Application of disinfectant "hyponat bpo" for the disinfection of slaughtering and live-stock dressing workshops

P A Popov

All-Russian Research Institute for Veterinary Sanitation, Hygiene and Ecology – Branch of Federal State Budget Scientific Institution «Federal Scientific Center – K. I. Skryabin, Ya. R. Kovalenko All-Russian Research Institute of Experimental Veterinary Medicine, Russian Academy of Sciences», Zvenigorodskoye Highway 5, Moscow, 123022, Russian Federation

E-mail: popov.petr18@gmail.com

Abstract. The article presents the results of laboratory studies and production tests of the developed disinfection regimes for slaughterhouses and live-stock dressing workshops. As a result of conducted laboratory and production tests, it was found that disinfectant "Hyponat BPO" provides 100% disinfection of the premises of slaughtering and live-stock dressing workshops, as well as equipment at slaughterhouses. Thus, it was determined that the positive effect of surface disinfection according to test cultures control of E. coli and S.aureus was achieved with a consumption rate of 0.5 l / square meter and an exposure of 90 minutes.

1. Introduction

The role of disinfection, performed in conjunction with other activities, is one of the factors ensuring the finished-product output of a high sanitary level. With the release of raw materials with initially low contamination, one can safely predict the development of microbial content during storage and sale of finished, processed products. One of the main points of contamination is the slaughtering point, where contamination occurs through the carcass surface, therefore, maintaining a low bacterial level in the slaughtering premises is an urgent task to reduce sedimentative contamination. Low bacterial level can be provided by high-quality and timely disinfection of premises. [1,4,6]

When choosing disinfectants it is necessary to take into account the specified requirements to disinfectants: they must be broad-spectrum in relation to 4 resistance groups, effectively eradicate bacteria, viruses, fungi and spores; must have a washing and minimal corrosion ability; not give a negative impact on the main structural details, be safe for human and animal health; easily-handled; at the same time be relatively inexpensive, environmentally friendly, residual free for finished product. [1,2,5,7,9]

Currently, in the Russian Federation, more than 400 chemicals, both domestic and imported, are used for disinfection of veterinary supervision objects, containing chlorine, hydrogen peroxide, formaldehyde, QAC, acids, alkalis, colloidal forms of metals, etc. that may have high volatility and toxicity, be environmentally unsafe or expensive.
2. Materials and methods

The studies were carried out in the veterinary-sanitary inspection laboratory of All-Russian Research Institute for Veterinary Sanitation, Hygiene and Ecology -branch of Federal State Budget Scientific Institution «Federal Scientific Center – K. I. Skryabin, Ya. R. Kovalenko All-Russian Research Institute of Experimental Veterinary Medicine, Russian Academy of Sciences»

For the disinfectant development were used: Sodium hypochlorite brand "A", calcium hypochlorite, lithium hypochlorite, alkylidimethylbenzylammonium chloride, its commercial form catamine AB, containing 50% of the basic substance, technical sodium hydroxide.

The work is based on "Methodological guidelines on the procedure for new disinfectants testing in veterinary practice" (1987); "Guide R 4.2.2643-10. Methods of laboratory research and testing of disinfectants to assess their effectiveness and safety ")(Official Edition, M., 2011).

Microbial contamination of slaughtering and live-stock dressing workshops at slaughterhouses was determined using generally accepted methods with the cultures determination of vegetative microflora, microflora of total microbial count, E. coli, S.aureus. In laboratory experiments, the disinfecting effect of “Hyponat BPO” was previously determined for the disinfection of various test surfaces used in the construction of slaughterhouses (sandstone plate, concrete, tiled plate, stainless steel).

Production (commission) tests of the developed disinfection regimes were carried out at the slaughtering and live-stock dressing workshops using the “Hyponat BPO” solution under vegetative non-pathogenic microflora control at the premises of LLC "Prodtorg +" Podolsky district, Moscow Region.

3. The results of the study

During the first experiments, the microbiological contamination indicators of slaughtering and live-stock dressing workshops and slaughterhouses were studied. On the example of LLC "Prodtorg +" enterprises in the Moscow region. Research results are shown in tables 1 and 2.

Table 1. Bacterial contamination indicators of slaughtering and live-stock dressing workshops at the meat processing enterprise (n=3)

| №  | Place of sampling                  | Total bacterial count | E. coli  | St. aureus |
|----|-----------------------------------|-----------------------|----------|------------|
|    |                                   | CFU/100cm²            |          |            |
| 1  | Floor (sandstone plate)           | 140*10²               | 40*10²   | 218±3      |
| 2  | Wall (tiled plate)                | 102*10²               | 35*10²   | 200±2      |
| 3  | Table (stainless steel)           | 40*10²                | 8*10²    | 120±2      |

1. Bacterial contamination of the pigs slaughtering surfaces

2. Bacterial contamination of the evisceration surface

3. Bacterial contamination of the pigs evisceration and butchering surfaces

As shown by the above tables, the surfaces and equipment of slaughtering workshops are contaminated by a significant amount of non-pathogenic vegetative microflora, this fact is taken into account in subsequent experiments.
Table 2. Bacterial contamination of the slaughtering workshops surfaces at the slaughterhouse (n=3)

| №  | Place of sampling              | Total bacterial count | E.coli CFU/100cm² | St. aureus spp CFU/100cm² |
|----|--------------------------------|-----------------------|------------------|--------------------------|
| 1  | Floor (sandstone plate)        | 165*10²               | 60*10²           | 285±3                    |
| 2  | Wall (tiled plate)             | 122*10²               | 40*10²           | 215±2                    |
| 3  | Table (stainless steel)        | 88*10²                | 12*10²           | 110±2                    |

P>0.001

At the next stage, laboratory tests were conducted to determine the disinfecting effect of the “Hyponat BPO” disinfectant for disinfecting various test surfaces most commonly used in the construction of slaughterhouses (stainless steel, concrete, tiled and sandstone plates). Disinfecting effect determination of “Hyponat BPO” was carried out according to the “Methodological guidelines on the procedure for new disinfectants testing in veterinary practice” (1987) using S.aureus as a test culture (pcs. 209-P). Test results are shown in table 3.

Table 3. The results of laboratory experiments to determine the disinfecting effect of "Hyponat BPO" on disinfection of test surfaces using the test culture S.aureus (pcs. 209-P)

| Exposition, min. | Concrete | Tiled plate | Sandstone Plate | Stainless steel |
|------------------|----------|-------------|-----------------|-----------------|
| 60               | +        | -           | +               | -               |
| 90               | -        | -           | -               | -               |

P>0.001

Note: 1. (- )- disinfected; ( + ) - not disinfected; 2. Control: growth of testing cultures on surfaces treated with sterile water.

On the basis of the experiments the following results were obtained:
- using the S.aureus testing culture (pcs. 209-P), it was found that in order to achieve 100% disinfection of the test surfaces, it is necessary to use a 5% aqueous solution of "Hyponat BPO" at an exposure time of 90 minutes at a dose for smooth surfaces in an amount of 0.5 l / m², and for rough - 1.0 l / m².

At the next stage, the developed disinfection regimes were tested under production conditions using “Hyponat BPO” for disinfection of slaughtering and livestock dressing workshops, at premises of meat processing enterprise and slaughterhouse of LLC "Prodtorg +" in the Moscow Region. According to the production test results:
- at the meat-processing enterprise "Prodtorg +" after a single application of 5% disinfectant solution “Hyponat BPO” on the surface of walls, floor, table and various containers of the workshop at a rate of 0.5 l / m² and exposure of 90 minutes, complete disinfection of surfaces was achieved under staphylococcus control
- during prophylactic treatment of slaughtering workshops, it is recommended to use "Hyponat BPO" preparation after the end of the shift at the rate of 5% solution, 0.3 l / m² with an exposure of 90 minutes. The quality control of disinfection is carried out according to the Coliform bacteria indicator per 100 cm² of the treated surface, which is not allowed or according to Quantity of Mesophilic Aerobic and Facultative Anaerobic Microorganisms, CFU / cm² not more than 1 * 10³ on the treated surface;
- in case of forced disinfection for infections of the first group (unstable infections), the drug is used at the rate of 5% disinfectant solution "Hyponat BPO" 0.3 l / m² with an exposure of 90 minutes. Quality control of processing is carried out in terms of the presence of E. Coli in the control swabs;
• in case of forced disinfection for infections of the second group (resistant infections) it is recommended to use 5% disinfectant solution "Hyponat BPO" at the rate of 0.5 l/m² with exposure of 90 minutes, taking into account the presence of staphylococci (S. aureus, epidermatis, saprophiticus) in the control swabs;

4. Conclusion
The conducted researches established microbial contamination of slaughtering and live-stock dressing workshops at the LLC "Prodtrg+" enterprise in the Moscow region. Effective regimes and application technology of the "Hyponat BPO" disinfectant for the disinfection of various of slaughtering and live-stock dressing workshops have been developed. This technology can be used by veterinarians at meat processing enterprises of all types and slaughterhouses, livestock farms of various directions and other enterprises equipped for slaughter and cattle processing, ensuring the production of safe and high-quality products of animal origin.

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