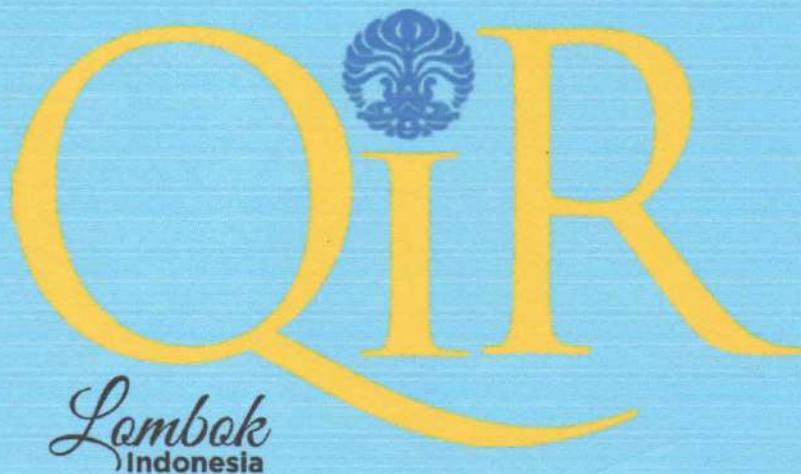


The 14th International Conference on QiR (Quality in Research)



In conjunction with :

4th Asian Symposium on Material
Processing (ASMP)

International Conference in Saving Energy in
Refrigeration and Air Conditioning (ICSEERA)

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PREFACE

WELCOME FROM THE RECTOR OF UNIVERSITAS INDONESIA

It is both a pleasure and honor for me to welcome you all to the 14th International Conference on QiR (Quality in Research) 2015. Globalization today results in very competitive atmosphere in all aspects. This flourishing competition should consider the harmony and balance between human needs and the environment quality for creating favorable sustainable future. Steps to ensure the preservation of the environment for our future generations are slowly but surely taken. This fragile balance between the development and innovation of mankind as an effort to enhance their quality of life with its harmony with nature must be maintained as a way to achieve sustainable future - helping us make products and services more efficient, design better buildings, produce safer cars and keep people healthier.



Nowadays, scientists and researchers, hand in hand with industrial experts are creating and developing new green technologies that give us hope for a Sustainable Future. Great minds in Engineering, Architecture and Design areas especially has come up with ideas such as Green Architecture that has the capability to cut down urban resource use dramatically, and making urban expansion sustainable; New Nuclear Material; Waste-Sourced Biofuel/Pyrolysis, where technology is now able to turn biomass waste such as paper, grass or wood chips into gas and eventually ethanol; Biomimicry, that has given the rise to self-healing materials. This in turn will give longer lives to most consumer goods, and thereby reducing the demand for raw materials and waste; and many more innovations that should be encouraged for the motivation of current and future development.

These Green and Smart Technologies can help protect, conserve and even restore our precious shared environment. To develop this technology, we need to combine engineering, scientific or technological approaches, with ecology, economics and the social sciences and humanities. The Green and Smart Technologies innovation field is now wide open and offers exciting new territories to explore and develop. Creative thinking by our top technical and scientific researchers is giving us a more and more treasures of new workable ideas. However, innovations require more than just brilliant ideas. Innovations require resources, skills, technology, knowledge, tools, techniques and so much more. But most of all, innovations require people. People are the driving force behind every need of change, changes that are aimed to improve mankind's quality of life, to enhance their living conditions or to simply make life easier and more comfortable.

This conference is about learning of the fundamental aspects which can transform the world and society, thinking ahead to possible challenges facing the globe, discovering innovations related to opportunities for industry, and most importantly, this conference is about bringing together interdisciplinary people to accelerate activities in many areas simultaneously. This is what makes the conference exceptional this year in terms of potential impact from this networking.

I extend my sincere thanks to the Faculty of Engineering Universitas Indonesia, supporting parties and institutions for their participation and contributions in QiR 2015. I would also thank the people of Mataram especially our colleagues from Universitas Mataram and STMIK Lombok for their gracious support and hospitality. Additionally, I extend a hearty thank you to the members of the organizing committees for dedicating their valuable time so that each one of us enjoys an exceptional conference program over the next several days. May we have a successful, stimulating, fruitful and rewarding conference.

Prof. Dr. Ir. Muhammad Anis, M.Met.
Rector
Universitas Indonesia

PREFACE

WELCOME FROM THE DEAN OF FACULTY OF ENGINEERING UNIVERSITAS INDONESIA

Welcome to the 14th International Conference on QiR (Quality in Research) 2015. The Faculty of Engineering Universitas Indonesia is proud that this year we could once again held an international conference of this grand scale. This two-day, biennial conference is presented together with our co-hosts Universitas Mataram and STMIK Lombok and speaks to the importance of fostering relationships among national and international front liners, thinkers, academics, executives, government and business officials, practitioners and leaders across the globe in an effort to share knowledge and best practices as part of a worldwide network.



For almost twenty years, the first definition of sustainable development and sustainability includes sentences like 'much remain to be done in the areas of sustainability' or 'the underlying science is still far from exact and we all still need to make a big effort' are common introducing and/or concluding phrases in both literature and scientific forums. I envisioned that QiR will be a platform where academicians, scientists, researchers and practitioners from engineering, architecture, design, and community services to share, discuss, and move forward with their findings and innovations. I hope that the intellectual discourse will result in future collaborations between universities, research institutions and industry both locally and internationally. In particular it is expected that focus will be given to issues on innovations for the enhancement of human life and the environment.

In accordance to this year's theme, this conference will cover a wide range of green and smart technology issues, especially state of the art information and knowledge of new innovations, ideas, creative methods or applications which can be implemented to enhance the human life with various smart technologies developed to improve mankind's quality of life and green technologies to make sure that we make a contribution to keeping our environment for our future generations. The itinerary for the two days has been carefully planned to ensure a lively exchange of ideas and the development of innovative strategies and there will be many opportunities for everyone in attendance to share their expertise with, and learn from, peers from around the world.

We foresee more and more challenges in our future. Challenges in how to improve our life, how can we enhance our society, how can we make our lives and the lives of our society better? These challenges should be answered together by developing collaborations for future research in various engineering and design areas. Let's make this conference an international media for exchange of knowledge, experience and research as well as the review of progress and discussion on the state of the art and future trend of prospective collaboration and networking in broad field of eco-based technology development.

My deepest appreciation to our sponsors, supported parties and various contributors for their never ending supports of this conference. I would also like to convey my gratitude to all of our distinguished speakers for making the time to share their knowledge with us. To our fellow researchers and/or practitioners from Indonesia and overseas, welcome and enjoy your stay in this amazing island, Lombok. I would also like to invite all participants in expressing our appreciation to all members of the QiR 2015 organizing committee for their hard work in making this conference another success.

Prof. Dr. Ir. Dedi Priadi, DEA
Dean Faculty of Engineering
Universitas Indonesia

WELCOME FROM THE QiR 2015 ORGANIZING COMMITTEE

Welcome to the 14th International Conference on QiR (Quality in Research) 2015. It is a great pleasure for Faculty of Engineering Universitas Indonesia to be hosting this biennial event with Faculty of Engineering Universitas Mataram and STMIK Lombok, in the spirit of strengthening of cooperation and mutual growth to be world class institution. For the first time, the QiR 2015 is held in Lombok Island, one of Indonesia's beautiful paradise islands. It is with our utmost pleasure to hold this year's QiR 2015 in conjunction with 4th Asian Symposium on Material Processing (ASMP), and International Conference in Saving Energy in Refrigeration and Air Conditioning (ICSERA).



The aim of this International Conference with our selected theme, "Green and Smart Technology for Sustainable Future", is to provide an international forum for exchanging knowledge and research expertise as well as creating a prospective collaboration and networking on various fields of science, engineering and design. We hope this conference can be a kick-off for the strengthened action and partnerships on creating a platform for us; national and international thinkers, academics, government officials, business executives and practitioners, to present and discuss the pivotal role of engineers in innovative products which will reduce environmental impacts, applications in sustainable planning, manufacturing, architecture, and many more to grow and ensure the rising prosperity of our society going into the future. Under this theme, the conference focuses on the innovative contributions in green and smart technology to encourage and motivate current and future development for achieving sustainable future.

Over the period of 18 years, this biennial international conference started from annual national conference and now has become an important place of encounter between scholars and practitioners from different countries, cultures and backgrounds discussing contemporary engineering and design issues dealt in their hometown, country or even region. Serving as a platform for an engineering and design dialogue, this conference will have 21 invited speakers and has gathered more than 500 papers from more than 17 countries all over the world:

- 86 papers on International Symposium on Civil and Environmental Engineering
- 129 papers on International Symposium on Mechanical and Maritime Engineering
- 121 papers on International Symposium on Electrical and Computer Engineering
- 107 papers on International Symposium on Materials and Metallurgy Engineering
- 36 papers on International Symposium on Architecture, Interior and Urban Planning
- 56 papers on International Symposium on Chemical and Bioprocess Engineering
- 74 papers on International Symposium on Industrial Engineering
- 21 papers on International Symposium on Community Development

This year, we have a special talkshow planned as a special session within our plenary lecture. This talk show was planned by our alumni with the theme "**Serve Our Country**". After more than five decades of existence, FTUI has in its library hundreds if not thousands undeveloped innovation ideas and research from its faculties, graduates and students, all of which are aimed at enhancing the quality of human life and the environment, especially in Indonesia. We feel that it's time we contribute more to our country by making sure that these innovations and research can be implemented and produced for a better future of our nation. The talk show will feature some of the most prominent figure in Indonesia's government and will discuss how these innovations can be used by the government in areas such as: electrical, oil and gas, IT, mining, design, manufacture and how the industry can be a part of it.

My deepest gratitude: to all of our speakers, participants, contributors, partners, exhibitors and professional associations, who have given this conference their generous support. I would also like to thank all members of the Organizing Committee, our International Advisory Board and distinguished Reviewers for all of their support and advice. We also

owe our success to the full support of the Rector of Universitas Indonesia and the Dean of Faculty of Engineering. Last but not least, a special thanks to our co-hosts, Universitas Mataram and STMIK Lombok for all of their immense supports in making this conference a success.

Allow me to wish all of you a meaningful and rewarding conference. We wish you a pleasant and memorable stay in Lombok. Thank you and we hope to see you again at the QIR 2017.

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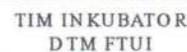


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Increased of Lamb Production on Padjadjaran Sheep through the Application of Synchronization Estrus and Artificial Insemination Innovation

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Abstract. This research about increased of lamb production on Padjadjaran sheep through the application of Synchroni-zation Estrus (SE) and Artificial Insemination (AI) innovation was conducted in the Faculty of Animal Husbandry, Padjadjaran University. Padjadjaran sheep is local sheep and distributed in west Java, they were selected using maternal lineage method. Padjadjaran sheep has qualitative character as white color (*white agouti* – Aw Aw), big earlobe, triangular tail, and prolific. Base on bio-molecular analysis, Padjadjaran sheep has variation sheep mt-DNA deletion 75 bp in the position of 1447 bp. Application of innovative bio-reproduction SE and AI help to accelerate the formation of the base population and improve reproductive efficiency. Research method was action research and laboratory experiment. Synchronization Estrus treatment using intra-vaginal sponges and Artificial Insemination used fresh semen diluted. Purpose of researched was to know the increased of lamb production using of Application SE and AI innovation. Result showed that the increased in lamb production is 35.8 percent as much as 29 lambs per birth period, in two years to 87 lambs. Bio-reproduction SE and AI can be used to improve the efficiency of the ewe productivity.

Introduction

Usefulness of sheep breeding in Indonesia is a producer of meat, as savings, as a hobby and an additional family activi-ties. In Padjadjaran Sheep Breeding Farm has been performed Padjadjaran Sheep, they were local sheep and they distributed in West Java, Wanaraja. Previously, local sheep is a hybrid between three breeds, namely local mated to Merino sheep, and then crossed with Kapstaat breed of Africa.

Padjadjaran sheep characteristic were white color (*white agouti*–AwAw), big earlobe, triangular tail, and prolific. Base on bio-molecular analysis, Padjadjaran sheep has variation sheep mt- DNA deletion 75 bp in the position of 1447 bp. Selection aims to improve the character of high growth and high percentage of lambing rate anyway. The elite ewe used for developing sheep production as contribution of sheep meat in the local market.

Base population is the number of animals that will be involved in the selection program. The productivity of the ewe to produce lamb is the key to success in the selection-program of breeding sheep. Some important factors to consider in producing lamb are the ewe fertility, type of birth charac-teristics (prolific), lamb survival and the number of ewe used in the program.

Application of innovative bio-reproduction Synchroni-zation Estrus and Artificial Insemination help to accelerate the formation of the base population and improve reproductive efficiency, based on the number of lamb production. Lamb production can be predicted with a special equation involving an average births per year (A), litter size (B), lamb crop (C), fertility of ewes (D) and number of ewe (E).

Bio-reproduction technology Synchronization Estrus was estrus by entering the intra-vaginal sponge containing the hormone progesterone, resulting in a 14 days progesterone production hit as

ewe pregnant condition. This condition is terminated by pulling out the sponge of reproductive ewe, and therefore the level of progesterone will drop suddenly and as their effects of it the hormones FSH and LH will increase. The impact of the high levels of FSH and LH will lead to ovarian follicles will mature and reach the estrus conditions of ewe, to be held next of artificial insemination (AI) using fresh semen diluted.

The information on the productivity of lamb produced by an ewe Padjadjaran still not available, therefore the study of increased of lamb production on Padjadjaran sheep through application of synchronization estrus (SE) and artificial insemination (AI) innovation needs to be done. The purpose of this study to find out how high the increased production of lamb base on SE and AI innovation.

Material and Method

The research object is about of 50 heads of ewes and 5 heads of rums. The method of research is an action research in the Sempurnunggal Breeding Farm, subdistrict Nanggeng, Purwakarta Regency and in Breeding Station, Faculty of Animal Husbandry, Padjadjaran University.

- Synchronization of estrus is done by entering the intra-vaginal sponge containing the hormone progesterone. Incubated in the vagina for 14 days, progesteron hormone levels will be high so that the corpus luteum extended service life. After 14 days, the sponge is removed, and at the same time progeteron level will go down, and the opposite effect Foliciel Stimulating Hormone hormone (FSH) and luteinizing hormone (LH) increased and on 2nd day after revocation achieved estrus condition.
- Artifial Insemination is done by inserting fresh semen diluted into intra-vaginal.
- Test pregnancy using DEEA Gestdect solution, at 14 days after treatment AI implemented.
- Litter Size is the number of fertilized egg, which can grow up to become the embryo becomes a fetus and then born as a lamb. Litter size in sheep there are: single, twin, triplet and kuadriplet. Furthermore, in the calculation of the formula lamb production, litter size is assumed with 80 percents twin births, with the value of the technical coefficients 150.
- Lambing Crop is the amount of lamb that can survive until weaning period, divided by the number of lamb is born. Lambing Crop formula given percentage, in the use of the formula is assumed value of 80 percents. Lambing Crop: Amount of lamb that can survive until weaning period divided by number of born lambs then multiplied by 100 percents.
- Fertility Rate of ewe is the number of pregnant ewe divided by the mated ewe, then multiplied by 100 percent. Then the formula assumed by value 0.9 (90 percents). The formula: The number of pregnant ewe divided by number of mated ewe then multiplied by 100 percents.
- Formula: Production of Lamb: $A * B * C * D * E$ [3]. Where:
 - A : Rata Average lamb born per year, assumed to be 3 times lambing in 2 years, assumed the value 1.5
 - B : Litter Size, is assumed with 80 percents twin births, with the value of the technical coefficients 150.
 - C : Lambing Crop, is assumed value of 80 percents.
 - D : Fertility of ewe, assumed by value 0.9 (90 percents).
 - E : Number of ewe (N) to produce lamb.

The formula of Lamb production: $1,5 * 150 * 0,8 * 0,9 * N$

- Increased of Lamb Production: [(Actual Lamb Production minus Estimated Lamb Production)] divided by Estimated Lamb Production then multiplied by 100 percents

Result and Discussion

Schedule for ewe treatment during the study, in accordance with the number of treatments listed in (Table 1). In Table 1 it appears that the treatment of ewes enrolled in the study was 50 heads, according to the recording for 2 years (2012 -2013).

Table 1. Schedule of Synchronization Estrus and Artificial Insemination

Period	SE	Revocation	AI	Test
	Treatment	Sponge	Treatment	Gestation
I	15 th Jun	29 th Jun	1 st Jul	15 th Jul
	2012	2012	2012	2012
II	15 th Mar	29 th Mar	1 st Apr	15 th Apr
	2013	2013	2013	2013
III	15 th Oct	29 th Oct	1 st Nov	15 th Nov
	2013	2013	2013	2013

When ewes are given treatment SE in June 15th, 2012 for 14 days sponge containing progesterone incubated intra-vaginal, so there progesteron hormone of sponge absorption process that will increase the level of progesterone in the blood, and hence the secretion of the hormone FSH (Follicle Stimulating Hormone) is inhibited by adenohipophisa. Under these conditions inhibited the growth of ovarian follicles, nor will prevent the occurrence of estrus. Estrus consists of several phases, *metestrus*, *diestrus* and *proestrus*, then on day 14 (on 29th June 2012) the condition of the reproductive organs are in *metestrus*, all reproductive organs ready to preserve of the embryo (as if in a state of pregnant ewe) [9].

Two days after the revocation of the sponge, then the progesterone hormone levels will drop and reverse the secretion of FSH will rise. Therefore ovarian follicle will mature and consequently increased *estrogen* and occurs estrus. Ewe done AI on June 31st, 2012, and after 14 days ewe tested for pregnancy, if there is positive pregnant, then the month of December 2012 awaited the birth of the first period, the amount of lamb produced 111 heads.

After 60 days of birth in March re-treated SE and AI, so then performed as where the previous. Lamb is produced from the 2nd period of 110 heads. In the treatment of 3rd period, as many as 108 heads produced lambs. In lamb production estimates calculated that for Indonesian local sheep, can be three times lambing in two years, it is also an advantage for sheep farming industry in tropical countries, because only affected two kinds of seasons, the rainy season and dry, while the sun shines every day.

Litter size. In (Table 2) it appears that the birth of the type depends on the breed of sheep, ewe health when mated, because most of the reproductive character has a value of heritability (h^2) is low, so it would be preferable to provide a good environment, including feeding before mated (flushing) and management.

Table 2. Percentage of single and twin births

No.	Period of Birth	Single Birth (percents)	Twin Birth (percents)
1	I	49.87	50.13
2	II	48.62	51.38
3	III	42.86	57.14
	Average	47.12	52.88

The amount of lamb that was born depends on the number of fertilized ova and embryos can survive up to lambing. Percentage of single and twin births are listed in (Table 2). Type of birth is the number of lamb that was born in a birth. Lambing percentage rate depends on the prolific character, this is one important factor in determining the profitability of sheep farming industry. [10].

The average percentage of single births is large enough that 47.12 percents, and the type of twinning is 52.88 percents, this is not in line with the postulate of Harjosubroto (1994), that an average of three times the birth of twins born within two years was 80 percents, this is because the quality of food given and different management. [9] Has tried to provide treatment super ovulation in ewes, do not give the expected results. Many ewe, which is treated super ovulation, giving a single births.

Furthermore, [8] in his research ongoing in dairy cows in vitro and in vivo have obtained preliminary results, that ovarian would be stressful for the treatment of super ovulation continuous, so although it can stimulate ovulation are more than one, but the ovaries are not able to produces the hormone progesterone until becomes a fetus, embryo deaths occur in the *blastomere* stage.

Lamb crop. Lamb crop is the number of lamb who live to the age of weaning divided by the number of lamb born multiplied by 100 percents. Results of research on the lamb crop listed in Table 3. It appears that the highest percentage of lamb crop is in the 2nd periods, this was due to a much ewe in the earlier period not yet adapted to the treatment and the existing environment, so a lot of lamb get milk that does not comply with the requirements of age often death occurs at birth dry season.

Table 3. Lamb crop within a period of two years

No.	Period	Lambing (heads)	Death (heads)	Live (heads)	Lamb Crop (percents)
1	I	111	3	108	97.29
2	II	110	3	107	97.27
3	III	108	2	106	98.14
Total		329	8	321	292.7
Average		109.6	2.66	107	97.56

The amount of lamb in the Crop Breeding Farm Sempur Nunggal is 97.56 percent. It is larger when compared with the postulate [3] who stated at 80 percents. Value of Lamb Crop is influenced by several factors including the condition of environments at the time of lambing, birth weight of lamb, ewe milk production conditions, environmental hygiene and health of lamb. Conditions of lamb, who comes from triplet birth included in the twin birth, because the lamb that was born from birth triplets have a lower birth weight than single births, many deaths in the third lamb.

Ewe fertility rates. Ewe fertility rates assumed by [3] with a value of 90 percents, but with the treatment Synchronization Estrus and artificial insemination then ewe fertility rate reached 100 percents, this happens when after insemination pregnancy does not occur, then the treatment is repeated. Estimation ewe pregnancy can be seen as early as possible by using a solution Deea GestDect. Results of research on ewe fertility listed in (Table 4).

Table 4. Percentage ewe fertility

No.	Period	Number of Ewe in AI (heads)	Number of Pregnant Ewe (heads)	Percentage Fertility (percents)
1	I	50	50	100
2	II	50	50	100
3	III	50	50	100

In Table 4. It appears that the percentage of pregnant ewe that achieved by treatment of SE and AI innovation is 100 percents, this suggests that the success of this innovation satisfactory. Treatment of the SE will make it easier for the management of maintenance because the AI can be carried out simultaneously, in contrast to sheep reared without a touch of bio-reproduction technology. Efficiency reproduction of an Ewe will affect profits for sheep farming industry.

Lamb actual production and estimation. Based recording actual number of lamb and number of

calculating mortality 2.44 percents. Mortality as occurred due because small birth weight and mother's milk production is low, and at birth of less healthy lamb. Sometimes when coincidence lambing in the dry season forage production is very less, and replaced with straw ammoniation or processed by bacterial fermentation. Addition of forage given also concentrate feed or waste Productions of towu.

Table 5. Lamb actual production and estimation

No.	Period	Number of lamb	
		Actual Production (heads)	Estimation (heads)
1	I	111	81
2	II	110	81
3	III	108	81
Total		329	243
Average		110	81

Table 6. Number of lamb using formula estimation

No.	Technical Coefficients	Values
1	Number of Lamb, they birth for 2 years	1.5
2	Number of lamb, they singel and twin birth (percents)	150.0
3	Lamb Crop (percents)	80.0
4	Ewe Fertility (percents)	90.0
5	Number of Ewe (heads)	50.0
6	Lamb Production (heads)	81.0

While the number of lambs in estimation by using the formula, lamb production is based on the assumption of birth for 2 years was 1.5 and the assumption that the lamb that was born a twin 80 percents, so the value is 150 percents. In addition, the value of the lamb crop assumed 80% and ewe fertility 90 percents, number of ewe 50 heads, the number of lamb produced as many as 243 heads.



Fig. 1. Lambs population in the breeding farm

Conclusions and Suggestions

Increased in lamb production is 35.8 percents as much as 29 lambs per birth period, in two years to 87 lambs. Application Innovation SE and AI is more effective.

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