Analysis of Risk Factors and Antibiotic Resistance of Pathogenic *Escherichia Coli Strains* Isolated from Livestock Layer Chicken in Binjai, Indonesia

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ABSTRACT

Binjai is one of the cities in North Sumatra Province Indonesia, with the second largest layer chicken population in North Sumatra. Studies on the use of antibiotics in layer chicken farms in North Sumatra, especially in Binjai, are still relatively minimal, so studies are still needed to find out the picture of antibiotic use and levels of antibiotic resistance. The aim of this study was to determine the level of resistance of pathogenic *E. coli* bacterial strains to antibiotics in layers of chicken farms in the city of Binjai and to find out which pathogenic *E. coli* bacterial strains O157:H7 are resistant type of antibiotic Tetracycline and Penicillin. The data were analyzed using a multivariable logistic regression model (SPSS). The results of antimicrobial resistance (AMR) testing against 9 types of antibiotics showed that the antibiotic Amoxicillin has the highest level of resistance. Based on the results of the analysis of risk factors for the occurrence of pathogenic *E. coli* strains in 120 isolates, there were possible causes for the occurrence of pathogenic *E. coli* at the research location, basically poor cage cleanliness and the provision of antibiotics as a preventative, through drinking water, so that the dosage were unmeasured and usage patterns were inappropriately monitored.

Keywords: Antibiotics, Binjai, *E. coli*, layer chicken, antimicrobial resistance.

INTRODUCTION

Antimicrobial Resistance (AMR) is a complex problem that requires a multi-sectoral approach to control. For the livestock and animal health sectors, we must understand that AMR is a serious threat to the sustainability of food security, in addition to sustainable animal health development (Director General of PKH, 2019). The AMR occurs naturally and generally through genetic changes. The rapid development of microorganism resistance to antimicrobials that are not balanced by the discovery and development of new or alternative antimicrobial agents makes AMR a serious threat to global health (WHO, 2020).

Various types of diseases can attack chickens resulting in decreased production of egg and death. Farmers usually make various efforts to prevent and control diseases through biosecurity, vaccination and administration of antimicrobials (Murtini *et al.* 2006). *Escherichia coli* is a normal flora of the digestive tract

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that benefits the chiken host by producing vitamin K or preventing the growth of other bacteria, but there are also several pathogenic strains such as *Enterotoxigenic E. coli* (ETEC). *Enteropathogenic E. coli* (EPEC), *Enterohaemorrhagic E. coli* (EHEC), *Verotoxigenic E. coli* (VTEC), *Uropathonegic E. coli* (UPEC) and *Avian Pathogen E. coli* (APEC) (Luhung *et al. 2017).* Colibasillosis cases often occur in laying hens and are generally treated with antibiotics.

Binjai is one of the cities in North Sumatra Province with the second largest layer chicken population in North Sumatra after Deli Serdang Regency. Based on the livestock population data recapitulation in August 2023, it shows that the layer chicken population wasis the largest population in Binjai (934,103 heads) with approximately 30 breeders spread across the districts of West Binjai (802,471 heads) with 22 breeders, North Binjai (89,281 heads) with 5 breeders, South Binjai (40,768 heads) with 2 breeders and East Binjai (1,583 heads) with 1 breeder (Binjai Agriculture and Livestock Service, 2023). Studies on the use of antibiotics in layer chicken farms in North Sumatra, especially in Binjai, are still relatively minimal. so that studies are still needed to determine the picture of antibiotic use and the levels of antibiotic resistance.

MATERIALS AND METHODS

Research Materials

The study was conducted using production layer chickens of at least 45 weeks of age that showed symptoms of illness such as lethargy, thinness, the presence of dried faeces that stuck to the feathers around the cloaca and experiencing clinical symptoms of Colibacillosis, as many as 2 chickens obtained from 20 layer chicken farms in Binjai. Samples of the liver, heart and respiratory tract of layer chickens were obtained by performing a necropsy at the Bacteriology Laboratory of PT Medion, Binjai Branch, while still implementing aseptic procedures. *E. coli* isolates were obtained from samples of liver, heart and respiratory tract of layer chickens whose identification was carried out at the Bacteriology Laboratory of PT. Medion Farma Jaya in Padalarang, West Bandung.

Research methods

The data collection of questionnaires of 20 layer chicken farmers in Binjai was conducted by direct interviews when sampling the liver, heart and respiratory tract of chickens. The methods that will be used in this study are field observation, direct interviews with layer chicken farmers in Binjai and AMR testing at the PT Medion Farma Jaya Bacteriology Laboratory in Padalarang, West Bandung using the cross-sectional study method and sampling techniques carried out on a budget purpose basis.

The target sample for this study was the isolation of *E. coli*. In principle, the design of this study will randomly select *E. coli bacteria* in the liver, heart and respiratory organs of layer chickens. So that the chances of each isolate are the same. The target sample has been determined as many as 120 *E. coli* isolate samples with a random sampling pattern in 20 (twenty) layer farms at the age of chickens over 45 weeks. These organ samples will be sent to the Bacteriology Laboratory of PT Medion Farma Jaya in Padalarang, West Bandung in a fresh frozen state.

Questionnaire used for know factors risk which affect the occurrence of *E. coli resistance* to antibiotics. Data collection The questionnaire was conducted randomly at layer chicken farms in Binjai on 20 target layer chicken farmers. the sample taken For testing AMR without looking at the minimum number of layer chicken population on the farm. Information farm which the data concerned were obtained when taking samples of the liver, heart and respiratory tract organs by means of direct interviews and filling out questionnaires by the farmers.

The dependent variable is something that depends on other factors, in this case the MIC value in the CLSI standard will determine whether the isolate is resistant (R), intermediate (I), and susceptible (S). Variables independent is variable factor risk Which in a way significant influence variable dependent. Variables

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independent on This research includes types of businesses, livestock systems, chicken populations, conditions cage, cage sanitation, age of farmer, education of farmer, length of farming, type feed, antibiotics water drink, support doctor animal, antibiotics feed, knowledge about AMR, program antibiotics, rotation antibiotics, failure antibiotics, objective antibiotics, combination antibiotics, And age use antibiotics.

RESULTS AND DISCUSSION

Isolation And Identification Of *Escherichia Coli* (*E. Coli*)

E. coli isolates were tested from 20 layer chicken farms in Binjai and 107 isolates were positive for *E. coli* and 13 isolates were negative. The 107 isolates that were positive for *E. coli* consisted of 78 isolates from West Binjai, 17 isolates from North Binjai, and 12 isolates from South Binjai. In this study, a total of 120 isolates were tested, 107 isolates (89.1%) were positive for *E. coli* with data distribution in West Binjai 78 isolates (65%), North Binjai 17 isolates (14.1%), and South Binjai 12 isolates (10%). The 120 isolates tested consisted of 40 (33.33%) isolates from the respiratory tract positive for *E. coli*, 35 (29.16%) isolates from the liver positive *for E. coli* and 32 (26.66%) isolates from the heart positive for *E. Coli*.

Table 1: Results of Isolation and Identification of *E. coli Isolates* in layer Chicken Organs

Kind of Sample	Number of Sample *(n=120)*			
	Positive	%	Negative	%
Respiratory Tract	40	33.33%	0	0%
Liver	35	29.16%	5	4.16%
Heart	32	26.66%	8	6.66%

Bacteria *E. coli* is bacteria general Which detected in channel digestion animal including poultry. Bacteria *E. coli* lots used for monitor AMR on material food origin animal (BPAH) including poultry. Some strains of *E. coli* originating from poultry are potential sources of the gene. AMR which can infectious to man (Nhung *et et al*., 2017). Bacteria *E. coli* own gene which functioning For maintain resistance from influence antibiotics derived from plasmids. *E. coli* was detected to have plasmids to become some drug resistance genes. Plasmids can carry resistance genes in bacteria which sensitive to antibiotics (Rahmahani *et al*., 2020).

Bacteria *E. coli* own gene default which can produce enzyme resistance antibiotics which encoded by gene resistance antibiotics And can transmitting resistance genes to other bacteria either through the same species or differ horizontally and vertically through self-division. Bacteria *E. coli* used as isolate in study This, Because bacteria This can be indicator bacteria to monitor trends in antibiotic resistance patterns. Bacteria *E. coli* is bacteria grams negative enteric commensal which general on poultry, so that can isolated and identified with easy in laboratory. *E. coli bacteria* are also considered as indicators good at use antibiotics on animal cattle (Besung *et al.*, 2019).

E. coli bacteria commonly live in the intestines of animals such as birds. Physiologically, *E. coli* has the ability to survive in conditions environment which difficult. *E. coli* grow with Good in water bid, water sea, or in soil. On condition the *E. coli* exposed environment abiotic And biotic. Diseases caused by *E. coli* are caused by its ability to adapt And endure on environment which different. There is a number of type environmental conditions which is not beneficial for *E. coli* to be able to remain survive, for example, in an acidic environment (low pH) such as in the digestive tract man, change temperature, as well as pressure osmotic. Ability *E. coli* For survival during cooling and freezing has been shown to make *E. coli* is tolerant of dry conditions (Winiati, 2018).

Test Resistance *E. coli* Against 9 Types of Antibiotics

A total of 40 randomly selected isolates were tested for AMR in the laboratory. Bacteriology PT. Medion Farma Jaya Padalarang West Bandung. Based on results testing AMR, obtained results that isolate *E. coli*

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Which taken from farm targeted as much as 20 farm in Binjai all of them had 100% resistance (20) to certain antibiotics. Results testing AST show mark MIC so that obtained conclusion *Resistant* or *Intermediate* or *Susceptible* (Prone to). Results mark MIC to 40 isolate the shown by Appendix 2.

The results of testing AMR9 types of antibiotics showed that antibiotics *Amoxicillin* own level resistance which most tall that is by (87.5%) followed *Ampicillin* (80%), *Oxytetracycline* (75%), *Trimethoprim* (67.5%) with presentation resistance in on 65%, intermediate resistance *to Spectinomycin* (35%) and *Fosfomycin* (27.5%) while resistance most low is antibiotics *Doxycicline* (0%), *E nrofloxacin* (2.5%), and *Gentamicin* (7.5%). If we look at the class of antibiotics, then what happens AMR inside study This originate from three groups, namely: Penicillin (Amoxyciclin and Ampicilin), Tetracycline (Oxytetraciclin), and Sulfanomide (Trimethropime).

Table 2. Incidence of *E. coli resistance* to antibiotics in 20 farms in Binjai

Antibiotic	Resistant	%	Susceptible	%	Intermediate	%
Amoxicillin	35	87,5	5	12,5	0	0
Ampicillin	32	80	6	15	2	5
Oxytetracyclin	30	75	10	25	0	0
Trimethoprim	27	67,5	12	30	1	2,5
Spectinomycin	14	35	26	65	0	0
Fosfomycin	11	27,5	22	55	7	17,5
Gentamicin	3	7,5	3	92,5	0	0
Enrofloxacin	1	2,5	38	95	1	2,5
Doxycycline	0	0	37	92,5	3	7,5

Bacteria *E. coli* which isolated from layer chicken farms in Binjai have antibiotic resistance to *Amoxicillin* (87.5%), *Ampicillin* (80%), *Oxytetracycline* (75%), *Trimethoprim* (67.5%), *Spectinomycin* (35%), *Fosfomycin* (27.5), *Gentamicin* (7.5%), *Enrofloxacin* (2.5%) and *Doxycycline (0%). E. coli* bacteria are still susceptible/sensitive to antibiotics *Enrofloxacin* (95%), *Doxycicline* (92.5), *Gentamicin* (92.5), *Spectinomycin* (65%), *Fosfomycin* (55%).

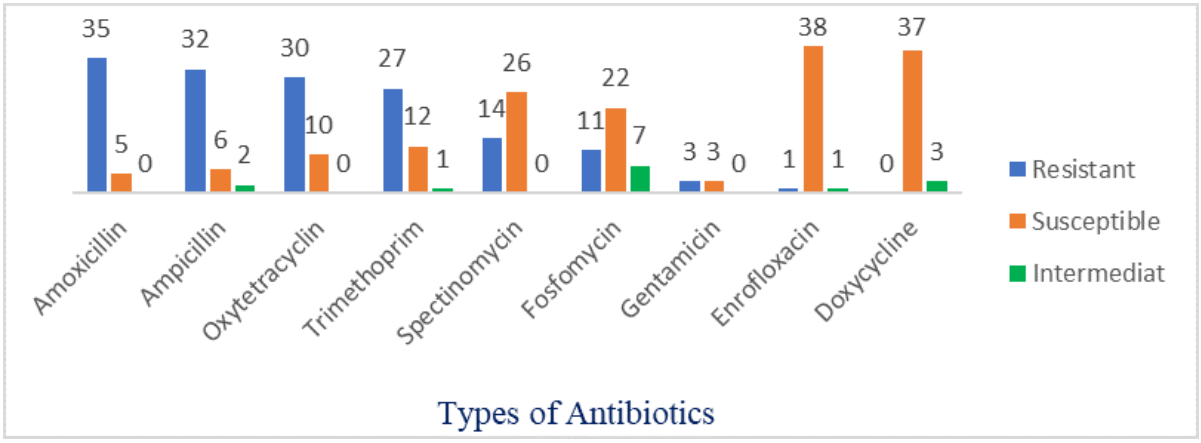

Figure 1. The occurrence of *E. coli resistance* to antibiotics in 20 farms in Binjai .

The results of this study are in line with the research of Agustin *et al*., (2022) which stated that *E. coli bacteria* are resistant to *Penicillin antibiotics*. Based on interviews, treatment using *Penicillin antibiotics* in layer chickens at the layer chicken farm in Sesaot village, West Lombok district was used only for routine treatment of digestive tract disorders so that there was resistance. *Penicillin antibiotics are Beta-lactam* antibiotics, it is known that gram-negative bacteria such as *E. coli* have *betalactamase enzymes*, namely enzymes that can inactivate *betalactan antibiotics* (Siswandoyo, 2008).

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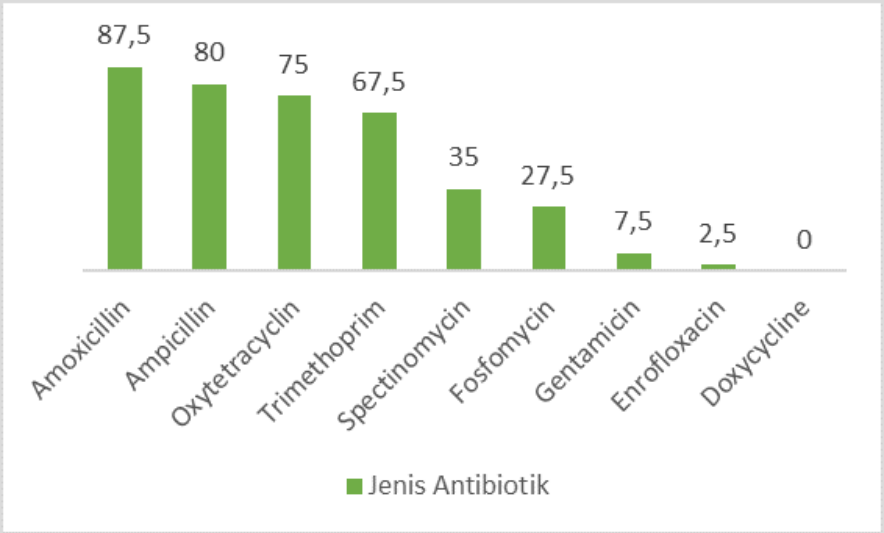

Figure 2. Percentage Comparison of Antibiotic Resistance Levels

According to Lopez-lozaroet *et al*., (2000) *Penicillin* is widely known and used in developing countries, therefore *Penicillin* is the most commonly used antibiotic to treat sick livestock or animals. The mechanism of resistance to the *Penicillin group* is due to: inactivation of antibiotics by *beta-lactamase*, modification of target PBPs, damage to drug penetration into target PBPs, and the presence of a *beta-lactamase production outflow pump* is the most common resistance mechanism (Katzung, 2018). Therefore, the use of *Penicillin antibiotics* is no longer effective in inhibiting the growth of *E. coli*.

A study also found residues of *penicillin antibiotics.* on one of the farms in Pidie Jaya Regency (Masrianto *et al.,* 2019). This can be caused by giving antibiotics to chickens during maintenance period for the purpose of treating disease and cut before *withdrawal time* (time) stop drug) end so that antibiotics Still accumulates in chicken meat. Other causes that can cause test results positive is feed commercial Which given when time maintenance contains antibiotics, according to (Bahri *et al.,* 2010) almost all feed factories add compound drug in the form of antibiotics as additive feed.

E. coli bacteria isolated from layer chicken farms in Binjai are 75% resistant to the antibiotic *Oxytetracyclin*. This is in line with the research of Agustin et al., (2022) which stated that the results of measuring the inhibition zone against the antibiotic *Tetracyclin* were resistant to *E. coli bacteria* from cloaca swabs of layer chickens. Based on the results of the interview, *Tetracycline antibiotic treatment* in layer chickens in Sesaot village, West Lombok is often used for the treatment or prevention of *Colibacillosis*, causing resistance to *E. coli bacteria*. Resistance to *Tetracycline* occurs due to changes in the permeability of the microbial cell envelope. In sensitive cells, the drug will be in the environment and will not leave the cell, while in resistant cells the drug cannot be actively transported into the cell or will disappear quickly so that the minimum inhibitory concentration cannot be maintained, the mechanism is controlled by plasmids (Meles et al., 2011).

According to Niasono *et et al*., (2019), Broilers in Subang Regency, West Java have antibiotic resistance to *Tetracycline* 97.3%, *Sulfamethoxazole* 87.8%, *Trimethoprim* 74.3%, And *Ampicillin* 68.9%. Results study Which other in Regency Blitar, incident antibiotic resistance to *E. coli* bacteria in broiler chickens shows percentage 88.75% (*Ampicillin*), 78.75% (*Streptomycin*), 76.87% (*Erithromycin*), 50.63% (*Tetracyclin*) and 75% (*Sulphamethoxazole- Trimethoprim*) (Wibisono *et al.*, 2021), while other studies in the same district also found AMR incidence. *E. coli* isolates originating from cloacal swabs taken from chicken in farm poultry egg layer own percentage resistance antibiotics the high one to antibiotics *Ampicillin*, *Ciprofloxacin*, *Tetracycline* And *Trimethoprim Sulfamethoxazole* more than 50 percent (Witaningrum *et al.,* 2020)

However, the Government through Law No. 18 of 2009 concerning Animal Husbandry and Animal health begins to prohibit the use of antibiotics as feed additives as stated in Article 22 paragraph 4c (Masrianto *et al.,* 2019). As many as 93.2% *E. coli* samples found MDR with the highest prevalence in all four types

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antibiotics, namely 40.5% for Subang Regency. The most common resistance observed was against *Tetracycline* 97.3%, *Sulfamethoxazole* 87.8%, *Trimethoprim* 74.3% (Niasono *et al.*, 2019).

Trimethoprim is an antibiotic from the *sulfonamide group* which is usually combined with *Sulfamethoxazole* so that it has a wider spectrum of action wide covering bacteria grams positive And grams negative. *Trimethoprim* own mechanism work become *inhibitor reversible* from *reductase dihydrofolate*. *Trimethoprim* inhibits the conversion of *dihydrofolic acid* which is needed for *synthesis sour nucleic* And protein from bacteria. Properties antibiotics this is *bacteriostatic* (inhibits bacterial growth) and *bactericidal* (kills bacteria) which work on track metabolism which the same with group *Sulfonamides. Trimethoprim* is mostly used in livestock treatment. Chicken which due to by infection bacteria *Escherichia coli*. *Trimethoprim* usually combined with *Sulfamethoxazole* for more effective. Combined *Trimethoprim* and *Sulfamethoxazole* are broad-spectrum antibiotics for chicken And poultry And usually used For treatment disease chicken *Coryza* (snot, runny nose, swollen face), *Colibacillosis* (difficulty breathing, liver and heart covered fibrin), *CRD* (snoring), *Cholera* (poop) green), And *Pullorum* (poop) lime). Drug This Work simultaneously oppose bacteria grams positive And grams negative.

Research from China shows that *E. coli isolates* have high levels of resistance antibiotics Which tall that is more from >80% for *Ampicillin*, A *moxicillin*, *Tetracycline* (Nhung *et al.*, 2017). According to Handayani *et al.*, (2020) *E. coli isolates* isolated from chicken cecum in the region Bali, Island Southeast West, And Island Southeast East also happen resistance against *Ampicillin*, *Cephalothin* and *Gentamicin* respectively, whereas to *Chloramphenicol* Still prone to however own trend For become resistant. A study from The Caviar 2021 find the occurrence resistance antibiotics on chain food chicken broiler to *Escherichia* bacteria *coli*. Sensitivity testing showed bacterial resistance to five types antibiotics, namely to *Meropenem* as much as 67%, *Sulfamethoxazole* 48%, *Colistin* 33%, *Ciprofloxacin* 24%, And *Chloramphenicol* 5%. Besides That isolate *E. coli* on sample carcass RPH-U Also resistant to *Coli*stin 60%, Sulfamethoxazole 45%, Ciprofloxacin 20%, And chloramphenicol 10%. *Antimicrobial* events *resistance* (AMR) on farm, triggered between other by use antibiotics Which excessive in farm poultry. Because for decades we have been accustomed to the use of growth-stimulating antibiotics. growth *antibiotic growth promoter* (AGP).

Analysis Questionnaire In general Descriptive

In study This amount farm chicken layers Which analyzed is as many as 20 farms originating from Binjai. Based on the results of the questionnaire, the type of business farm chicken layers Which run 100% independently. The farm in this study has an *open house system* of 100%. Technically, *open house cages* are worse than *closed cages. house*. Pen layers system *closed house* is pen closed Which ensure security in a way biology (contact with organism other) with arrangement ventilation Which Good so that more A little stress Which happen on livestock. The aim is to provide air and climate that are conducive to livestock so as to minimize stress levels. *Closed House cages* have advantages of higher weight gain, lower mortality rate, and the FCR of the *Closed House cage* is better than the Open House cage (Susanti *et al.*, 2016).

The chicken population in the breeders varies from 10,000 to 50.000, with details of 10.000 to 20.000 for 3 breeders (15%), 20.000 to 30.000 for 5 breeders (25%), 30.000 to 40.000 for 8 breeders (40%), 40.000 to 50.000 (20%), average population 34.150 and at least 15.000 until 50.000 tail most Lots. The condition of the cages is 60% dirty and 40% clean, with 100% of farmers carrying out cage sanitation.

Table 3. Descriptive analysis of livestock profiles (interviews)

Variable	Sub-variable	Result	%
Type of Business	Independent	20	100
Livestock System	Open	20	100
Chicken Population	10000-20000	3	15
	20000-30000	5	25

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	30000-40000	8	40
	40000-50000	4	20
Cage Condition	Clean	8	40
	Dirty	12	60
Cage Sanitation	Yes	20	100

The condition of the layer chicken coop is mostly (60%) visible dirty as seen from the smell, flies and rubbish even though some cages Already seen clean. Even though all pen do sanitation routine cage. Sanitation pen is one of business prevention to disease who attacked chicken, with method eliminate factors environment Which related in chain displacement disease the. Sanitation very important done because if sanitation problematic will impact on environment pen And animal Which There is in in pen. Pen which clean on maintanance chicken layers is one of effort for reach environment comfortable, air healthy, and minimal condition stress (Please, 2021). Poultry farmers who are less knowledgeable have poor cage hygiene. Worse because knowledge can greatly influence people's behavior in the form of knowledge, attitudes and practices (Syafitri *et al.,* 2021), including in health care for layer chickens and antibiotic use.

Table 4. Descriptive analysis of livestock breeder profiles (interviews)

Variabel	Sub-variabel	Result	%
Farmer Age	≤30 years	2	10
	31-40 years	6	30
	41-50 years	3	15
	>50 years	9	45
Farmer Education	D3/S1 (college)	20	100
Length of Farmer	>5 years	20	100

The average farm owner profile has an age of 47 years with age most young 29 year until 65 year most old, with education high school level (40%), and education studying (S1 And D3) as big as 60%. For experience operate the total livestock farming is over 5 years, which is 100% with an average of as big as 22 year with most low 10 years and more long 38 years old. Profile management farm chicken layers specifically use antibiotics is factors Which relate with use antibiotics in livestock such as antibiotic use programs, rotation programs antibiotics, the purpose of using antibiotics to the support and role of veterinarians in farm chicken layers the. Study this show that farm which targeted most of the use type feed concoction (50%), manufactured feed (40%) and both (10%). Matter, it is possible that farmers prefer compound feed because of the cheaper price and the guarantee of better quality raw materials and the ease of mixing antibiotics into the feed.

Table 5. Descriptive analysis of livestock management profile (interview)

Variable	Sub-variable	Result	%
Type of feed	Factory	8	40
	Mixture	10	50
	Both	2	10
Drinking water antibiotics	Yes	19	95
	No	1	5
Veterinary support	Yes	20	100
Feed antibiotics	Yes	20	100
AMR tofu	Yes	7	35
	No	13	65

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Antibiotic program	Yes	20	100
Antibiotic rotation	Yes	20	100
Antibiotic failure	Yes	20	100
Antibiotic purpose	Treatment	1	5
	Both	19	95
Antibiotic combination	Yes	20	100
Antibiotic age	End >21 months	20	100
Deworming	Yes	20	100
Drinking water pipe cleaning	Yes	20	100
Drinking water cleaning period	1 time/month	18	90
	2 times/month	2	10
Drinking water source	PDAM	20	100
Drinking place type	Talang Air	12	60
	Nipple Drinker	2	10
	Both	6	30
Drinking water treatment	Yes	16	80
	No	4	20
Drinking water treatment type	Chlorine	15	75
	Both	1	5
	None	4	20
Feces disposal	Yes	20	100
Feces disposal period	3 times	20	100

The role of veterinarians in monitoring livestock health on farms chicken layer is already 100 % from TS and Marketing of animal drugs, but its role is only to appeal and recommend to farmers. Farmers often violate and tend not to care about the rules of dosage and application of administration, such as excessive doses and application of medication through feed. S should role doctor animal in in farm very influential to treatment and health chicken especially in use antibiotics. Besides that in Indonesia still found purchase antibiotics without recipe with knowledge which not enough about use antibiotics are the underlying cause of inappropriate antibiotic use in animal husbandry (Niasono *et al.*, 2019).

According to the research results, it shows that most (65%) do not know about AMR, only 35% know about AMR and the purpose of giving antibiotics is also 95% for prevention and treatment, and a combination of antibiotics of more than 2 preparations is mixed into chicken feed. According to the research results, antibiotic preparations are used for prevention And treatment disease chicken between other originate from group *Penicillin, Quinolones, Macrolides, Tetracyclines, Phosphonic Acids, Lincosamides, Aminoglycosides*, and *Polypeptides*. Prevention is usually carried out during the transitional season and rain so that feared will influence health chicken. Preparation Amoxicillin and Tetracycline are antibiotics that are often used in layer chicken farms in Binjai . All the farms that sampled using a *Penicillin antibiotic preparation* such as *Amoxicillin* 19 (95%) and *Ampicillin* 19 (95%) and group *Tetracycline* like *Oxytetracycline* 14 (70%) and *Sulfanamides* 10 (50%). The amount farm Which Still use antibiotics group *penicillin* because of breeder Still stated that the antibiotic had no side effects and was inexpensive. low (Memish *et al.*, 2004). Antibiotics that are often used in poultry farming in Thailand between other *Amoxicillin, colistin, doxycycline, oxytetracycline* (Wongsuvan *et et al.*, 2018). Besides that a number of country in American also use type antibiotics like *tetracycline* and *tylosin* on poultry farming (Mehdi *et al*, 2018).

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Table 6. Details of Antibiotic Use in Farms (interview) Analytical Analysis of Questionnaires

AB Group	AB Type	Livestock	%
Penisilin	Amoxicilin	19	95
	Ampicillin	19	95
Quinolon	Enrofloxacin	4	20
Makrolida	Eritromicin	16	80
Tetrasiklin	Doxycycline	6	30
	Oxytetracyclin	14	70
	CTC	6	30
Lincosamide	Lincospectin	1	5
Aminoglikosida	Streptomicin	2	10
	Neomicin	10	50
Polipeptida	Colistin	4	20
Diaminopirimidin	Trimethoprim	2	10

Collection data complement in the form of data breeder, management farm, And observation field around farm done moment sampling through interviews and filling out questionnaires by farmers. The data were then analyzed using logistic regression analysis using SPSS. Univariable analysis identified one variable Which potential related with incident AMR E. *coli* that is factor knowledge of antibiotic resistance in layer chicken farming.

Level knowledge breeder about AMR possibility only is definition about AMR. Knowledge breeder about problem failure of antibiotic treatment and its impact on health chickens and the humans who consume them is very important in use antibiotics the rational one And appropriate (Walyani *et et al*., 2019). On the other hand, a lack of awareness can create uncertainty and evaluation bad at Usage process antibiotics (Antao) *et al.,* 2018). If the bivariate results produce a Pvalue <0.25, then the variable immediately enters the multivariate stage. Analysis of risk factors for the occurrence of *E. coli* in layer chicken farms obtained that the factors of cage conditions, drinking water antibiotics and antibiotic purposes have a pvalue of less than 0.25. Thus, these factors will proceed to the multivariate test stage.

Multivariate Analysis

Multivariate analysis is conducted with the aim of obtaining the best model in determining determinants (determining factors). The multivariate analysis used is multiple logistic regression test. If the test results show that there are variables that have a pvalue (sig) > 005, then these variables must be removed from the modeling. Variables that are removed from the modeling are carried out in stages according to the highest variable probability value. After being removed, a logistic regression test is carried out again until there are no variables that have a pvalue (sig) > 0.05.

Table 7. Multiple Logistic Regression Test Results

Variable	Description	Sig.	OR	CI (95%)	
				Lower	Upper
X2	Cage Condition	0,003	0,096	0,02	0,457

If we look at the Confident Interval (95% CI) value of 0.02-0.457, it means that we are 95% confident that the influence of variable X4 on the occurrence *of E. coli* is 0.02-0.457 times. Based on the results of the analysis of risk factors for the occurrence of *E. coli* in 120 isolates in layer chicken farms in Binjai, there is a

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possibility that the cause of the occurrence the incidence of AMR is poor cage hygiene (0.002) and the administration of antibiotics as prevention Which applied in drinking water so that the dosage and use are not measured and the dosage is not right (0.288), as well as the use of antibiotics for prevention and treatment which is inappropriate and excessive in feed due to the lack of support from the role of veterinarian for health monitoring chickens in the chicken farm layers. Besides That knowledge breeder which has not been understand incident AMR for example knowledge breeder about AMR And the danger for health animal and humans.

CONCLUSION AND SUGGESTIONS

Conclusion

The results of the AMR test on 9 types of antibiotics showed that antibiotics *Amoxicillin* own level resistance Which most tall that is by (87.5%) followed *Ampicillin* (80%), *Oxytetracycline* (75%), *Trimethoprim* (67.5%) with presentation resistance in on 65%, intermediate resistance *to Spectinomycin* (35%) and *Fosfomycin* (27.5%) while resistance most low is antibiotics *Doxycicline* (0%), *Enrofloxacin* (2.5%), and *Gentamicin* (7.5%). Based on the results of the analysis of risk factors for the occurrence of *E. coli* in 120 isolates, there is a possibility that the cause of the occurrence The incidence of *E. coli* at the research location was poor cage hygiene (0.002) and the administration of antibiotics as prevention Which applied in drinking water so that the dose and usage become unmeasured and the dose is not correct (0.288)

Suggestion

In connection with incident resistance Which tall to antibiotics Amoxicillin, Ampicillin and Oxytetracycline in Layer Chicken Farms in Binjai are recommended for use this antibiotic stopped and rolled with other antibiotics, such as Doxycycline, *Enrofloxacin, and Gentamicin.*

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