Synthesis

R&D Digest of Universiti Putra Malaysia

• Issue 2 • 3rd Quarter • Sept. 2003 ISSN. 0127 - 9394 http://rmc.upm.edu.my/synthesis/

Contents

What's Next
Highlights from the next issue –
• Environment friendly synthetic lubricant.
• Detection of lard in chocolates.
& many more!!!

Enhancing Tolerance to Heat Stress, Resistance to Infectious Bursal Disease and Expression of Heat Shock Protein 70 in Broiler Chickens by Early Age Feed Restriction

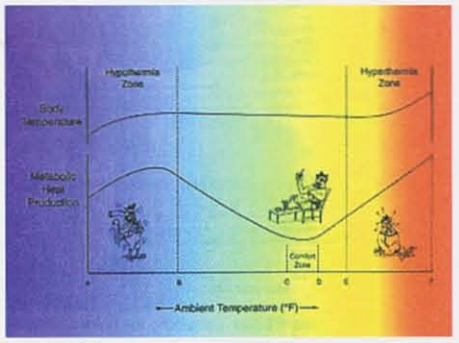
I. Zulkifli, P.K. Liew, M.T. Che Norma, M. Hair-Bejo, D.A. Israf and A.R. Omar

Award Winner

GOLD – Invention & Research Exhibition 2002

The hot and humid tropical climate has a highly detrimental effect on growth, feed efficiency, survivability and disease resistance in broiler chickens. Commercial broilers are particularly susceptible to heat stress because metabolic heat production increases with growth rate while heat dissipation does not. We examined the possibilities of modifying the birds' own natural coping mechanisms through early age stimulation. Two experiments was carried out to investigate the effects of stress attributed to early age fasting on heat tolerance and disease resistance in broiler chickens at market age, and to ascertain the mechanisms involved on a molecular level.

Chicks



Heat Stress

In the first experiment, day-old commercial broiler chicks were brooded for 3 weeks and then maintained at 24°C. On day (d) 1, chicks were assigned to one of four feeding regimens; (i) ad libitum feeding (AL), (ii) 40% feed restriction on d 4, 5 and 6 (E40), (iii) 60% feed restriction on d 4, 5 and 6 (E60), (iv) 80% feed restriction on d 4, 5 and 6 (E80). From d 35 to 41, all chicks were exposed to 38°C for 2h/d. Traits measured were body weight, survivability rate, heterophil/lymphocyte ratios (HLR) (stress index), and heat shock protein (hsp) 70 density in the brain. Heat shock protein 70 was determined by SDS-PAGE and Western blotting, and the relative density was measured using a densitometer.

In the second experiment, broiler chicks were subjected to either AL or E60. From d 35 to 50, all chicks were exposed to 38°C for 2h/d. On d 36, each bird was administered with 10 times the normal dose of live infectious bursal disease (IBD) vaccine. Bursa samples were collected on d 44, 49 and 51 for determination of bursal histological score (BHS).

The E60 chicks had improved body weight, survivability, and reduced HLR in response to the heat challenge as compared to the other groups. On a molecular level, following heat challenge, the E60 birds had higher hsp 70 density than those of AL, E40 and E80. Hsp are the most highly conserved proteins and play a profound role in restoring normal function to cells or organisms that are exposed to potentially damaging stimuli. This study demonstrates that subjecting chicks to 60% food restriction at 4, 5 and 6 days of age, leading to improved heat tolerance later in life, enhances ability to express hsp 70 in the brain of chickens. In Expt. II, following heat exposure, E60 broilers had lower BHS than those of AL. Thus, E60 can enhance resistance to IBD in heat-stressed broiler chickens.

Our results provide clear indications that subjecting broilers to 60% feed restriction on day 4, 5 and 6 leads to improved heat tolerance and resistance to viral infections at market age, by enhancing the ability to express heat shock protein 70. The procedure has great potential to be a successful mean of enhancing heat tolerance and resistance to IBD in the poultry industry because it is practical, economical and effective.

Reader Enquiry

Department of Animal Science
Faculty of Agriculture
Universiti Putra Malaysia
43400 UPM, Serdang, Selangor
Malaysia

Tel: +603 8946 6908
E-mail: zulkifli@agri.upm.edu.my

EDITORIAL BOARD

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Editorial

A feel for success

It was a proud moment for Universiti Putra Malaysia when 27 of its scientists were conferred 30 medals in the *Expo S&T 2003 – Invention and Innovation Awards* in different categories of Gold, Silver and Bronze.

Datin Khatijah Yusoff, Professor of Microbiology received a Gold medal for her innovation, BioCarrier™: A Novel Molecular Carrier from Newcastle Disease Virus that is Patent pending in Malaysia and USA.

Associate Professor Arfah Salleh, currently the deputy dean, Graduate School of Management won Gold medal for her achievement in developing "Generating Financial Reports Simulation (GenerReS) Software".

Associate Professor Mohd. Azmi Mohd. Lila from Faculty of Veterinary Medicine won two Gold medals for his research on IMURON™ -a Total Solution for Polynucleotide Vaccines, and innovative Novel Polynucelotide Vaccine, NUCLEOCEPTIN™ for an Effective Fertility Control in Animals.

Associate Professor Mohd. Shahwahid Hj. Othman from Faculty of Economics and Management who is also currently the director of Research Management Centre (RMC) won a Gold medal for his successfully developing a software and a manual for Cost Benefit Analysis Simulation for Development Project Evaluation.

Associate Professor Ghizan Bin Saleh from Faculty of Agriculture won a Gold medal for his research on Improved Sweet Corn (*Zea mays* L.) Genotype Developed by Introgression of Exotic Germplasm: UPM-GS 2002.

Associate Professor Jamilah Bakar from Faculty of Food Science and Biotechnology won a Gold medal for her research on Gelatin from 3 cultured Freshwater Fish Skins Obtained by Limiting Process.

Associate Professor Foo Hooi Ling from Faculty of Food Science and Biotechnology received a Gold medal for her research on the Study of Novel Biopreservative produced by *Lactobacillus plantarum* I-UL4 isolated from Fermented Tapioca, *Manihot Esculanta*.

Associate Professor Tan Wen Siang from Faculty of Science and Environmental Studies won a Gold medal for his research on NDPath™: A Simple Solution to Newcastle Disease Virus Pathotyping.

Pn. Robiah Yunus from Faculty of Engineering received a Gold medal for her research in developing an Environmental Friendly Synthetic Lubricant.

Recipients of Silver and Bronze medals are given below: *(not in any particular order)*

	Medal	Scientist
1.	Silver	Professor Ho Yin Wan, Institute of Bioscience
2.	Silver	Professor Yaakob Che Man, Faculty of Food Science and Biotechnology
3.	Silver	Professor Mahiran Basri, Faculty of Science and Environmental Studies
4.	Silver	Professor Maziah Mahmood, Faculty of Science & Environmental Studies
5.	Silver (2 medals)	Professor Radin Umar Radin Sohadi, Faculty of Engineering
6.	Silver	Professor Mohd Ali Hassan, Faculty of Food Science & Biotechnology
7.	Silver	Assoc. Prof. Suraini Abd. Aziz, Faculty of Food Science & Biotechnology
8.	Silver	Assoc. Prof. Maznah Ismail, Faculty of Medicine & Health Sciences
9.	Silver	Assoc. Prof. Shattri Mansor, Faculty of Engineering
10.	Silver	Assoc. Prof. Borhanuddin Mohd. Ali, Faculty of Engineering
11.	Silver	Assoc. Prof. Fakhru'l-Razi Ahmadun, Faculty of Engineering
12.	Silver	Dr. Abdul Rahman Ramli, Faculty of Engineering

	Medal	Scientist
1.	Bronze	Professor Mohd.Zobir Hussein, Faculty of Science & Environmental Studies
2.	Bronze	Assoc. Prof. Aminuddin bin Hussin, Faculty of Agriculture
3.	Bronze	Assoc. Prof. Zulkarnain Zainal, Faculty of Science & Environmental Studies
4.	Bronze	Assoc. Prof. Fakhru'l-Razi Ahmadun, Faculty of Engineering
5.	Bronze	Pn. Nor Azowa Ibrahim, Faculty of Science & Environmental Studies
6.	Bronze (2 medals)	Wong Shaw Voon, Faculty of Engineering

In addition, UPM received the **First Prize** for the *Best Booth in the special design category*.

Executive Editor
sidek@putra.upm.edu.my

Spotlight

Reinventing yourself

How do you get established in the research world?

The first thing is to be realistic about your aims. Do you prefer to work on one topic, to the exclusion of all others? If so, you must be extremely good at identifying new leads in that area, you must work with the best people in the field and must gather around you young workers who are also single-minded. You must be prepared for the slings and arrows of outrageous fortune. You risk being beaten to the punch by other groups with better facilities or your topic may fall out of favor with funders. So, if you are wise, you will choose an area of generic long-term interest. The best topics will probably be taken. Be prepared for disappointments on the way.

Alternatively you may decide that you can contribute in a variety of areas, so long as your work is novel and the questions reasonably important. It is possible to address a large number of topics with the same basic portfolio of skills, if one is willing to adopt new ones. Some of these are the transferable skills, which you attempt to teach your students, including gathering information about funding opportunities and examining the criteria closely to identify topics, which could be addressed by current skills of the group, and anticipating new projects, which could be attempted by adopting new skills. The willingness to think laterally, and the confidence to be sure that success in a new field is attainable, is vital for progress.

Actually writing the grant application is, in my view, an enjoyable part of a scientific researcher's task. However, it astonishes me how many people make elementary mistakes. Remember that the more applications written, the better the chance of success. There is no point writing a gold-plated application—produce good, workmanlike applications which are hypothesis-based and in which the research tasks clearly follow from the hypotheses. There should be well-defined endpoints and well-defined milestones. Make sure that the timings and costs are realistic. There is nothing worse than obtaining salary funding and not having enough consumables. It should be hard to write a poor application if these simple rules are followed.

Then, of course, as a project leader you must make sure that everything works well. The best way to manage a team is to ensure that the people are capable, and are given as much freedom as possible. This may lead to disappointments but by and large it works because most professional laboratory scientists are intelligent, dedicated people who thrive on independence and responsibility. The best way to find out what is happening is to adopt the "management by walking-about" technique. In one of my friend's laboratory it was for years a standing joke that he would come in and shout "What is the answer?" This prompted obvious replies, some ribald, but it gave the opportunity for feedback, and also for him to check the progress of those who had not yet found their answer. When his progress was less than he wished it was often because he had spent too long teaching or on one of the other quantum tasks of a university professor.

Have the faith to believe that a good idea can come to fruition. Fred Sanger won two Nobel prizes, despite his distinctly poor first degree. He simply plugged away, step by step, knowing that the scientific method would, if applied strictly and fairly, produce results. This, combined with a fair and flexible management approach, ought to enable anybody, whether starting or restarting a research career, to obtain funding and produce worthwhile results, helping us to make better sense of the world in which we live.

Managing Editor
ndeeps@admin.upm.edu.my

The Use of the EPP Foam as a Liner Material for Motorcycle Helmet — Finite Element Simulation and DOE Optimization

F.M Shuaeib, A. M. S. Hamouda, S.V. Wong, M. M.H. Megat Ahmed, R.S. Radin Umar

AwardWinner

The aim of this research work is to carry out a finite element simulation as a verification tool for motorcycle helmet design using the expanded polypropylene foam as an energy absorption liner. This type of foam has a multi-impact protection performance and also has a potential for ventilation system improvement due to its resiliency. Simulations are carried to provide data for response surface creation and optimum design determination. The shell thickness, the foam thickness, and the foam density are selected as the design factors for the response surface optimization.

Helmet crash simulations are conducted using the large scale, non-linear, dynamic finite element package LS-DYNA3D. Impact of hemispherical headform is used to validate the foam model according to the available experimental data. As the material and the size of the headform used for material model validation are the same of that required for helmet simulation, it is used for the helmeted-head impact simulation. Based on this model the impact attenuation requirements of the Malaysian standards MS: 1996 are fulfilled. Then the shell thickness, the foam thickness, and the foam density are varied according to the required settings of the Box-Behnken design of experiment. The resulted simulations peak acceleration are recorded and used as a response predictor for the design of experiment matrix. The finite element model used is shown in Figure 1. The response surface design of experiment factors levels are shown in Table 1 and the response surface for the foam density and the foam thickness against the peak linear acceleration for the helmeted-headform center of gravity impact is shown in Figure 2.

Therefore, by combining the output of the CAE simulation with the DOE method, a comprehensive visualization of the helmet design parameters are achieved, and also the approach provides an insight inspection of the factors interaction effects which could not be determined by other methods.

The optimization is made using the response surface method, which also includes design of experiment that requires the use of the same simulation data. The optimum design is found to be a helmet with a foam density of 55 kg/m^3, 15 mm EPP foam thickness and 4 mm ABS shell thickness. Therefore the results of this work provided a useful information not only for the suitability of the EPP foam as a motorcycle helmet liner, but also about the helmet optimization problem which is considered as a significant contribution achievement. This methodology is summarized in Figure 3.

Table (1) The design levels of the RSM

Level	Foam density (kg/m^3)	Foam thickness (mm)	Shell thickness (mm)
Low	45	15	3
Medium	55	20	4
High	65	25	5

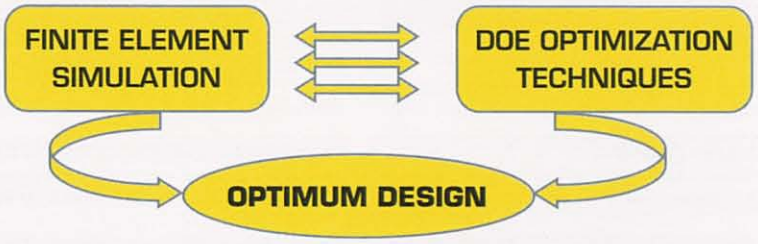


Figure (3): *The linking of the DOE with the FE simulation for helmet design optimization*

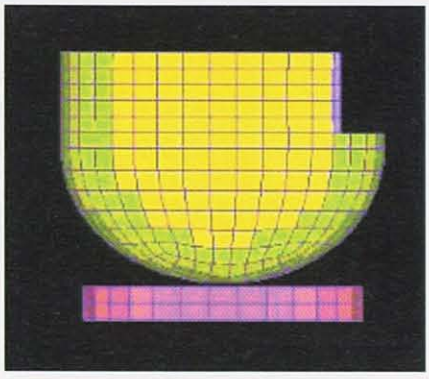


Figure (1): *the FE model used*

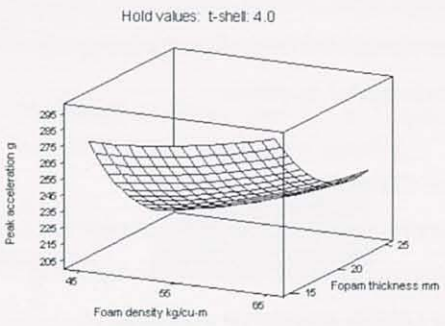


Figure (2): *the response surface of the acceleration against the foam thickness and the foam density*

Silver – Invention & Research Exhibition 2002

Reader Enquiry

Road Safety Research Centre and Department of Mechanical and Manufacturing Engineering
Faculty of Engineering
Universiti Putra Malaysia
43400 UPM, Serdang, Selangor
Malaysia

Tel: +603 8946 6263, 8946 7550
E-mail: radimumx@eng.upm.edu.my

Biocompost from Food Agricultural and Industrial Wastes

Mohd. Ali Hassan

Award Winner






Wastes from leftover food, agriculture and industry can be used as raw materials for value-added products. Municipal solid wastes and organic sludges such as palm oil mill effluent (POME) sludge, food factory sludge, sewage sludge and leachate sludge can be composted using bioreactor or windrow systems. In this study, the objective is to develop an appropriate rapid bioreactor composting system for municipal solid waste (MSW) and several selected organic sludges. Two types of bioreactors are used, i.e. (a) a modified cement mixer, with the drum insulated with 1.0 cm polystyrene to reduce heat loss; and (b) a locally designed and fabricated 200 liters drum composter. Due to the availability of sawdust, it is used as a bulking agent. The aeration, pH, temperature, C/N ratio and moisture content were controlled and monitored during the fermentation phase of the composting process. A good compost product was obtained with a ratio of 3:1:1 (wet weight basis) of MSW: sludge: bulking agent. For the composting with sewage sludge, POME sludge, food factory sludge and leachate sludge, the fermentation phase took 5, 5, 10 and 13 days respectively in the bioreactor. The fermentation phase could be reduced by the addition of 1% effective microbes (EM) as dry inoculum to the initial mixture. The pH for all the final biocompost products was between pH 6-8. The highest temperature achieved during the composting process was about 55°C. Thermophilic condition in the composting process was very important to kill the harmful pathogens, to reduce fermentation phase period and also to maintain optimum moisture content in the compost product. The moisture content (wet weight basis) during the composting was between 50-70% without added water. The C/N ratio was reduced from an initial value of 30 to below 20 in the final biocompost products. The low C/N ratio of the final biocompost products is an important indicator of maturity. There was about 50% reduction in weight from the original compost mix. Overall, the composting period of MSW with organic sludges using the bioreactor system took around 30-40 days as compared to 60-90 days by using conventional systems.

The characteristics of the final biocompost products were similar to commercial composts and complied to the USEPA standards especially in heavy metals content and total coliform bacteria. Based on planting

out performance with spinach, amongst the four biocompost products, the best compost was produced from MSW with sewage sludge.

GOLD – Invention & Research Exhibition 2002

Reader Enquiry

Environmental Biotechnology Research Group
Department of Biotechnology
Faculty of Food Science and Biotechnology
Universiti Putra Malaysia
43400 UPM, Serdang, Selangor
Malaysia

Tel: +603 8946 8353
E-mail: alihas@fsb.upm.edu.my

NDPath™: A Simple Solution to Newcastle Disease Virus Pathotyping

Tan Wen Siang, Priadarishni Ramanujam, Sheila Nathan, Lee Thong Chuan and Khatijah Yusoff

Award Winner

The Newcastle disease virus (NDV) is an economically important poultry virus worldwide which also infects many types of birds. Although this virus is controlled effectively by vaccination and mass slaughtering, sporadic outbreaks still occur.

Various kinds of tests have been developed to distinguish the different strains of NDV. Unfortunately, these tests are often laboratory specific, expensive or tedious and they were not able to distinguish between the vaccine strains (mesogenic and lentogenic strains) and the field isolates (velogenic strains) which are the etiologic agents for the disease. A novel peptide has been developed at UPM that can distinguish between vaccinated chickens and those that were infected with the field isolates of NDV.

It is found that this form of NDV typing is not previously reported, and furthermore it is the first invention that can distinguish the velogenic from the mesogenic strains. This invention is therefore useful as a routine diagnostic test to locate the source of an epidemic. In addition, this peptide is able to inhibit the replication of the virus and may be used as an antiviral drug.

NDPath™ is a patent-pending (P120013687) invention.

GOLD – Expo S&T 2003

Reader Enquiry

Department of Biochemistry and Microbiology
Faculty of Science and Environmental Studies
Universiti Putra Malaysia
43400 UPM, Serdang, Selangor
Malaysia

Tel: +603 8946 6715
E-mail: wstan@fsas.upm.edu.my

Career Indecision and Career Game Intervention Technology

Othman Dato' Haji Mohamed

Award Winner

Development of the Osman Career Decision Inventory was initiated through a systematic validation and reliability research study. Thirty-seven items were utilized in the original inventory. Variability of the items were tested on an *n* size of 50 with Type II error controlled. Subsequently, a Cronbach Alpha .84 was accepted as the stable reliability index for the final inventory with 33 items. Also the study indicated no significant difference in career indecision between Bumiputra Malay subjects with Non Bumiputra Chinese subjects t (45) 1.268, $p > .05$. The mean for Bumiputra subjects 114.0; SD 10.75 and Non Bumiputra subjects Mean = 108.75; SD 18.55. Seventy four percent of subjects were found to be career indecisive with common factor characteristics about career indecisiveness among subjects from the two groups.

The findings indicated that the commonality in career indecision requires a common career and job awareness strategy. In this regard, a job related career game was constructed that may instill inquisitiveness and knowledge about the world of work.

The Career Champion' (see Figure 1) is an innovative matrix board game exposing players to the rudiments of job awareness and job descriptions of specific occupations. The game also activates the counselling intervention framework of the career counsellor with the players rendering the enhancement of the players' career awareness, job knowledge and the job market (see Chart 1).

***Figure 1:** Career Champion™— a Matrix Jobs Game*

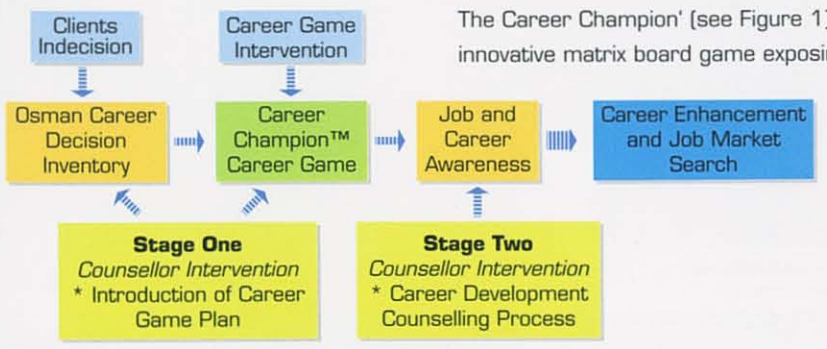


***Chart 1:** Flow of Career Awareness Enhancement*

GOLD – Invention & Research Exhibition 2002

Reader Enquiry

Faculty of Educational Studies
Universiti Putra Malaysia
43400 UPM, Serdang, Selangor
Malaysia

Tel: +603 8946 8111
E-mail: othman@educ.upm.edu.my

Research

THROUGH

Expo S&T Invention and Innovation Awards *(7-9 August 2003)*

Dr Mohd Azmi Lila explains his invention, Novel Polynucelotide Vaccine, NUCLEOCEPTIN™

Dr Arfah demonstrating her GenerReS Software to the judges

Prof Mohd Ali Hassan explains his research on Recovery of Intracellular Bioplastics from Various Waste Resources

UPM Invention and Research Exhibition & Awards *(8-10 July2003)*

From Left: Dr Khanif, Dr Shahwahid, Vice Chancellor Prof Dato' Zohadie and Prof Fatimah

From Left: Dr Sidek, Prof Fatimah, Prof Ali Hassan with Deputy Vice Chancellor (Academic) Prof Muhamad Awang

Dr Arfah explains her exhibit to Prof Dato' Zohadie while Dr Shahwahid (back) and Dr Sidek look on

From Left: Dr Jalaludin with Prof Kamel

ITEX 2003 Exhibition *(15-18 May 2003)*

A proud moment for our scientists at the ITEX 2003 Exhibition held from 15-18 May 2003

From Left: Dr Jalaludin, Prof Zulkifli and Prof Ho Yin Wan

Besides wining a Gold medal, Professor Ho Yin Wan received Anugerah Ram Rais with RM 1,500 cash for the best biotechnology project

From Left: Dr Maznah with her co-researcher Pn Azrina

Happenings

THE LENS

Dr. Shahwahid talks about his innovation on Cost Benefit Analysis Simulation for Development Project Evaluation

Deputy Vice Chancellor (Academic) Prof. Muhamad Awang receiving for UPM the first prize for the Best Booth in the special design category

UPM's Scientists—conferred a total of 30 medals comprising 10 Gold, 13 Silver and 7 Bronze at the EXPO S&T 2003 Invention and Innovation Awards 2003 held from 7-9 August 2003

Prof. Dato' Zohadie and Dr. Shahwahid with a keen eye on postgraduate research

From Left: Prof. Maziah and Prof. Fatimah

From Left: Dato' Zohadie, Y.B. Dato' Hj. Zainal and Dr. Shahwahid after the prize giving ceremony

UPM—a pool of talent; our scientists won a total 266 medals comprising 37 Gold, 81 Silver and 148 Bronze at the UPM Invention & Research Exhibition and Awards 2003 held from 8-10 July 2003

Dr. Jamilah Bakar demonstrates her exhibit to the Mr. P. Kandiah and his co-judge

A feel of success—UPM garnered ten medals at the International Invention, Innovation, Industrial Design and Technology Exhibition (ITEX 2003) held from 16-18 September 2003

Dr. Fakhru'l-Razi and his research team comprising postgraduate students from UPM

From Left: Dr Tan, Prof. Khatijah, Dr. Jamilah and Dr. Raha

Novel Polynucleotide Vaccine

NUCLEOCEPTIN™

for an Effective Fertility Control in Animals

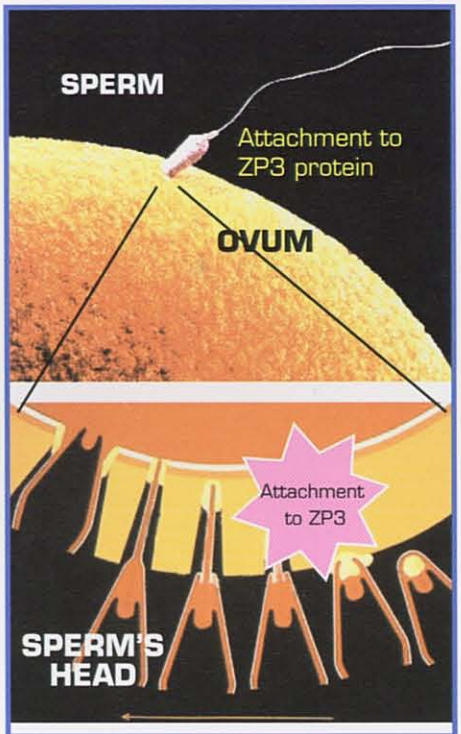
Award Winner

Mohd Azmi M.L., K.Y. Lai, Sheikh-Omar A.R. Sabrina S., Rosnina Y. and Hafidzi M.N.

A new mode of fertility control, immunocontraception has been adopted as a tool to solve the problem of overpopulation. Immunocontraception can be achieved by vaccinating animals with gamete proteins or reproductive hormones. The former is tissue specific; which means, other tissues will not be affected after treatment, therefore is of preference. One of the most useful gamete antigens is zona pellucida (ZP) protein, an extracellular matrix covering the mammalian oocytes. It composes of three sulphated glycoproteins, ZP1, ZP2 and ZP3, mediating sperm contact with the oocyte. Given the fact that the availability of intact ZP3 is always limited and purified natural protein is less stable compared to nucleic acid, polynucleotide vaccination will be an excellent alternative.

NUCLEOCEPTIN™ a polynucleotide vaccine has been developed by our group that carries the gene that encodes ZP3 protein for direct injection to animal. The anti-fertility vaccine constructed is comprised of a mammalian expression vector containing gene sequence encoding ZP3 protein.

Administration of this vaccine facilitates *in vivo* expression of ZP3 protein, which in turn stimulates the development of specific cellular and humoral immune responses directed against the destruction of self-ZP3 protein of oocytes. Animals immunised with NUCLEOCEPTIN™ were infertile. The reduction in average litter size of at least 90% is due to assured prevention



FERTILIZATION PROCESS

of follicle development. Ovaries of animals treated with NUCLEOCEPTIN™ showed direct prevention of mature follicles formation. Excessive depletion of the functional follicles was accompanied by an increase in the number of oocyte-free cell clusters. The ovaries became atrophic and eventually ended up with premature ovarian dysfunction and sterility. Alterations in ovarian function were also evidenced when the immunosterilised animals no longer sensitive to intensive exogenous hormonal (hCG) stimulation. None of the treated animals showed sign of recovery over extended period.

The NUCLEOCEPTIN™ has been proven as an excellent irreversible contraceptive vaccine. Its application in fertility control is assured. The application is only via a simple injection. Expensive and complicated invasive procedures like surgery and castration can now be avoided.

NUCLEOCEPTIN™ is a patent-pending (PI20020030) invention.

GOLD – Expo S&T 2003

Reader Enquiry

Virology Research Laboratory
Faculty of Veterinary Medicine
Universiti Putra Malaysia
43400 UPM, Serdang, Selangor
Malaysia

Tel: +603 8946 8305
E-mail: azmi@vet.upm.edu.my

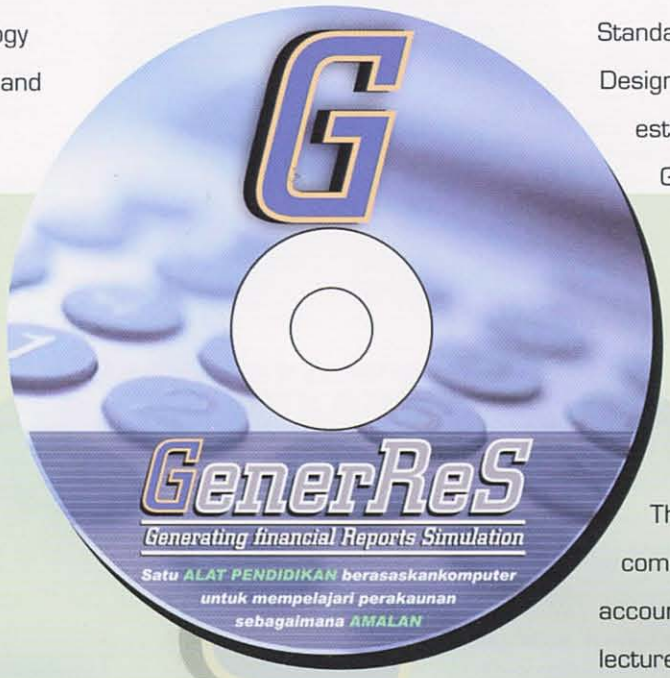
The Generating Financial Reports Simulation (GenerReS) Software

Arfah Salleh

AwardWinner

The need to design an accounting curriculum that continually reflects the changing work place environment has long been established. Yet, criticism on dated pedagogy applied in institutions of higher learning remains prevalent. Educators are claimed to be reluctant to develop creative types of learning including technology assignments while applying pedagogy that over-emphasises memorising and testing of recalls. This project which aims to develop a computer-based learning courseware for financial accounting is hoped to provide an innovative pedagogical tool that meets educational needs while simulating current industry practice.

Todate, the GenerReS software is the only one developed in the country that integrates aspects of computer-based learning with a simulation of computerised accounting systems program where the processes involved in a full cycle record keeping are provided from the generation of source documents to the preparation of financial statements and without sacrificing the logic of bookkeeping. Another breakthrough feature of the software is its ability to allow users to self-construct the relevant financial statements in addition to generating the statements automatically according to the Malaysian Accounting Standards Board (MASB) format. Designed according to some established learning theories, GenerReS provides the opportunity for students to develop and enhance their skills according to their individual time, location and ability.



The GenerReS Software

This product, which is already commercialised, can bring accounting as is practiced into the lecture rooms.

GOLD – Expo S&T 2003

Reader Enquiry

Graduate School of Management
Universiti Putra Malaysia
43400 UPM, Serdang, Selangor
Malaysia

Tel: +603 8946 7440/7441, 8946 7432
E-mail: arfah@putra.upm.edu.my

Cost Benefit Analysis Simulation for Development Project Evaluation

Mohd. Shahwahid Hj. Othman and Awang Noor Abd. Ghani

Award Winner

Evaluation of environmental goods and services and their damages by project development are difficult subjects and are often ignored in project evaluation assessments. Methods exist to place a value on these intangible impacts involving use and non-use economic values by applying various methodologies available in the literature.

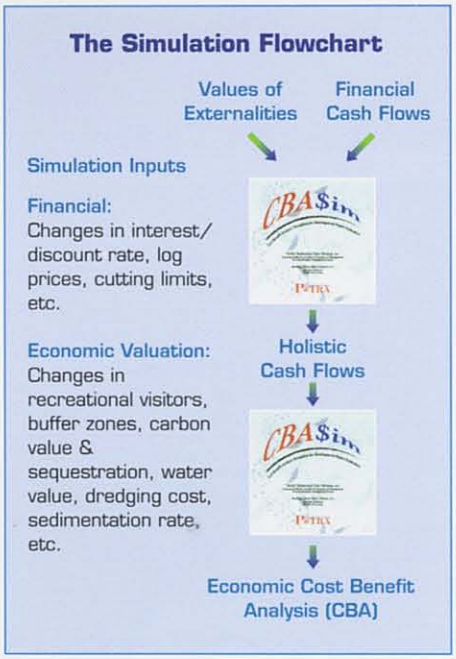
The study undertaken provided an innovation—a program to value these impacts for incorporation into the final cash flows, a more responsible analysis of the project viability can be made because the 'true' price of the environmental and social loss on account of poorly planned development project is ac-counted for.

This innovation is about a computing programme to compute economic cost benefit analysis by incor-porating monetary values of externalities/ environmental impacts into the computations of investment profitability criteria.

The programme facilitates analysts not familiar in economic valuations of intangible impacts of devel-opment to conduct cost benefit analysis. This enables economic planners and environmentalist/ conser-vationist to assess holistic viability of development project and to promote sustainable development. It's applications are NPV (Net Present Value), Benefit Cost Ratio, Internal Rate of return, Cost Effec-tiveness Analysis, Social Cost, Switching Value, and Sensitivity Indicator.

This programme is also helpful in teaching courses in environmental economics and project planning and evaluation at undergraduate and graduate levels. It is useful for EIA consultants, Environmental planners, Project analysts, Researchers, Policy makers, NGOs and Conservationists, etc.

The Simulation Flowchart



GOLD – Expo S&T 2003

Reader Enquiry

Department of Hospitality and Recreation
Faculty of Economics and Management
Universiti Putra Malaysia
43400 UPM, Serdang, Selangor
Malaysia

Tel: +603 8946 6185
E-mail: msho@econ.upm.edu.my

A Glance at Research Inventions & Innovations at UPM[1]

No.	Faculty/ Institute	Researcher	Innovation	Research Cluster	Project Number	IRPA Cycle
1.	Agriculture	Abdul Ghani bin Yunus	Structural biology of the reproductive organs of some tropical fruits	AFF	01-02-04-0006-EA001	Cycle 2001 - 1
2.	Agriculture	Adam Bin Puteh	Inducing polyembrony through cytology and chemical techniques to increase planting material for nursery industry	SAE	01-02-04-0575-EA001	Cycle 2002 - 3
3.	Agriculture	Ahmad Husni bin Mohd. Hanif	Fertilization of sago palm (metroxylon sago) suckers in the nursery and production of advance planting material	AFF	01-02-04-0576-EA001	Cycle 2002 - 3
4.	Agriculture	Anuar Abd. Rahim	Site specific management (Precision Farming) for rice production	AFF	01-02-04-0014-EA001	Cycle 2001 - 1
5.	Agriculture	Azmi Abdul Rashid	In vitro culture and genetic transformation of cabbage	BAB	09-02-04-0265-EA001	Cycle 2001 - 1
6.	Agriculture	Christopher Teh Boon Sung	Modelling the oil palm growth and its micro	AFF	01-02-04-0686-EA001	Cycle 2003 - 1
7.	Agriculture	Ghizan Bin Saleh	Breeding of sweet corn hybrids for yields, quality and adaptation	AFF	01-02-04-0025-EA001	Cycle 2001 - 1
8.	Agriculture	Ghizan Salleh	Breeding Of Grain Mize Hybrids For tolerence To Acid Soils	AFF	01-02-04-0491-EA001	Cycle 2002 - 2
9.	Agriculture	Halimatun Yaakob	The utilisation of salts of saturated and unsaturated fatty acids as sources of energy in lactating goats		01-02-04-0713-EA001	Cycle 2003 - 1
10.	Agriculture	Halimi Bin Mohd Saud	Development of effective microbial biofertilizers for yield improvement of high value vegetable crops grown on soilles, organic and conventional culture system	AFF	01-02-04-0028-EA001	Cycle 2001 - 1
11.	Agriculture	Hiryati binti Abdullah	Development of disease-suppressive compost for control of bacterial wilt of tomato	AFF	01-02-04-0031-EA001	Cycle 2001 - 1
12.	Agriculture	Hor Yue Luan	Cryopreservation of rattan (calamus spp.) seeds in liquid nitrogen for germplasm conservation	AFF	01-02-04-0035-EA001	Cycle 2001 - 1
13.	Agriculture	Hor Yue Luan	Conservation of genetic resources of oil palm (Elaeis guineensis Jacq.) in liquid nitrogen using the vitrification technique	BAB	01-02-04-0036-EA001	Cycle 2002 - 1
14.	Agriculture	Ismail Idris	Crossbreeding of deer for commercialization	AFF	01-02-04-0038-EA001	Cycle 2001 - 1
15.	Agriculture	Kamaruzaman Sijam	Bacterial plant disease management through rapid detection and sustainable control measures	AFF	01-02-04-0394-EA001	Cycle 2002 - 1
16.	Agriculture	Liang Juan Boo	Anti-nutritive Factors in Common Tropical Legumes Forages	AFF	01-02-04-0055-EA001	Cycle 2001 - 1
17.	Agriculture	Loh Teck Chwen	Minimising nitrogen excretion in swine by dietary manipulation	BAB	01-02-04-0395-EA001	Cycle 2002 - 1
18.	Agriculture	Mad Nasir Shamsudin	Efficiency Analysis of Rice Production and Distribution system	EAM	05-02-04-0197-EA001	Cycle 2001 - 1
19.	Agriculture	Maheran Abd. Aziz	Somatic embryogenesis and plant regeneration from immature male flowers of local banana cultivars	BAB	09-02-04-0430	Cycle 2002 - 1
20.	Agriculture	Maheran Abd.Aziz	In Vitro propagation of Nymphaea spp. and other commercilly important aquatic plants	AFF	01-02-04-0060	Cycle 2001 - 1
21.	Agriculture	Mahmud bin Tengku Muda Mohamed	Development and production of locally produced Chitosan base postharvest treatments for extending storage life of fruits (Papaya and Banana) and cut flowers (Chrysanthemum and Orchids)	AFF	01-02-04-0061-EA001	Cycle 2001 - 1
22.	Agriculture	Mihdzar Abdul Kadir	In vitro mass propagation of pineapple varieties 'Josapine and Sarawak'	AFF	09-02-04-0442-EA001	Cycle 2002 - 1
23.	Agriculture	Mohamed Hanafi bin Musa	Development of the fertigation technique for pineapple production on sandy soil	AFF	01-02-04-0067-EA001	Cycle 2001 - 1
24.	Agriculture	Mohd. Khanif Yusop	Soil management for low water input rice culture	AFF	01-02-04-0078-EA001	Cycle 2001 - 1
25.	Agriculture	Mohd. Razi Ismail	Regulated irrigation and root pruning on flower and fruit development of mango, dokong and mangosteen plants	AFF	01-02-04-0518-EA001	Cycle 2002 - 2
26.	Agriculture	Mohd. Razi Ismail	Precise control of irrigation, nutrition and microclimate for high value vegetables in soilless culture using automation and computer control	AFF	01-02-04-0082-EA001	Cycle 2001 - 1
27.	Agriculture	Mohd. Ridzwan Abd. Halim	Commercial production of a complete rice straw -based feed for intensive ruminant production	AFF	01-02-04-0083-EA001	Cycle 2001 - 1
28.	Agriculture	Mohd. Yusof Hussein	Enhancing biological control of Asiatic corn borer through habitat and vegetative diversification	AFF	01-02-04-0400-EA001	Cycle 2002 - 1

[1] **Data refers to IRPA RM-8 (as of August Cycle 2, 2003); Total 356 EAR Grants.**

to be continued...

†The description of the some of the above Inventions and Innovative research products available for commercialisation at UPM are contained in the book—"R&D at UPM: Creating New Frontiers of Innovative Research", First Edition, Editor: Nayan Deep S. Kanwal, Published by Research Management Centre (RMC), UPM, available from Publications & Promotion Unit, Administration Building, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor Darul Ehsan, Malaysia, Tel: +603 8946 6028, 8946 6192, Fax: +603 8942 6539, e-mail: rschinfo@admin.upm.edu.my

Reportage

Professor Zulkifli Hj. Shamsuddin, the outgoing director, RMC

Professor Zulkifli Hj. Shamsuddin served as the foundation director of the Research Management Centre (RMC) since his appointment in September 2001. He had used every opportunity for the centre to get to know UPM's scientists better and seeing them in action.

He left RMC on 17 June 2003 to return back to his parent faculty to be actively involved in research. Prof. Zulkifli can now be reached at 03 8946 6990, Department of Land Management, Faculty of Agriculture or via email at zulsham@agri.upm.edu.my

Assoc. Prof. Mohd. Shahwahid Hj. Othman, the new incoming director, RMC

Assoc. Prof. Mohd. Shahwahid Hj. Othman, Deputy Director, Research Management Centre took over as the new incoming Director, RMC effective 18 June 2003. He is seconded from the Faculty of Economics and Management and specializes in Natural Resource Economics. He can be reached at 03 8946 6028 or via email at msho@putra.upm.edu.my

Assoc. Prof. Zulkifli Idrus, Deputy Director, Policy, Planning and Finance Unit, RMC

Assoc. Prof. Zulkifli Idrus from the Department of Animal Science, Faculty of Agriculture has taken over as the new Deputy Director, Policy, Planning and Finance Unit, RMC with effect from 1 August 2003. He can be contacted at 03 8946 6185 or via email at zulkifli@agri.upm.edu.my

Mr.Mohd. Izham Ismail, Head, Corporate Communication Unit

Mr.Mohd. Izham Ismail, Deputy Registrar, Research Management Centre left the center on 31 July 2003 to be the new Head of Corporate Communication Unit, Chancellory, UPM. His new contact details are: Telephone: 03 8946 6003, Email: izham@putra.upm.edu.my

Mr.Jamsari Tamsir, Deputy Registrar, RMC

Mr.Jamsari Tamsir has been appointed as the new Deputy Registrar, Research Management Centre (RMC) with effect from 1 August 2003. Prior to his appointment with RMC, he was attached to the Faculty of Engineering. He can be reached at 03 8946 6030 or via email at jamsari@putra.upm.edu.my

Letters to the Editor

If you have any comments about the content of the publication or any contributions that you may wish to make for the forthcoming issues, please send them to: The Managing Editor, *Synthesis*, Publication and Promotion Unit, Research Management Centre, 3rd Floor, Administration Building, 43400 UPM, Serdang, Selangor, Malaysia or via the Internet to editor@rmc.upm.edu.my. The editor reserves the right to edit articles for clarity and space before publication.

The opinions and views expressed in this publication are not necessarily those of *Synthesis* or the Research Management Centre (RMC). Acceptance and publication of articles in this publication does not imply recommendations by RMC.

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Scientists must be made aware of how important the impact of their work is and its possible applications on society and public opinion. It is hoped that this digest will provide the opportunity to interact particularly through feedback or direct mail to the scientist from either the private sector or by scientists from other government research institutions.

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Research Management Centre

UNIVERSITI PUTRA MALAYSIA
Chancellory
Administration Building
43400 UPM, Serdang,
Selangor Darul Ehsan
Malaysia

Tel
+603 8946 6028
+603 8946 6192, 8946 6183
Fax
+603 8942 6539

E-mail
editor@rmc.upm.edu.my
Website
http://www.admin.upm.edu.my/research
http://rmc.upm.edu.my/