time (before or during the operation), the concentration and dose; method description of execution; controllability. Categorization of expertise in performance -, +, ++, +++;

8. *D. gallinae* adaptation behaviour (observations on farms) [27];

9. The length of the rest of the building is a period of preparation to completion of settlement clusters. Categorized as follows: - (0 days), + (1-4 days) ++ (5-14 days), +++ (15-30 days), ++++ (over 30 days);

10. Biosecurity: outside the farm (infestation new, young flock; infestation transports cage [24], when the staff comes from farms elsewhere in contact with poultry or other birds; when external technicians serviced cages and equipment) and within the farm.

11. Control: The manner and periodicity. Regular monthly visual monitoring (day or night) Review, test dust (cage system), chatting with staff, analysis of production results. As an auxiliary method recommended traps. Evaluation of suppression: -, +, ++, +++, ++++ [16,25,26]. A final evaluation of preparation and the method yields on an annual basis, the duration of the exploitation of the cluster.

12. Undesirable effects, disadvantages, complications, side effects.

13. Other

## 3. Results and discussion

Collective, a summary of the key information selected examples of clinical examination 547/17 were presented at Table 1.

Other important information not specifically presented in the tables because they are common to date examples: breeding hens in conventional cages; laboratory tests; application; lack of resistance, and conversion; deficiency. Amendment tabulation case of clinical trials:

### **Example: 1**

- The farm has three production facilities for laying hens, sizing facility, with storage space and administration.

- Technology. The building was built with modified conventional cages, in a way that is inaccessible to the central metal part around drinkers switched wire. Trash is disposed in the vicinity of the farm.

- Temperature conditions during operation are air-conditioned.
- Hygiene. Inadequate preparation facility was caused by a malfunction Puomat (washer under pressure), but there were no technical conditions to do it right. For this reason, were not removed most of the liquid silicate sediments from past

exploitation. After the application of SiO<sub>2</sub> deposited layer is absorbed P 547/17. In addition, impurities are retained to a greater extent and protective function on *D. gallinae*. During exploitation flock was taken into account the current hygiene at an acceptable level.

**Table 1.** Cumulative, a summary of the key information from selected examples of clinical trials P 437/1

Number	Capacity	The complexity of the environment		Treatment (1)		Resting period of the building			Biosecurity		Supervision (infestation / months)				Period of control (months)	
				Date of application	Working concentration (%)	Dose (l / 1,000 h)	Length of rest (days, category)	Temperature of resting building	Date of settlement of the flock	Infestation of young flock and transport cages	Inside the farm	Before t.		After t.		
												visual	visual	by dust		Observations of staff
1	18000	-	--	17.12. 2017.	20	80	3,-	-	21.12. 2017.	+	-	++	1,+	1,+	1,+	4
2	34800	-	++	24.01. 2018.	20	91	3,-	-	28.01. 2018.	-	-	++	6,+	5,+	7,+	8
3	41280	-	++	06.01. 2018.	20	87	3,-	-	10.01. 2018.	-	-	++	7,+	6,+	7,+	9
4	50000	-	++	17.11. 2017.	20	80	4,-	-/+	22.11. 2017.	-	-	+	-	9,+	-	12
5	4000	+	+++	24.07. 2017.	15	91	10,+	++++	04.08. 2017.	-	++	+	-	-	-	16 it's lasting

- The intensity and extension infestation in the previous flock was ++. Visually were less visible clumps, but not in number to cause clinical anaemia and lead to a significant impact on the health status of the flock. Infestation is not particularly bothered no farm staff.

- Biosafety. New, young flock of hens were infested with *D. gallinae*. On the farm there are two other infested buildings connected transport of egg. There is also a risk of transmission of internal staff farms.

**Examples 2, 3**

- Farms have 7 possess a manufacturing facility for the hen's accommodation, for classifying the

object, with a warehouse, feed mill, and auxiliary spaces administration.

- Technology. The buildings are the panel walls. Conventional cages for a pipe manure drying, but are structurally accessible. Technological error in design, battery cages in experimental facility are closer than they should be, and is dusting environment is higher than normal (especially at the ends to fans). Trash from each object individually loaded on trailers of relations with the farm.

- Temperature conditions during operation are air-conditioned

- Hygiene. The building is properly prepared and properly maintained.

- The intensity and extensity of infestation in the previous flock was ++. Visually were smaller clusters, but not in number to cause clinical anaemia and lead to a significant impact on the health status of the flock. Infestation is not particularly bothering the staff did not farm.
- Length of vacation object was small (only 3 days) and in the colder period of the year. They were freezing.
- Biosafety. New, young flock of hens and transport cages were infested with *D. gallinae*. On the farm there are three infested facility connected conveyor for eggs. The staff is usually separated by objects. On the farm there are three infested facility connected conveyor for eggs. The staff is usually separated by objects. On the farm there are three infested facility connected conveyor for eggs. The staff is usually separated by objects.

#### **Example 4**

- Production farm has 6 units intended for laying hens, for the object being classified, with the storage space, and the auxiliary rooms administration
- Technology. The buildings are the panel walls. Conventional cages for a pipe manure drying, but are structurally accessible. Trash from each object individually loaded on trailers of relations with the farm.
- Temperature conditions during operation are air-conditioned.
- Hygiene. The building is properly prepared and maintained.
- The intensity and diffusion infestation in the previous flock was +. In the last cluster is building infested by introducing a small number of infected chickens in the flock. Visually they could hardly notice mites only in a small number, which is insignificant impact on farm flock and staff.
- Biosafety. On the farm there are four infested facility, a single conveyor is connected to the eggs.

#### **Example 5**

- The farm is family economic field. The facility was built and plastered.
- Technology. Conventional cages are on trays, plastic trays and work to connect the site of the cage.
- Hygiene. The building is well prepared and properly maintained.
- The intensity and diffusion infestation in the previous flock was +. And if the infestation perennial, is adequately controlled. Visually they

could hardly notice mites only in a small number, which is insignificant impact on farm flock and staff.

#### **Comments**

Criteria of clinical examination *D. gallinae*:

1. Farms and facility. The number of objects, their density and infestation, as well as technological connection (conveyor for eggs, the personnel, the method of manure and manure) are vital aspects of biosafety within the farm, which is of particular importance in the program control and eradication of *D. gallinae* on the farm; In our clinical trial conveyors eggs associated facilities in Examples 1-4. The risk of internal transmission which derives from the farm is also common to Examples 1, 2, 3 and 4. The level of risk, the internal transmission of mites within the farm, based on the intensity of infestation *D. gallinae*. Method of manure and the disposal of city garbage is not assessed as a significant risk in the examples.

2. Technology. Type of production greatly affect weight control *D. gallinae*. Changes in the system of keeping hens, generally speaking, is a complicated technological opportunity to control *D. gallinae* [3]. And let the tips of the cage and the equipment (the discrepancy within a model and manufacturer of the cage and the equipment, in particular between different manufacturers) may vary according to its complexity, and to a control. The complexity of the equipment of the cage, and has a profound effect on the weight of externals applications, the distribution of composition and the results of control *D. gallinae* [28]. This applies primarily to means for outdoor use, but can also affect other types of controls. Of all the agents for external use, for the most part these circumstances affect the application and the efficiency of the preparation of SiO<sub>2</sub>. The impact goes to the point that particularly complex cages and equipment can make their application even completely unjustified. Length of exploitation (one year or extended) requirements increases the efficiency of suppression, while the length of the eradication of exploitation flock does not essential. In previous years, the frequent use of technological error used packaging (substrate) for the eggs, which is now mostly abandoned. A very important issue is buying used cages and equipment, and inclusion in existing production farm. Categorization and labelling, the complexity

of environmental conditions: + (opportunities) - (disadvantages to a lesser extent, acceptable), - (a significant impact on the effects) --- (unacceptable decisive influence). In the examples the complexity of cages and equipment did not affect significantly the control *D. gallinae*. Yet the ease of cages and equipment was the most favourable case 5. A very distinctive feature of the new generation of inert matter and the importance of the quality and nature of the substrate on extended operation. In Example 5, to a greater extent representation of plastic parts and to enable the lower dosage (15%) P 547/17 works effectively.

3. Environment: temperature, humidity, dustiness (increased dusting occurs as a result of technological errors), other specificities. The temperature is particular importance in break object, or treatment at this time. Low temperatures below zero, are more unfavourable for the application itself and the effect of the preparation. In addition, the exposure of *D. gallinae*, because due to lack of activity does not leave hiding places. High temperatures at rest facility play an important positive role for the implemented control measures *D. gallinae*. In service the high temperature adversely affects the effects of suppression, because it shortens the cycle time and increases the power of the reproductive *D. gallinae* [29], thus reducing the effects of suppression. High humidity adversely effects the efficiency of the preparation of SiO<sub>2</sub> [30]. For the recording of ambient conditions is generally sufficient evidence season, and, if necessary, empty facility is useful to categorize closer to the ambient conditions. The exploitation of evaluation brief treatment effect is sustained season, because during the summer period of intensive reproduction of *D. gallinae*.

5th case of application P 437/17 is optimized in the summer period, while in other occasions primero less favourable, in the winter period (1-4). However, extremely cold period was not in any case.

4. Hygiene refers to the preparation of the building before the settlement, and then the maintenance in flocks. Creating and maintaining hygienic conditions on farms varies from adequate to undue. Hygienic conditionality is most important to control *D. gallinae* means for outdoor use, but also contributes to other control methods. Good hygienic conditions allow exposure of the substances to control or eliminate themselves *D.*

*gallinae*. And the preparations and methods for external application of a significant difference. Since funds for outdoor applications has the greatest significance in the application of SiO<sub>2</sub>, and somewhat less in P 437/17. Neatly removal of dead chickens is an important method to control *D. gallinae*. Dead chickens are becoming residence *D. gallinae* which are not exposed to long-acting preparations such as cages and equipment. When the treatment is the application of substances for externally- during operation, the dead mites on the chickens can be protected; In the case of disinfection using disinfectants act acaricidal, it is important to record their use.

Proper application of substance P 547/17 is conditional on good hygienic occasions; however, cages and equipment must be thoroughly washed after the eviction of livestock. In the case of the former use liquid form SiO<sub>2</sub> must be removed from the surface. If it is used to be the frequent use of the preparation for external application (insecticide), it is possible that they form a fatty layer, which will resist the washing with tap water In this case, it is necessary to employ special means for washing in order to remove from the surfaces of fat cover. After settling flocks, it is important to regularly Connecting the cage and clean the floor with a broom farm, under the cage and hall.

In 1th Example sanitary conditions were not acceptable. In the examples 2-4 hygienic conditions of preparation and holding were acceptable or good. 5. In the case of hygiene when preparing the facility were excellent, and hygiene after settling flock acceptable. So that in this case, and from this side, fulfilling an important prerequisite for obtaining the maximum control effect.

5. Infestation. Great intensity and extensity of infestation is associated with the distribution and exposure of *D. gallinae* in the environment. Therefore, height of the intensity and extensity of infestation prior to treatment increases a stage of control, and has a negative impact on the results, particularly in a method for suppressing *D. gallinae*. Important is the assessment of infestation *D. gallinae* before treatment, then after settling while lasting effects of control or is complete the production cycle. It is recommended that multiple (in several ways) and ongoing regular monthly insight into infestation (when it comes to building inhabited) leisure day and night visual inspection,

dust, chatting with staff, analysis of production results.

Before treatment, the previous flocks before the eviction, the intensity and extensity of infestation in farms 1-3 did not affect the health status of the flock. Visually the spotting clusters to a lesser extent (++). In Examples 4 and 5 of the infestation was barely able to visually detect +. Therefore, in all these examples, the factor of infestation prior to treatment is not particularly negative effect on the control results.

6. Laboratory tests provide basic information on the effectiveness of the directly exposed, and long-acting preparations, which requires initial information for all types of products. Furthermore, for compositions that create chemical resistance (synthetic or natural neurotoxic substances) it is necessary to specifically test samples from the farm, where we perform the clinical trial. Recent reports have noted resistance *D. gallinae* in high level [31,32]. In addition to direct resistance, possible side set. Basic information on the efficiency and sensitivity are the basis for the proper setup and evaluation of clinical trials. Under conditions where laboratory testing demonstrate the high efficiency, absence of the expected effect may indicate any error in their implementation and other factors important impact control. Likewise, and to indicate the negative properties of the compositions and methods, which are not (or hardly) be seen in the laboratory. It is particularly important to the results compared with the other substances and compositions, in order to affirm the rational control;

Puvača et al. [32] determined the toxic and repellent effect oils thymol and lavender and eligible assess the clinical trial. In tests with long exposures (24, 48 and 32 hours) had not been received the value of the full toxicity (lavender and 96% thymol, 82% for 72 hours exposure). Since substantially not expressed continued operation, we believe that the test substances have significant potential to control *D. gallinae*. Continued operation of the most important characteristics of potential substances for control *D. gallinae*, however the lack of determination is the case in many other laboratory tests. Prolonged operation of the feature by which the dynamics is determined by the application, the period between two consecutive treatments. For the proper application of some substances it is necessary to define its properties in laboratory conditions.

Prolonged operation of the feature by which the dynamics is determined by the application, the period between two consecutive treatments. For the proper application of some substances it is necessary to define its properties in laboratory conditions. Accordingly, improvement and standardization of laboratory tests, are also clearly necessary, in themselves, but also as an important premise of clinical trials.

The use of drugs and biocides that create resistance requires the introduction of a permanent monitoring resistance control *D. gallinae*, collecting the results and the availability of information on resistance. This would contribute to phase IV clinical trials, the observations in the application.

Phoxim in Sweden was approved in 2009. The largest number of treatments carried out in phoxim inhabited facility during exploitation flock. Tests Fox and cypermethrin exposure in 48 hours gave the results efficiency phoxim in 15 of the 18 flocks, cypermethrin 7/18 flock [34]. Surprising is the level determined by the efficiency of Fox and cypermethrin. It is possible that a long period exposure in experiments give a better picture than it really is. Experience with susceptibility to cypermethrin is that already in 2005. its use was no longer justified in control *D. gallinae* in the territory of Serbia.

Important properties 547/17 P are pre-determined by laboratory tests [15,17,20,21]. According to current knowledge, inert substance P 547/17 does not create chemical resistance.

7. Treatment: There are two different moments for the treatment, empty object and populated when treated atmosphere and the cluster. Treatment empty object is the basis of the concept of prevention, because we need to prevent young cluster comes into contact (or at least no significant) or to contact as many postponed. Treatment of settlement building, the treatment of flocks, and rational only in case of necessity (not as a basic access control). Professional applications are an important prerequisite for the successful implementation of funds for external use. In practice, control *D. gallinae* are common errors in application of the preparation with acaricidal activity. Persons who can administer a mistake due to insufficient knowledge of dishonesty or kill the workload. This is especially true in hand-held applications as external preparations for application. Mechanical application reduces the human error factor, which is important in the industrial

production of high capacity.

The application of formulations P 547/17 implemented a professional service under the instruction and supervision of qualified persons. An application which allows the used applicator machine application. Applicator worked at a pressure of 6-8 atmosphere. The supporting structure provided with nozzles of different diameters (depending on the task and position), have enabled a detailed and systematic application of an aqueous emulsion. The ends of the batteries are done manually.

8. The adaptation *D. gallinae* behaviour is very markedly manifested itself in the application of the preparation of SiO<sub>2</sub>. Since this type of preparation is very limited distribution, *D. gallinae* survives and reproduces at such places therefore the further spreading. On this way it minimizes the effects of subsequent treatments performed in the same manner.

In the performed clinical trials adaptation *D. gallinae* has not been established for the substance and application technology P 547/17.

9. Length rest of the facilities is a period of preparation to completion of settlement clusters. And if the length of the fallowing technology issue, was singled out for its importance. The effects of fallowing largely conditioned by the temperature. Duration of rest facility contributes to the effects of control because it promotes contact with the preparation infestation, but also eliminates *D. gallinae* at long sightseeing. It should be borne in mind that some specimens can survive longer than a year of starvation [26]. A finding alternative Vora food, mite problem of hunger can be solved. Also known is the parasitic fields in 30 species of birds and 20 species of mammals [35].

Length rest of the building is small in Examples 1-4. 5. In the case of a pause of 10 days at a high temperature is favourable for the expression of high efficiency control *D. gallinae*.

10. Biosecurity in this particular case deals with the subsequent introduction of *D. gallinae* in building or farm that conducts clinical testing. Re-infestation can reduce or eliminate the effects of the control, which is particularly related to the eradication. Therefore, it is mandatory checks of infestation education of the young flock that will be settled after the preparatory treatment facility during his Odom. Also, when a flock of immigration, it is necessary to check the dirt from

the transport cage [25]. Then infestation knowledge of other buildings on the farm and possibilities of entering. The transfer of the building to the building on the farm, in the first year is characterized by uneven distribution of *D. gallinae* infestation in the newly introduced facility. Biosafety within the farm builds on the basic data on the farm.

Significant efficacy in the clinical trials was determined for insecticides fluralaner [36]. The interpretation examples of lower efficiency, because for 56 days hardly possible re-infestation *D. gallinae* inside the farm, which would be manifested clinically significant.

Example 1. A clinical trial, testifies to the failure biosecurity measures, which are next to other circumstances, leading to an unsatisfactory effect of suppression. Despite the existence of risk, we found a significant transfer of *D. gallinae* in the farms that were tested.

11. Control: the manner and periodicity. Detection of dust, visual inspection, interview with staff. If necessary, use some form of traps. And if the traps are the most common methods of researchers, have disadvantages: not a concentration method gives information only from close range to have an overview of the situation in the whole farm seeks important work or investment. Not recommending to invest money more attention to detection. As compared to the growth of infestation by *D. gallinae*, monitoring at monthly intervals, allows for the timely discovery of the substance which are determined in the laboratory high efficiency. The cage system of detection of dust is recommended because of the ease of implementation and reliability. Visual inspection is basic insight. Interview with staff always recommend adding quality insight. When infestation *D. gallinae* high intensity taking into account the results of production. Evaluation of suppression must be defined in a way that relates to detection. The most trusted consolidate the most important ways of detection in whole. Exploitation hens last year. Farmers is very important to know to what extent and for what cost will this time be able to control *D. gallinae*. It is therefore important that the entire exploitation period be included in the clinical trial at the final assessment of the compositions and methods for the control (1 year);

An example of a systematic approach to the study to investigate the composition Ectopar (Ectopar is

a liquid for PRM control containing a patented combination of silica compounds, siloxanes), [37]. There is monitoring the traps carried out on a weekly basis. Control on a weekly basis provides more detailed information and more appropriate for trial preparation and methods with lower efficiency.

Liebisch et al. [38] conducted a clinical trial of spinosad, fermented products of the two most active metabolites (A, D) of *Saccharopolyspora spinosa* bacteria.

Laboratory testing determined the efficiency of all mobile phase *D. gallinae*. A clinical trial is based on laboratory results. Testing was conducted in 3: 1. 2,000 ppm spinosad application, the application 2. 4,000 ppm spinosad and 3 controls. Facilities were highly infested. The results showed: the first 28 days the facility was nearly 100% efficiency, and 49 days, 74.3%. 2. The object effects were 90% for 77 days. The question of how long he was suppressing effect and how long it takes a year treatment method (in this case spinosad) to rational control *D. gallinae* in a flock?

It is very important to set the criteria of rational control. Effects of novel neem oil formulation (RP03™), which exhibit its highest for 10 days, a longer period of 2 months [40] not an example of rational control *D. gallinae*.

Inert formulation based on SiO<sub>2</sub>, for many years was the only significant alternative to synthetic neurotoxic compounds (acaricides, insecticides in the broad sense). The basic directions for their use in the control of *D. gallinae* offer researchers [30]. In addition to laboratory tests [22,39,41,42] are only long-term clinical trials could indicate all disadvantages and to recommend their use in rational control *D. gallinae* [19-21]. The effect of 100% should mean that there is no presence of *D. gallinae* in the house or farm. This is required torque, which can be claimed only after a long time, and past time. Since the extremely small number of *D. gallinae* cannot be detected in any way, it is the presence of chickens and time that they can be sufficient to amplify and detect. Traps provide information about the immediate surroundings and the information they give in a short period cannot be taken as representative of the whole area, especially for hiding places.

The efficacy of T 547/17 verified the constant supervision of the farm staff, under the direction and with occasional inspections of the authorized person. The findings are presented in tables. The

event infestations in only 1 case showed the effects of suppressing completed in a short period between 4 months. It points to the factors that have contributed to the (inadequate preparation facility and settling infested flock, aided winters and short break facility). In the examples 2-4 infestation is detected, or the effects of suppression still good. 5. In the case of control lasted one year the period of settlement flock. After all the negative findings, it was concluded that *D. gallinae* in the house (and farms, because the farm has only one object) eradicated. This is also one of the first two cases it is a new generation of inert substances (P 547/17) successfully demonstrated the eradication. By adopting the principles of software control *D. gallinae*, and implementation of biosecurity measures, we expect long-term retention of the negative status of the farm. And if the case no. 5 clinical trials conducted in easier circumstances than those prevailing in large systems and large farm production livestock in it is contained the essence of the problem of control *D. gallinae*, which had to be solved. Use in large systems only asking for the necessary adjustments, attention and assignment requires program control.

The aim of control *D. gallinae* is the eradication of production facilities and farms, and the introduction of biosecurity measures. This goal should be the aim and direction of clinical trials control *D. gallinae*.

12. Undesirable effects, disadvantages, complications, side effects.

Application of substance P 547/17 can lead to slip tape manure and eggs. It happened in Examples 2-4 (objects larger capacity), but the dusting powder resorptive substances (talc, diatomaceous earth, animal feed) in order to prevent sliding. Application of inert substance P 437/17 requires increased efforts to maintain hygienic conditions in service clusters. In the case of suppression, maintaining hygienic conditions will significantly affect the efficiency of substance P 437/17. The workers in some places, in the beginning, had to take care not to slip, especially where the tiling.

Other. In large infestation (+++, ++++) it is necessary to record the performance indicators of the health status of the flock. An example is given by the authors Thomas et al., [36] in our examples, the impact on the health status and the performance was not the case. Factors of the clinical trials can be specifically complemented,



depending on the specific kind of the substance and a method for the control of *D. gallinae*. It is useful to record the history of infestation and the measures of control; and other information that is assessed that may affect the control *D. gallinae*.

How to factors ranging clinical trial is needed sufficient case (repetition). In the future, it is planned to submission of clinical reports of application P 437/17, and for other methods of growing laying hens (5 cases).

## Conclusion

There is a need to improve clinical trials and standardized. Performance of control depending on the number of factors on which it is important to take into account. The adoption of important factors (13), will contribute to comparability, accuracy and completeness, or usefulness of clinical trial results *D. gallinae*.

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