UNIVERSITI PUTRA MALAYSIA

EFFECT OF EPIPHYTIC LACTIC ACID BACTERIA ISOLATED FROM GUINEA GRASS ON NUTRITIONAL VALUE OF THE SILAGES

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MASTER OF SCIENCE

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2010

EFFECT OF EPIPHYTIC LACTIC ACID BACTERIA ISOLATED FROM GUINEA GRASS ON NUTRITIONAL VALUE OF THE SILAGES

By

MAHDI PASEBANI

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Master of Science

October 2010

DEDICATION

To my Father and my Mother who are the entire world to me

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science

EFFECT OF EPIPHYTIC LACTIC ACID BACTERIA ISOLATED FROM GUINEA GRASS ON NUTRITIONAL VALUE OF THE SILAGES

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October 2010

Chairman : Associate Professor Halimatun Bt Yaakub, PhD

Faculty : Agriculture

An investigation was carried out to isolate and identify predominant indigenous and epiphytic lactic acid bacteria from guinea grass. The effects of epiphytic lactic acid bacteria on the nutritional value and aerobic quality of the silages were also studied. The standard plate counts of naturally occurring bacteria in guinea grass were estimated to 2.65×10^5 CFU/g in fresh grass while the amount for epiphytic lactic acid bacteria were only 8.3×10^3 CFU/g. Isolations were carried out by 10 fold serial dilution which resulted in 18 purified bacteria. Three indigenous bacterial species comprised of *Flavimonas oryzihabitans*, *Enerobacter cloacae*, *Sphingomonas paucimobilis B* and four epiphytic lactic acid bacteria included of *Weissella confusa*, *Weissella paramesenteroides*, *Leuconostoc mesenteroides* ssp. *dextranicum*, and *Lactococcus lactis* ssp. *hordniae* were identified by BIOLOG identification system. The four lactic acid bacteria were individually applied in inoculation of guinea grass silage at the rate of 1 ×

10^5 CFU/g in fresh grass. Fixed amount of MRS broth was considered as a carrier for inoculation of these lactic acid bacteria and thereby, two controls (with and without broth) were proposed to evaluate the effect of carrier separately. Six treatments of silages were opened on days 14, 21 and 28 in three replications. Temperature, pH value, proximate and van soest analysis and ammonia nitrogen were measured for each silage sample. Epiphytic lactic acid bacteria were effective to increase crude protein and crude fat while acid detergent fiber, neutral detergent fiber and ammonia nitrogen declined significantly. Decreasing of pH value was speeded up in all inoculated silages and hence, the silage reached to stable phase on day 14 and remained stable up to day 21 and 28. The inoculated silages were remained in the accepted range of pH value up to 48 h when they exposed to the air.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Master Sains

KESAN EPIFITIL BAKTERIA ASID LAKTIK ISOLASI DARIPADA RUMPUT GUINEA PADA NILAI NUTRISI DALAM SILASE

Oleh

MAHDI PASEBANI

Oktober 2010

Pengerusi: **Associate Profesor Halimatun Yaakub, PhD**

Fakulti: **Pertanian**

Suatu penyelidikan telah dijalankan untuk mengira bakteria hasilan secara semulajadi dan mengenalpasti kedua-dua bakteria asli utama dan epifitik bakteria asid laktik. Selanjutnya, kesan epifitik bakteria asid laktik pada nilai nutrisi dalam silase telah dipelajari. Perhitungan bakteria dengan plat piawai standard dalam rumput guinea segar menunjukkan bahawa jumlah bakteria hasilan secara semulajadi adalah setara dengan 2.65 × 105 CFU/g sementara jumlah ini untuk epifitik bakteria asid laktik dengan hanya 8.3 × 103 CFU/g. Oleh kerana itu, keperluan tambahan bakteria asid laktik sebagai aditif adalah disahkan hasil silase rumput guinea. Selain itu, dengan kejadian pembusukan aerobik. Tiga spesies bakteria asli terdiri daripada *Flavimonas oryzihabitans*, *Enerobacter cloacae*, *Sphingomonas paucimobilis B* dan empat epifitik

bakteria asid laktik termasuk *Weissella confusa*, *Weissella paramesenteroides*, *Leuconostoc mesenteroides* ssp. *dextranicum*, dan *Lactococcus lactis* ssp. *hordniae* telah dikenalpasti oleh sistem pengenalan BIOLOG. Empat bakteria asid laktik telah dilaksanakan secara individu dalam inokulasi silase rumput guinea pada kadar 1×10^5 CFU/g rumput segar. Jumlah pati MRS yang tetap telah dianggap sebagai pembawa semasa inokulasi daripada bakteria asid laktik dan dengan demikian, dua kawalan, iaitu kawalan dan kawalan dengan pati yang telah ditentukan untuk menilai kesan pembawa secara individunya. Enam rawatan silase telah dibuka pada hari 14, 21 dan 28 dalam tiga replikasi. Suhu, nilai pH, analisis proksimat dan van Soest dan nitrogen ammonia telah diukur pada setiap sampel silase. Epifitik bakteria asid laktik adalah berkesan untuk meningkatkan protein kasar dan lemak kasar sementara asid detergen serat dan serat detergen neutral adalah menurun secara signifikasi. Penurunan nilai pH telah dipercepat dan oleh itu, silase dapat mencapai ke tahap stabil pada hari ke-14 dan tetap stabil selama 48 jam semasa dikemukakan kepada udara.

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I certify that an Examination Committee has met on 2010 to conduct the final examination of Mahdi Pasebani on his Master of Science thesis entitled "Effect of Epiphytic Lactic Acid Bacteria Isolated from Guinea Grass on Nutritional Value of the Silages" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the Master of Science degree.

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This thesis was submitted to the Senate of Universiti Putra Malaysia has been accepted as fulfillment of the requirement for the degree of Master of Science. The Members of the Supervisory Committee were as follows:

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Date:

DECLARATION

I declare that the thesis is my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously and not currently submitted for any other degree at Universiti Putra Malaysia or other institutions.

MAHDI PASEBANI

Date: 26 October 2010

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