Original Article

Comparative Evaluation of Disinfectants' Efficacy in Reducing Bacterial and Fungal Contamination in Livestock Feed Production

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ABSTRACT

Background: Disinfectants in feed factories are crucial in maintaining a clean and hygienic environment, preventing disease spread, controlling cross-contamination, and ensuring product quality, thereby ensuring food safety.

Objectives: This study aims to assess the performance of multiple disinfectants in a factory producing livestock, poultry, and aquatic feed, as well as in a laboratory.

Methods: Microplate and agar-well diffusion methods were utilized to assess the efficiency of commercial chemical disinfectants (1 and 2) and formalin (37%) on the internal surfaces of the mixer, mill, extruder, dryer, and cooler in the factory and to examine the performance of eight common disinfectants, including disinfectants 1, 2, and 3, sodium hypochlorite (NaClO) (10%), ethanol (70%), methanol (70%), povidone-iodine (10%), and formalin, against *Salmonella typhimurium*, *Escherichia coli*, and *Fusarium oxysporum*.

Results: The extruder had the highest level of microbial contamination, while the cooler had the lowest level. Disinfectant 2 and formalin showed the most effective antibacterial and antifungal properties. Disinfectants 2 and 3 showed the highest antibacterial effects in the laboratory, while other disinfectants had the lowest. Disinfectant 2 showed the strongest antifungal effect, followed by formalin, povidone-iodine, and NaClO. Ethanol and methanol showed the least effect.

Conclusion: The study emphasizes the importance of selecting effective disinfectants to reduce contamination in animal feed production facilities. Disinfectant 2 (Huwa-San TR-50), with its unique combination of hydrogen peroxide and silver-based ionic chemistry, is a powerful disinfectant solution for various applications. These results can serve as a valuable guide for choosing appropriate disinfectants for similar industries.

Keywords: *E. coli*, Feed factory, Fusarium, Commercial disinfectant, *Salmonella*

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Introduction

Feed is an integral part of the food chain, and its safety is a prerequisite for human health, animal health and welfare, income generation, and economic sustainability. Feed safety is a shared value and responsibility and should be subject to quality assurance through integrated food safety systems, similar to food production (Negash, 2020). Maintaining a clean and hygienic environment in livestock, poultry, and aquatic feed production facilities is crucial to preventing the spread of disease and controlling cross-contamination between contaminated and non-contaminated materials. This prevents the colonization-infection-contamination cycle, ensuring the safety and quality of final products and reducing the risk of microbial agents entering human food sources. Effective disinfection protocols are vital in controlling microbial contamination and reducing the risk of pathogen transmission (Dvorak, 2008; Muckey, 2016). Pathogens that can enter the human food supply through microbial contamination include *Salmonella enterica*, Shiga toxin-producing *Escherichia coli*, *Campylobacter*, and *Yersinia enterocolitica* (Huss et al., 2015). Since decontamination of facilities is a crucial step in preventing the spread of these diseases and controlling cross-contamination (Dvorak, 2008; Huss et al., 2015; Muckey, 2021), it is necessary to evaluate the effectiveness of disinfectants in disinfecting facilities and removing or inhibiting the growth of microorganisms (Wales et al., 2021). The assessment of disinfectant performance can be conducted using various methods, all of which permit the investigation of antibacterial and antifungal effects on specific pathogens. Judicious and effective selection of disinfectants plays a critical role in maintaining a clean and secure environment, reducing the risk of disease transmission, and guaranteeing the quality of the final products (Abban et al., 2013; Davies & Wales, 2019; Stringfellow et al., 2009). The outcomes of this investigation will offer invaluable insights into the capacities of disinfectant agents for application in livestock, poultry, and aquatic feed production facilities. These results can be utilized as a pragmatic guide by industry professionals for selecting suitable disinfectant agents, thereby mitigating contamination and promoting food safety.

This study evaluated the performance of several common disinfectants in animal, poultry, and aquatic feed production facilities, focusing on their ability to remove feed microorganisms from the surfaces. The research was conducted in an animal feed production factory and, at the same time, in a laboratory setting. Some of these disinfectants are commercially used on a large scale in the animal feed industry, while others are used on a smaller scale to clean and disinfect specific small surfaces.

Materials and Methods

Chemicals and media

Plate count agar (PCA), yeast extract glucose chloramphenicol (YGC), tryptic soy broth (TSB), potato dextrose agar (PDA), and Mueller-Hinton agar were obtained from Mirmedia (Kardan Azma Co., Iran). Sabouraud dextrose broth (SDB), ethanol, methanol, and sodium chloride (NaCl), were prepared from Merck (Germany); commercial disinfectants 1 (based on hydrogen peroxide, Iran), 2 (based on hydrogen peroxide with silver ions, Belgium), 3 (based on the composition of stabilized peroxyacetic acid and hydrogen peroxide, Iran); formalin (37% formaldehyde), sodium hypochlorite (NaClO), povidone-iodine 10%, and nalidixic acid were produced from Iran.

Microbial strains

Fusarium oxysporum (Persian Type Culture Collection [PTCC]-2112), obtained from the Iranian Research Organization for Science and Technology (IROST), *Salmonella typhimurium* (American Type Culture Collection [ATCC]-14028) and *E. coli* (ATCC-10698), were obtained from the Microorganisms Collection of the Food Microbiology Laboratory of the Department of Food Hygiene and Public Health, School of Veterinary Medicine, Shiraz University, Shiraz, prepared and activated according to the manufacture's instructions.

Animal feed factory phase

Surface determination, preparation, and sample collection from factory facilities

The performance of disinfectant agents in a factory producing animals, poultry, and fish feed was studied. This study was conducted using a completely randomized design, with four treatments and three replicates. The experimental treatments included two chemically based disinfectant agents available on the market (two treatments), formalin as a positive control, and a location without using a disinfectant agent as a negative control (sterile water spray).

As part of the hazard analysis and critical control point (HACCP) program, certain areas in the factory producing animal, poultry, and fish feed were identified, which were as follows: inside the mixer, inside the mill, inside the extruder area, inside the dryer, and the cooler. After physically cleaning the designated areas (10 cm^2), disinfectants were applied to the surfaces in quantities consistent with the manufacturer's recommended concentrations. The treated surfaces were allowed to dry according to the manufacturer's instructions. Sampling was then conducted using a swab, which were transferred to glass containers with screw lids containing 5.0 mL of normal saline. Subsequently, samples were sent to the laboratory.

Laboratory analysis

In the laboratory, samples were diluted under aseptic conditions. PCA was used for total microbial enumeration, and YGC was used for mold and yeast enumeration. Cultivation was done in two layers. Mold and yeast counts were performed after three days of incubation at 25 ˚C, and bacterial counts were performed after two days at 37 ˚C.

The laboratory phase

Microplate method

The microplate method was used to examine the performance of disinfectant agents. Nine common disinfectant agents were used; commercial disinfectants 1, 2, and 3, NaClO (10%), ethanol (70%), methanol (70%), povidone-iodine (10%), nalidixic acid (40 ppm), and formalin (37% formaldehyde). The tests were performed twice, with three replicates per treatment.

Bactericidal tests: Following Farouk et al. (2020)'s method with minor modifications, the recommended amount of disinfectant was mixed with sterile distilled water, and 100 µL of each disinfectant was added to 100 µL of TSB medium (double concentration) in each well. A volume of 10 µL of bacterial suspension (*S. typhimurium* and *E. coli*) equal to 0.5 McFarland standard (approximately 10^8 colony-forming units [CFU]/mL) was added to the wells. A row of culture medium and bacterial suspension was used as a positive control, while a row of culture medium without bacteria was a negative control. After inoculation with bacteria and disinfectants, the microplate was placed inside a microplate reader (model: mqx200r2), and the data were obtained after 24 h at 37 ˚C, the wavelength of 600 nm, and a shaking intensity of 10 s every 60 minutes, with a one-hour reading.

Fungacidal tests: The antifungal effects were studied using a 96-well microplate (Rahimi-Kakolaki et al., 2023). To prepare a spore suspension, sterile normal saline solution was pipetted onto a five-day-old PDA culture. After collecting the resulting solution, the number of spores was adjusted to 2×10^6 spores/mL using a hemocytometer. The recommended amount of disinfectant was mixed with sterile distilled water. In each well, 100 µL of each disinfectant was added to 100 µL of SDB (double concentration). A volume of 10 µL of *F. oxysporum* spore suspension (2×10^6 spores/mL) was added to the wells. After incubation at 25 ˚C for five-seven days, the wells were examined for fungal growth by visually observing the mycelium. The absence of fungal growth in the wells indicated the inhibitory effect of the tested substances on the respective cultures.

Agar-well diffusion method

The agar-well diffusion method was used to investigate the antimicrobial activity of the disinfectants on Mueller-Hinton agar, PCA, and PDA.

Bactericidal tests: The bacteria were inoculated with 0.5 McFarland concentration (1×10^8 CFU/mL) of *Salmonella* and *E. coli*, following the method of Gomaa et al. (2020) with minor modifications. After bacterial inoculation, 5-mm-diameter wells were created in the agar plates. A volume of 50 µL of each sample was added to each well. The plates were then incubated at 37 ˚C for 24 h. Nalidixic acid antibiotics were used as standard controls for both methods. The diameter of the inhibition zone was measured after incubation.

Fungacidal tests: Applying the method introduced by Kavitha and Satish (2016) with slight modifications to investigate the antifungal effects of disinfectants, the surface of the PDA culture medium was inoculated with the appropriate amount (in this test, 100 µL) of *F. oxysporum* spores with a concentration of 2×10^6 spores/mL. After drying the surface, five-millimeter-diameter wells were made in the agar plates. A volume of 50 µL of each disinfectant sample was added to the wells, and the plates were incubated at 25–28 ˚C for three days. The diameter of the inhibition zone was measured after incubation.

Statistical analysis

Statistical analysis was performed using SPSS software, version 25 to compare mean values using Duncan's multiple range test with a significance level of less than 0.05, and GraphPad Prism software, version 8 was used for laboratory data analysis and graph drawing.

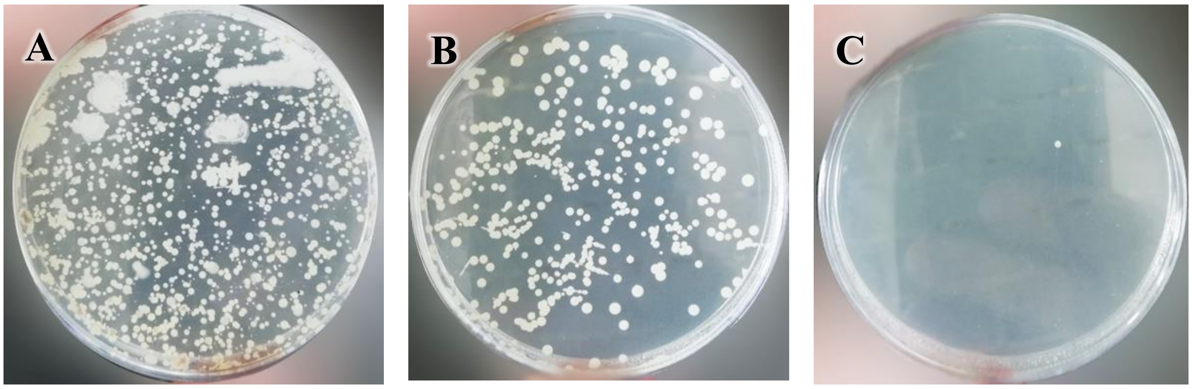

Figure 1. Investigating the effect of physical cleaning on reducing pollution

A) The number of bacteria before physical cleaning, B) The number of bacteria after surface cleaning, C) The number of bacteria after disinfection

Results

Animal feed factory phase

The samples were collected post-physical cleaning to minimize surface contamination (Figure 1) and promptly transported to the laboratory for further analysis. Tables 1 and 2 present the disinfectants' antibacterial, antimold, and anti-yeast effects on samples obtained from feed factory surfaces. Examination of factory sections showed high microbial contamination in the extruder and low contamination in the cooler. Disinfectant 2 and the positive agent (formalin 37%) showed the best antimicrobial effects. Commercial disinfectant 1 had a good effect only in the most contaminated area (extruder).

The extruder had the highest mold and yeast contamination in the factory equipment and facilities, while the cooler had the least contamination. Disinfectant 2 and the positive agent (formalin 37%) showed the best antifungal effects. Disinfectant 1 showed no effect on different sections of the facility. Formalin and disinfectant 2 showed the highest antimicrobial effects. Disinfectant 1 showed no antimicrobial effect in some places (sampling locations 1, 3, etc.) but had a minimal antimicrobial effect in others. The comparison of antifungal effects in sampling location 5 (cooler) showed no significant difference ($P>0.05$), but formalin and disinfectant 2 had a greater antifungal effect compared to disinfectant 1 and the control group. The disinfectants showed inhibitory effects on *E. coli*. However, disinfectant 1 showed no inhibitory effect on this bacterium. The inhibitory effects on *E. coli* were similar to those of the inhibitory effects on *S. typhimurium*.

The laboratory phase

Microplate method

Formalin and disinfectant 2 showed antifungal effects at different concentrations; however, disinfectant 1 only showed antifungal effects at 5% and 10% concentrations. Disinfectants 2, 3, and nalidixic acid showed the highest effects, while 70% ethanol, 70% methanol, 10% povidone-iodine, and 10% NaClO had the least antimicrobial effects against *S. typhimurium* (Figure 2). Nalidixic acid had the highest antimicrobial effect, and disinfectants 2 and 3 had good antimicrobial effects against *E. coli* compared to other substances. In contrast, 70% ethanol, 70% methanol, 10% povidone-iodine, and 10% NaClO had the least antimicrobial effects. Disinfectant 2 had the greatest antifungal effect against *F. oxysporum* fungus. Formalin (37% formaldehyde), 10% povidone-iodine, 10% NaClO, and disinfectants had good antifungal effects compared to other substances. In contrast, 70% ethanol and 70% methanol had the least antifungal effects.

Agar-well diffusion method

Table 3 compares disinfectant inhibitory effects on *E. coli*, *S. typhimurium*, and *F. oxysporum* using the agar well diffusion method. Disinfectants 2, 3, and nalidixic acid showed the highest inhibitory effects, while 70% ethanol, 70% methanol, 10% povidone-iodine, and 10% NaClO had the least antimicrobial effects against *S. typhimurium* (Figure 3).

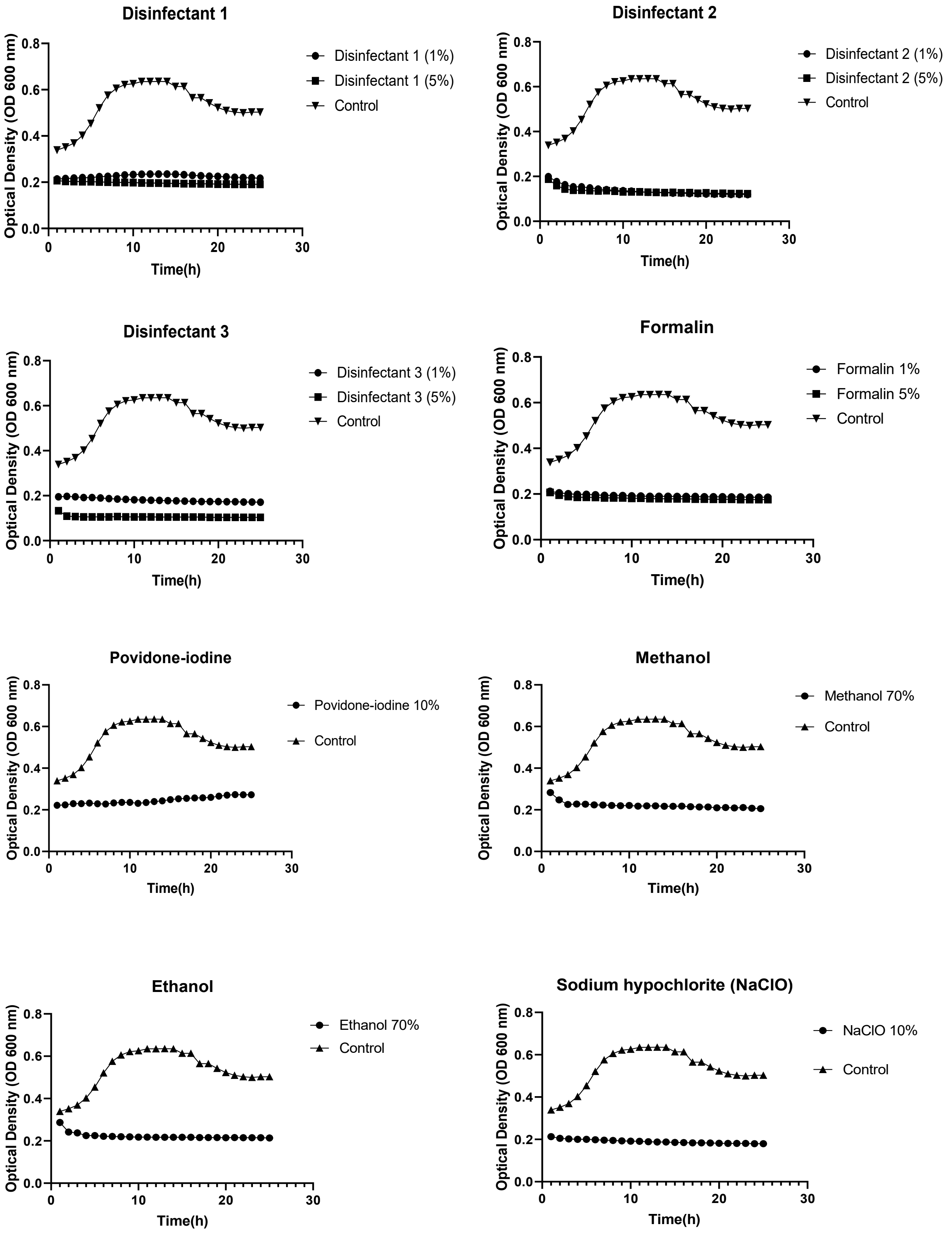

Figure 2. The impact of disinfectants on *S. typhimurium* growth rate compared to the control (bacteria) at 600 nm wavelength and 37 ˚C for 24 h

Table 1. Comparative evaluation of antibacterial effects of disinfectants (total count, CFU/10 cm^2)

Sampling Location	Mean±SD			
	Negative Control (No Disinfectant)	Positive Control (Formalin)	Disinfectant 1	Disinfectant 2
Mixer	30.67±10.78^{a}	7.67±2.51^{b}	29.67±4.72^{a}	14.67±2.3^{b}
Hammer mill	37.33±7.02^{a}	1±0^{b}	37.33±8.02^{a}	5.33±1.52^{b}
Extruder	61±7^{a}	5.67±1.52^{c}	20.67±5.85^{b}	17.00±4.35^{b}
Dryer	34.33±3.05^{a}	6.00±1.73^{b}	34.00±1^{a}	9.33±3.51^{b}
Cooler	5.67±2.08^{a}	1.33±0.57^{c}	3.00±2^{ab}	1.33±0.57^{c}

Note: Dissimilar letters in each row represent differences between groups ($P \leq 0.05$).

Nalidixic acid had the highest effect, and disinfectants 3 and 2 had good antibacterial effects against *E. coli* compared to other substances. In contrast, 70% ethanol, 70% methanol, 10% povidone-iodine, and 10% NaClO had the least antibacterial effects (Figures 4A and 4B). Disinfectant 2 had the greatest antifungal effect against the *F. oxysporum* fungus (Figure 4C). Formalin and disinfectant 3 had good antifungal effects, followed by 10% povidone-iodine and 10% NaClO, while 70% ethanol and 70% methanol had the least antifungal effects.

Discussion

This study was conducted to evaluate, select, and review the internal surfaces of five crucial parts of livestock, poultry, and aquatic feed production facilities that were identified as potential sources of contamination (Davies & Wales, 2010; Huss et al., 2015; Jones, 2011; Muckey, 2016), and HACCP programs. Sampling was performed after physical cleaning to ensure that the presence of organic substances inside and on the surfaces of the equipment did not affect the effectiveness of disinfectants. Organic matter can deactivate chemical disinfectants like NaClO (Huss et al., 2015).

In this study, the pellet cooler had the lowest contamination levels, while the extruder had the highest mold, bacteria, and yeast levels. Our results are inconsistent with those of Davies and Wray (1997), who observed that 85% of the samples collected from coolers were contaminated with *Salmonella*. Parker et al. (2019) also reported that the probability of a positive *Salmonella* sample from the cooler is twice the probability of its detection in the final feed ($P \leq 0.05$). This can be attributed to the increase in the moisture density in the pellet cooler. Moisture added to the powder feed to generate steam during pellet preparation was removed using a pellet cooler. However, condensation on indoor pellet cooler surfaces, such as *Salmonella*, can increase humidity and microbial growth (Jones, 2008).

Table 2. Comparative assessment of disinfectants' anti-mold and anti-yeast effects (total count, CFU/10 cm^2)

Sampling Location	Mean±SD			
	Negative Control (No Disinfectant)	Positive Control (Formalin)	Disinfectant 1	Disinfectant 2
Mixer	8.33±2.51^{a}	2±2^{b}	8±2^{a}	2.33±1.52^{b}
Hammer mill	8±2^{a}	3±1^{c}	6±1^{ab}	3.67±1.52^{bc}
Extruder	33.67±10.21^{a}	6.67±2.88^{b}	32.67±5.03^{a}	7.67±2.51^{b}
Dryer	8.67±2.3^{a}	3±1^{b}	5.33±2.08^{b}	4±1^{b}
Cooler	1.67±1.15^{a}	0.33±0.57^{a}	0.67±0.57^{a}	0.033±0.57^{a}

Note: Dissimilar letters in each row represent differences between groups ($P \leq 0.05$).

Table 3. Comparative evaluation of disinfectant performance in laboratory using agar well diffusion method (cm^2)

Disinfectants	Mean±SD		
	E. coli	*S. typhimurium*	*F. oxysporum*
Disinfectant 1	0 ± 0^{e}	0 ± 0^{e}	0 ± 0^{d}
Disinfectant 2	1.7 ± 0.89^{c}	2.4 ± 0.11^{a}	2.2 ± 0.28^{a}
Disinfectant 3	1.8 ± 0.15^{bc}	2.6 ± 0.3^{a}	1.6 ± 0.15^{b}
NaClO (10%)	0.7 ± 0^{d}	0.5 ± 0.43^{d}	1.4 ± 0.05^{bc}
Ethanol (70%)	0.5 ± 0.45^{de}	0.8 ± 0.05^{cd}	0.1 ± 0^{d}
Methanol (70%)	0.2 ± 0.35^{de}	0.9 ± 0.25^{c}	0.1 ± 0^{d}
Betadine (10%)	0.8 ± 0.11^{d}	0.8 ± 0.11^{cd}	1.3 ± 0.15^{c}
Formalin (37%)	2.43 ± 0.05^{ab}	1.9 ± 0.05^{b}	1.6 ± 0.11^{bc}
Nalidixic acid (40 ppm)	2.5 ± 0^{a}	2.5 ± 0.05^{a}	-

Note: Dissimilar letters in each row represent differences between groups ($P\leq0.05$).

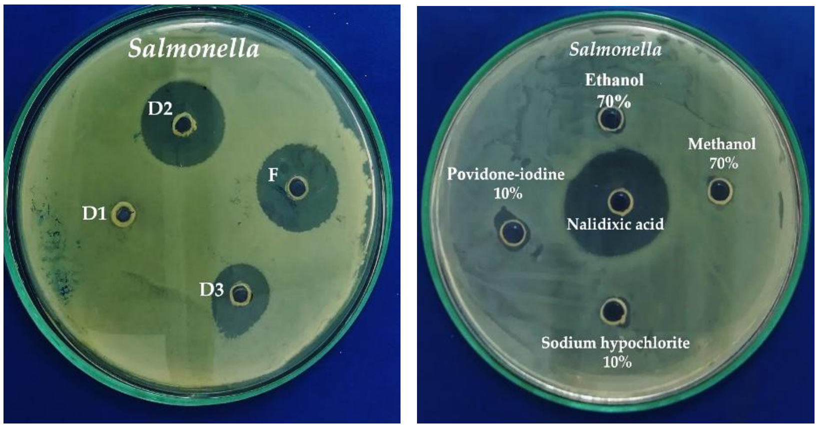

Figure 3. Comparison of disinfectant inhibitory effects on *S. typhimurium* using the agar-well diffusion method

Abbreviations: D1: Disinfectant 1; D2: Disinfectant 2; D3: Disinfectant 3; F: Formalin.

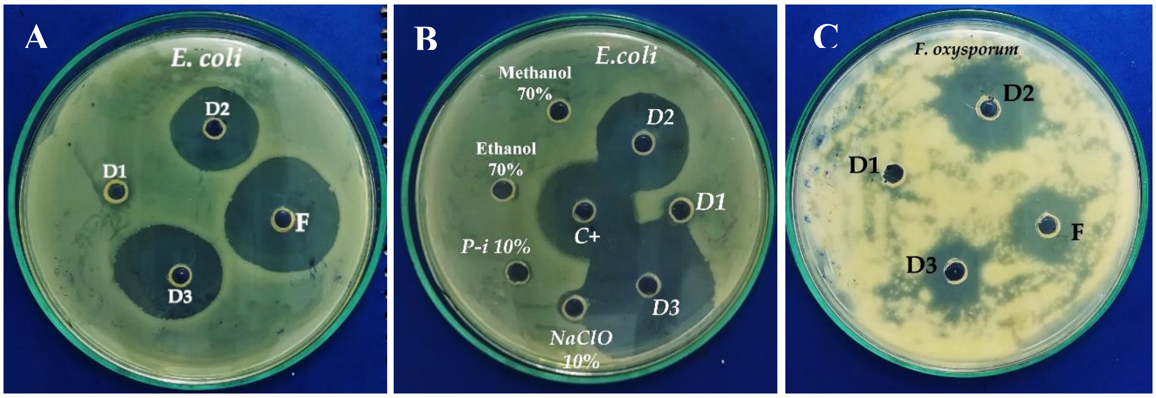

Figure 4. Comparison of disinfectant inhibitory effects on *E. Coli* (A & B) and *F. oxysporum* (C) using the agar-well diffusion method

Abbreviations: D1: Disinfectant 1; D2: Disinfectant 2; D3: Disinfectant 3; F: Formalin; P-i 10%: 10% povidone-iodine; NaClO 10%: 10% sodium hypochlorite; Ethanol 70%: 70% ethanol; Methanol 70%: 70% methanol; C+: Nalidixic acid (positive control).

The lower level of contamination observed in the pellet cooler in this study may be attributed to the implementation of adequate ventilation. Additionally, in the studied factory, the production line involved a dryer in which pellets were dried for 30 minutes at 100 ˚C before entering the cooler. This process eliminates several microorganisms. The hot pellets, which remain hot when entering the cooler, reduce the microbial load in the cooler area. These results are consistent with Jones' findings, which indicated that maintaining a temperature of 46 ˚C at the top of the pellet cooler could effectively reduce *Salmonella* growth. All three commercial disinfectants, 1, 2, and 3, utilize hydrogen peroxide in their structure. Hydrogen peroxide is a disinfectant with bactericidal and sporicidal properties, is effective against most chlorine-resistant bacteria (Linley et al., 2012), and effectively combats biofilms by producing free radicals that affect the biofilm matrix (Farjami et al., 2022). Unlike peracetic acid and aldehydes, which require disrupting the biofilm matrix before use, hydrogen peroxide can be effective without this process (Wirtanen & Salo, 2003). The superior performance and more effective efficiency of commercial disinfectant 2 compared to commercial disinfectants 1 and 3 can be attributed to colloidal silver in commercial product 2. A complex salt mixture containing ionic silver was formed. This mixture stabilizes hydrogen peroxide and augments its effectiveness (Martin et al., 2015).

Our results are consistent with those of previous research on the antimicrobial effects of formalin (Chen et al., 2016; Ricke et al., 2019), but it has been reported that some microorganisms, including Pseudomonas species, members of the Enterobacteriaceae family, and *E. coli* strains, have shown resistance to formalin (Chen et al., 2016; Nikolic et al., 2019). Resistance to formaldehyde has often been observed in gram-negative bacteria (Nikolic et al., 2019). Although formaldehyde is one of the most effective antibacterials available (Ricke et al., 2019), concerns have been raised about its safety, especially for people working in closed environments (Carrique-Mas et al., 2007; Ricke et al., 2019). The European Food Safety Authority considers formaldehyde safe for humans when used as an additive in animal feed products but warns against inhalation and skin and eye contact (Resae et al., 2023; EFSA, 2014).

The results of the present study regarding 70% ethanol, 70% methanol, 10% povidone-iodine, and 10% NaClO against *Salmonella* are consistent with the results of Abed and Hussein. (2016) In their study, the disinfectant chemicals used (0.5% NaClO, 70% ethanol, 1% iodine, and 10% potassium permanganate) had the lowest antimicrobial effect against the studied microorganisms compared to formalin and the commercial disinfectant Dettol®. In contrast to our results, in a study by Møretrø et al. (2009), 70% ethanol and alcoholic compounds were more effective in controlling *Salmonella* strains in animal feed production facilities in Norway than acids, aldehydes, peroxides, and chlorine-based surface disinfectants.

The observed differences could be attributed to the variety of disinfectant compounds used. In the present study, while most commonly used compounds demonstrated effectiveness, they ranked lower than formalin and disinfectants 2 and 3. The insufficient efficacy of disinfectants, such as povidone-iodine 10%, NaClO 10%, 70% ethanol, and 70% methanol, can be attributed to the emergence of resistance in the studied microbes, which has become a serious concern and highlights the need for more effective and sustainable solutions (Tong et al., 2021). Continuous disinfectant exposure increases microorganism adaptation and tolerance through phenotypic adaptation, gene mutation, and horizontal gene transfer (Cloete, 2003). The rapid growth of disinfectant-resistant bacteria is alarming and reduces the killing efficiency of disinfectants (Zhu et al., 2021), posing challenges for medical treatment and foodborne diseases. These concerns have led to extensive research on safer alternatives to disinfectant chemicals, including formaldehyde, in the animal feed industry. Effective plant essential oils have been identified as a potential solution to combat microbial resistance (Vidács et al., 2018; Rahimi Kakolaki et al., 2023). The antimicrobial effects of some probiotics (Soltani et al., 2023; Rahimi-Kakolaki & Omidi, 2020; Zhang et al., 2012; Zhao et al., 2017) and the interaction between probiotics and bacteria to remove biofilms have also been confirmed, making them potential alternatives to disinfectants (Tong et al., 2021; Hassanzadeh & Mohammadzadeh, 2022; Asad Salman et al., 2023). The food industry employs new technologies, such as nanotechnology, precise methods, and high-quality ingredients, to fulfill the global requirements for extended storage, stringent quality control, and international hygiene standards (Peidaei et al., 2023).

Conclusion

This research evaluated the effectiveness of several common disinfectants in animal, poultry, and aquatic feed production facilities. This research highlights the importance of selecting factors that can effectively reduce and control microbial contaminants in sensitive livestock, poultry, and aquatic feed areas. In the present study, as a baseline study, by analyzing the performance of several common chemical disinfectants and three new commercial disinfectants, commercial disinfectant 2 (Huwa-San TR-50) was identified as a broad-spectrum disinfectant with high reliability in the factory environment. It was observed in the laboratory that it can compete with formaldehyde in the parameters investigated in this study.

Ethical Considerations

Compliance with ethical guidelines

There were no ethical considerations to be considered in this research.

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The paper was extracted from a research project conducted by Arash Omidi at the Department of Animal Health Management, School of Veterinary Medicine, Shiraz University, Shiraz, Iran.

Authors' contributions

Conceptualization and supervision: Arash Omidi; Methodology, investigation, and writing: All authors; Data collection: Hassan Mosleh; Data analysis: Arash Omidi and Maryam Rahimi-Kakolaki; Funding acquisition and Resources: Arash Omidi.

Conflict of interest

The authors declared no conflicts of interest.

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مقاله پژوهشی

ارزیابی مقایسه‌ای کارایی ضدعفونی کننده‌ها در کاهش آلودگی باکتریایی و قارچی در تولید خوراک دام

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چکیده

زمینه مطالعه: ضدعفونی‌کننده‌ها در کارخانه‌های خوراک، نقش مهمی در حفظ یک محیط پاکیزه و بهداشتی، جلوگیری از گسترش بیماری، کنترل آلودگی متقاطع و تضمین کیفیت محصول و در نهایت تضمین ایمنی مواد غذایی دارند.

هدف: این مطالعه با هدف ارزیابی عملکرد چند ضدعفونی کننده شیمیایی، در کارخانه تولید کننده خوراک دام، طیور و آبزیان و همچنین در آزمایشگاه انجام گرفت.

روش کار: از روش‌های میکروپلیت و انتشار درچاهک آگار به منظور ارزیابی کارایی ضدعفونی‌کننده‌های شیمیایی تجاری (۱ و ۲) و فرمالین (۳۷٪) بر روی سطوح داخلی میکسر، آسیاب، اکسترودر، خشک‌کن و کولر در کارخانه و بررسی عملکرد هشت ضدعفونی کننده رایج شامل ضدعفونی کننده‌های ۱، ۲، ۳، NaClO (۱۰٪)، اتانول (۷۰٪)، متانول (۷۰٪)، پوویدون آیوداین (۱۰٪) و فرمالین (۳۷٪) در برابر سالمونلا تیفی موریوم، اشریشیا کولای و فوزاریوم اکسیسپوروم در آزمایشگاه استفاده شد.

نتایج: اکسترودر بیشترین میزان آلودگی میکروبی و کولر کمترین میزان آلودگی را داشت. ضدعفونی کننده ۲ و فرمالین بیشترین اثرات ضدباکتریایی و ضدقارچی را داشتند. ضدعفونی کننده های ۲ و ۳ بیشترین اثرات ضد باکتریایی را در آزمایشگاه نشان دادند؛ در حالی که سایر ضدعفونی کننده ها کمترین میزان کارایی را داشتند. ضدعفونی کننده ۲ قوی‌ترین اثر ضدقارچی را داشت و پس از آن فرمالین، پوویدون آیوداین و NaClO قرار گرفتند. اتانول و متانول کمترین اثربخشی را داشتند.

نتیجه‌گیری نهایی: این مطالعه بر اهمیت انتخاب مواد ضد عفونی کننده مؤثر به منظور کاهش آلودگی در تأسیسات تولید خوراک دام، طیور و آبزیان تأکید می‌کند. ضدعفونی‌کننده ۲ (Huwa-San TR-50)، با ترکیب منحصر به فرد پراکسید هیدروژن و شیمی یونی مبتنی بر نقره، به عنوان یک محلول ضدعفونی کننده قوی برای کاربردهای مختلف توصیه می‌شود. یافته‌های این مطالعه می‌تواند به عنوان راهنمای ارزشمندی برای انتخاب ضدعفونی‌کننده‌های مناسب در صنایع مشابه باشد.

کلیدواژه‌ها: اشریشیا کولای، سالمونلا، ضدعفونی کننده تجاری، فوزاریوم، کارخانه خوراک دام

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