Antibiotic Resistance in *Salmonella* sp. Isolated from Layer Chicken in North Lombok, West Nusa Tenggara

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Abstrak

Resistance antibiotic *Salmobnella* sp. difficult to recover when treated. Antibiotic resistance can occur due to inappropriate use of antibiotics, such as incorrect dosage, incorrect indications, and incorrect use. This research was conducted based on reports from farmers that their chickens did not recover after being given antibiotics when they had diarrhea. The results of interviews with farmers show that they usually use antibiotics without advice from a veterinarian, they can buy antibiotics freely at poultry shops. The samples in this study were taken from egg-laying chicken farms in Santong village, North Lombok, West Nusa Tenggara. Samples were taken from farms with the most reported cases of persistent diarrhea, with 32 samples taken from two farms 16 samples each. Samples were taken using sterile cotton buds from chickens showing symptoms of chalky diarrhea, the results of the rectal swab from each chicken were inserted into the brain heart infusion (BHI) transport media and placed in an ice box to then be planted in the media in the laboratory. From BHI media, cotton buds were swabbed on XLD media, the colonies that grew were purified and then tested for gram and biochemistry. esult was determined by standard biochemical procedures using Bergey's Manual. Identified salmonella bacteria were tested with the antibiotics trimethoprim, ampicillin, ciprofloxacin, penicillin G, and erythromycin. Isolation results from 32 samples tested, 22 samples showed *Salmonella* sp. isolates. The results of the antibiotic resistance test showed that 22 isolates were resistant to penicillin G, ciprofloxacin was no longer able to kill 21 isolates resistant, and 11 isolates were resistant to the antibiotics erythromycin and ampicillin. The evidence of antibiotic resistance in *Salmonella* sp. bacteria from layer chickens in North Lombok can have an impact on human health, one health and can be spread through livestock food.

Keywords Resistance antibiotic, *Salmonella* sp, One Health, Human Health.

Abstract

Resistance antibiotic *Salmobnella* sp. difficult to recover when treated. Antibiotic resistance can occur due to inappropriate use of antibiotics, such as incorrect dosage, incorrect indications, and incorrect use. This research was conducted based on reports from farmers that their chickens did not recover after being given antibiotics when they had diarrhea. The results of interviews with farmers show that they usually use antibiotics without advice from a veterinarian, they can buy antibiotics freely at poultry shops. The samples in this study were taken from egg-laying chicken farms in Santong village, North Lombok, West Nusa Tenggara. Samples were taken from farms with the most reported cases of persistent diarrhea, with 32 samples taken from two farms 16 samples each. Samples were taken using sterile cotton buds from chickens showing symptoms of chalky diarrhea, the results of the rectal swab from each chicken were inserted into the brain heart infusion (BHI) transport media and placed in an ice box to then be planted in the media in the laboratory. From BHI media, cotton buds were swabbed on XLD media, the colonies that grew were purified and then tested for gram and biochemistry. esult was determined by standard biochemical procedures using Bergey's Manual. Identified salmonella bacteria were tested with the antibiotics trimethoprim, ampicillin, ciprofloxacin, penicillin G, and erythromycin. Isolation results from 32 samples tested, 22 samples showed *Salmonella*

sp. isolates. The results of the antibiotic resistance test showed that 22 samples were resistant to penicillin G, ciprofloxacin was no longer able to kill 21 isolates resistant to the antibiotic ciprofloxacin, and 11 samples were resistant to the antibiotic erythromycin and ampicillin. The evidence of antibiotic resistance in *Salmonella* sp. bacteria from layer chickens in North Lombok can have an impact on human health, one health and can be spread through livestock food.

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Introduction

Antibiotic resistance remains an unresolved problem. The WHO notes that global resistance has shown no signs of decreasing, particularly in developing countries (WHO, 2025). Several factors contributing to the rapid spread of antibiotic resistance include travel (Agustin et al., 2024a), inappropriate antibiotic use in livestock (Ningtyas dkk., 2024), inadequate use of antibiotics by the public, and a lack of public awareness of antibiotic resistance (Meinitasari dkk., 2021). Antibiotic resistance in the community can cause economic losses (Agustin et al., 2025) due to the lengthy treatment of bacterial infections in individuals who have developed antibiotic resistance (Agustin and Tirtasari, 2022).

Antibiotic resistance in animals occurs not only in livestock (April dkk., 2022), but also in pets (Agustin and Ningtyas., 2022), and wild animals (Agustin et al., 2024). In the pre-research, we conducted a few interviews with farmers. From the results of these interviews, we obtained the fact that farmers in Santong Village, North Lombok, West Nusa Tenggara often use antibiotics without first consulting a veterinarian. They do not know for sure what illness their chickens are suffering from. With their limited knowledge, they treat chickens with diarrhea with antibiotics.

Previous research has shown that 27 *Escherichia coli* (*E.* coli) isolates from layer chickens in North Lombok Regency were resistant to penicillin G (89%), ciprofloxacin (85%), erythromycin (63%), and ampicillin (59%). Bacteria have the ability to transfer their resistance genes to other bacteria (Liu et al., 2024). Antibiotic resistance genes (ARGs) dapat ditularkan melalui plasmid (Wang et al., 2024). These results prompted us to conduct research to determine antibiotic resistance in *Salmonella* sp. bacterial isolates.

Materials and Methods

Sampling location

Samples were taken from two layers chicken farms in Santong Village, North Lombok, West Nusa Tenggara, where diarrhea frequently occurs and is difficult to treat. The sample was taken using a cotton bud and validated in the chicken's rectum, the sample was then placed on BHI media and stored in an ice box to be taken to the laboratory.

Sample isolation and identification

BHI media from the field containing samples was stored in an incubator for 24 hours at 32°C. The color of the BHI media containing the samples was observed. If the media turned cloudy, it indicated that bacteria had grown on the media. Samples on BHI media were planted on Salmonella shigella agar (SSA) media to grow *Salmonella* sp. bacteria incubated media for 24 hours at 32°C. The bacteria that grew were purified, then the purified bacteria were identified using gram staining and biochemical tests with sulfide indole motility (SIM), cimoncitrat agar, Methyl Red and Voges Proskauer.

Antibiotic resistance Test

Bacterial isolates showing *Salmonella* sp. were tested for their susceptibility to the test antibiotics, namely Penicillin G, ciprofloxacin, erythromycin, and ampicillin. The isolates were grown on Mueller Hinton Agar (MHA) incubated media for 24 hours at 32°C. After incubation, the isolate is examined to see whether there is an inhibition zone or not. The inhibition zone formed is measured to determine the diameter formed. The zone formed is then compared with the identification key according to clinical Laboratory Standard Institute (CLSI).

Results and Discussion

The results we obtained were that, from 32 samples tested, there were 22 isolates identified as *Salmonella* sp bacteria. *Salmonella* Sp. bacteria that grow on SSA media will form a black color on the colony, the black color of the colony indicates that Salmonella sp produces H2S as a result of the decomposition of sodium thiosulfate in the media (Adriani et al., 2024).

In the gram test, the bacteria show a red color, in the biochemical test, it can be seen that the indole ring does not form on the SIM media, Methyl Red is red, Voges-Proskauer is yellow, and citrate changes color to blue. Gram-negative bacteria will appear pink in Gram staining (Khair et al., 2021). The SIM test is used to determine whether bacteria use tryptophan as an energy source. A positive result is indicated by the formation of a pink ring on the media. *Salmonella* sp. bacteria do not use tryptophan as an energy source, so no pink ring (-) is formed in the SIM test (Anita et al., 2021).

The MR test is used to identify the ability of bacteria to produce acid (such as lactic acid and acetic acid) as a result of glucose fermentation. If the bacteria ferment glucose into acid, the pH of the media will drop below 4.4, and the MR indicator will turn red, which means positive, while a negative result is indicated by a yellow color on the media (Anjelifa et al., 2025). The VP test is used to determine whether bacteria use acetyl-methylcarbonyl as an energy source. *Salmonella* sp. bacteria do not use acetyl-methylcarbonyl, so the VP test result is negative, meaning the VP medium does not change color.

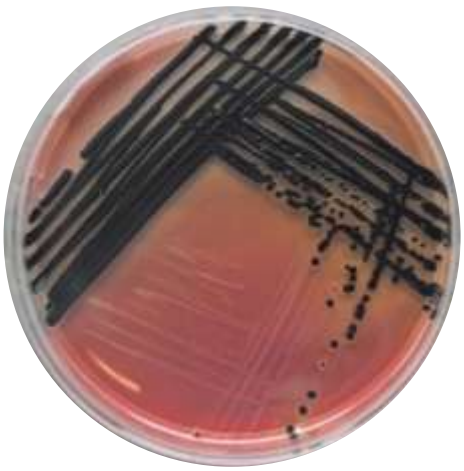

Figure 1. Isolate of *Salmonella* sp. bacteria from rectal swab samples of laying hens from North Lombok, West Nusa Tenggara

All isolates that showed positive salmonella were planted on MHA media for antibiotic resistance testing. From the results of the antibiotic resistance test, it was known that 22 isolates were resistant to penicillin G antibiotics, 21 isolates were resistant to ciprofloxacin antibiotics, and 11 isolates were resistant to erythromycin and ampicillin antibiotics.

The antibiotics commonly purchased by Indonesian people without a prescription are penicillin, macrolide and fluoroquinolone antibiotics (Hadi & Setiyanto, 2024). Antibiotic resistance can reduce the effectiveness of treatment, inappropriate use of antibiotics can also increase toxicity, side effects, and treatment costs (Arifudin et al., 2025).

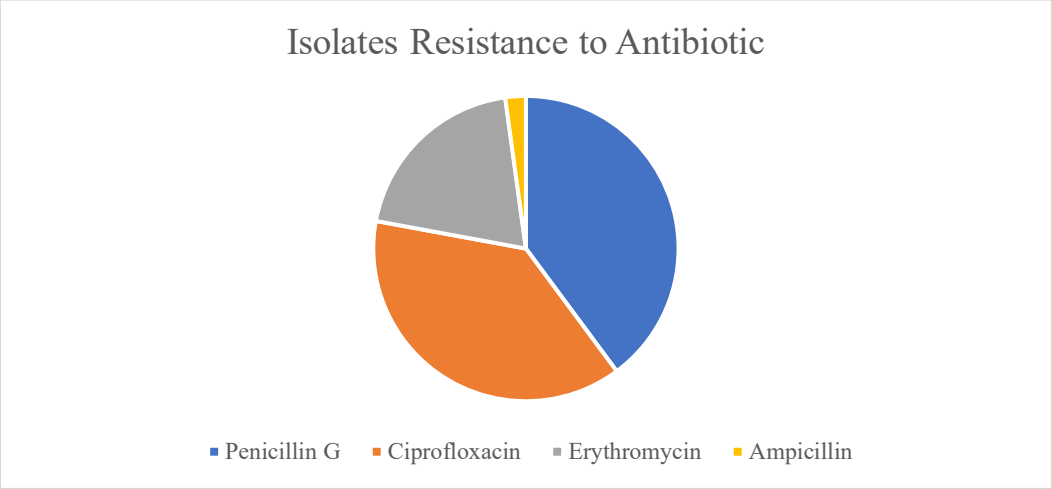

Figure 2. Antibiotic resistance diagram of *Salmonella* Sp. isolates from laying hen farms in North Lombok, West Nusa Tenggara

Conclusion

We found that from 32 chicken feces swab samples from North Lombok, West Nusa Tenggara, 22 isolates were identified as *Salmonella* sp. Antibiotic resistance test results showed 22 isolates were resistant to penicillin G antibiotics, 21 isolates were resistant to ciprofloxacin antibiotics, and 11 isolates were resistant to erythromycin and ampicillin antibiotics.

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