

## STARTEC (Smart Tetracycline Kit detection) in Carcass of Broiler

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**Abstract :** Broiler consumption in Indonesia is increasing every year. However, broiler production is still insufficient. Consequently, many breeders put additional substances such as antibiotic to boost the growth of broiler. Most commonly used antibiotic is tetracycline. Tetracycline added in poultry feed affects the broiler to be resistance of antibiotic due to high amount of subtherapeutic continuously received by the broiler. Tetracycline also affect to the consumer such as allergy, hypersensitivity, and toxic. So, the consumer should be smart to identify the carcass of broiler, which contains residue of tetracycline. Therefore, writer have innovation of STARTEC (*Smart Tetracycline Residual Kit Detection*) to help consumer and related institute to detect the residue of tetracycline in carcass of broiler. STARTEC using the principle of reaction between tetracyclines with *sulfuric acid*. This detector work seamlessly because it only put meat into a glass and grind it. Then, the meat reacted by EDTA to denature protein contained in tetracycline. So, a pure tetracycline could be obtained. Subsequently, sulfuric acid added into the glass to identify the process of color changing in the sample. STARTEC could be operated easily, fast, and safely to detect the residue of tetracycline in carcass of broiler.

**Keywords :** antibiotic, carcass, sulfuric acid, tetracycline.

### Introduction

The level of broiler meat consumption in Indonesia reached 8 kg/capita/year in 2010, in 2011 increased to 9 kg/capita/year in 2012 to 10 kg/capita/year and the trend continues to increase each year<sup>1</sup>. However, the increase in consumption of broiler meat are imbalance with the broiler production, forcing farmers find a way for faster growth of broiler and eventually meet the needs of consumers. One effort that can be done to meet those needs is to use a *feed additive* that serves to improve and optimize the performance of broiler. The use of *feed additives* such as antibiotics have been rapidly adopted, especially in the commercial feed. It had been proven by the research of Ditjenak (2006) stating that the need to feed antibiotics and treatment in 2001 amounted to 502.27 tonnes, later increased to 5574.16 tons in 2005, and the use of antibiotics in world's animal husbandry ranged from another 80% is being used for poultry<sup>2</sup>.

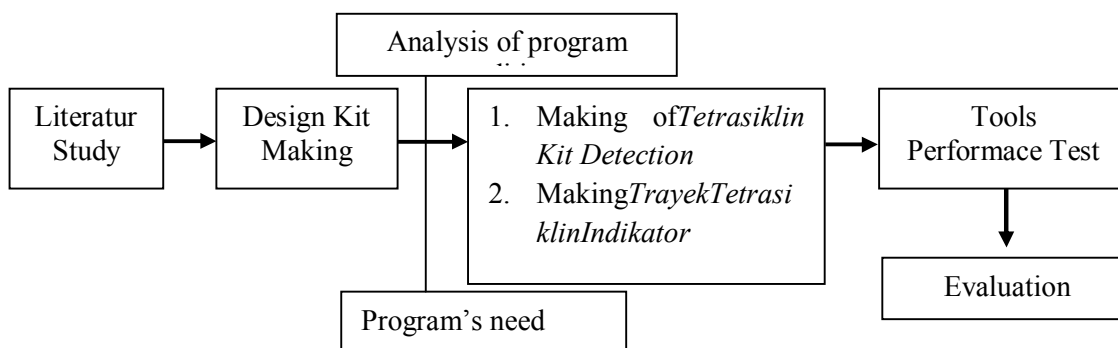
Antibiotics are chemical compounds that can inhibit or kill microorganisms (except viruses). Antibiotics are used for the prevention of infectious diseases and growth promoters in broiler. One antibiotic that is widely used in Indonesia is tetracyclines. This is because tetracyclines have a broad spectrum, meaning that tetracycline has the ability to fight a number of pathogenic bacteria. In addition, tetracycline is inexpensive and easily obtained<sup>3</sup>.

Excessive use of antibiotics, will have negative impacts, both the impact on the broiler or on consumers. The impact of antibiotics excessive usage in broilers will leave a residue on the carcass of broilers and can be a major cause of resistance to the consumer because of the number of subterapetik received continuously, disturbance of the normal microflora in the gut that can reduce the population and eliminate strains of good bacteria, cause allergies, hypersensitivity, and toxic in the body of consumers<sup>4</sup>. Thus, to ensure that food products are safe for consumption, National Standadization Agency (BadanStandarisasi Nasional) establish maximum residue limits (BMR) are listed in SNI 01-6366-2000 which stipulates that limit contamination of tetracycline residues in livestock products was 100 ppb in meat<sup>5</sup>.

Residues of antibiotics, especially tetracycline contained in broiler carcass can not be identified by consumer's naked eye. Currently, the common type of technology used to identify the presence of antibiotic residues are using thin layer chromatography, chromatography gas and liquid chromatography. But these methods is less effective because the process is too much complicated and still a lot of use of several treatment stages<sup>6</sup>. As for another popular way is by using the method of HPLC (*High Performance Liquid Chromatography*) or High Performance Liquid Chromatography (KCKT) [7]. However, HPLC metode is only usable on a laboratory scale.

Our Creative innovation for the detection of residues of tetracycline is by using STARTEC. This tool combines *sulfuric acid* in the kit detector which can react with tetracycline that causes discoloration. The color changes occured is used as an indicator that there is a titrasiklin residue on the carcass of broiler. Subsequently, the color change reactions are matched with tetracycline stretch, so that the value of residue on samples could be obtained quickly and practically. The tetracycline has also been equipped with a 2-line indicator that serves as a guide whether or not the samples is safe for consumption. By considering the advantages of this instrument, STARTEC is expected to be easily and practically cultivated by the common people, which is expected to achieve food safety of animal-based food which eventually ensure human welfare.

## Experimental



- **Literature Study**

Implementation methods first used is seeking a review of literature conducted to locate and assess the sources of relevant and reliable in gathering the material as a reference in the writing and the activities of this program to obtain complete information, directional and reliable in the writing and implementation of the design and manufacture of STARTEC as innovation renewal.

- **Designing STARTEC**

Before doing construction, designing the framework becomes important. Design framework is made in two stages, namely Detection Kit Making of Tetracycline and Tetracycline Making Route indicators. making tools made with care and using the prescribed standards to produce the best tool.

- **Testing STARTEC**

Testing is the phase that aims to ensure that STARTEC could not function as expected before it is applied to the community. The parameters that need to be examined, ie the level of sensitivity of the tool and

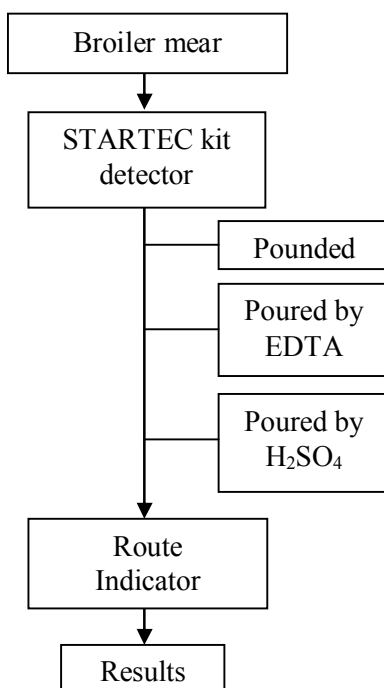
the effectiveness of performance tools that do.

- **Evaluation STARTEC**

Evaluation as an assessment tool working system, both functionally and structurally. In terms of the functional form of the products produced and the overall performance of the tool. While in terms of structural, namely the performance of each component of the tool. If the tool is not as expected then it will be re-repair tool that aims to improve the quality STARTEC better.

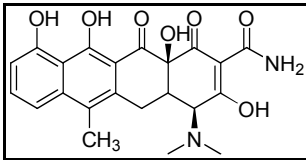
## Results

Small size of broiler meat are included in the STARTEC Kit Detector then crushed. The function of the comminution of meat is to be able to issue a tetracycline stored in the cell. After that, the samples of meat is poured with EDTA to denature the proteins bound to tetracycline, which is expected to get a pure tetracycline residues. Then the meat sample is poured with a few drops of  $H_2SO_4$  which is a key indicator on STARTEC detection kit, because it can bind with tetracycline and can display color changes. The color changes are matched with the color on the route of tetracycline indicators. Where each color on a stretch of tetracycline contained a different tetracycline contents. So that the color change in the detection kit is the same color as the trajectory of tetracycline, suggesting that the tetracycline content contained in the sample having the same content with the tetracycline stretch.



## Discussion

Reaction between tetracyclines with sulfuric acid gives violet color. This is because the wavelength of the tetracycline compound (390 nm) in the UV-Vis is located in the wavelength range 400-420 nm. But when the result of the reaction is added with distilled water, the reaction color changed to a yellow color. The color change is due to the wavelength shift to higher wavelength is 440 nm. This wavelength provides yellow color of the compound formed. The compounds that formed that anhidrattetrasiklin<sup>8</sup>. Here is the structure of tetracycline compounds in the acid environment that sulking in Figure 1:

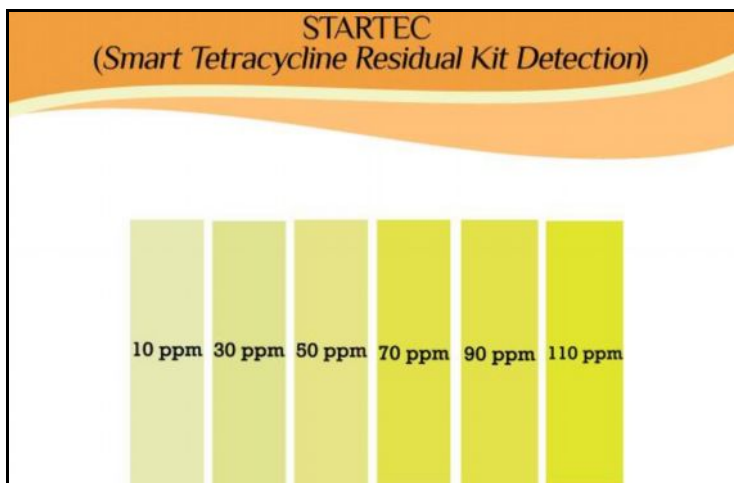


**Figure 1. Structure of Compounds Anhydrotetracycline**

Results of tetracycline reaction with sulfuric acid to be used for the manufacture of route the indicator. The route can be used to determine the contents of tetracycline that is contained in broiler chicken carcasses. Tetracycline levels in chicken carcass can be detected by STARTEC at a level of 10, 30, 50, 70, 90, and 110 ppm. As for the threshold tetracycline on chicken carcasses at 0.1 ppm. Therefore, the manufacture of stretch this indicator still need optimization process in order to detect levels of tetracycline to 0.1 ppm.

**Table 1. Preparation Route Indicator**

Content (ppm)	Composition		
	Tetracycline (mg)	Sulfuric Acid (mL)	Aquades (L)
10	2	3	0,2
30	6	3	0,2
50	10	3	0,2
70	14	3	0,2
90	18	3	0,2
110	22	3	0,2



**Figure 2. Results Route Indicator**

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