

# BOOK OF ABSTRACTS

## 7<sup>th</sup> Vietnamese–Hungarian International Conference on Agricultural Research for Development (ARD)

Including

**“International EU-SEA Scientific Symposium on Agricultural Research for  
Development (ARD) with special regards to Ecological Farming Systems”**

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Organized by



with participation of European and Hungarian institutions:



Institute for Small Animal Research and Co-ordination  
Centre for Gene Conservation (KÁTKI)

Godollo



Association of Hungarian Small Animal Breeders for Gene  
Conservation (MGE)

Godollo



Research Institute for Fisheries, Aquaculture and Irrigation  
(HAKI)

Szarva

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**7<sup>th</sup> Vietnamese-Hungarian International Conference  
International EU-SEA Scientific Symposium on Agricultural Research for Development  
with special regards to Ecological Farming System**

**OFFICIAL PROGRAM**

Place: Hall 007, College of Agriculture and Applied Biology, Can Tho University (Campus II), Ninh Kieu District, Can Tho City, Viet Nam

Can Tho University, 28- 29/8/2012

Date	Activities	Remark
Tuesday August 28, 2012	<b>08.00-08.30:</b> Registration	Staff, Department of International Relations, CTU
	<b>08.30-09.00:</b> Welcoming notes <b>08.30-08.45:</b> Dr. Ha Thanh Toan <b>08.45-09.00:</b> Dr. Mezes Miklos	Facilitator: Mr. Pham Xuan Binh
	<b>09.00-10.00: Plenary session</b> Keynote lectures <b>09.00-09.15:</b> Dr. Mezes Miklos <i>“Feed and food safety aspect of mycotoxins”</i> <b>09.15-09.30:</b> Dr. Nguyen Van Thu <i>“Adapting livestock production systems to global crises in tropical developing countries”</i> <b>09.30-09.45:</b> Dr. Kisne Do Thi Dong Xuan <i>“Overview of ethical frame of agricultural research for development (ARD). Sustainable improvement of poultry research for development (PRD) with Hungarian genetic resources in the remote areas of Southeast Asia”</i> <b>09.45-10.00:</b> Dr. Soulivanthong Kingkeo <i>“Animal Genetic Resources in the Lao PDR: Current status and production systems”</i>	Chairman: Dr. Mezes Miklos, Dr. Nguyen Van Thu
	<b>10.00-10.30:</b> Coffee break	

	<p><b>10.30-12.00: Agricultural Research for Development (ARD) presentations</b></p> <p><b>10.30-10.45:</b> Dr. Szalay Istvan  <i>"The Hungarian protection system of farmanimal genetic resources and its research and development scopes"</i></p> <p><b>10.45-11.00:</b> Dr. Cel Kheiu Borin,  "Challenges and Opportunities – What will be the future of smallholder farmers?"</p> <p><b>11.00-11.15:</b> Dr. Soukhanh Keonouchanh  <i>"Adaptation study of Hungarian turkey breed in the LAO PDR"</i></p> <p><b>11.15-11.30:</b> Dr. Lustyik Gyorgy  <i>"Multiplex Flow Cytometric Mycotoxin Assay. Principles of the Technology – Building a Complex System"</i></p> <p><b>11.30-11.45:</b> Dr. Nguyen Thi Kim Dong  "A study of feed and nutrient intakes, growth rate and economic analysis of Guinea fowls fed different levels of dietary crude protein in the Mekong delta of Viet Nam"</p> <p><b>11.45-12.00:</b> Dr. Tran Ngoc Hai  " Freshwater prawn farming in the brackish water area of the Mekong Delta, Viet Nam"</p>	<p>Chairman: Dr. Szalay Istvan,  Dr. Dang Kieu Nhan</p>
	<p><b>12.00-13.30: Lunch</b></p>	
	<p><b>13.30-15.00: Animal husbandry presentations</b></p> <p><b>13.30-13.45:</b> Dr. Nguyen Van Thu  "A response of growth performance, carcass values and economic return of Guinea fowls supplemented by different fresh water hyacinth (<i>Eichhornia crassipes</i>) levels in the Mekong Delta of Viet Nam"</p> <p><b>13.45-14.00:</b> Dr. Nguyen Thi Kim Khang  "Effect of phase feedings on nitrogen excretion and carcass yield of cobb 500 broilers"</p> <p><b>14.00-14.15:</b> Ms. Thieu Ngoc Lan Phuong  <i>"Comparative cyopreservation of guinea fowl spermatozoa: a slow, programmable and pellet method"</i></p> <p><b>14.15-14.30:</b> Dr. Do Vo Anh Khoa  "Structural homology of the terminal complement components in pigs"</p> <p><b>14.30-14.45:</b> Dr. Bodi Laszlo  <i>"Poultry meat quality – properties and the effects of genotype and keeping methods"</i></p> <p><b>14.45-15.00:</b> Dr. Ho Thi Viet Thu  <i>"Study on route and dose of administration of recombinant Bacillus subtilis expressed chicken interferon alpha (B. subtilis-ChIFN alpha) in pretreatment of Newcastle disease in chickens".</i></p>	<p>Chairman: Dr. Nguyen Van Thu, Dr. Bodi Laszlo</p>
	<p><b>15.00- 15:30</b> Coffee break</p>	

	<p><b>15.30-17.00: Aquaculture and fisheries presentations</b></p> <p><b>15.30-15.45:</b> Dr. Gyongyosine Papp/Zsuzsanna  <i>"Effect of vitamin C feeding for European catfish during chemicals caused stresses"</i></p> <p><b>15.45-16.00:</b> Dr. Vu Ngoc Ut  "Assessment of water quality in shrimp culture areas in the Mekong Delta"</p> <p><b>16.00-16.15:</b>Dr. Nguyen Thi Ngoc Anh  "A survey on abundance and distribution of gut weed (<i>Enteromorpha sp.</i>) in brackish water bodies of the Mekong Delta, Viet Nam"</p> <p><b>16.15-16.30:</b> Dr. Le Xuan Sinh  "Technical and financial comparison in using different types of feed for snakehead fish culture and perception of the farmers in the Mekong Delta, Viet Nam"</p> <p><b>16.30-16.45:</b> Dr. Ngo Thi Thu Thao  "Survey on technical and financial factors from different cultured systems of blood cockle (<i>anadara sp</i>) in Kien Giang and Ca Mau provinces"</p> <p><b>16.45-17.00:</b> Dr. Chea Tharith</p>	<p>Chairman: Dr. Gyongyosine Papp/Zsuzsanna , Dr. Vu Ngoc Ut</p>
	<p><b>18.00-20:30: Diner</b></p>	
<p>Wednesday August 29, 2012</p>	<p>05.30-08.00: Floating market (optional activity)</p>	
	<p><b>09.00-10.00: Agricultural Research For Development-Poster session and discussion</b></p> <p><b>09.00-09.15:</b> Dr. Ardó Laszlo  <i>"Application of herbal extracts to improve non-specific immune response and health status of fish"</i></p> <p><b>09.15-09.30:</b> Dr. Nguyen Thi Kim Dong  "Effects of different levels of crude protein in the diets on apparent nutrient digestibility and nitrogen balance of the Guinea fowls at 8, 10 and 12 weeks of age in the Mekong delta of Viet Nam"</p> <p><b>09.30-09.45:</b> Mr. Jancsó Mihály  "Organic Rice in Hungary. Research for Sustainable Food Production"</p> <p><b>09.45-10.00: Poster session and discussion</b></p> <p><b>-Mr. Bui Xuan Hung</b>  <i>"A promising bio-control agent in sustainable management of western corn rootworm (<i>Diabrotica virgifera</i>)"</i></p>	

	<p><b>Dr. Duong Nhut Long</b>  <i>“Rice-Freshwater Prawn (Macrobrachium rosenbergii) in the Integrated Farming System in Hong Dan District, Bac Lieu Province, Viet Nam”</i></p> <p><b>--Dr. Lustyik Gyorgy</b>  <i>“Side by Side Comparison between the Traditional ELISA and the New Competitive Fluorescent Microsphere Immunoassay (CFIA). Detection of Six Mycotoxins”</i>  <i>“Development of a method for the detection of different mycotoxins in rice, tea, coffee and pepper”</i></p> <p><b>Mr. Nguyen Thanh Hieu</b>  <i>“Evaluation on the growth, survival rate and yield of common carp (Cyprinus carpio) in integrated rice – fish system”</i></p> <p><b>Ms. Nguyen Thuy Linh</b>  <i>Effect of replacing of dietary fish meal by catfish (Pangasius hypophthalmus) by-products on growth performance and economic returns of growing Muscovy ducks</i></p> <p><b>Dr. Nguyen Van Thu</b>  <i>“A study of animal waste and plants to produce biogas and electricity”</i></p> <p><b>Dr. Nguyen Van Thu</b>  <i>“Effect of water hyacinth (Eichhornia crassipes) supplementation in diets on nutrient intakes, digestible nutrients and nitrogen retention of guinea fowls at 8 and 11 weeks of age in the Mekong Delta of Viet Nam)</i></p> <p><b>Mr. Phan Quoc Nam</b>  <i>“Weed flora of organic and conventional maize fields in the Jászszág region, Hungary”</i></p> <p><b>-Ms. Thieu Ngoc Lan Phuong</b>  <i>“Cryopreservation method of guinea fowl spermatozoa”</i></p> <p><b>Ms. Tran Thi Hong To</b>  <i>Effect of protein sources and prebiotic on growth, survival, and immunology in culture of yabby (Cherax destructor Clark (1936))”</i></p>	<p>Chairman: Dr. Ardó Laszlo, Dr. Do Vo Anh Khoa</p>
	<p><b>10.00-11.00:</b> Chairmen session, Closing ceremony – recommendations</p>	<p>Chairman: Dr. Mezes Miklos, Dr. Ha Thanh Toan</p>
	<p><b>11.00-13.00: Lunch</b></p>	
	<p><b>13.00-18.00:</b> Can Tho family farming systems  - Tan Loc Island  - Bang Lang bird paradise</p>	<p>Can Tho family farming systems: organised by CTU</p>



# Plenary session

# FEED AND FOOD SAFETY ASPECT OF MYCOTOXINS

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## **Abstract**

Mycotoxins, secondary metabolites of microscopic fungi or moulds, are contaminants of feeds and consequently in foods of animal origin. Those are major problem all over the world because most of the mycotoxins, even at very low quantity have been shown to induce signs of toxicity in mammalian and avian farm animal species and humans. It has been estimated that 25% of the world's crop production is contaminated with mycotoxins, and some of them have importance even in South-East Asia, such as aflatoxins, ochratoxins, zearalenone, deoxynivalenol and fumonisins. In most cases these mycotoxins can be found in combination in contaminated feed. The above mentioned mycotoxins have detrimental effects on production traits and health, in particular immune response, of farm animals and they also accumulate in different animal origin foods, such as milk, egg, meat or other edible tissues, such as liver or kidney. Rate of accumulation of mycotoxins in different products depends on the exposure (intake of mycotoxin contaminated feeds) and the species and age of farm animals. There are numerous data about the accumulation of mycotoxins in different tissues or products, but in some cases mycotoxins are present in products in metabolised, and some cases in "masked" forms. Most of the metabolites are also toxic, sometimes more toxic than the initial compound and in most cases the synergistic effect among them is not known. Therefore adequate food quality control methods require for accurate determination for mycotoxins and their toxic metabolites. There are legal limits of mycotoxins in feeds and also in foods in all over the world, therefore human exposure with animal origin feeds can be kept at safe level.

*Keywords: mycotoxins, feed safety, food safety, farm animals*

# ADDAPTING LIVESTOCK PRODUCTION SYSTEMS TO GLOBAL CRISES IN TROPICAL DEVELOPING COUNTRIES

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## Abstract

There is a global triple crisis including food, energy and climate change, which are interrelated and interactive. The food and energy crisis have caused severe problems in many countries of the World due to the increasing human population and worsening economic development, while global climate change has made these problems even more serious because of the difficulties of food production, disasters, diseases, etc. To satisfy the animal protein demands of human nutrition, present systems of large-scale animal production in tropical developing countries (e.g., industrial chicken and pork, feedlot beef cattle, concentrate feeding to dairy cattle) have caused unacceptable harm to the environment (e.g., excess levels of nitrogen and phosphorus entering rivers and green house gas emissions). With the increasing human population, there is now greater risk of protein-malnutrition. There is also obvious risk of environmental pollution resulting from natural disasters. The adaptation of animal production systems to the global crises has been, therefore, a pressing and high priority issue in tropical developing countries. Despite constraints of current livestock production in many parts of the World, there exists promising and sustainable models of animal production that are based on utilization of renewable plant biomass as feed for livestock production, while saving grains for human consumption. In addition, diversification of animal species aids in mitigating green house gas emissions, while adapting to climate change. Utilization of animal production models based on appropriately sustainable farming systems ensures better use of locally available feeds, while increasing renewable energy production, etc. The wise choice of livestock production systems for sustainable development in tropical developing countries could be beneficial for the producers and for our globe.

*Key words: Change, livestock production, climate change, diseases, sustainability.*

**OVERVIEW OF ETHICAL FRAME OF AGRICULTURAL RESEARCH FOR DEVELOPMENT (ARD). SUSTAINABLE IMPROVEMENT OF POULTRY RESEARCH FOR DEVELOPMENT (PRD) WITH HUNGARIAN GENETIC RESOURCES IN THE REMOTE AREAS OF SOUTHEAST ASIA.**

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**Abstract**

Having a disposal of a rich Old Hungarian poultry gene bank (HUBA poultry) and rare traditional animal genetic resources, KATKI&MGE possess a great tool for ARD and Poultry Research for Development, principally Family Poultry. For decades Hungary has disposed important experiences in Agriculture Research for Development (ARD) which activity occupies one of the most significant places in the rural economy of Southeast Asia (SEA). Definition of ethical frame of ARD is unconditionally important in the project. ARD has to promote sustainable agriculture, increasing food security and productivity, while protecting the environment, local traditions, and generating income for rural people and manpower. The ecological type family farming systems indirectly protect the multifunctional rural landscapes. Poultry Research for Development (PRD) is the most accessible way for people leaving in the rural/remote areas to join the economic development. The best method of the gene conservation of the rare Animal Genetic Resources is their use in everyday production. The results of our adaptation projects in SEA proved that old Hungarian poultry breeds either purebred or crossed with local ones are excellent objects of family farming in the tropics. Our further aim is to elaborate methodology of food safety “from farm to fork” in family poultry (FP) production for rural producers in the SEA countries.

*Keywords: Sustainability, Family Poultry, Animal Genetic Resources, Rural Development*

# **ANIMAL GENETIC RESOURCES IN THE LAO PDR: CURRENT STATUS AND PRODUCTION SYSTEMS**

**Dr. SOULIVANTHONG KINGKEO**

## **Introduction**

About 77 % of all families of the Lao People's Democratic Republic (PDR) are engaged in agriculture. The agricultural sector contributes to about 30.4 % of the gross domestic product (GDP) including 18 % by the livestock and fisheries sub-sector (MAF 2010). Almost all output - live animals and products - is from traditional small scale production by low inputs and low outputs. The farmers are kept one or more species of livestock (including poultry). The traditional livestock management practice is based on free-range grazing of harvested or fallow lands. Breeding is generally uncontrolled with nearly negligible attempts for genetic improvement. The cattle is yellow Asian, the buffaloes are of swamp type, the swine have been characterized and classified in to four types of breeds by phenotypes (genotypes analysis are required) and indigenous poultry have been classified in to 6 types.

In 2010 the livestock population consisted of 1.18 million buffalo, 1.5 million cattle, 0.35 goats, 2.75 million pigs (with about 20 % of them being exotics, i.e. in Lao terms 'modern, intensive' breeds) and poultry 25.1 million birds are the main species of livestock in the country(DLF,2010). Elephants (estimated at 800 domestic or domesticated with perhaps an additional 1200 in the wild) are used for transport and as prime movers in the forested areas of the far north and as the tourist gimmick in several areas. The probably less than 10.000 horses are used for transport in the mountainous areas (Trevor Wilson, 2007). There are some wild life's of bovines including Banteng and Kouprey in the southern part of the country. Per capita consumption for the Lao people in 2010 is 45 kg/year, including 20 kg of fish, 8.7 kg of pork, 6.4 kg of poultry, 3.2 kg of beef, 2.9 kg of buffalo meat, 0.2 kg of goat meat and 3.6 kg of egg. At present, there is no dairy farm in the country, all of milk product import from neighboring countries and demand is increasing day by day, especially in the Vientiane capital.

# **DEVELOPMENT OF A METHOD FOR THE DETECTION OF DIFFERENT MYCOTOXINS IN RICE, TEA, COFFEE AND PEPPER**

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## **Abstract**

As we shown earlier, the Fungi-Plex™ kit (Kit) developed by Soft Flow Hungary R&D Ltd. is a competitive fluorescent-microsphere immunoassay (CFIA) for the multiple mycotoxin detection mainly from wheat, barley, rye and corn. The kit was extended to a six-plexed cytometric bead assay, which is able to detect simultaneously Aflatoxin B1 (AB1), OchratoxinA (OTA), Fumonisin B1 (FB1), T-2-toxin (T-2), Zearelenone (ZEA) and Deoxynivalenol /Vomitoxin/ (DON) contaminations in various food and feed. The applied technology combines the superior specificity of regular immunoassays such as the enzyme-linked immunosorbent assay (ELISA) with the high sensitivity and simplicity of the flow cytometry and it provides a validated, suitable platform for the detection of the relevant fungal agents mentioned above.

The assay principle is based on the competition of antigens (the small mycotoxins and larger mycotoxin-coupled phycoerythrin macromolecules) to the binding places of antibodies. Specific monoclonal antibodies prepared against that mycotoxins are conjugated to the surface of the different carboxyl-modified polystyrene particles (beads) covalently, and antigen-antibody reaction can be realized. The assay was optimized to comply with the ranges determined by most international/legal rules and directives such as EEC 315/93, EC 1881/2006, EC 1126/2007 and EC 165/2010. The Kit works according to the FDA Regulatory Guidance for Toxins and Contaminants as well.

Because of the global problems of mycotoxin contaminations appearing in most of the dominant agricultural plants/yields, the relevance of an accurate, cost-effective detection from more, highly produced cereals (e.g. rice) and consumer goods (e.g. coffee, tea, spices) is unquestionable.

As a first step, we demonstrate here improved methods aiming the reduction of the matrix effects observed in rice, tea, coffee and pepper which can significantly embarrass or even inhibit the mycotoxin detection. We attempt to apply our Kit for the determination of AB1, OTA, FB1, T-2, ZEA and DON in cases of those matrices as well.

## **Acknowledgement**

This work was supported by National Office of Research and Technology, BIO-SURF (NTP) and the National Development Agency of Hungary (GOP 1.1.1-07/1-2008-0049; GOP-1.1.1-09/1-2010-0201 ).

## ORGANIC RICE IN HUNGARY

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### Abstract

Organic production is an increasing part of European agriculture. Organic rice (*Oryza sativa* L.) is also increasing in Hungary but further development needs new improvements of varieties and technology. Recently, food safety and food security have an increasing role in the relation of agriculture, food industry and consumers.

Multifunctional utilization of rice fields e.g. for fish culture has a long history, particularly in Asia. In Europe, Hungary was the first country to introduce rice-fish farming in the end of the 19th century by using of common carp (*Cyprinus carpio* L.) in paddy fields.

In our study, different rice varieties and fish species (Common carp, European catfish (*Silurus glanis* L.), Ide (*Leuciscus idus* L.)) and various stocking densities were tested in organic rice fields to determine suitable combination of fish species for plant protection purposes and for fish rearing.

Juvenile fish in combination of 1500 Common carp, 500 Ide and 500 Wels catfish per hectare were found appropriate for decreasing the damage of *Triops cancriformis* Bosc, *Cricotopus bicinctus* Meigen and *Hydrellia griseola* Fall. and for recovery.

Organic rice has an increasing role in human nutrition because of the complex dietary effects. Three different region of organic rice production (Csárdasszállás, Kisújszállás, Rózsás) in Hungary were investigated to determine the concentration of toxic and possible toxic heavy metals (As, Cd, Cr, Cu, Ni, Pb, Zn, Hg) during the lifecycle of rice in the soil of paddies, in the irrigation water and in the rice plants and grains.

Based on our results, Hungarian organic rice is healthy and safe. However, the Cu content could be higher than limits. The monitoring of these paddies is recommended because of minor exceed of Cr, Cu, Ni, Pb and Zn in soils, irrigation water or rice plants but not in the grains.

The concentration of As, Cd and Hg was much below the official limits in all samples. In the samples from Csárdasszállás the concentration of the Cu (14,55 mg\*kg<sup>-1</sup>) and Pb (0,51 mg\*kg<sup>-1</sup>) in plants, from Kisújszállás the Ni (0,034 mg\*l<sup>-1</sup>) in irrigation water, the Cr (95,55 mg\*kg<sup>-1</sup>) and Ni (54,41 mg\*kg<sup>-1</sup>) in soil, the Cu (34,28 mg\*kg<sup>-1</sup>), Pb (0,4 mg\*kg<sup>-1</sup>) and Zn (48,98 mg\*kg<sup>-1</sup>) in plants and the Cu (5,46 mg\*kg<sup>-1</sup>) in milled rice; from Rózsás the Cr (122 mg\*kg<sup>-1</sup>) and Ni (61,63 mg\*kg<sup>-1</sup>) in soil and the Cu (10,35 mg\*kg<sup>-1</sup>), Pb (0,515 mg\*kg<sup>-1</sup>) and Zn (40,43 mg\*kg<sup>-1</sup>) in plants were above the limits on these elements.

Keywords: organic farming, *Oryza sativa*, fish, heavy metals

# **Agricultural Research for Development (ARD) presentations**



# THE HUNGARIAN PROTECTION SYSTEM OF FARM ANIMAL GENETIC RESOURCES AND ITS RESEARCH AND DEVELOPMENT SCOPES

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## SUMMARY

Several protection systems of farm animal genetic resources have been elaborated to accomplish conservation programmes, however they must differ region by region even within one country, according to the local climate, agricultural traditions and unique for the region breeds. The paper introduces the Hungarian protection system, which consists of gene banks, gene protection, gene conservation and gene rescue (see

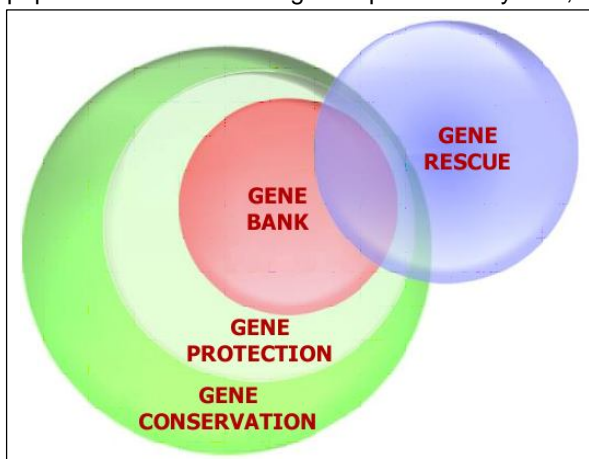


Figure 1 for the scheme of the protection system), as main elements of local farm animal breed protection for the Carpathian basin. In the first part, an overview of the protection categories, their relations and research scopes are briefly discussed. Examples taken from related research and development, including rural initiatives and co-operation programmes with Southeast-Asia, illustrating the importance and possible use of old breeds as part of Agricultural Research for Development (ARD) are also given.

Figure 1. Scheme of the Hungarian protection system of farm animal genetic resources

(Source: Szalay et al., 2012)

In the second part of the paper, the main activities of the Institute for Small Animal Research and Co-ordination Centre for Gene Conservation (KATKI) are presented. Founded recently on the basis of the former Institute for Small Animal Research in Hungary with a special task of strengthening and developing the conservation activities of the traditional domestic animal breeds in the Carpathian basin, the Centre provides an example for combining research and development with conservation, breeding and use of traditional domestic animal breeds, with the additional education and training to make conservation research one of the essential elements of sustainable *Agricultural Research for Development (sARD)*.

The protection system, however, would not be taken into action without the participation of breeding organisations (NGOs), providing the professional background for all activities related to protecting domestic animal breeds. An example is also given for a special co-operation, built between KATKI and MGE (the Association of Hungarian Small Animal Breeders for Gene Conservation) for the Hungarian poultry breed protection programme, in which MGE, as the official breeding association supervises the implementation of the protection system, and KATKI is the main gene bank and breeding centre for old Hungarian poultry, including 7 chicken, 2 turkey, 1 guinea-fowl, 2 duck and 2 goose breeds.

*Keywords: AnGR, conservation, agricultural research for development (ARD)*

# CHALLENGES AND OPPORTUNITIES – WHAT WILL BE THE FUTURE OF SMALLHOLDER FARMERS?

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## Abstract

Cambodia has the population of 14,952,665 (estimated in 2012) of whom 80% live in the rural areas with the main livelihood activities from agriculture. The population is projected to be 18,390,683 in 2030. The real GDP per capita is estimated at USD945 for 2012 but indicating a serious gap between rich and poor. The GDP by sector is 30% from agriculture, 30% from industry and 40% from services. The economy grew about 10% per year from 2004-2008 but has declined to 6-7% since 2009 due to global economic slowdown. Livestock contributes about 15 percent of agricultural GDP. The Strategic Planning Framework for Livestock 2011-2020 aims to improve the livelihoods of small producers, household income and food security and provide a safe and efficient supply of livestock products to the urban consumers and potential export market.

The opportunities of livestock keepers to supply meat to local consumers will increase due to income and population increases in the cities but at the same time they will also face great challenges to adapt their livestock production systems due to climate change and the diseases including HPAI and PRRS. Cambodia currently does not produce enough pig meat for its own consumption, requiring the import of over 600,000 pigs to meet demand but having potential for cattle production for export market.

Most of the livestock keepers are small-scale of which 67% keep  $2.37 \pm 0.24$  (1-5) cattle, 15% keep  $0.50 \pm 0.06$  (1-3) buffalos, 46.1% keep  $1.41 \pm 0.16$  (1-5) pigs, 89.9% keep  $12.7 \pm 0.74$  (5-23) chickens, and 23.5% keep  $6.41 \pm 2.03$  (1-40) ducks. They commonly practice traditional scavenging systems as a means of risk mitigation rather than in systems more orientated toward increased production. Except pigs of which they supplement concentrate, majority of smallholder livestock keepers feed their animals with local available feed resources such as agricultural by-product including rice bran and broken rice and forages.

Producers should be classified in three main categories – smallholder, small and medium scales and large producers. Understand characteristics of these producers will help for the development of adequate solutions and policy options to address their needs. Smallholders by nature are subsistent farmers largely relied on the natural resources of their accessibility, produce just enough for home consumption but having the tendency to decline in numbers. Their disappearance is linked to their economic improvement or opportunity or pushing to switch to other non-farm work. The small and medium producers are self-sufficient farmers, they commonly produce for the market either with their own investment or through contract farming with large farms/producers and they are common dependent on purchased inputs but they are the important drivers to meet the demand of the increasing population. Based on this nature what should be the appropriate options for smallholder farmers?

Keyword: *livestock, smallholder, food, inputs, production systems,*

## ADAPTATION STUDY OF HUNGARIAN TURKEY BREED IN THE LAO PDR

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### Abstract

One thousand of Hungarian day old turkey chicks from Poultry Research Center (POREC, NIAS) are introduced to Livestock Research Center (LRC, NAFRI) in May, 2010 under trilateral project. There are two lines including Copper and Bronze turkeys. Thirty heads of each line were used for data collection. The average daily gain (ADG) and body weight of copper and bronze turkeys at 22 weeks of age were 23 g and 26 g, and 3648 g and 4043 g respectively. The body weight of male and female at first laying (30 weeks), number of egg per hen per year and hatching rate were 7.0 kg and 6.5 kg, 10 kg and 9.0 kg, 50 and 60, and 70% and 71% for copper and bronze turkeys respectively. According to these records indicated that both of Hungarian turkey breeds are well adapted to Lao environment and conditions as in Vietnam and original country.

*Keywords: Hungarian turkey, adaptability, Lao PDR.*

## MULTIPLEX FLOW CYTOMETRIC MYCOTOXIN ASSAY. PRINCIPLES OF THE TECHNOLOGY – BUILDING A COMPLEX SYSTEM

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### Summary

**Technology:** Mycotoxins, as a toxic secondary metabolite produced by organisms, besides its human health effects may cause serious harms throughout the value chain. These cause both serious health disorders and economical costs. Both governments and international organizations focus on mycotoxin regulations, by determining compulsory maximum of mycotoxin contaminations.

A six-plexmicrobead array technology has been developed for detection of mycotoxins in feed and food samples. Mycotoxins are "fungus poisons", harmful metabolites produced by various species of fungi. The multiplexed assay kit is an ideal tool for high throughput screening of large number of samples for simultaneous detection of the six most frequent mycotoxins.

Mycotoxin-contaminated foods and feeds are of critical importance due to their potential hazard to the human health and that of livestock and poultry. Mycotoxins can cause a variety of both short term and long-term health effects, such as immediate toxic response, potential long-term carcinogenic and teratogenic effects. This was recognized by authorities of many countries and by the United Nations almost twenty years ago. As a result, the food legislation arm of the UN, Food and Agriculture Organization (FAO) has called for reliable analytical methods to detect mycotoxins.

In response to these needs, we have developed multiplexed microbead array technology for simultaneous detection of six mycotoxins: Ochratoxin A, Aflatoxin B1, Fumonisin B1, T2-toxin, Zearelenone and Deoxynivalenol. The goal of our work was to develop a multiplexed assay that can be used as a high throughput screening method for quantitative detection of mycotoxins in large number of samples. We successfully developed a cytometricmicrobead assay that is considerably simpler and less expensive than the conventional ELISA assay.

There are three main components of the developed assay kit: (1) Fluorescently labeled toxin molecules, (2) antibody coated microbeads, and (3) standards containing known concentrations of the six mycotoxins. The samples are measured in a flow cytometer, and the acquired data are analyzed with FCAP Array, our sophisticated software package developed for analysis of cytometric bead array data.

The kit works on the principle of competitive immunoassay. The procedure requires preparation of mycotoxin-fluorescent dye conjugates as detectors. In our case, we developed *phycoerythrin*-antigen conjugates using various chemical methods to bind the chemically different toxins to the protein moiety of *phycoerythrin* (PE).

The microbeads were coated with toxin specific monoclonal antibodies by covalent coupling. The applied direct conjugation provided stable bead conjugates with low unspecific binding and background.

**Economic aspects:** The economic losses of mycotoxin contamination derive from four major aspects: contaminated crops are less valuable; diseases, caused by toxigenic fungi result in yield losses; mycotoxins cause losses in animal productivity; mycotoxin contaminations have human health costs. Based on our calculations the losses are serious in case of Vietnam as well. Considering only one type of mycotoxin, the loss on rice, deriving from the necessary price discounting resulting from Aflatoxin contamination, is estimated to be 383 000 thousand USD.

Soft Flow Hungary Ltd., located in Pécs, Hungary, is a leading Hungarian biotechnology company providing innovative analytical solutions for the food/feed industry by developing multiplexing cytometric bead array technologies. Soft Flow Hungary developed the first multiplexed cytometric bead assay kit for simultaneous detection of up to six mycotoxins from food and feed products. The

Company has 20 years of international experience in fields of food and feed safety diagnosis and distribution.

Our company offers a technology suitable for the simultaneous detection of 6 mycotoxins. This feature is unique and currently it is the most cost effective solution for these purposes. Besides economic factors FungiPlex is a reliable and accurate detection system, proved to be suitable for these purposes.

As an expert of this field, Soft Flow Hungary offers various solution packages for Mycotoxin detection in Vietnam. Toxin detection together with a mycotoxin handling system promised to offer an approximate of 1000% return. These high returns derive from efficiency, productivity increase, less costs on animal health care and last but not least from the increased volume and price of agricultural product export. Present document includes the basic technology descriptions and also contains economical calculation presenting the high value offered by this present project plan.

In longer turn, we propose to establish laboratory centers for routine measurement of mycotoxins in the major logistic centers, warehouses, export centers. The current proposal describes the project of organizing the first laboratory facility that can serve as a prototype for the network controlling the mycotoxin contamination issue in the Socialist Republic of Vietnam.

### **Acknowledgement**

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# A STUDY OF FEED AND NUTRIENT INTAKES, GROWTH RATE AND ECONOMIC ANALYSIS OF GUINEA FOWLS FED DIFFERENT LEVELS OF DIETARY CRUDE PROTEIN IN THE MEKONG DELTA OF VIETNAM

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## **Abstract**

A feeding trial was carried out to investigate the feed intake, growth performance and economic analysis of Guinea fowls fed concentrate-based diets including maize, broken rice, rice bran, fish meal and soybean meal. One hundred and fifty of guinea fowls originally come from Hungary were arranged in a completely randomized design with 5 treatments and 3 replications. The treatments were the crude protein levels of the diet at 14, 16, 18, 20 and 22% (CP14, CP16, CP18, CP20 and CP22). The experimental period lasted 9 weeks.

The results of the experiment indicated that CP intake improved gradually with increasing the crude protein level in the diets ( $P < 0.05$ ), while the other nutrient intakes were not significantly different ( $P > 0.05$ ) among the diets. The daily weight gain was significantly different ( $P < 0.05$ ) among the diets with the highest for the diet CP20 (19.4g) and the lowest for the diet CP14 (16.1 g). Similarly the feed conversion ratio was significantly ( $P < 0.05$ ) improved when crude protein level of diet increasing up to 20% and they were 3.43, 3.10, 3.07, 2.90 and 3.10 for the CP14, 16, 18, 20 and 22 diets. The economic analysis of the study indicated that the profit was improved when increasing CP level up to 20% and they were 43.5, 47.6, 48.1, 53.8 and 46.3 thousand VND per bird. It was concluded that the nutrient intakes, growth performance and economic return gradually improved with dietary crude protein increasing from 14 to 20%.

*Key word: Chicken, growth, dietary protein, income, nutrient utilization*

# FRESHWATER PRAWN FARMING IN THE BRACKISH WATER AREA OF THE MEKONG DELTA, VIETNAM

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## Abstract

This study aims to evaluate the current technical and socio-economical status of freshwater prawn (*Macrobrachium rosenbergii*) farming systems in the seasonal brackish water area in the Mekong Delta, where apply rotational crops of tiger shrimp culture during the sunny season with brackish water, and freshwater prawn culture during rainy season with freshwater. The survey was conducted for two systems of semi-intensive prawn culture in Tra Vinh province (17 households), and the integrated rice- prawn culture in Ben Tre and Bac Lieu province (76 households). The results showed that for the semi-intensive prawn culture, prawns are cultured in ponds of  $0.71 \pm 0.50$  ha with stocking density of  $4.85 \pm 1.50$  prawns/ $m^2$ . Prawns are fed with pellet feed, homemade feed, and casually with trash fish. Prawns are harvested after six months of culture with average yields of 977.14 kg/ha. Net income from prawn culture is 55.44 millions VND/ha. For the integrated rice –prawn culture, farm area was  $0.71 \pm 0.47$  ha. Prawn is stocked in the early rainy season when water salinity at about 3-12ppt, and salinity was decreased gradually to 0-3ppt at the end of the crop. Low stocking density of  $1.42 \pm 0.85$  prawns/ $m^2$  was applied. Prawns were not fed or fed casually with grains, vegetable or trash fish during the culture. Prawn yields after 6 months of culture were  $110 \pm 55$  kg/ha which gave net income of  $6,559 \pm 5,711$  million VND/ha/crop. Financial aspects for shrimp culture and rice cultivation were also analyzed for these systems. For both systems, prawn culture significantly support diversification of culture species, farming systems, and income for farmers in the coastal areas of the Mekong Delta.

**Key words:** Prawn culture, *Macrobrachium rosenbergii*, integrated farming systems

# **Animal husbandry presentations**



# A RESPONSE OF GROWTH PERFORMANCE, CARCASS VALUES AND ECONOMIC RETURN OF GUINEA FOWLS SUPPLEMENTED BY FRESH WATER HYACINTH (*EICHHORNIA CRASSIPES*) IN THE MEKONG DELTA OF VIETNAM

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## Abstract

One hundred and twenty Guinea fowls at five weeks of age were used in an experiment to evaluate effects of different supplementation levels of fresh water hyacinth in basal concentrate diets on the growth performance, carcass values and economic returns. The experiment was a completely randomized design with 5 treatments and three replications. The treatments were the different supplementation levels of fresh water hyacinth at 0, 1.5, 3.0, 4.5 and 6.0% levels of body weight (WH0, WH1.5, WH3.0, WH4.5 and WH6.0, respectively) and the experiment was finished at 14 weeks of age. The concentrate used for feeding birds contained 20.0 %CP, 6.35% CF and 2.850 kcal/kg ME.

The results showed that the daily DM intakes were significantly ( $P < 0.01$ ) different among the treatments and they were 57.3, 57.6, 59.0, 58.5 and 58.4 g for the WH0, WH1.5, WH3.0, WH4.5 and WH6.0, respectively. Similarly the daily CF intake were significantly different ( $P < 0.05$ ) among the treatments and they were 3.64, 4.02, 4.44, 4.74 and 4.99 g for the WH0, WH1.5, WH3.0, WH4.5 and WH6.0, respectively. The daily CP and ME intakes were significantly different ( $P < 0.05$ ) among the treatments with the highest values for the WH3.0 treatment. The highest value of daily weight gain was for the WH3.0 treatment (17.7 g) and significantly higher than the lowest one of the WH0 (16.9 g), while FCR value was not significantly different ( $P > 0.05$ ) in different treatments. The weights of carcass and breast meat of the WH3.0 was significantly higher than the WH0 treatment ( $P < 0.05$ ). The economic analysis showed that the profit got from the experiment was improved in the WH supplementation diets. The conclusion was that Guinea fowls fed concentrate basal diets with 6.35 %CF and supplemented by fresh water hyacinth from 3% to 6% body live weight could increase daily weight gain and economic returns.

*Key words: Green fodders, supplement, chicken, meat, performance, benefit.*

## **EFFECT OF PHASE FEEDINGS ON NITROGEN EXCRETION AND CARCASS YIELD OF COBB 500 BROILERS**

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### **Abstract**

This study was conducted to evaluate the effect of phase-feeding on nitrogen excretion and carcass yield of Cobb500 broiler chickens, the experiment was completely randomized design into 4 treatments as followed three different feeding phases: 0-21d, 22-35d, 36-42d was control treatment; treatment 1 was 0-21d, 22-28d, 29-42d of feeding phases; treatment 2 with feeding phases 0-14d; 15-35d; 36-42d and treatment 3 with feeding phases 0-14d, 15-28d, 29-42d. Each treatment was replicated 4 times with 2 chicks at 1 day of age per replication. The diets contained 21, 19.5 and 18% crude protein which correlated to three different phases as starter, grower and finisher, respectively.

The results showed that the different significance of nitrogen intake, nitrogen balance and nitrogen retention among treatments were found only at finisher period ( $P < 0.05$ ). However, the nitrogen excretion was not significant difference among treatments in both grower and finisher phases ( $P > 0.05$ ), as well as, the digestibility of DM, OM, EE and NDF of broilers were not significantly different among treatments ( $P > 0.05$ ).

The carcass trait results indicated that the significant differences among treatments were found in breast meat weight, % breast meat, weight of heart and % abdominal fat/carcass weight in with the control diet was the highest values and treatment 3 was the lowest values, conversely, the highest small intestinal length was in treatment 3 (197.6 cm) and lowest in the control (179.8 cm) ( $P < 0.05$ ). The % breast meat/carcass weight in female of treatment 2 (17.25%) was the highest value compare to the lowest in male of treatment 3 (13.87%) which was also the lowest values in heart weight and in % abdominal fat/carcass weight than others treatments ( $P < 0.05$ ).

**Keyword:** broiler, phase feeding, nitrogen excretion, carcass

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## COMPARATIVE CRYOPRESERVATION OF GUINEA FOWL SPERMATOZOA: A SLOW PROGRAMMABLE AND PELLET METHOD

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### Abstract

Semen cryopreservation is a practical method for banking germplasm from critical livestock and saving the valuable indigenous poultry species with increasing risk of extinction, as well. Many scientific publications have been described different protocols of avian sperm cryopreservation for both domestic and non-domestic avian species, involving cryoprotectant type and packaging method, as well as freezing and thawing rates. However, the effective freezing protocol for guinea fowl is still lacking, presumably, due to the lower freezing tolerance of guinea fowl sperm. A comparative approach was used to evaluate two freezing protocols for guinea fowls: a slow programmable method with freezing rate of  $-1^{\circ}\text{C}/\text{min}$  until  $-30^{\circ}\text{C}$ , then  $-30^{\circ}\text{C}/\text{min}$  until  $-60^{\circ}\text{C}$  using 10% ethylene glycol (EG); and a fast freezing in pellet form with 6% dimethylacetamide (DMA). The efficiency of two protocols is measured by *in vitro* tests (determination of sperm concentration and motility, morphological and live/dead sperm analysis) and artificial insemination. *In vitro* qualification shows that the survival rate of live and intact spermatozoa was significantly higher in pellet than in slow protocol (29 % vs 23 %,  $P < 0.05\%$ ). Insemination of frozen-thawed semen yielded 64 % fertility rate with pellet, while only 29 % with slow programmable method. By the end of third week of artificial insemination, fertility rate reached the peak level in all groups (control, slow programmable, pellet), and the rate of very early embryonic deaths decreased significantly from 38 to 4.5% in case of pellet formation. As a conclusion, pellet formation seems to be an effective method for cryopreservation of guinea fowl, while slow protocol produced low fertility rate despite of the seemingly acceptable survival rate.

*Key words: poultry, guinea fowl, sperm freezing, cryobank*

# STRUCTURAL HOMOLOGY OF THE TERMINAL COMPLEMENT COMPONENTS IN PIGS

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## Abstract

Complement system is known as one of the initial humoral immune response mechanism of host body against invading pathogens. Complement activation acts via three different modes - classical, alternative and lectin pathways leading to the formation of membrane attack complex (MAC). This is a assembly of the terminal complement components C5b-9. In this study, it was investigate to identify molecular structure by sequencing and to detect polymorphism of porcine candidate genes pC6-9 by using PCR-RFLP method. The results indicated that (i) there were high homologous among the candidate genes, except pC8G, in pigs and among mammalian species. This may open new ways in cure/ treatment of disease in related animals, (ii) polymorphisms were detected within the pC6-9 and Mườ̄ng Khườ̄ng animals have a great genetic potential to improve health status of pigs.

*Key words: pig, terminal complement genes, homology, polymorphism*

**STUDY ON ROUTE AND DOSE OF ADMINISTRATION OF RECOMBINANT *BACILLUS SUBTILIS* EXPRESSED CHICKEN INTERFERON ALPHA (*B. SUBTILIS*-ChIFN $\alpha$ ) IN PRETREATMENT OF NEWCASTLE DISEASE IN CHICKENS**

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**Abstract**

The in vivo effects of recombinant *Bacillus subtilis* expressed chicken interferon alpha (*B. subtilis*-ChIFN $\alpha$ ) by dose and route of administration on Newcastle disease virus (NDV) were investigated in this study. Chicks were given doses of  $0.5 \times 10^{10}$  spores of *B. subtilis*-ChIFN $\alpha$  by eye drop or oral administration with 1 or 5 supplies. Challenges with virulent Newcastle disease virus were carried out after 2 or 6 hours of *B. subtilis*-ChIFN $\alpha$  administration with dose of  $10^4$  ELD<sub>50</sub> per experimented chicken. The experimented results showed that the survive rate of chickens which received *B. subtilis*-ChIFN $\alpha$  by oral administration was (79.17%) significantly higher than that by eye drops. No significant difference was reported from chickens with 1 and 5 supplies as well as in chickens challenged by NDV after 2 and 6 hours of *B. subtilis*-ChIFN $\alpha$  administration.

*Key words:* *Bacillus subtilis*, chicken interferon alpha, Newcastle disease

# FATTY ACID PROPERTY OF THE AGRICULTURAL PRODUCTS APPLIED IN ANIMAL FEEDING IN THE MEKONG DELTA OF VIETNAM

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## Abstract

The experiment was conducted on nutritional lipid source from locally agricultural products to identify their iodine index value and fatty acid property used for human and animal consumption. The important agricultural products were investigated: soybean *Glycine max*, coconut *Cocos nucifera*, catfish *Pangasius* and the common vegetables *Ipomoea batatas* and *Ipomoea aquatica*. The ether extract (EE) concentration of each representative samples was determined. The total oil was extracted from each sample, then iodine index and fatty acids (FAs) analyzed for its composition. Results showed that five soybean varieties 'MTD65', 'MTD176', 'Namvang C', 'Namvang H' and 'Cantho 4' containing EE content ranged from 19.5-20.6% ( $P < 0.01$ ), while iodine index from 106-117 ( $P < 0.05$ ) and linoleic acid from 40.4-55.0%. Among the coconut varieties, 'Bi', 'Lua', 'Taxanh', 'Tadai' and 'Dau', the EE content ranged from 69.2-72.0% ( $P > 0.05$ ), while iodine index from 6.7-7.4 ( $P < 0.05$ ) and lauric acid from 44.4%-49.9%. To the catfishes, the 'Basa' contained more fish oil and unsaturated fatty acid concentration than the 'Tra' (52% vs 63%,  $P < 0.01$ ) and iodine index value was 61.5 vs 53.9 ( $P < 0.01$ ). Among the sweet potato (*Ipomoea batatas*) varieties, 'Hongdao', 'Hsinchu', 'Duongngoc' and 'Langbi', the EE content of the leaves ranged from 4.8-5.8% ( $P < 0.01$ ), while linolenic acid from 39.7-45.5%. Three water spinach (*Ipomoea aquatica*) varieties, 'Hat', 'Nuoc' and 'Dong' containing EE content ranged from 6.9-7.2% ( $P < 0.05$ ), while linolenic acid from 45.1-47.3%. The improvement of these above agricultural products may be valuable sources of nutrition for either human and animal production in the region.

*Key words: iodine index, lauric acid, linolenic acid, unsaturated fatty acids*

# **Aquaculture and fisheries presentations**

# EFFECT OF VITAMIN C FEEDING FOR EUROPEAN CATFISH DURING CHEMICALS CAUSED STRESSES

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## Abstract

Vitamin C is an essential cofactor of hydroxylation reactions go on in human and animal organs, it has a key role in the protection against dangerous reactions of free radicals and stress effects, as well as it is antioxidant and immunostimulant. The humans and some animals are not able to synthesise of this essential vitamin due to lack of gulonolacton oxidase enzyme. As intensive fish breeding was spread in the world, symptoms similar to human scurvy were described as deficiency disease due to lack of vitamin C, for several fish species (rainbow trout, channel catfish, salmons etc.). However it was described, that some primitive fish like sturgeon have a sufficient amount of gulonolacton oxidase enzyme to produce L-ascorbic acid.

As vitamin C has key role against different stresses effects of ascorbic acid for European catfish (*Silurus glanis* L.) in different chemical stress situations were studied in our work.

Experiments on chemicals caused stresses were performed in the recycling system of Research Institute. Basic feeding treatments with different levels (0, 10, 100,1000, 10000 mg/kg diet) of vitamin C were carried out before stress experiments with 5 g average body weight fish at the beginning. After four months fish were used with 150 g average body weight in stress (formaline, high nitrite, and hypoxia) experiments. Vitamin C concentration were determined by an own HPLC-UV method.

Changes in ascorbate concentrations of studied organs in three environmental stress model with chemical character were shown that vitamin C requirement of fish increased temporally (Table 1).

**Table 1: Changes of total vitamin C concentration in tissues of European catfish (*Silurus glanis* L.) in different stress situations**

Stress	Brain	Liver
Nitrite	↑	↑
Formaline	↑	↓
Hypoxia	↓	↑

Acknowledgement: ↓ = decreased in all groups; ↑ = increased in all groups

According to this result fish might require a higher, sometimes 10,000 mgkg<sup>-1</sup> ascorbate supplementation in the diet. Increasing of dietary ascorbate level is recommended in case of water pollution or if there is a need to apply a bath with chemicals.

*Keywords: vitamin C, fish, stress reactions*



**ASSESSMENT OF WATER QUALITY IN SHRIMP CULTURE AREAS  
IN THE MEKONG DELTA**

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**Abstract**

Water quality was investigated in shrimp culture areas in Cau Ngang, Tra Vinh where three culture systems were found in the same area to assess the impact of intensification of shrimp culture on the surrounding environment. Three culture systems were selected including intensive, semi-intensive and rice-shrimp alternated culture. Water quality assessment was based upon water physical-chemical parameters and biotic parameters including mainly zooplankton and zoobenthos species compositions. The water physical –chemical parameters recorded include temperature, pH, dissolved oxygen, chemical oxygen demand (COD), total suspended solids (TSS), total ammonium (TAN), nitrite (N-NO<sub>2</sub><sup>-</sup>), nitrate (N-NO<sub>3</sub><sup>-</sup>) and total nitrogen (TN), total phosphorus (TP) in both water and sediment. Zooplankton and zoobenthos were determined quantitatively and qualitatively using zooplankton nets and Petersen grabs, respectively. Both water quality and aquatic animal samples were collected monthly for one year round in the canals surrounding the culture systems. The results indicated that most of water parameters were not significantly different between culture systems and were in suitable ranges for aquatic life within the National Standard Criteria except DO, TSS and TP at some periods. DO concentration in rice-shrimp system was significantly lower than that in other systems. TSS and TP concentrations both in water and sediment were high exceeding the limit ranges (>100 mg/L). The occurrence of some zooplankton and zoobenthos species indicated that all systems were polluted at a level in which the rice-shrimp alternated culture system subjected to more environmental fluctuation not only by shrimp culture but also rice cultivation and salinity variation between dry and rainy seasons.

*Keywords: water quality, shrimp culture, bio-indicators*

# A SURVEY ON ABUNDANCE AND DISTRIBUTION OF GUT WEED (*ENTEROMORPHA* SP.) IN BRACKISH WATER BODIES OF THE MEKONG DELTA, VIETNAM

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## Abstract

The investigation was conducted monthly from March 2011 to February 2012 at the extensive farms and abandoned water bodies of Bac Lieu and Soc Trang provinces in the Mekong delta of Vietnam. The survey results showed that high standing crop (1.60-2.73 kg ww m<sup>-2</sup>) and production (10,624-16,230 kg ww ha<sup>-1</sup>) of gut weed, *Enteromorpha* sp. were mainly observed between December and March in Bac Lieu province. However, in Soc Trang province, gut weed abundances were obtained from February to May with the ranges of 1.24-2.66 kg ww m<sup>-2</sup> and 11,322- 13,024 kg ww ha<sup>-1</sup> for standing crop of gut weeds and their production, respectively. Analysis of the linear regression revealed that a negative correlation between the production of gut weed and the water temperature was observed in the water bodies of Bac Lieu ( $R^2 = 0.7286$ ) while within salinity range of 0-16 ppt recorded in the water bodies of Soc Trang, there was a positive relationship between the production of gut weed and salinity ( $R^2 = 0.7951$ ). Furthermore, gut weeds widely distribute in the extensive farms and abandoned water bodies where salinity ranged from 5 to 35 ppt. Besides, gut weed can be found in the discharge canals from shrimp ponds, the reservoirs, the fertilization ponds in the *Artemia* culture system and brackish water bodies next to the populated areas, especially gut weeds developed abundantly (2-5 kg ww m<sup>-2</sup>) in the extensive shrimp ponds. In some cases, a temporary occurrence of gut weed was seen at salinities between 60 and 70 ppt in the *Artemia* ponds. These results indicate high potential of gut weeds, *Enteromorpha* sp. in the brackish water bodies of the Mekong delta.

*Keywords: Gut weed, Enteromorpha sp., distribution, abundance, standing crop.*

# TECHNICAL AND FINANCIAL COMPARISON IN USING DIFFERENT TYPES OF FEED FOR SNAKEHEAD FISH CULTURE AND PERCEPTION OF THE FARMERS IN THE MEKONG DELTA, VIETNAM

LE XUAN SINH<sup>3</sup>; DOAN HONG VAN<sup>1</sup> & NGUYEN THI THUY KIEU<sup>1</sup>

## Abstract

Common snakehead fish (*Channa striatus*) is a native species and mostly preferred by local consumers, also cultured popularly in the Mekong Delta of Vietnam. However, the supply of feed is the most serious difficulty for snakehead industry in the delta region. The results from surveying 100 snakehead farms showed some significant differences ( $p < 0.05$ ) between three typical farming systems (earth pond, hapa in pond, and hapa on the river/canal). Experience, total area or volume and water depth are higher for pond culture but lower for hapa on the river while the number of crops per year is the same (1.6 crops) using 1-2 ponds or hapas. More than 90% of farmers use artificial fingerling at the highest stocking density with hapa in pond and lowest with earth pond even though the stocking duration is longest with pond culture and shortest with hapa on river. The rate of pellet feed application must higher for pond farmers but very rare in the case of hapa on the river. The proportion of feed cost is about 1.5 times higher when using pellet feed in comparison with trash fish only. FCR varies from 1.4-2.4 if pellet feed is applied but it ranges from 3.9-4.8 if only trash fish is used. There is only 10% of pond farmers treat the water by using sedimentation pond while red spots and bacteria are two most frequent diseases. FCR, survival rate, net income and rate of net income/total cost are not significantly different between the types of feed application. Approximately 90% of harvested snakeheads are directly sold to traders and 85% of farmers receive at least some profit even though the users of pellet feed have higher selling price due to the off-season harvests. Hapa in pond seems to be less risky than others because of the highest of profit receivers and also the highest rate of net income/total cost (91.1% and 0.54). The regression analysis show that amount of feed (trash fish or pellet), cost for fish health management, stocking density and month of stoking fingerlings are positively related to the yield of fish while hapa on the river and the rate of total cost for fish culture/total annual costs for all economic activities of the household have negative effects. In general, snakehead farmers tend to replace trash fish by pellet fish. The binary logistic regression show three significant factors have affected the application of pellet feed include: total water volume of pond or hapa, water depth and educational level. However, for the coming time, only total water volume has effect on the replacement of pellet feed for trash fish. It is important to produce more appropriate feed specified for snakeheads in association with some improvement in credit supply and better technical trainings. In addition, there is a need for the snakehead industry to meet the international standards or certification for an expansion of the markets for this species.

**Key words:** snakehead fish, trash fish, pellet fed, hapa, pond, river.

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# **SURVEY ON TECHNICAL AND FINANCIAL FACTORS FROM DIFFERENT CULTURED SYSTEMS OF BLOOD COCKLE (*ANADARA SP*) IN KIEN GIANG AND CAMAU PROVINCES**

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## **Abstract**

This survey was conducted to evaluate technical and financial factors from different blood cockle culture systems (in mangrove forests, in ponds and on tidal flats) from 60 farmers in Kiengiang and Camau provinces during December 2011 to June 2012. The results showed that blood cockle yield was highest in tidal flat ( $3.15 \pm 1.21$  tons/ha) following by mangrove forest systems ( $2.15 \pm 1.69$  tons/ha) and in ponds ( $2.15 \pm 1.72$  tons/ha). The benefit reached highest value when blood cockles were cultured in ponds ( $70,3 \pm 66,0$  million VND/ha/crop), then in mangrove forest canals ( $70,3 \pm 66,0$  million VND/ha/crop) and lowest in tidal flats ( $68,7 \pm 65,0$  million VND/ha/crop). However, cost benefit ratio was highest in tidal flat systems ( $2.73 \pm 1.24$ ), then in mangrove forest systems ( $2.44 \pm 0.69$ ) and lowest in pond culture ( $1.34 \pm 0.79$ ). Results from survey also revealed that applications of each system depending on many factors in that the location, financial source, land property and seed resource... were important factors.

*Keyword: Culture systems, blood cockle, Anadara sp, benefit*

## MORE FISH, THE CHALLENGE OF FISHERIES IN CAMBODIA

NAM SO, PHEN CHHEN AND THARITH CHEA

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### Abstract

Total production of Cambodian fisheries ranges between 400,000 and 500,000 tonnes annually. The majority of the fish supply in Cambodia is from freshwater capture fisheries. This makes up around 79% of the total, with marine capture providing around 15% of the total. Overall fish and other make up over 80% of animal protein intake for the population as a whole and this can rise to 90% in fishing dependent provinces. It is estimated that the nation wide consumption level is around 52.4kg/person/year although it could be substantially higher given that much of the fish landed is not recorded.

More than 500 fish species are found in Cambodia freshwaters. Cambodians categorise the freshwater fish species as 'Black' or 'White'. 'Black fish' are species able to survive in wetlands areas year round and have limited lateral migrations. Among them are the snakehead species. 'White fish' are mainly riverine species that show strong lateral and longitudinal migrations. This group includes cyprinids (among them the 'riel') and various *Pangasius* species.

The actual catches in recent years for the sub sector are shown large scale and middle scale fisheries, 85,600-120,000, small-scale/family fisheries 140,000-155,000 tonnes, rice field fisheries 1110,000-115,000 tonnes. Total inland fish catch 335,000-390,000 tonnes. Marine catches 42,000-75,000 tonnes, aquaculture 14,000-50,000 tonnes.

Keyword: *fisheries, freshwater, consumption, production, aquaculture*

# APPLICATION OF HERBAL EXTRACTS TO IMPROVE NON-SPECIFIC IMMUNE RESPONSE AND HEALTH STATUS OF FISH

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## Abstract

*Antibiotics and vaccines against pathogen bacteria are the most commonly used agents in prevention of infectious fish diseases. Excessive use of antibiotics can lead to selection of resistant bacteria and causes environmental pollution. Vaccination helps in prevention of diseases, but enhances only the specific immune response against one pathogen. Innate (non-specific) immune system also has an important role in protection of fish against diseases. Agents stimulating non-specific immune response are called immunostimulants. They are compounds of various structures; there are polysaccharides, flavonoids and alkaloids among them. Recent results of research demonstrate that they can be applied to prevent infectious fish diseases in practice.*

Research group of immunology in the Research Institute for Fisheries, Aquaculture and Irrigation (HAKI, Szarvas, Hungary) has been studying the immunomodulatory effect of herbal extracts for already five years, in cooperation with Chinese, Vietnamese and South African research partners. During the years, a series of feeding experiments were carried out on various fish species, e.g. common carp or Nile tilapia. Herbal medicine extracts used in our experiments are well known immunostimulants in traditional Chinese human medicine. This effect has been demonstrated in many experimental animals, e. g. mouse or chicken, but we have much less experimental data of their effect on the fish immune system.

In our experiments we studied the effect of three medicinal herbs, *Astragalus membranaceus*, *Lonicera japonica* and *Ganoderma lucidum*. These herbs were applied alone or in combination with each other. In two experiments, herbal extracts were combined with boron, a trace element. In one experiment, half of the experimental groups were vaccinated against the bacterium *Aeromonas hydrophila*. Herbal extracts and boron were mixed to the fish feed in various combinations. The control feed did not contain herbal extracts or boron. Fish were being fed with these feeds for three, four or five weeks and blood samples were taken once a week. Phagocytic cells and blood plasma were isolated from blood by centrifugation, and non-specific immune response was determined. Phagocytic activity of white blood cells and lysozyme activity, total protein and immunoglobulin level of blood plasma were measured. Results were evaluated by statistic methods. At the end of feeding experiments, fish were challenged with the bacterium *A. hydrophila*, then mortality was being registered during one week and survival rates were calculated.

All three herbal extracts had a positive effect on the measured parameters of non-specific immune response and survival after the challenge with *A. hydrophila*. Boron could even more enhance the disease resistance of fish. The most effective immunostimulant was the combination of *Astragalus* and *Lonicera*, with or without boron supplementation. This combination can be applied in fish farming practice to enhance disease resistance of cultured fish.

*Keywords: non-specific immunity, common carp, Chinese herbs, boron*

# **Agricultural Research For Development-Poster session and discussion**

# APPLICATION OF HERBAL EXTRACTS TO IMPROVE NON-SPECIFIC IMMUNE RESPONSE AND HEALTH STATUS OF FISH

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*Keywords: non-specific immunity, common carp, Chinese herbs, boron*



# EFFECTS OF DIFFERENT LEVELS OF CRUDE PROTEIN IN THE DIETS ON APPARENT NUTRIENT DIGESTIBILITY AND NITROGEN BALANCE OF THE GUINEA FOWLS AT 8, 10 AND 12 WEEKS OF AGE IN THE MEKONG DELTA OF VIETNAM

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## **Abstract**

A study was carried out to evaluate the nutrient digestion and nitrogen retention of the Guinea fowls at an experimental farm of Binh Thuy district, Cantho City of Vietnam. Thirty Guinea fowls originally come from Hungary were used in a completely randomized design with 5 treatments and 3 replications. The treatments were the crude protein levels of the diets at 14, 16, 18, 20 and 22% (CP14, CP16, CP18, CP20 and CP22). It was done in three age periods ( at 8, 10 and 12 weeks of age) with each period lasted for one week. The concentrate feed used in the experiment consisted of maize, broken rice, rice bran, fish meal and soybean meal.

The results showed that the apparent nutrient digestibilities of three periods were increased when the diets contained higher crude protein levels with the highest value for the diet CP20 and the lowest one for the CP14 ( $P < 0.05$ ). The nutrient digestibilities of Guinea fowls at 10 and 12 weeks of age were significantly higher as compared to those of the fowls at 8 weeks of age ( $P < 0.05$ ), while there was no significant difference between fowls at ten- week age and twelve-week age ( $P > 0.05$ ). Nitrogen retention increased corresponding with increasing crude protein levels in the diets at 3 age periods of guinea fowls. While the nitrogen retention of the fowls at 10 weeks of age was significantly higher than that of fowls at 8 and 12 weeks of age. In conclusion, the Guinea fowls fed concentrate gave better nutrient digestibility and nitrogen retention when increasing crude protein level up to 20% and those values of the fowls at 10 weeks of age were the highest.

Key word: Fowls, nitrogen, weight gain, feed utilization, diets, 10-weeks of age

# A PROMISING BIO-CONTROL AGENT IN SUSTAINABLE MANAGEMENT OF WESTERN CORN ROOTWORM (*DIABROTICA VIRGIFERA VIRGIFERA*)r

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## Abstract

Western Corn Rootworm (WCR) – *Diabrotica virgifera virgifera* (Dvv) – is a serious invasive pest of maize in Europe. Available control methods in field conditions are not entirely perfect due to the development of resistance and adaptation to chemical insecticides, Bt-corn and crop rotation. The efficacy of soil-born insect-pathogen *Metarhizium anisopliae* strains (Met-4, 16, 34, 43, 51) isolated in Hungary was investigated in laboratory and greenhouse experiment for the control of Dvv. Laboratory trial was carried out with 6 treatments (5 *M. anisopliae* isolates and control) in completely randomized design, in three replicates/treatment. Spore suspension ( $10^7$  spores/mL) was put on the larvae in Petri dishes and mortality rate was evaluated (Abbott's formula) six days following the treatment. Greenhouse experiment was conducted with nine treatments (5 *M. anisopliae* strains, 2 pesticides (Force and Novodor) and 2 controls (no Dvv eggs and with Dvv eggs) in 15cm diameter pots with two germinated corn seeds and 20 WCR eggs/ seed in each pot, in six repetitions. Pots were confined in isolators. Modified IOWA scale was applied to examine corn root damage 10 weeks following treatment. One-way ANOVA analyses were performed by R-commander software. The results of laboratory trial showed that all 5 tested strains had significant efficacy against WCR, resulting 61- 94% of mortality. Significant differences have been recorded between the efficacy of five isolates and control treatments (P-value< 0.01). However, there was no significant difference among efficacy of experimental strains (P-value> 0.05). In greenhouse experiments, one of *M. anisopliae* isolates (Met-16) had similar efficacy as the *Bacillus thuringiensis* (Novodor) treatment. In addition, root damage in treatments Met-34 and Met-43 was also significantly lower than in control with Dvv eggs (P-value< 0.05). The results suggested that *Metarhizium anisopliae* can be a candidate for biological control in sustainable maize cultivation.

**Key words:** *Diabrotica virgifera virgifera*, *Metarhizium anisopliae*, corn, root damage.

# **RICE-FRESHWATER PRAWN (*MACBROBRACHIUM ROSENBERGII*) IN THE INTEGRATED FARMING SYSTEM IN HONG DAN DISTRICT, BAC LIEU PROVINCE, VIET NAM**

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## **Abstract**

This study was conducted to evaluate the effect of different stocking densities on growth, survival rate, yield of giant freshwater prawn in the integrated rice – prawn farming system in order to apply to Bac Lieu province and other area of the Mekong Delta where having seasonal brackish water and fresh water intrusion. The experiment has 3 treatments of different stocking densities including 1, 2 and 3 prawns / m<sup>2</sup>. Farms after culturing tiger shrimp during the sunny season were prepared carefully for this experience in the rainy season. Local rice variety was planted as normal practice. During culture, prawns were fed casually with local materials. After 6 months of culture, results showed that water quality parameters (temperature, transparency, pH, Oxygen, ammonium, COD, P – PO<sub>4</sub><sup>3-</sup>, H<sub>2</sub>S, Chlorophyll-a, TSS, zoobenthos) were in suitable ranges for the prawn growth. The final mean weight and daily weight gain of prawn were respectively 47.9 ± 2.5 g/ind, and 0.27 ± 0.01 g/day in the treatment with 1 prawn/m<sup>2</sup>; 46.0 ± 3.0 g/ind and 0.26 ± 0.02 g/days in the treatment with 2 prawn/m<sup>2</sup>, and 37.0 ± 2.6 g/ind and 0.21 ± 0.01 g/day in the treatment with 3 prawn/m<sup>2</sup>. There was no significant difference in survival rates among the treatments which was in range of 21- 24%. Productivities were from 104 ± 13 kg/ha to 234 ± 37 kg/ha at different stocking densities. Net income was from 8.1 to 19.5 million VND/ha/crop. The profit cost ratio in the density of 2 inds/m<sup>2</sup> was 1.36 ± 0.17. The findings indicated that stocking at 2 inds/m<sup>2</sup> was the suitable density for prawn farming in the integrated rice – prawn system.

*Keywords: Giant freshwater prawn, stocking density, integrated system.*

# **SIDE BY SIDE COMPARISON BETWEEN THE TRADITIONAL ELISA AND THE NEW COMPETITIVE FLUORESCENT MICROSPHERE IMMUNOASSAY (CFIA) DETECTION OF SIX MYCOTOXINS**

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## **Abstract**

Background: Metabolic byproducts from a number of fungi need to be identified in order to protect the health of both humans and livestock. Mycotoxins rarely occur alone in the environment; however, exposure to the combinations of multiple contaminants will occur. Using traditional ELISA methods, multiple screening of mycotoxins can be expensive and time-consuming. However, with the help of our new competitive fluorescent microsphere immunoassay (CFIA) assay (Fungi-Plex kit) using flow cytometry with our dedicated software called FCAP Array v3.0 (Soft Flow Hungary Ltd., Hungary) a significant cost reduction can be achieved.

Methods: CFIA is a solid phase immunoassay with enhanced sensitivity and simplicity by integrating multiplexed flow cytometry. The actual CFIA methodology was already described [1]. Only 8 wells of 96-well plate required to place the 8 level standards for all 6 mycotoxins. Therefore 88 wells are available for sample analysis. The multiplexed algorithm to calculate the 8 standard curves and corresponding results are managed by FCAP Array v3.0 software which is specifically designed for the CFIA (Fungi-Plex Kit) system. A kit and software combination was developed to work synergistically with polychromatic flow cytometers obtained from Becton Dickinson, Beckman-Coulter, Partec and Luminex.

Results: Pipetting 6 mycotoxins standards in one well requires 60% less plates. On each plate, the number of specimens assayed is doubled with CFIA as compared to ELISA. On the other hand, the results are comparable to ELISA results, and there is a significant reduction in time to prepare and manipulate plates.

Conclusion: This new multiplexed assay platform goes beyond mycotoxin reporting. It is possible to add other toxins synthesized by various fungi species. Complementary assays can be developed, e.g. other contaminants, such as antibiotics, hormones and pesticides can be integrated as well. Our new technology may improve the food safety.

## **Acknowledgement**

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**EVALUATION ON THE GROWTH, SURVIVAL RATE AND YIELD OF COMMON CARP  
(CYPRINUS CARPIO) IN INTEGRATED RICE – FISH SYSTEM**

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**Abstract**

This study aims to evaluate the effect of different stocking composition of fish especially common carp with others on fish growth and productivity in order to apply to the integrated rice – fish farming system in the Mekong Delta. The study was conducted in Hau Giang province from May to December, 2009. A total of 9 paddy fields with farm area of 3.000 - 5.000 m<sup>2</sup> were used. Three treatments of fish compositions were applied including 15, 20 and 25% of Vietnamese common carps; 15, 20 and 25% of Hungarian common carps; 50, 40 and 30% of tilapia; 10% of kissing gourami and 10% of silver carp. Stocking density was 3 fingerlings/m<sup>2</sup> for all treatments. Results of the study showed that for all experiments, water quality parameters fluctuated in the suitable ranges for fish. The daily growth of Vietnamese carp, Hungarian carp, tilapia, snakeskin gourami, and silver carp was 1,28 g; 1,48 g; 1,01 g; 0,3 g, and 1,09 g, respectively. Survival rates and productivity of Vietnamese carp, Hungarian carp, tilapia, snakeskin gourami and silver carp were respectively 11,9 % and 107 kg/ha; 16,4% and 186 kg/ha; 27,4% and 407 kg/ha; 31,9% and 36,4 kg/ha; and 46,3% and 182 kg/ha. There was a significant difference in productivity of Vietnam's carp and Hungary's carp among the treatments. Total fish productivity from the first, the second and the third treatments were 1.006 kg/ha; 920 kg/ha; and 836 kg/ha, respectively. Profit and benefit cost ratio in the first and second experiments were significantly higher than that in the third treatment. Hungary's carp performed many dominant characteristics than Vietnam's carp so the Hungarian carp is very potential for the integrated rice - fish farming system.

**Key word:** *rice-fish; Common carp*

# EFFECT OF REPLACING OF DIETARY FISH MEAL BY CATFISH (*PANGASIUS HYPOPHthalmus*) BY-PRODUCTS ON GROWTH PERFORMANCE AND ECONOMIC RETURNS OF GROWING MUSCOVY DUCKS

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## **Abstract**

An experiment was carried out at household in Hoa Loi village, Chau Thanh district of Tra Vinh province to evaluate the effects of replacing of dietary fish meal by catfish (*Pangasius hypophthalmus*) by-products on growth performance and economic returns of growing Crossbred Muscovy ducks. A total of 150 Crossbred Muscovy ducks at four weeks of age were arranged in a completely randomized design with 5 treatments and 3 replicates with 10 birds (balanced for sex) per experimental unit. The treatments were a control diet with only fish meal protein (CF 0) and in the others fish meal protein was replaced by catfish by-products at different levels of 25% (CF 25), 50% (CF 50), 75% (CF 75) and 100% (CF 100) of the amount of the fish meal protein of the CF 0 diet. Premix - vitamin was supplied at 0.3% for all treatments. Water spinach was offered with the same amount of 30g in fresh weight/duck/day to provide vitamins and minerals.

The results of the experiment on Crossbred Muscovy ducks showed that the DM and CP intakes were significantly higher in the CF 75 treatment ( $P<0,05$ ). The daily gain and final live weight were significantly higher in the CF 50 and CF 75 diets ( $P<0,05$ ). The significantly higher weights of carcass, breast and thigh muscle were found for the CF 50 and CF 75 treatments ( $P<0,05$ ).

**Key words:** *Crossbred Muscovy ducks, catfish by- product, weight gain, growth performance*

# A STUDY OF ANIMAL WASTE AND PLANTS TO PRODUCE BIOGAS AND ELECTRICITY

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## Abstract

A study were carried out to investigate biogas and electricity production by using plant sources and pig waste. It included three experiments: experiment 1 (Exp 1) was a complete randomized design in *in vitro* conditions with 6 treatments and 3 replicates by using the 10 liter-flasks. The treatments were the water hyacinth juice (WHJ) replacing pig manure at the levels of 0, 20, 40, 60, 80 and 100% (DM basis). The experiment last 42 days, while the WHJ and manure were daily supplied for 21 days with around 5 gOM per day. Exp 2 was a factorial design in *in vitro* conditions. The first factor was plant materials (rice straw, water hyacinth (*Eichhornia crassipes*) and Para grass (*Brachiaria mutica*)) and the second factor was replacement levels of plants to pig manure of 10, 20, 30, 40 and 50% (DM basis). The experimental period was 60 days. One 50 m<sup>3</sup>-biodigester was used (in Exp 3) to evaluate the biogas production and electricity produced with 3 levels of pig manure loaded daily being 40, 60 and 80 kg (in fresh), respectively. Each loading time was 40 days. Afterward loading 40 kg manure as usual was for 10 days to get the stable gas production before starting the next manure loading levels.

The results indicated that biogas production from day 8 to day 21 was significantly different ( $P<0.01$ ) among the treatments in Exp1. Similarly the methane production was 0.261, 0.223, 0.201, 0.190, 0.171 and 0.155 m<sup>3</sup>/kgOM ( $P<0.001$ ) for the above treatments, respectively. The biogas production in Exp 2 at day 60 was significantly different ( $P<0.001$ ) and it was 0.296, 0.323 and 0.0867 m<sup>3</sup>/kgOM for rice straw, water hyacinth and para grass, respectively. The methane concentration of rice straw at the day 37 reached to methane concentration standard of biogas of 61.6% while water hyacinth and Para grass were 58.2 and 16.6%. In Exp 3 Methane percentage produced from the digester was of 61.2% and good as energy sources of electricity or cooking. The conclusion was that juice from pressed water hyacinth could be potentially used for replacing the pig manure for biogas production, *in vitro* biogas production from rice straw and water hyacinth were higher than Para grass, and biogas produced from pig manure source was good for electricity production.

*Keywords: Anaerobic fermentation, animal wastes, plant materials, green house gas, biogas digester*

**EFFECT OF WATER HYACINTH (*EICHHORNIA CRASSIPES*)  
SUPPLEMENTATION IN DIETS ON NUTRIENT INTAKES, DIGESTIBLE  
NUTRIENTS AND NITROGEN RETENTION OF GUINEA FOWLS AT 8 AND 11  
WEEKS OF AGE IN THE MEKONG DELTA OF VIETNAM**

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**Abstract**

A study to evaluate the effects of different supplementation levels of fresh water hyacinth in concentrate diets on apparent nutrient digestibility and nitrogen retention of growing Guinea fowls at 8 and 11 weeks of age was done. It was carried out at the experimental farm in Long Hoa commune, Binh Thuy district, Can Tho City of Vietnam. Thirty Guinea fowls at eight and eleventh weeks of age were used in this experiment. Two chickens per an experimental unit was used and the experiment lasted in 3 weeks. The experiment was a completely randomized design with 5 treatments and three replications. The treatments were the supplementation levels of fresh water hyacinth at 0%, 1,5%, 3,0%, 4,5% and 6,0% levels of body weight (WH0, WH1.5, WH3.0, WH4.5 and WH6.0, respectively).

The results indicated that apparent digestible DM and OM in both two periods was improved by water hyacinth supplementation, and they were not significantly different ( $P>0.05$ ) among the treatments at 8 weeks of age. However, these values among the treatments at the 11 weeks of age were significant differences ( $P<0.05$ ). Nitrogen retention at eight weeks of age period was not significantly different ( $P>0.05$ ) among the treatments, however this value at eleventh weeks of age period was significantly increased ( $P<0.05$ ) with increasing of water hyacinth in diets up to 4.5 %. All the values of apparent nutrient digestibility and nitrogen balance of the birds at 11 weeks was significantly ( $P<0.05$ ) higher than those at 8 weeks of age. It was concluded that growing Guinea fowls fed concentrate-based diets and supplemented with fresh water hyacinth would potentially enhance growth performance due to the improvement of digestible nutrients and nitrogen retention.

*Key words: digestion, nutrition, forages supplements, birds, nitrogen utilization*



# WEED FLORA OF ORGANIC AND CONVENTIONAL MAIZE FIELDS IN THE JÁSZSÁG REGION, HUNGARY

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## Abstract

In organic maize fields, weeds are important yield loss factors by competing with maize for light, water and nutrition supply and being the intermediate hosts of crop pathogens. To establish appropriate weed control strategies, weed surveys are necessary in the fields. Our aims were to identify the dominance of weed species (based on cover %) in the fields, to analyse the influence of farming systems and sampling time and their interaction on weed flora. Weed surveys were carried out 3 times during maize growing season of 2011 in 2 organic maize fields and in the 2 neighbouring maize fields where same natural conditions could be found, but conventional agricultural technologies were applied. Weed cover was assessed in eight 1x1 sample quadrates per field randomly placed within the fields. Weed diversity was also investigated in the studied fields. Farming systems affected the weed flora in maize. Average total weed cover and diversity index of organic maize fields were higher than those in conventional fields. The effect of farming system was significant both on weed cover ( $F = 134.18$ ,  $p < 0.01$ ) and on diversity index ( $F = 12.42$ ,  $p = 0.01$ ). Effects of sampling time on weed cover was significant ( $F = 35.40$ ,  $p < 0.01$ ) but not on diversity index ( $F = 2.63$ ,  $p = 0.07$ ). Significant interactions between farming system and sampling time on weed cover ( $F = 32.05$ ,  $p < 0.01$ ) and on diversity index ( $F = 9.27$ ,  $p < 0.01$ ) were found.

The most dominant weed of both organic and conventional fields was *Echinochloa crus-galli*. *Ambrosia artemisiifolia* ranked as the second cover of organic, but was not present in conventional ones. The most dominant weed life forms were T4 (summer annuals) and G3 (perennial weed, wintering by roots rhizome) in both organic and conventional farming systems. The cover of T4 weeds was higher than G3 weed species. G1 (perennial weed, wintering by stem rhizome) species were rare, and other weed life forms did not occur in the studied fields.

*Keywords: organic maize fields, conventional maize fields, weed surveys, weed diversity.*

# CRYOPRESERVATION METHOD OF GUINEA FOWL SPERMATOZOA

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## Abstract

The domesticated guinea fowl originated from one of several wild species, what used to be called the Guinea Coast of West Africa. The ancestors of the domesticated guinea fowl we know today were introduced into Europe during the late fifteenth century, and from Great Britain, the breed was taken to Hungary and many other parts of the world including Vietnam. They had the reputation of being the most ill-tempered of all poultry breeds, making them difficult to keep. In addition, the guinea fowl is considered as a rare breed with increasing risk of extinction. Therefore, preservation of guinea fowl genetic resources is critical. Recently, semen cryopreservation has been known as the most practical method for poultry species. Many scientific publications have been described different protocols of avian sperm cryopreservation for both domestic and non-domestic avian species, involving cryoprotectant type and packaging method, as well as freezing and thawing rates. However, there is only a single study that described the freezing protocol for guinea fowl so far (*Seigneurin and Blesbois, 2005*) due to the lower freezing tolerance of guinea fowl sperm. The aim of this study is to describe two different protocols, a slow programmable and pellet method using for guinea fowl sperm freezing. Moreover, the methods using to evaluate the sperm function such as *in vitro* tests (determination of sperm concentration and motility, morphological and live/dead sperm analysis), *in vivo* test (artificial insemination) were mentioned and described in detail. Vitrification with pellet formation has been proved to be more effective for long time storage of guinea fowl sperm while both, *in vitro* and *in vivo* assays were valuable assessments to evaluate the efficiency of sperm freezing protocols. They are promising to contribute in establishment of a suitable diluent, and cryoprotectant for cryopreservation of guinea fowl semen.

*Key words: poultry, guinea fowl, sperm freezing*

**EFFECT OF PROTEIN SOURCES AND PREBIOTIC ON GROWTH, SURVIVAL,  
AND IMMUNOLOGY IN CULTURE OF YABBY (*CHERAX DESTRUCTOR*  
CLARK (1936))**

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**Abstract**

The experiments were conducted to examine the potential of yellow lupin protein as an alternative source for fishmeal protein in yabbies diets and the effect of an immunomodulator (Bi-Mos) on yabbies fed the plant protein based diet.

Five different diets were fed to yabbies a period of 42 days. They were a basal diet (BS), partial replacement of fishmeal protein with lupin protein (L50), the partial replacement of fishmeal protein with lupin protein with (L50B) and without Bio-mos (L50) and a total replacement of fishmeal protein with lupin protein with (L100B) and without (L100) Bio-mos (L100B). The initial average weight of yabbies was  $18.16 \pm 0.75$ g. Parameters of growth rate, survival rate and immunology were evaluated. There was no significant difference in the survival rate between the five treatments. Groups fed BS, L50B and L100B showed no significant difference in the mean values of SGR and the lowest SGR was belonged to animals fed L50 and L100. Animals fed L50 showed a higher SGR compared to L100, but no significant difference was detected. No significant differences were found in the percentage of granular cells and semi - granular cells of animals among the five treatments, whereas, animals fed L50B and L100B had the highest percentage of hyaline cells. Lysozyme activity of animals fed L50B and L100B was significantly higher than those fed BS, L50 and L100 diets without Bio-Mos.

*Key words: yellow lupin protein, yabbies diets*

# EFFECT OF BEER WASTE REPLACEMENT OF CONCENTRATE ON THE PERFORMANCE OF GUINEA-FOWL

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## *Abstract*

150 Guinea-fowl, from thirty-five day-old were allocated in a Completely Randomize Design 5 groups with 3 replications for 49 day growth trial. All birds were give a basal diet of concentrate and were supplement with beer waste (BW). The treatments were:

The individual treatments were

- *C100*: Concentrate only ad libitum as the control diet
- *C75*: 75% of concentrate of the amount of the control diet consumed, and with BW ad libitum
- *C50*: 50% of concentrate of the amount of the control diet consumed, and with BW ad libitum
- *C25*: 25% of concentrate of the amount of the control diet consumed, and with BW ad libitum
- *C0*: 0% of concentrate of the amount of the control diet consumed, and with BW ad libitum

Total feed dry matter (DM) intake were significantly different among treatments ( $P<0.05$ ). DM intakes in *C75* (74g/day) were higher than in *C50* (65g/day) and *C25* (69g/day). Average daily weight gain were significantly different among treatments ( $P<0.05$ ). *C100*, *C75* and *C50* (21, 20.5 and 19.5 g/day, respectively) were higher than in *C25* and *C0* (17 and 10 g/day, respectively). FCR in *C100* and *C50* (3.4 and 3.4) were lower than in *C0* (6.1). It was concluded that BW can replace 50% of the concentrate in growing Guinea-fowl diets without reducing daily live weight gains and with improved economic benefits.

**Key words:** *Beer waste, concentrate, guinea-fowl and performance*

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