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Prof. Dr. Ir. Enri Damanhuri

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PREFACE

Green Technology that provides the basic needs of society in sustainable environment is essential for the survival, health and well-being of a society in developing countries. The engineers, scientists, policy makers, academics, environmental consultants, environmental contractors, industrial practitioners, businessmen, politicians, NGOs are at the epicenter in seeking means to enhance human life through modernization of technology and infrastructure. The current rate of urbanization, industrialization and environment mismanagement rise environmental issues. The problems are further aggravated with environmental degradation such as soil erosion, depletion of water resources, climate changes, and others. In order to seek answers for these multifaceted challenges, proper planning, implementation and verification exercises are required, via an integrated, multidisciplinary and holistic approach especially in the area of green infrastructure and green cities, development of eco-industry, environmental health and risk assessment, air quality, advanced technology, natural resources and mitigation of climate change. This international conference shall become a momentum for development of sustainable environment through green technology.

The 5th Environmental Technology and Management Conference (ETMC) was held on 23-24th November 2015, at *Sasana Budaya Ganesha, Institut Teknologi Bandung* (ITB). The ITB is located in Bandung, West Java. Bandung is the center of Sundanese culture and volcanoes surrounds city which make Bandung to be a delightful place to host this conference. More than 300 scientific participants (researcher, students, government officers and industries) had many fruitful discussions and exchange ideas that contribute to the success of the conference. Participants of the conference are coming from US, Australia, Nederland, Japan, Malaysia, Singapore and Indonesia, made the conference truly worthwhile globally. There are 4 speakers in plenary sessions covering different areas, and all the keynote speakers are well known and competent speakers; They are Ir. Mochamad Basoeki Hadimoeljono, M.Sc., Ph.D (Ministry of Public Works and Housing, Republic of Indonesia), Prof. Dr. AJM Smits (Director of Institute for Science, Innovation & Society, Radboud University Nijmegen), Albert Simanjuntak (President Director of Chevron Pacific Indonesia) and Ir. Edwan Kardena, PhD (Environmental Engineering, Institut Teknologi Bandung). There were also 5 parallel sessions with eight invited speakers : Prof. Satoshi Okabe; Prof. Ir. Mindriany Syafila, MS; Prof. Ir. Iwan Kridasantausa Hadihardaja, MSc, PhD; Prof. Dr. Takeshi Fujiwara; Rene van Berkel, PhD; Prof. dr. A.M.J. Ragas; Dr. Budi Haryanto, SKM, MKM, MSc; Dr. rer.nat Armi Susandi,MT.

This volume of proceedings from the conference provides an opportunity for readers to engage with a selection of refereed papers that were presented during the conference. These proceedings divided into 6 sections of 110 abstracts as oral presentation and 23 abstracts as poster session with such topics as follows: Air Quality & Climate Change, Green Cities & Infrastructures, Eco-Industries, Appropriate & Advanced Environmental Technology, Natural Resource Management, and Environmental Health and Risk Assessment. Selected papers will be republished in the special issues of Journal of Technological and Engineering Sciences.

Generous support for the conference was provided by Chevron Pacific Indonesia, JICA, BNI, Vale, Sari Husada, Indocement, Holcim, Sabuga and Faculty of Civil and Environmental Engineering, ITB. The funds were sizeable, timely, and greatly appreciated, and allowed us to support a significant number of young scientists (students) and delegates from developing countries.

Finally, the 5^{th} ETMC was a very successful conference. The plenary lectures, parallels session and special reports bridged the gap between the different fields of green technology, making it possible for non-experts in a given area to gain insight into new areas. Also, included among the speakers were several young scientists and students, who brought new perspectives to their fields. Given the rapid advancement of science in all areas that covered by ETMC, we expect that this ETMC was as stimulating as the previous one, as indicated by the papers contributions presented in this proceeding volume.

Bandung, 24 November 2015

Ir Agus Jatnika Effendi, PhD

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KEYNOTE SPEAKERS

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INVITE SPEAKERS

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MECHANICAL PROPERTIES OF CONCRETE USING NICKEL SLAG AS COARSE AGGREGATE

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Abstract:*Experimental study on the use of nickel slag as coarse aggregate in concrete has been realizedconcerning compressive strength, splitting tensile strength and modulus of elasticity. The nickel slag was obtained from solid waste of the nickel ore processing in Southeast Sulawesi, Indonesia. Natural sand was used as fine aggregate, naturally weathered gravel as control coarse aggregate as well asordinary Portland cement as hydraulic binder. The aggregates grain distribution was designed to meet the mixture gradation of the granules with a maximum diameter of 40 mm according to Indonesian Standard SNI 03-2834-2000. The mix proportion of concrete, by weight, was 1.0 hydraulic binder: 2.0 fine aggregate: 3.0 coarse aggregate with the water-cement ratio was 0.5. Two mixtures were produced by varying the type of coarse aggregate used: one mixture using slag nickel and another mixture using naturally weathered gravel as a control. The test result, realized at 28 days, shows that the use of nickel slag in the mixture of concrete improves the mechanical properties of the concrete. In fact, the compressive strength, splitting tensile strength and modulus of elasticity of concrete using nickel slag increase, respectively, about 45%, 24% and 19% compared with the results given by control concrete. The interesting development of these mechanical properties can be relied by the rough-textured of nickel slag aggregate giving a stronger physical bond between the aggregate and the hydrated cement paste. This study reveals another possible way of the valorization of nickel slag, especially as coarse aggregate in concrete, in order to simultaneously conserve natural resource, reduce environmental problem and also production cost of concrete.*

Keywords: *nickel slag; compressive strength; splitting tensile strength; modulus of elasticity*

1. Introduction

Nickel slag is a solid waste product from nickel ore processing. A lot of nickel slag is generated for producing pure nickel. About 1.000.000 tons nickel slag are produced annually in Southeast Sulawesi, Indonesia [http://www.antam.com]. This by product, therefore, must be well managed in order to avoid environmental problem, because it is waste.

In Southeast Sulawesi, nickel slag is usually used as overburden backfilling material to fill in or extend usable land. Figure 1 shows an area in Southeast Sulawesi where nickel slag is disposed. From the ecological consideration, it seems that this strategy is not yet a "green" solution because slag could release toxic metals that are normally presents in small amounts. Therefore, it should find out a strategic way that can "consume" nickel slag in large quantities in order to reduce the future environmental problem.

Figure 1. Nickel slag disposal area in Southeast Sulawesi

In this research, concrete made by using nickel slag as coarse aggregate has been studied regarding its size and shape are similar to those of aggregates for normal concrete. The objective of this study is to evaluate the possibility of this kind of waste as a coarse aggregate in concrete production from the standpoint of compressive strength, splitting tensile strength and modulus of elasticity. As a control, it was also made concrete using naturally weathered gravel as coarse aggregate.

2. Materials and Methods

Natural sand was used as fine aggregate, naturally weathered gravel as control coarse aggregate as well as ordinary Portland cement as hydraulic binder. The nickel slag used in this study was obtained from Pomalaa in Southeast Sulawesi, Indonesia which was originally from the nickel smelting process at the electric furnace. Figure 2presents the shape and surface texture of this slag while Table 1gives some physical properties of natural sand, naturally weathered gravel and nickel slag.

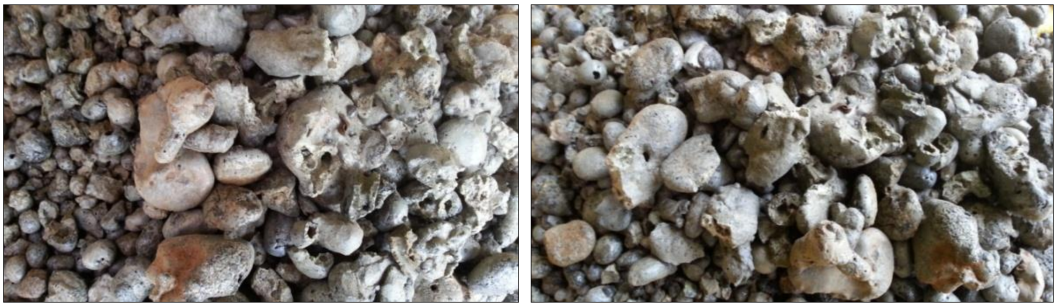

Figure 2. Shape and surface texture of nickel slag

Table 1. Physical properties of sand, gravel and nickel slag

Material	Unit weight (g/cm^3)	Specific gravity	Los Angeles Abrasion loss (%)	Absorption (%)
Natural sand	1.57	2.60	-	0.81
Weathered gravel	1.44	2.59	31.53	1.31
Nickel slag	1.57	2.90	40.92	0.88

The aggregates grain distribution was designed to meet the mixture gradation of the granules with a maximum diameter of 40 mm according to Indonesian Standard SNI 03-2834-2000.

Figure 3 shows the grain distribution of the aggregates used in this study.

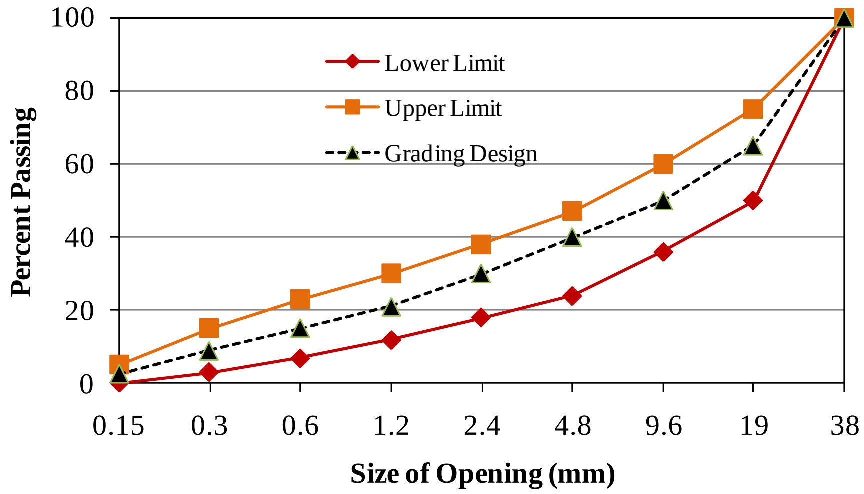

Figure 3. Grading curve for aggregate with SNI 03-2834-2000 grading limits

The mixture proportion of concrete, by weight, was 1.0 hydraulic binder: 2.0 fine aggregate: 3.0 coarse aggregate with the water-cement ratio was 0.5. Two mixtures were produced by varying the coarse aggregate types used: one mixture using slag nickel and another mixture using naturally weathered gravel as a control. Each mixture was used to cast cylindrical specimens with a diameter of 150 mm and a height of 300 mm. These cylindrical specimens were kept in molds for 1 day and then cured in water until used for the mechanical properties test.

Tests of compressive strength, splitting tensile strength and modulus of elasticity were realized after 28 days of hydration by using 6 specimens for each test and conducted according to SNI 03-1974-1990, SNI 03-2491-2002 and ASTM C 469 respectively. Figure 4 shows the preparation and realization of the mechanical properties test.

Figure 4. Preparation and realization of mechanical properties test

3. Results and Discussion

3.1 Results

Results of the mechanical properties test, after 28 days hydration, are given in Figure 5, 6 and 7 for the compressive strength, splitting tensile strength and modulus of elasticity respectively. It can be clearly observed that the use of nickel slag as coarse aggregate in the mixture increases the compressive strength of the concrete. This result is in accordance with other research results [Sugiri, 2005; Tanijayaand Hardjito, 2007].This phenomenon can also be clearly observed for the splitting tensile strength and modulus of elasticity.

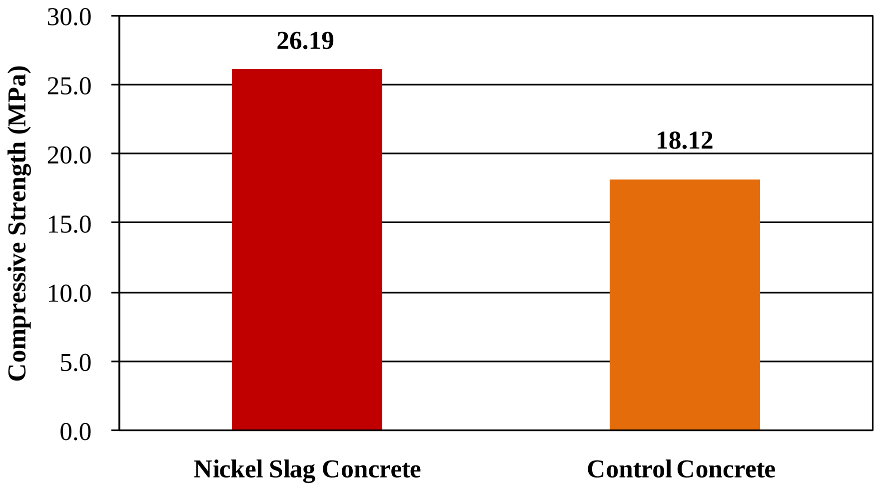

Figure 5. Compressive strength of nickel slag concrete and control concrete

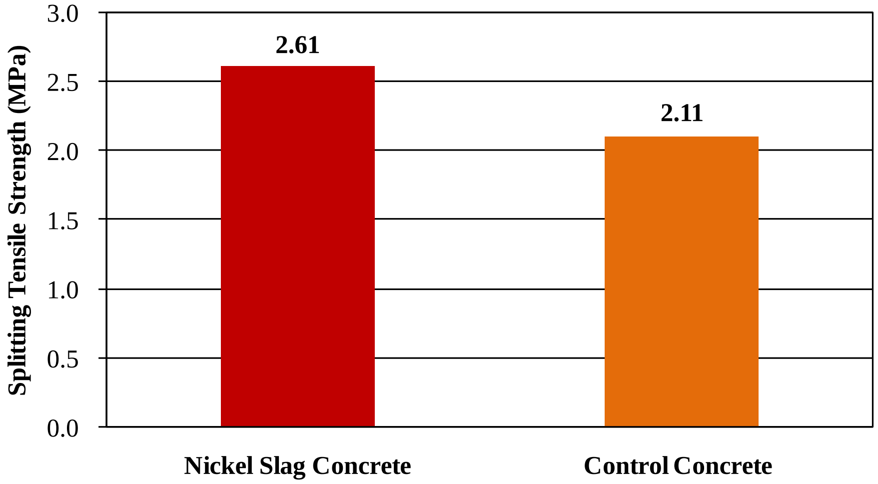

Figure 6. Splitting tensile strength of nickel slag concrete and control concrete

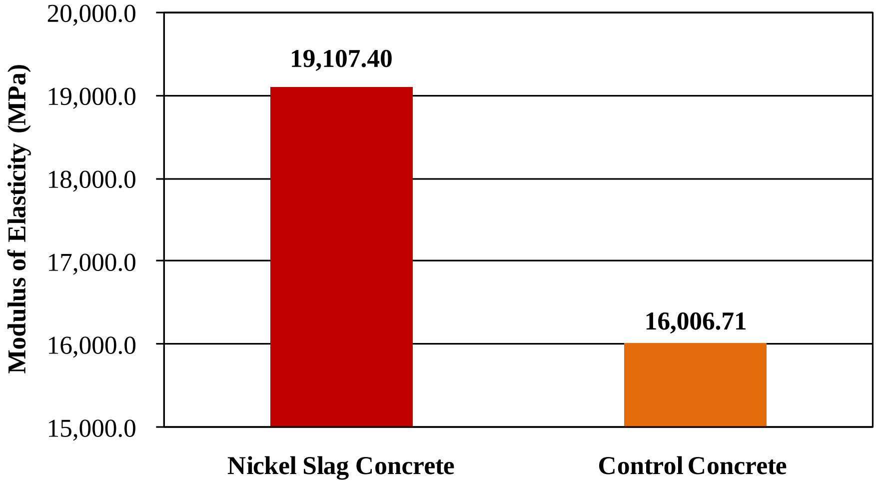

Figure 7. Modulus of elasticity of nickel slag concrete and control concrete

By using nickel slag as coarse aggregate in the mixture, the compressive strength, splitting tensile strength and modulus of elasticity concrete increase respectively about 45 %, 24 % and 19 % compared with the results given by control concrete which use naturally weathered gravel as coarse aggregate. It is clearly noted that the improvement is more pronounced for the compressive strength.

3.2 Discussion

It is clearly observed that the use of nickel slag in the mixture improves the mechanical properties of concrete, especially its compressive strength. The magnitude improvement can reach about 45 %, 24 % and 19 %, respectively, for the compressive strength, splitting tensile strength and modulus of elasticity.
This interesting improvement can be obviously related to the physical form of nickel slag aggregate. A more rough surface texture of the nickel slag aggregate compared with that of naturally weathered gravel produces a stronger physical bond between the aggregate and the hydrated cement paste [Mehta, 1986; Neville and Brooks, 1998]. In fact, this stronger physical bond helps to increase the capacity of nickel slag concrete to carry load, especially compressive load. Thus the presence of rough-textured aggregate in a concrete mixture gives an advantage for the development of the compressive strength, splitting tensile strength and modulus of elasticity of concrete although not to the same degree.
From the result of this study it can be showed that nickel slagcan be used as coarse aggregate in concrete mixture. The massive use of this waste in concrete technology in the future could help simultaneously to conserve naturally weathered gravel as natural resource, reduce environmental problem and also production cost of concrete.

4. Conclusions

- The use of nickel slag as coarse aggregate in concrete mixture can improve the mechanical properties of the concrete.
- The compressive strength, splitting tensile strength and modulus of elasticity of nickel slag concrete increase, respectively, about 45 %, 24 % and 19 % compared with the result given by concrete using naturally weathered coarse aggregate.

- The massive use of this waste could help simultaneously to conserve the natural resource, reduce environmental problem and also production cost of concrete.

References

[1] ASTM. Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression, ASTM C 469.
[2] BadanStandarisasiNasional, 2000. StandarNasional Indonesia Untuk Tata Cara PembuatanRencanaCampuranBeton Normal, SNI 03-2834-2000.
[3] BadanStandarisasiNasional, 1990. MetodePengujianKuatTekanBeton, SNI 03-1974-1990.
[4] BadanStandarisasiNasional, 2002.MetodePengujianKuat Tarik BelahBeton, SNI 03-2491-2002.
[5] http://www.antam.com. Sustainability Report Antam 2012. Accessed on 7 October 2015.
[6] Mehta, P. K., 1986. Concrete: Structure, Properties and Materials, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.
[7] Neville, A. M. and Brooks, J. J., 1998. Concrete Technology, Longman Singapore Publishers Pte Ltd, Singapore.
[8] Sugiri, S., 2005. *PenggunaanTerakNikelsebagaiAgregatdanCampuran Semen untukBetonMutuTinggi*,JurnalInfrastrukturdanLingkunganBinaan, Vol. 1 No. 1.
[9] Tanijaya, J. and Hardjito, D., 2007. *The Sort-Term Properties of Nickel Slag-Aggregate High Strength Concrete*, Conference on Sustainable Building South East Asia, 5-7 November 2007, Malaysia.

SAFETY STUDY OF USING *SALMONELLA sp.* BACTERIOPHAGE AS A NATURAL ANTI MICROBE TO DECREASE *SALMONELLA* CONTAMINANT ON FOOD AND ENVIRONMENTAL

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ABSTRACT

Bacteriophage can be used as an alternative to decrease of microbial content on food or environmental. Bacteriophage can lyse *Salmonella* bacteria in food significantly. This study was to determine the safety effect of using Salmonella bacteriophage on food when it was consumed in vivo.Bacteriophage safety test was done with using by mice. The Mice were Sprague Dawley strain. Parameters that was observed were organs of the heart, lung, and colon.The study conclusion was the Effect of bacteriophage treatment 10^7 ml /day for 16 days on Sprague Dawley Rat was not give an effect on organ, such as, 1) heart weight (0.813 ± 0065), colors, and the overall shape; 2) lungs weight (2.002 ± 0126), colors, and the overall shape; 3) colon weight (22.869 ± 0136), color, and overall shape. The rat that was treat by bacteriophage is not different than control significantly. So, It indicates that using the bacteriophage as a natural anti microbe to Decrease salmonella on food and environmental was safety.

Keyword: Bacteriophage, safety, *in-vivo.*

I. INTRODUCTION

Contamination of *Salmonella sp.* on the environment, such as, soil and water, increased in both developed and developing countries. Water and soil was contaminated with Salmonella, in the other case, a food and beverage was agent pollutants too, that trigger outbreaks of salmonellosis on the environment. More than 50% of diarrhea case in the world was caused of food that was contaminated by Salmonella (Miliotis & Bier 2003).

Salmonella sp. Contaminant on food was causing food borne and water borne disease (Bell & Kyriakides 2002); food poisoning (Zhuang and Mustapha, 2005). That was caused by *Salmonella sp.* So, it had needed something that could decrease of *Salmonella sp.* contaminant. Bacteriophage can be used as an alternative as a antimicrobe on the food processing, because it was a natural, and there are many on the environment (Abedon 2008); can be isolated from a shellfish (Albert et al. 1994); on carrots (Endley et al. 2003); on cheese (Gautier et al. 1995); on meat (Atterburry et al. 2001); on yogurt (Kilic et al. 1996).

In Indonesia, bacteriophage isolation has been done, such as, Xanthomonas campestris bacteriophage isolation (Triana, 1996); enteropathogenic E. coli bacteriophage (Budiarti et al. 2011); and FR38 Salmonella bacteriophage (Budiarti & Rusmana 2010). Sartika (2012) reported that the use of bacteriophage to decrease of Salmonella contamination on milk, sausages, and water was a effective significantly. The result of research on Bacteriophage safety showed that the liver, stomach, spleen and small intestine of animal test that be given bacteriophage 10^7/day for 15 days was normal (Sartika et al. 2012), however, the security of in-vivo studies on the heart, lung, and colon has not been done. In this research, will be study of bacteriophage safety when used as a natural anti-microbial on food and environment, with observe through the heart, lung, and colon of Sprague Dawley. Rats.

2. MATERIALS METHODS

2.1 Phage Production

After 24 hours incubation, bacteria-phage cocktail were centrifugated with 2800rpm speed (Backman GPR Centrifuge), at 4^{o}C for 20 minutes (The cocktail of *Salmonella* P38 phage were cultivated in 49 ml of NB (Nutrient Broth) medium, were incubated at 37^{o} C for 24 hours). Supernatan (3 ml) were took by use a syringe (vol. 5ml) and be done the filtration process by use a milipore's membrane 0,22 μm (Whatmann). The result from filtration process as a supernatant were moved into sterile tube (Clokie & Kropinski, 2009). The end ptocess were done the double overlay process, the phage were counted by use Clokie And Kropinski formula, (Figure 1).

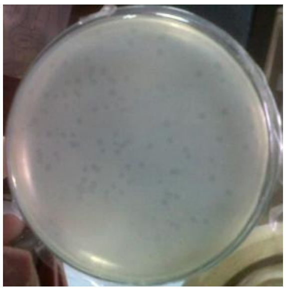


Figure 1. The plaque *Salmonella sp*. Bacteriophage Appearance

2.2 Experimental Design

Sprague Dawley rat were used on this research.. The rate age of rats were 2 months old, as much as 12 rats. The aclimitated of experimental rat were at rat cage for 15 days, 2 groups. The first group were the rat that given the bacteriophage treat~~a~~ment and the others group were control. The adaptation process, all of rat were given drink with a standard drink and given feed with Japfa animal feed.

The treatments of this research are bacteriophage treatment (5 ml/kg bw; 1 ml = 1.59 x 10^7 pfu). The layout of experiment was arranged by coding of the sample, such as, phage treatment code (P1, P2, P3, P4, P5, and P6). and the control's treatment code (K1, K2, K3, K4, K5, and K6). After The coding process, were done a randomization. Experimental design were randomized group design, with model design as a follows:

$Y_{ij} = u + A_i + E_j$.

2.3 Bacteriophage Treatments.

All of rat were done the body weights measurement and label~~l~~ed with treatment code. The measurement of body weight rats were done every 2 days for 15 days. The treatment doses were (i) Bacteriophage FR38’s group and (ii) control group. Each group was given treatment (5 ml kg^{-1} bw) by bacteriophage every day for 15 days..

2.4 Intragastric Administration.

The rat treatment on (control group and bacteriohage group) was feeded using by 16 G intra-gastric syringe. For intra-gastric safety administration, the treatment syringe were manipulated and added a needle of bulbed (Sartika (2012).

2.5 The Administration of Data

The collected of Data were by technique of surgical on body rat (16^{th} day). After was given the treatment for 15 days, the collecting of data was done on 16^{th} day. The euthanasia process of rat were ether. The blood collected used by bleeding method from the posterior vena cava. The chemistry blood was analyzed for white cell count, haemoglobin, red cell count (erythrocyte), hematocrit, leukocyte differentiation. The performances (shape and color) of rat feces also was collected for 16 days.

2.6 Statistical Analysis

Statistical analysis of this research was carried out using student's t-test. The results are presented as the differences mean between individual groups with P (less than or equal to) 0.05 considered significant of statistically.

III. RESULTS AND DISCUSSION

3.1 The Bacteriophage Effect on faeces And Urine Appearance

The Bacteriophage treatment for 15 days on rat did not affect either the form of faeces characteristics. The appearance of faeces was normal, black-grey color, and solid integrity. The research result was summarized in Table 1 as a follows.

Table 1. Effect Of Bacteriophage Treatment On Shapes And Colors Faeces

No	Faeces Characteristic	Bacteriophage Treatment for 15 days	Control
1	Shapes	Normal	Normal
2	Color	Black-grey	Black-grey
3	Integrity	solid	solid
4	The overall appearance	Normal	Normal
5	Figure		

The rats display on the 16th day, both bacteriophage treatment and control, are presented on the following figure:

Figure 2. The appearance of the bacteriophage treatment rat on 15th day

This case was in line with the observation of the bacteriophage treatment effect with administration for 15 day on Sprague Dawley rats. When it was observed at 16th days, did not different effect on the Urine characteristics, such as, normal odor, yellow color, and the normal whole-appearance. The research result was summarized in table 2 as a follows:

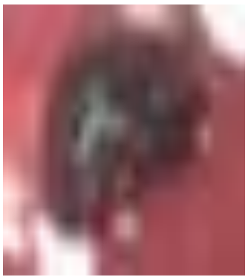
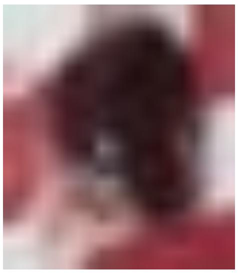
Table 2. Effect of Bacteriophage Treatment on Appearance And Color of Urines

No	Urines Characteristic	Bacteriophage Treatment for 15 days	Control
1	Shapes	Normal	Normal
2	Color	Yellow	Yellow
3	Overrall Appearances	Normal	Normal

3.2 The Bacteriophage Effect on Heart Organ

Observations on the cardiac showed that the treatment of bacteriophage for 15 days on Sprague Dawley rat did not gave an bad characteristics effect. The heart of treatment rat had normal characteristic, such as, heavy (Normal not different significantly compared with controls), color (bright red). The appearance of the whole was summarized in Table 3 as a follows:

Table 3. The Bacteriophage Effect on Heart Organ

No	Heart Organ Characteristic	Bacteriophage Treatment for 15 days	Control
1.	Weight	0.813±0.065g [a]	0.807±0.070g [a]
2.	Color	Merah Cerah	Merah Cerah
3.	Overrall Appearances	Normal	Normal
4..	figure		

Undifferent letter(s) in each column indicated unsignificant difference on P > 0.05

3.3 The Bacteriophage Effect on Lung Organ

Observations of Bacteriophage effects on the lung showed that the treatment of bacteriophage for 15 days on Sprague Dawley rat did not gave an bad characteristics effect. The lung of treatment rat had normal characteristic, such as, heavy (Normal not different significantly compared with controls), color (bright red). The appearance of the whole was summarized in Table 4 as a follows:

Table 4. The Bacteriophage Effect on Lung Organ

No	Lung Organ Characteristic	Bacteriophage Treatment for 15 days	Control
1.	Weight	2.002±0.126g[a]	2.011±0.111g[a]
2.	Color	Bright red	Bright red
3.	Overrall Appearances	Normal	Normal
4.	figure		

Undifferent letter(s) in each column indicated unsignificant difference on P > 0.05

3.4 The Bacteriophage Effect on Colon

Observations of Bacteriophage effects on the colon showed that the treatment of bacteriophage for 15 days on Sprague Dawley rat did not gave an bad characteristics effect. The colon of treatment rat had normal characteristic, such as, heavy (Normal not different significantly compared with controls), color (normal). The appearance of the whole was summarized in Table 5 as a follows:

Table 5. The Bacteriophage Effect on Colon

No	Heart Organ Characteristic	Bacteriophage Treatment for 15 days	Control
1.	Weight	22.869±0.136a	22.707±0.627a
2.	Color	Normal	Normal
3.	Overrall Appearances	Normal	Normal
4.	figure		

Undifferent letter(s) in each column indicated unsignificant difference on P > 0.05

IV. CONCLUSION

The conclusion from this study was (1) Effect of bacteriophage treatment on Sprague Dawley rats for 15 days did not give unnormal affect; the characteristics of weight (0.813 ± 0065g); color, and apperance of heart was not different significantly than controls, (2) The characteristics of weight (2.002 ± 0126g) color, and apperance of lung was not different significantly than controls, (3) The characteristics of weight (22.869 ± 0136g) color, and apperance of colon was not different significantly than controls. So, The conclusion from this study was the bacteriophage was safety on rat organ, such as, lung, heart and colon. It indicates that using the bacteriophage as a natural anti microbe to Decrease salmonella on food and environmental was safety.

DAFTAR PUSTAKA

Abedon ST. 2008. Bacteriophage Ecology. Cambridge University Press: Cambridge.

Albert M, Vannesson C, Schwartzbrod I. 1994. Recovery of somatic coliphages in shellfish. *Water Sci technol* 31:453-456.

Atterbury R, Connerton P, Dodd C, Rees C. 2001. Isolation and characterisation of *Campylobacter* specific bacteriophage from retail poultry. *Int J Med Microbiol* 291:79-80.

Bell C, Kyriakides A. 2002. *Salmonella*.USA: Blackwell Sciences.

Budiarti S, Rusmana I. 2010. Kajian pemanfaatan fage litik sebagai biokontrol bakteri patogen enterik penyebab diare [Laporan Penelitian]. Bogor: IPB.

Budiarti S. 2011. Antibiotic resistence *Escherichia coli* isolated from faecal of healthy human. *J Int Environ Appl Sci* 6(3):359-364.

Clokie MRJ, Kropinski AM. 2009. *Bacteriophages: Method and Protocols.* UK: Humana Press.

Endley SI, Vega LE, Hume ME, Pillai SD. 2003. Male-specific coliphages as an additional fecal contamination indicator for screening fresh carrots. *J Food Prot* 66:88-93.

Gautier M, Roult A, Sommer P, Eret V, Jan G, Fraslin JM. 1999. Occurence of *propionibacterium freudenreichii* bacteriophages in swiss cheese. *Appl Environ Microbiol* 61:2572-2576.

Killic AO, Pavlova SI, Ma WG, Tao I. 1996. Analysis of *Lactobacillus* phages and bacteriocins in American dairy products and characterization of phage isolated from yogurt. *Appl Environ Microbiol* 62:2111-2116.

Miliotis MD & Bier JW. 2003. *International Handbook of Foodborne Pathogens*. USA: Marcel Dekker Inc.

Triana S. 1996. Skrining dan isolasi bakteriofage yang menginfeksi Xanthomonas. Bogor: IPB.

Zhuang Z, Yu L, Mustapha A. 2005. Simultaneous detection of *E. coli*, *Salmonella*, *Shigella* in apple cider. *J Food Protect* 67:27—33.

Sartika, D. 2012. Phage FR38 Treatment on Sprague Dawley Rat Inferred from Blood Parameters and Organ Systems. *J Hayati* 19 (3).