FACULTY OF MATHEMATICS AND NATURAL SCIENCES
UNIVERSITAS NEGERI MAKASSAR
INDONESIA

PROCEEDING

"The Role of Mathematics, Sciences, Technology, Education towards ASEAN Economic Community and Global Challenges"

ICMSTEA 2016

ISBN: 978-602-99837-4-6

PROCEEDING

2nd ICMSTEA

INTERNATIONAL CONFERENCE ON MATHEMATICS, SCIENCE, TECHNOLOGY, EDUCATION AND THEIR APPLICATIONS

"The Role of Mathematics, Sciences, Technology, Education towards ASEAN Economic Community and Global Challenges"

October 3rd - 4th, 2016
Makassar, South Sulawesi, Indonesia

FACULTY OF MATHEMATICS AND NATURAL SCIENCES
UNIVERSITAS NEGERI MAKASSAR
INDONESIA

PROCEEDING

ICMSTEA 2016 :

The Role of Mathematics, Sciences, Technology, and Education Towards ASEAN Economic Community and Global Challenges

Makassar, South Sulawesi, Indonesia
3rd – 4th October 2016

Fakultas Matematika dan Ilmu Pengetahuan Alam
Universitas Negeri Makassar
2016

ICMSTEA 2016: THE ROLE OF MATHEMATICS, SCIENCES, TECHNOLOGY, AND EDUCATION TOWARDS ASEAN ECONOMIC COMMUNITY AND GLOBAL CHALLENGES

Editor **:** Dr. Syafruddin Side
Dr. Ir. Wiharto Caronge, M.Si.
Uca, S.Si., M.Si., Ph.D.
Iwan Dini, S.Si., M.Si.
Ansari Saleh Ahmar, S.Si, M.Sc.
Bustang, S.Pd., M.Sc.
Muh. Husnul Khuluq, S.Pd., M.Sc.
Said Fachry Assagaf, S.Pd., M.Sc.
Sahlan Sidjara, S.Si., M.Si.
Ahmad Ansar, S.Pd., M.Sc.
Syamsuddin Mas'ud, S.Pd., M.Sc.
Muhammad Isbar, S.Si., M.Si.
Surahman, S.Pd., M.Pd.

Editorial Assistant
Layouter : Andi Ikhsan Maulana, S.Pd
Dimas Suharto

Cover Administrator : Nurul Kusuma Wardani, S.Pd.

Reviewer Board : Prof. Alfred Edward Szmidt, Ph.D.
Prof. Valerio Sbordoni, Ph.D.
Prof. Birgit Loch
Dr. Richard Randriantoamanana
Prof. Fahrul Zaman bin Huyop, Ph.D.
Prof. Mohd. Ekhwan Toriman, Ph.D.
Prof. Eko Hadi Sujiono, M.Si.
Prof. Oslan Jumadi, S.Si., M.Phil., Ph.D
Muh. Abdy, S.Si, M.Si., Ph.D
Prof. Dr. Jasruddin M, M.Si.
Prof. Dr. Muris, M.Si.
Prof. Dr. Ir. Yusminah Hala, M.Si.
Prof. Dr. Usman Mulbar, M.Pd.
Prof. Dr. Muh. Danial, M.Pd.

Copyright © October 2016

ISBN 978-602-99837-4-6

Diterbitkan oleh : Fakultas MIPA Universitas Negeri Makassar

WELCOME SPEECH

Forewords from the Chairman of Committee

Assalamu'alaykum wa Rahmatullahi wa Barakatuh

First of all, I wish to extend a warm welcome to fellow delegates from the various countries and regions. I realize that you are fully dedicated to the sessions that will follow but I do hope you will also take time to enjoy sparkling Makassar with its tropical setting, friendly people, and wonderful cuisine.

This 2nd International Conference on Mathematics, Science, Technology, Education, and Their Application 2016 is organized by the Faculty of Mathematics and Natural Sciences, Universitas Negeri Makassar to bring all experts and researches in these field sharing their important thoughts and findings. The conference will be held in two days from 3rd – 4th of October 2016 with two keynote speakers, seven invited speakers, and more than 80 parallel speakers from different backgrounds.

Let me take this opportunity, on behalf of the committee members, to express my gratitude and sincere thanks to the keynote, invited and all parallel speakers for spending their valuable time with us in this conference. I do hope that your time in Makassar will be valuable and memorable.

Finally, I would like to thank all steering and organizing committee for their hard work and dedication to the success of this conference. I would like also to apologize to all of you should you find any inconvenience during this event.

Thank you very much,

Wassalamu'alaykum Warahmatullahi Wa barakatuh

Chairman of Committee,

Dr. Drs. A. Mushawwir Tayeb, M.Kes.

The 2nd ICMSTEA Speech
By The Dean of Mathematics and Natural Sciences Faculty
Universitas Negeri Makassar

Your excellency Rector of Universitas Negeri Makassar
Honorable Vice Rectors and Dean of All Faculties
Honorable Keynote Speakers
Distinguished all invited speakers from outstanding universities
Distinguished all speakers and guests
All participants,
Ladies & Gentlement,

Assalamu'alaykum Warahmatullahi Wabarakatuh. My greetings for all of you. May peace and God's blessing be upon us all. *Alhamdulillah*, all praises be to the Almighty God, Allah *subhanahu wata'ala*.

It is my pleasure to welcome you all to the opening of The 2nd International Conference on Mathematics, Science, Technology, Education & their Applications (2nd ICMSTEA). I am delighted to see that the Mathematics and Natural Science Faculty has again organized the second conference that capitalize on our strength and built on our commitment to promoting Mathematics, Science, Technology and Education.

I do hope that this conference would bring a great opportunity for all of us to strengthen our contribution to the advancement of our nation.

I would like to take this opportunity to thank the conference organizing committee for their diligent work. I would also like to thank participants, especially those of you coming from abroad, for joining us and sharing your valuable experiences. Should you find any inconveniences and shortcomings, please accept our sincere apologies.

Finally, let me wish you fruitful discussion and a very pleasant stay in Makassar.

Thank you,
Wassalamu'alaykum Warahmatullahi Wabarakatuh

Dean of Faculty of Mathematics and Natural Sciences
Universitas Negeri Makassar

Prof. Dr. Abdul Rahman, M.Pd.

TABLE OF CONTENTS

Cover i

Welcome Speech iii

Table of Contents v

Invited Speakers 1

Genetic Structure and Evolutionary History of a Diploid Hybrid Pine Pinus densata Inferred from the Nucleotide Variation at Seven Gene Loci 1 – 8
Alfred Edward Szmidt

Biodiversity and Big Data In A Changing World: From Museum Specimens to Citizen Sciences 9 – 15
Valerio Sbordoni

Engaging Students with Tablet Technology in Science, Technology, and Mathematics Education 16 – 38
Birgit Loch

Assesment Within Elpsa Lesson Design 39 – 48
Sitti Maesuri Patahuddin

Why High Performance Computing (HPC) Matters? 49 – 58
Richard Randriantoamanana

In Silico Study of L-specific dehalogenase from Rhizobial Species Strain RC1 59 – 68
Fahrul Zaman bin Huyop

Fostering Water Innovation: Securing the ASEAN Water Future 69 – 78
Mohd. Ekhwan Toriman

Basic Research (in Physics) for Development of Nation Innovation 79 – 86
Eko Hadi Sujiono

Parallel Speakers

The Influence Of *Problem Based Learning Model* Toward Motivation and Physics Learning Outcomes Of Students SMA Negeri 1 Parangloe Gowa Regency 87 – 95
Muhajirin, Sidin Ali & Pariabti Palloan

Analysis of Student's Conceptual Understanding of Mathematics on Set at Class VII SMP Frater Palopo 96 – 102
Muhammad Ilyas & Fahrul Basir

Pah Characteristics In Sediment Around Makassar Coast Using GC-FID 103 – 114
Muhammad Syahrir, Nurul Hidayat Aprilita, Nuryono, & Netti Herawati

Perception of 21st Century Learners to The E-Books as A Learning Resources 115 – 122
Muhammad Takwin Machmud

The Group Of Understory Herbaceous Vegetation Stand At Tropical Lower Mountain Forest Of Mount Salak, West Java 123 – 129
Muhammad Wiharto, Cecep Kusmana, Lilik Budi Prasetyo, Tukirin Partomiharjo, Hamka L, & Abd. Muis

Antibacterial Compounds Characterization in Chloroform Extract Leaves of Tahiayam Plant (*Lantana Camara* Liin.) 130 – 135
Muharram, St. Nurzulaiha, Nurrahmania, Iwan Dini, Pince Salempa, & Maryono

Effect of Mixture Inoculum of Lactic Acid Bacteria (LAB) and Mold Amylolytic In Various Concentration And Fermentation Time of Changing Protein And HCN Content Of Bitter Cassava Roots (*Manihot aipi* Phol.) 136 – 143
Nurhayani H. Muhiddin, Nur Arfa Yanti, & Hasanah

The Analysis of Total Cholesterol Levels in Mice (*Mus musculus*) MALES who were Given Extracts of Methanol Leaf *Cemba* (*Acacia pennata*) 144 – 150
Nurul Muhlishah, Irma Suryani Idris , Andi Mu'nisa, & Ernawati

Plants in a Square: Explore Plants Description With QR Code Feature 151 – 155
Khalisha Azis, Sitti Saenab & Syamsiah

Exploring the Correlation between Metacognitive Skills and Retention of Students in Different Learning Strategies in Biology Classroom 156 – 161
Arsad Bahri

Physical Fitness For Futsal Referee Of Football Association In Thailand 162 – 170
Acting Sub L.t.Thaweesub Koeipakvaen

Histological study of the respiratory system of Sulawesi Medaka fish (Oryzias celebensis): as a candidate of animal model 171 – 176
Dwi Kesuma Sari, Irma Andriani, & Khusnul Yakin

Technological Innovation of Learning Mobile-Based Learning 177 – 184
Herlinah & Baso Habibi

Evaluation of Antimicrobial Activity and Phytochemical Screening of Chloroform Extract of Usnea sp. 185 – 188
Iwan Dini, Maryono, Nurul Utami, Sitti Hajar, & Ahmad Hadani

The effectiveness of Scientific-Inquiry Learning Model to Improve Scientific Thinking Skills of Grade X student of High School in Gowa Regency 189 – 194
Jusniar & Sumiati Side

Pedagogical Content Knowledge: Teacher's Knowledge Of Students In Learning Mathematics On Limit Of Function Material 195 – 199
Ma'rufi, I Ketut Budayasa, & Dwi Juniati

Simulation Infiltration Rate of Water on Sand Media by Finite Difference Method 200 – 210
Masitah Osman, Nasrul Ihsan, & Muhammad Arsyad

The Influence Of Problem Based Learning Model Toward Motivation and Physics Learning Outcomes Of Students SMA Negeri 1 Parangloe Gowa Regency 211 – 218
Muhajirin, Sidin Ali & Pariabti Palloan

The Influence of Experiment Methods on Science Process Skill and Cognitive Learning Outcomes of the X Grade Students of MIA SMAN 1 Soppeng Riaja 2015/2016 219 – 226
A. Sri Sofializa, Muhammad Arsyad, & Muris

The Influence Of Problem Based Learning Model Toward Motivation and Physics Learning Outcomes Of Students SMA Negeri 1 Parangloe Gowa Regency 227 – 233
Muhajirin, Sidin Ali & Pariabti Palloan

The Development of Critical Thinking Inventory Instrument for Biology Department Students 234 – 239
Abd Muis, Adnan Gassing, Ismail Laumma & Nurjannah

Unleash Students' Motivation with Blended Knowledge Transfer Instructional Model 240 – 243
Adnan, Sitti Saenab, & Andi Rahmat Saleh

The Development of Student's Worksheet of Physics Based on Virtual Simulation and Its Influence on Physics Learning Outcomes of Students 244 – 251
Ahmad Swandi & Bunga Dara Amin

Teaching Material Development with Challenge Based Learning (CBL) Basis to Improve Critical Thinking Ability on Human Reproduction System Material of Class XI IPA 4 Students at MAN Pinrang 252 – 258
Andi Asmawati Azis, Jasruddin, & Reni

Implementation of Accreditation Policy and Quality of Public Primary School Education Service in South-Sulawesi 259 – 262
Andi Cudai Nur & Sumarlin Mus

Plants in A Square: Explore Plants Description with QR Code Feature 263 – 272
Khalisha Azis, Wiharto, Siti Saenab, & Syamsiah

Fostering Science Learning Quality in Frame of Ecosystem Topic through Lesson Study 273 – 275
Besse Aisyah, Nurfatima, Rina Kurnia, Andi Asmawati Aziz, & Andi Nurul Virninda Yusuf

Fractionation Ethyl Acetate Extract of Stem Bark Soursop(*a. Muricata*. Linn) Potential Anticancer 276 – 279
Pince Salempa, Muharram, & Iwan Dini

Entrepreneurship Education Development In Dealing Asean Economic Community 280 – 285
Mohammad Rakib

The Development of Basic Chemistry Courses Program Based Problem Solving to Improve Student's Critical Thinking Skills 286 – 291
Ramlawati & Ratnawaty Mamin

Increase The Production and Quality of Biogas from Waste of Cattle Rumen Content Through The Addition of Molasses and Zeolite 292 – 296
Ramli, Satria Aly, & Hartono

Marica Goat's Response To The Provision of Superior Feed 297 – 301
Rosdiana Ngitung

Students' Mathematics Achievement and Its Relationship with Parents' Education Level, and Socio-Economic Status In Turkey 302 – 308
Rusli

The Abstraction Ability in Constructing Relation Within Triangles By The Seventh Grade Students of Junior High School 309 – 313
Sitti Mutmainna Hasma, Suwardi Annas, & Djadir

Water Content Influence to Electrical Properties From Soil Volcanic 314 – 320
Sulistiawaty

The Influence Of Using Destination Card Through Team Games Tournament (TGT) Type Of Cooperative Learning Toward Student's XII Grade Achievement at SMA Negeri 01 Unggulan Kamanre, Luwu Regency 321 – 324
Ulva Nilawaty Sudarmadi

Applying SARAC Approach and The Effect in Learning Mathematics For Students Grade VIII 325 – 331
Usman Mulbar & Nasrullah

Analysis Von Bertalanffy Equation With Variation Coefficient 332 – 338
Usman Pagalay, Budiawan, & Anisyah

Results Increasing Student Learning Through The Use of Biology Learning Model Cooperative Think Pair Share (TPS) The Student Class XI IPA SMA Negeri 5 Makassar 339 – 346
Wiwik Wiji Astuti, Ismail &Musyafar

Characterization of crude chitinase produced by *Trichoderma virens* in solid state fermentation 347 – 354
Rachmawaty & Madihah

Increase The Production and Quality of Biogas from Waste of Cattle Rumen Content Through The Addition of Molasses and Zeolite

Ramli, Satria Aly, Hartono

Universitas Negeri Makassar
Email: ramlielones@gmail.com

Abstract. Currently, The requirements of domestic energy must be directed to the diversification of energy sources other than petroleum. One of them is biogas. This research aim to determine the number and quality of biogas production from waste of cattles rumen content through the addition of molasses and zeolite. This study uses an anaerobic digester which comprised four treatments: control; waste of cattles rumen content with the addition of molasses (B); waste of cattles rumen content with the addition of zeolite (C); as well as waste of cattles rumen content with the addition of molasses and zeolite (D) on a laboratory scale with total volume of 5 liters and a retention time of 21 days. the volume of biogas formed is measured and tested the levels of methane gas using gas chromatography. in addition to the pH and temperature are also measured as the supporting data that support this research. based on results the average production of biogas in control digester for 21 days as much as 21.57 ml, while in the addition of molasses as much as 200 grams increase production with the average volume is 26, 5 ml. as for the concentration of methane gas, the addition of molasses can increase the concentration of methane. while the zeolite has a negative effect on the amount of biogas production. Zeolites absorb the gases contained in the digester, thereby reducing the volume of gas in the digester.

Key word: biogas production, molasses, zeolites, waste of cattles rumen content

INTRODUCTION

The high rates of population growth in Indonesia resulted in the emergence of issues related to environment and energy. Human dependence on fossil fuels for energy particularly, causing these energy sources dwindling. Kompas (2014) reported that the need for fuel oil (BBM) in the country reached 1.25 million barrels per day (bpd), while the oil production approximately 649 barrels per a day. This fact shows, every day, Indonesia deficit608 barrels of oil. To that end, the fulfillment of the country's energy needs to be directed to the diversification of energy sources other than petroleum.. One of them with the waste to energy program where garbage or waste that communities can not be used anymore can be converted into energy, biogas is one of examples. Biogas is a renewable fuel that is formed from organic materials through the process of methanogenesis by methanogenic bacteria. Biogas has advantages over other biofuel because it helps to overcome problems of garbage pollution and assist in providing a source of cheap and renewable energy.

One source of organic material that can be used as raw material for making biogas is waste of cattles rumen contents. The waste of cattles rumen content is one of the biggest wastes generated from Abattoirs, in the form of grass that has not been fermented and fully digested by animals. In the rumen contents contained *Methanosarcina sp*. that play a role in the formation of biogas (Fithry, 2010) and celluololitic bacteria that can digest cellulose of grass (Gamayanti, 2012).

According Baller in Padmono (2005), one cow produces waste rumen content about 25-35 kg. in Tamangappa abattoirs, the number of slaughter cattles is 58, so, the estimated number rumen contents waste daily reach 1.5-2 tons. In 2012, the number of cattle slaughtered cattle reach 19 733. So in a year, Tamangapa

abattoirs produces rumen contents waste as much as 50-60 thousand tons (Asdar, 2014), which the waste is not used at all, so the rumen contents of this waste can be used as raw material for biogas.

Until now, biogas can be produced and utilized by the community however, the quantity or amount of biogas produced per once production is still low. This is caused by a lack of nutrients used as an energy source of bacteria used in fermentation process. One way that can be done to produce optimally of biogas is by adding more glucose. Padang (2011) states that the addition of sugar in the manufacturing process can increase the amount of biogas production by 25%.

Glucose is used to supply nutrients that improve the speed of microbial fermentation processes in biogas production. one source of glucose derived from waste is molasses. According Dellweg in Widyanti (2010) on molasses, sugar content reach 50%. In addition, Indonesia is one country with a high sugar production, and the amount of molasses in Indonesia reached 1.3 million tons / year, which will increase to 1.8 million tons / year.

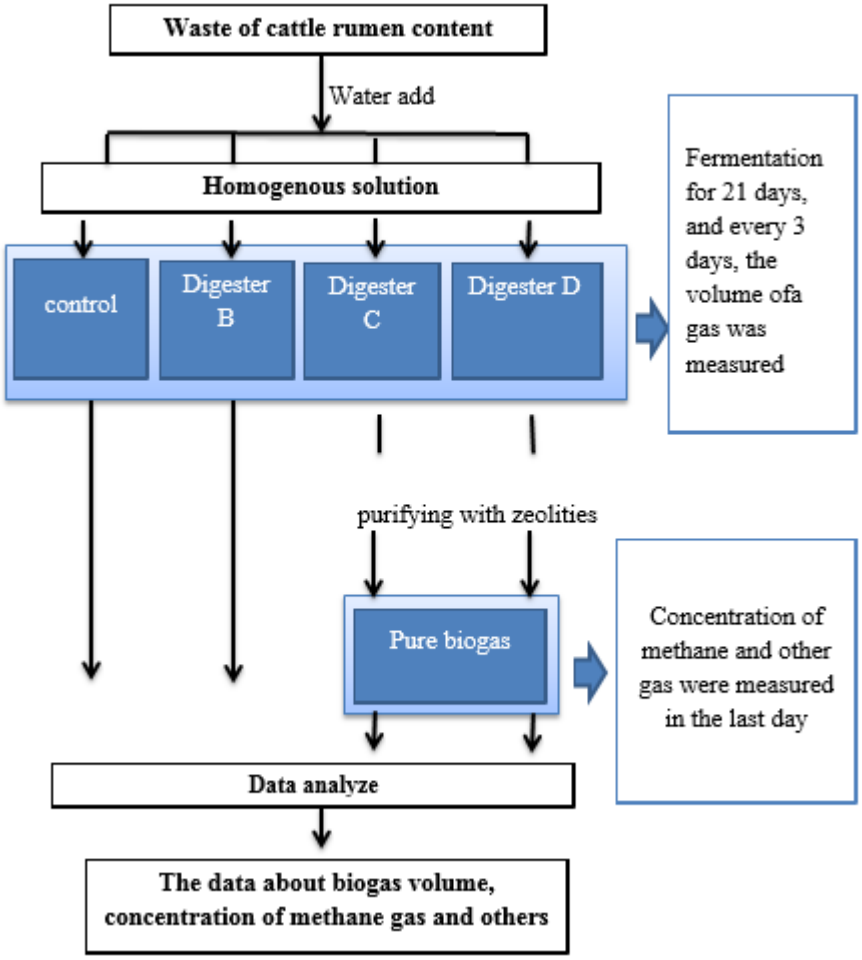
If the levels of CO2 in the biogas is low, then the methane gas content increases so that biogas has a high calorific value. The ratio of methane gas and carbon dioxide determine the high and low quality of biogas produced. To improve the quality of biogas, it is necessary to purifying biogas through absorption of CO2 (Price, 1981). Nurkholis (2011) concluded that the biogas can be purified by the zeolite so as to increase the methane content of up to 25%. Zeolites able to absorb CO2 after activated by heating or chemically.

Waste of cattle rumen content and molasses respectively are a byproduct of slaughterhouses and sugar cane factories that are still underutilized, including in the production of biogas itself neither had much in demand, but these materials are very potential to be a source of raw materials biogas. The purpose of this study was to determine the number and quality of production of biogas from waste of cattle rumen content through the addition of molasses and zeolite.

METODH

In this study, there were 4 treatments consisting of control (a mixture of waste of cattle rumen contents and water); mixture of waste of cattle rumen contents and molasses (digester B); mixture of waste of cattle rumen contents and zeolite (digester C); mixture of waste of cattle rumen contents, molasses and zeolite (digester D)

in this study, the substrate fed into the digester is only one time, not continuously. Substrates destroyed by means kneaded and mixed with a little water to be more easily crushed. Optimal conditions required for the initial filling into the digester is as much as 80% of the total volume (junus, 1987), so the volume that must be put into digester is 4 Liter. The ratio of the waste of cattle rumen content and water is 1: 2, and pursued the addition of 500 grams of molasses in the digester B and D did not change the final volume. In the digester C and D, add 100 grams of zeolite 60 mesh inserted previously been heated at a temperature of 300oC and activated by KOH 15%.



Samples were analyzed ie gas volume and the concentration of methane.

1. Volume of gas. The volume of biogas is measured by observing changes in the volume of water in the manometer U (assumption: the biogas produced is equal to the change in the gas-driven water hose). The volume of gas is calculated using the formula: $V = \pi \times r^2 \times t$
2. the concentration of methane. Levels of methane were analyzed using Gas Chromatography. Sample preparation using shirink 10 ml were injected into the hose out of gas and then immediately put into the vacuum container 10 ml which is already in a state of vacuum, then put into Gas Chromatography instrument.

RESULT AND DISCUSSION

The average volume of each digester biogas is presented in Table 1. In Table 1 we can see that on the first day to the third day has not seen the production of biogas. It can be seen from the lack of movement of water in a simple manometer. On the fourth day, the methane-producing bacteria have not shown activity for substrates needed for the production of biogas has not been there, this is what causes have not produced biogas. On the first day until the fourth day, the activity of hydrolytic and cellulolytic bacteria increased. these bacteria break down the organic material originating from undigested grass perfectly into the substrate which would then be used by methane-producing bacteria.

Tabel 1. Volume Gas pada Produksi Biogas

Day	Volume (ml)			
	control	B	C	D
3	-	-	-	-

6	20,6455	-	-	-
9	24,943	20,625	19,428	-
12	20,979	26,258	20,154	-
15	20,586	26,552	19,801	-
18	21,038	26,65	19,33	-
21	21,528	26,415	19,448	19,448

gas production in digester controls began to look at the end of the 5th and early 6th day. Then, the biogas production will be increased until the ninth day. Then will decrease gradually and then stagnate until the last day. In the digester B consisting of a mixture of waste of cattle rumen contents and molasses, gas production is produced at the end of the 7th day and peak production of biogas are in the 18th day. The increase in production caused by the activity of methanogenic bacteria optimum. This bacterial activity is influenced by the adequacy of the organic material used as a substrate by methanogenic bacteria. The more available the substrates, the more increase the production of gas. After pass the highest point, biogas production tends to stagnate. This is due to the formation of froth on the surface of the digester which can inhibit the production of gas or gas produced less (Sihombing et al., 1997). Additionally, in this study the stirring factor is eliminated, so that the resulting gas suspended between water and organic materials. additionaly, it is caused by insufficiency of the substrate and a waste byproduct produced by the bacterium itself. On D digester, biogas production just beginning to appear on the 20th day shown on manometer U. This is caused by the activity of the zeolite in the digester. This zeolite absorb all kind of gas in digester, so it can not alter the position of the water in the manometer.

The proportion of gas contained in biogas which detected ie methane, carbon dioxide and nitrogen oxides. The proportion of gas contained in biogas which ie detected methane, carbon dioxide and nitrogen oxides. Concentrations of methane, carbon dioxide and nitrogen oxides in the biogas can be seen in Table 2.

Table 2. Concentrations of Methane, Carbon Dioxide and Nitrogen Oxides in The Biogas

Treatment	**Concentration**		
	μg CH4-N g^{-1}	**μg CO2-N g^{-1}**	**μg N2O-N g^{-1}**
control	0,99	0,07	0,0000108
B	9,47	0,11	0,0006578
C	1,04	0,08	0,0005199
D	0,81	0,07	0,0005938

Concentration of methane in the digester B containing waste of cattle rumen contents and molasses is the highest among other digester. this shows that the addition of molasses had a positive impact on the formation of biogas and methane gas levels. The addition of molasses push selectivity toward formation of methane gas, if the conditioned as the need to grow flowers rumen bacteria such as the need for appropriate acclimatization conditions for bacterial growth and the process of adaptation to the subsequent treatment. Temperatures in the rumen is between 38 to 42 °C with a pH of 6.8 in the stomach of ruminants (Adger and Brown, 1995).

Excess substrate is fed into the bioreactor, causing acetogen and acidogen bacteria more active and faster to convert more organic matter (carbohydrates, protein and fat) into fatty acids that cause a decrease in pH. Methanogenic bacteria can not work optimally at low pH. This creates an imbalance between acidogenesis and methanogenesis because the process is dominated by the process of methanogenesis less acidogenic and activities both within the system.

In the digester C and D containing zeolite. the use of zeolite has no effect on the quality of biogas. This can be seen in the ratio of methane: carbon dioxide in the control and treatment. Zeolites just shows a negative effect on the amount of biogas production. In Table 1, the digester containing zeolite shows a slowdown in producing biogas. Zeolites absorb gases contained in the bio digester, thereby reducing the volume of gas in the digester.

Digester temperature at each treatment can be seen in Table 3. In general the temperature range in the digester for 21 days is 28-32oC. Temperature conditions affects the quantity of biogas produced. Temperatures that are too high cause biogas forming bacteria will die so it is not capable of producing gas, while the temperature is too low causing biogas forming bacteria can not thrive so that the biogas produced is low.

Tabel 3. Suhu Digester pada setiap Perlakuan

Hari ke-	Suhu (^oC)			
	Kontrol	**B**	**C**	**D**
3	28,5	29	29	29
6	29	30	29	30
9	28,5	28,5	29,5	29
12	29	30	30	30
15	30,5	30	30,5	30
18	30	30	30	30
21	29	29	30	30

Results of pH measurement using universal indicator. The measurement results in early studies show the pH value is in the neutral condition which is 7, while at the end of the study the results of measurements of pH values are also at a score of 7. The pH determines the quality of the main products produced biogas if the pH value is too high is CO2. The optimum pH value is between 7 to 7.2 when the pH drops will inhibit the formation of gas which can result in decreased volume of biogas. Saseray et al. (2012) states, methanogenic bacteria are very sensitive to acidity.

CONCLUSION

The addition of molasses in the production of biogas waste cow rumen contents can increase the volume and improve the methane biogas. While the addition of the zeolite does not affect the quality of biogas.

REFERENCE

1. Adger, N.E. and K. Brown. 1995. Land Use and the Causes of Global Warming. John Wiley and Sons, New York.
2. Asdar, Zulkifli. 2014. Analisis Proses Pengelolaan Pemotongan Sapi dan Kebau di Rumah Potong Hewan Tamangapa Kecamatan Manggala Makassar. Skripsi, Program Sarjana Universitas Hassanudin: Makassar.
3. Fithry, Y. 2010. Pengaruh Penambahan Cairan Rumen Sapi pada Pembentukan Biogas dari Sampah Buah Mangga dan Semangka. Tesis, Program Pasca Sarjana Universitas Gajah Mada: Yogyakarta.
4. Gamayanti, K.N., Pertiwiningrum, A., Mira, Y.L. 2012. Pengaruh Penggunaan Limbah Cairan Rumen dan Lumpur Gambut Sebagai Starter dalam Proses Fermentasi Metanogenik. Buletin Peternakan Vol. 36 No. 1: 32-39.
5. H, Nurkholis., Wardana, ING., Widhiyanuriyawan, D. 2011. Peningkatan Kualitas Bahan Bakar Biogas melalui Proses Pemurnian dengan Zeolit Alam. Jurnal Rekayasa Mesin. Vol.2 No.1 : 227-231.
6. Junus, M. 1987. Teknik Membuat dan Memanfaatkan Unit Gas Bio. Gadjah Mada University Press, Yogyakarta.
7. Kompas. 2014, Maret. Indonesia Defisit Minyak Bumi 608.000 Barrel Perhari.[online],(http://bisniskeuangan.kompas.com/read/2014/03/24/0900598/Indonesia.Defisit.Minyak.Bumi.608.000.Barrel.Per.hari, Diakses 10 September 2014).
8. Padang, Yesung Allo., Nurchayati dan Suhandi. 2011. Meningkatkan Kualitas Biogas dengan Penambahan Gula. Jurnal Teknik Rekayasa. Vol.12 No.1:53-62.
9. Padmono, Djoko. 2005. Alternatif Pengolahan Limbah Rumah Potong Hewan-Cakung (Suatu Studi Kasus). Jurnal Teknik Lingkungan. Vol. 6 No. 1:303-310.
10. Price,E.C & Cheremisinoff, P. N; 1981: Biogas Production and Utilization; Ann Arbor Science Publishers Inc, United States of America.
11. Widyanti, E.M. 2010. Produksi Asam Sitrat Dari Substrat Molase pada Pengaruh Penambahan VCO (Virgin Coconut Oil) terhadap Produktivitas Aspergillus Niger Itbcc L74 Terimobilisasi. Tesis, Program Pasca Sarjana Universitas Diponegoro: Semarang.