7th Scientific conference of
Faculty of Tropical AgriSciences, 2013

Economic Aspects of Natural Resources Management in Tropics: Social Capital and Microfinance

Czech University of Life Sciences Prague
Czech Republic
28th and 29th November, 2013

Abstracts

Alternative Finance or the Democratisation of Money?

Tanweer A.[*]

Empire State College: State University of New York; University of New York in Prague

[*]E-mail: tanweer27@gmail.com

The banking system plays a key role in our modern economy since it provides the lending for businesses to grow and for communities to develop. At present the banking system, especially in Europe, is dominated by large multinational players, conforming to a one particular business model, and not focused on the needs of local regions and communities. Encouraging the growth of alternative business models would make for a more robust financial system and also better serve the needs of small and medium enterprises and of communities. Such models include credit unions, regional banks, state investment banks, microcredit and complementary currency schemes. Rather than simply wanting to support 'alternative' types of institution, we need to carefully examine the actual benefits to businesses and to people. Perhaps 'community-focused' would be a better term than 'alternative'. Even small savings banks can fall prone to herd behaviour – witness the Savings & Loan scandal in the United States – and complementary currency schemes need not serve communities, as the example of Bitcoin shows. This applies equally to microcredit, where some of the early enthusiasm has turned into scepticism for exactly the same reasons. We will end with a discussion of some of the more recent issues facing microcredit, concluding that we need to focus on the needs of communities and of the marginalised in order to build a robust and fair microcredit system.

Potential Role of Horizontal Integration in Agricultural Value Chain Development among Subsistence Farmers in Georgia

Kotkova H.[*]*, Hejkrlik J.*

Department of Economics and Development, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague

[*]E-mail: kotkovah@ftz.czu.cz

As a part of former Soviet Union, Georgian agriculture underwent forced collectivization that led to reorganization of traditional farming systems into cooperatives. Those agricultural were of multifunctional character provide employment for number of rural population. After the collapse of Soviet Union at the beginning of 1990s political and economic changes, especially land privatization process, have resulted in substantial land fragmentation and increasing number of subsistence family farms. Thus, there is evident need to improve the efficiency of subsistence family farms, especially to focus on value chain development and cooperation. Value chain approach represents a suitable tool in order to understand the whole complexity of rural system and to identify the ways how to improve the farmers' production in the terms of quantity and quality. This approach is being used to guide and drive high-impact and sustainable initiatives focused on improving productivity,

competitiveness, entrepreneurship, and the growth of small enterprises. In order to do so, trust and cooperation must be considered as crucial issues related to value chains development as formalized and/or even forced collaboration has been the subject of criticism. Moreover, recently discussed a poor role of social capital in Georgia will be one the limitation factor of any development strategy. Thus, our paper suggests that horizontal integration might be the way forward. However, higher involvement of farmers is necessary in order to increase their competitiveness and social capital to boost the cooperativeness within the community. Moreover, policy makers, as core players in successfulness of social entrepreneurs, have to be also considered as key stakeholders.

Key words: *co-operative farming, rural development, policy strategies, legislation, value chain approach, social capital.*

Acknowledgement: The study was supported by Internal Grant Agency of Czech University of Life Sciences Prague (IGA CULS Prague) project no. 20135117.

Analysis of Small-scale and Large-scale Mining with Other Contributions to Ghana's Economy

Boatri W.E.[1], Kabat L.[1], Verner V.[1], Kabutey A.[2]*

[1]Department of Economic Development, Faculty of Tropical AgriSciences, Czech University of Life Sciences, Prague
[2]Department of Mechanical Engineering, Faculty of Engineering, Czech University of Life Sciences, Prague

[*]E-mail: boatri@ftz.czu.cz

Small-scale and large-scale mining and other forms of contributions towards Ghana's economy development (e.g. Corporate Social Responsibilities (CSR), employment, investment, etc.) with emphasis on gold production and revenues were investigated and analyzed with support of software package STATISTICA. Specifically we applied the time series analysis, particular attention was given to analysis of stationarity. As a tool for avoiding the non-stationarity the differentiation of time series values has been applied. Furthermore, Augmented Dickey-Fuller unit root test was also used to determine the unit root or otherwise of small-scale and large-scale gold production. Data between 1990 and 2012 on both forms of operations and other variables were collected from Ghana Minerals Commission, Bank of Ghana and Chamber of Mines. Analyzed results of marginal growth rate and actual data indicated various scenarios as minerals production (Large-scale) declined between 2000 and 2004 as a result of political climate but steady growth in small scale mining. Furthermore, employment data keeps on shrinking after Economic Recovery Program/Structural Adjustment Program in 1983. It was observed that percentages of dynamics of investments into production, exploration and support services during the 23 years span has been 57.8, 37.0 and 5.2, respectively, with various correlation dynamics.

Keywords*: small-scale, large-scale, gold production, minerals, corporate social responsibility, mining concession*

Cuboni Reaction as Pregnancy Diagnosis Test from Urine in Bactrian Camels (*Camelus bactrianus*)

Fedorova T.[*], Brandlova K., Lukesova D.

Department of Animal Science and Food Processing, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague

[*]E-mail: fedorova@ftz.czu.cz

Pregnancy diagnosis by common methods used in cattle like rectal palpation, vaginal examination, transrectal or endovaginal ultrasonography or blood progesterone analysis are not usually applicable in half-tamed camels kept in European zoological

gardens and keepers can estimate the pregnancy only by changes in size of abdominal parts of animals. The aim of this research was to test the possibility of application of Cuboni reaction, based on chemical fluorescent reaction of urinary estrogens, as the non-invasive and alternative methods of pregnancy diagnosis in camels. The urine of 14 adult female Bactrian camels housed in four zoological gardens (Prague, Plzeň, Ústí ad Labem and Bratislava) was collected during their different stages of reproduction between September 2010 and November 2011. A total of 78 samples of urine from pregnant and non-pregnant camels were evaluated. The Cuboni reactions, carried out in the State Veterinary Institute Prague by standardized method which is commonly used in mares, were evaluated as positive, negative or dubious. The results of Cuboni reactions in camels were significantly affected by pregnancy status of females (Pearson chi-sq.: 18.9325, df = 6, p = 0.004282). The accuracy of the Cuboni reactions was 100.0% in camel females in the 3rd third of pregnancy. The accuracy was significantly affected by the season of the year (Pearson chi-sq.: 17.3537, df = 9, p = 0.043469) which correspond with seasonal reproduction in camels. Dubious reactions occurred only during autumn. The majority (57.1%) of false negative results occurred during the 1st third of pregnancy and the last false negative result was reached 160 days before parturition. Their occurrence was also significantly connected with abortions of females (Pearson chi-sq.: 13.6324, df = 2, p = 0.001096). More false positive results were reached during the winter season which means during the breeding season. We can conclude that the Cuboni reaction is applicable for pregnancy diagnosis in camel females and summer or autumn seasons are recommended times for this testing in Europe.

Keywords*: camelid, camel urine, gestation, Cuboni test, non-invasive method*

Acknowledgment**:** We thank the State Veterinary Institute Prague and all mentioned zoological gardens for their cooperation and the Internal Grant Agency of the Faculty of Tropical AgriSciences CULS Prague for funding this research in the year 2010 (project no. 51120/1312/3111).

Estimation of Population Size and Distribution of Lions and Hyenas in Zakouma National Park, Chad, 2013

Olleova M.[1], Antoninova M.[2], Dogringar S.[2]*

[1]Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, Czech Republic
[2]Zakouma National Park, African Parks, Chad

[*]E-mail: olle.michaela@gmail.com

We were interested to estimate the population size of lions (*Panthera leo*) and hyenas (*Crocuta crocuta*) and their distribution during dry season in the Zakouma National Park (NP) on south-east of Chad. The study was conducted between February and May 2013 and we used method of playback sounds (call-in stations) the same technique was used in the park in the past. Since behaviour of carnivores is influenced by behaviour of prey species and mainly their distribution, density, and habitat selection, we focused our study on the east part of the park, as the west part is without water and prey during dry season. We conducted 120 call-in stations, equally distributed across the east part of the park, during 42 days, where we recorded 89 lions and 221 hyenas. From this number we estimated the population size of lions between 110 – 130 individuals. We also analyzed the lion's and hyena's density and mean group size. The population density results are 5.93 lions and 14.73 hyenas per 100 km^2 for studied area (1,500 km^2), which corresponds to 2.97 lions and 7.34 hyenas per 100 km^2 for whole protected area (3,000 km^2). Mean lion's pack size was: 3.88 ± 0.18 (n= 192) (Max pack size= 8) based on data of all observations during the study. Mean hyena group size was 1.37 ± 0.06 (n =161) (Max clan size = 5) based on call-in stations data. Lion's distribution corresponded with water location in the park whereas hyenas were distributed equally thorough all the study area. Hyenas were more habituated to human presence. Unlike lions, hyenas were seen on positions very close (3km) to human settlements. The lower presence of lions around human settlements can be explained: 1) by human disturbances and chasing or poaching lions or 2) lion presence is the same as elsewhere, but lions are more cautious in human presence. We found out that hyenas in Zakouma NP are more solitary or forms very small groups. We didn't find any evidence (articles, reports) about bigger lion population in Central and West Africa, than in Zakouma NP.

Keywords: *Panthera leo, Crocuta crocuta, Zakouma National Park, Chad, distribution and population size*

Acknowledgement: The study was supported by African Parks and European Union

In vitro Antioxidative Activity of Nineteen Medicinal Plants from Amhara Region, Ethiopia

Tauchen J.[1], Caffi C.[2], Lulekal E.[2, 3], Van Damme P.[1, 2], Kokoska L.[1]*

[1]*Department of Crop Sciences and Agroforestry, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague*
[2]*Department of Plant Production, Faculty of Bio-Science Engineering, Ghent University*
[3]*Department of Plant Biology and Biodiversity Management, College of Natural Sciences, Addis Ababa University*

[*]E-mail: kokoska@ftz.czu.cz

Identification and characterization of natural products with antioxidant activity has received much interest over the past few years. Ethiopia is one of the developing countries where high floral diversity is presented, however majority of plants stays scientifically neglected and undiscovered. In this work, the ethanol extracts of 19 Ethiopian wild medicinal plants selected according to previous ethnobotanical studies and for their relatively unknown phytochemical profile were investigated for their antioxidative potential using DPPH (2,2-diphenyl-1-picrylhydrazyl), ORAC (oxygen radical absorbance capacity) and TPC (total phenolic content) assays. Results were expressed as trolox or gallic acid equivalents. Best results in DPPH assay was observed for *Rubus steudneri* leaves, *Rumex nepalensis* roots and leaves and *Dodonea angustifolia* with activity at 0.89 ± 0.12; 0.92 ± 0.06; 0.47 ± 0.04 and 0.22 ± 0.03 μg TE/ μg extract, respectively. In ORAC assay, *R. steudneri* leaves and roots, *R. nepalensis* (roots), *Jasminum abyssinicum* (leaves) exhibited supreme results, 1.21 ± 0.07; 1.02 ± 0.1; 1.06 ± 0.11 and 1.02 ± 0.05 μg TE/ μg extract, being stronger than trolox. Plant extracts with highest content of phenolic compounds were *R. nepalensis* (roots), *R. steudneri* roots and leaves and *D. angustifolia*; 1.1 ± 0.16; 0.83 ± 0.09; 0.69 ± 0.11 and 0.53 ± 0.08 μg GAE/ μg extract, respectively. In summary, studied plants namely *Dodonea angustifolia*, *J. abyssinicum*, *R. nepalensis* and *R. steudneri* possessed significant antioxidative activity using three distinctive *in vitro* assays. This finding suggests that these species could be potentially used in pharmaceutical or food industry as natural material with antioxidative effect. However, further phytochemical and pharmacological analyses are needed in order to detect what compounds are responsible for their antioxidative potential.

***Keywords*:** *DPPH, ethnopharmacology, oxygen radical scavenging ability, total phenolic content, underutilized plants*

***Acknowledgement*:** The study was supported by Internal Grant Agency of Czech University of Life Sciences (IGA CULS Prague) project no.: 20135118.

How to Improve Competitiveness of Public Extension Service in Mongolia?

Ganchimeg G[1], Mazancova, J.[2]*

[1]*School of Economics and Business, Mongolian State University of Agriculture, Mongolia*
[2]*Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, Czech Republic*

[*]E-mail: go.ganchimeg@yahoo.com

The collapse of the socialist regime made big changes in agricultural development of Mongolia. Traditional advisory service for rural area also failed due to top down approach. The National Agricultural Extension Center was established in Ministry of Food, Agriculture and Light Industry in 1996. The NAEC is represented by the extension units at 21 provincial (*aimag)* and 329 district *(soum*) levels and Agro-parks. NAEC provides technical and business advice to herders, crop producers and food processors to sustain profitable production under market conditions. Further, educational and training activities are offered. Donor organizations had been providing us the technical and financial support to initiate extension units in different levels. This affords us the opportunity to keep activities without worrying about initial investment cost. Moreover, people who is part of agricultural development well aware of need extension service. Accepting various types of entities running in this market stimulates to initiate private and voluntary based extension system. Although several types of service providers are in the sparsely populated country like Mongolia they could not fulfil clients' demand and satisfaction fully. Particularly herders and farmers' satisfaction level is comparatively low for public extension service even this network covers a whole country. This paper aims to describe the situation facing public extension as well as current status of extension system in general in order to improve competitiveness of public extension service in Mongolia. The paper methodologically based on primary and secondary data taken by literature review, policy documents, survey carried out

from clients and personal interviews. The paper presents situation analysis and alternatives to improve competitiveness of public extension service. In the end, recommendations are presented.

Keywords: *Public extension service, competitiveness, situation analysis, customer satisfaction*

Acknowledgement: This research was supported within framework of the project "Improving teaching quality of Mongolian State University of Agriculture", funded from Czech Development Cooperation of Czech Republic

Analysis of Three Dimensions of Food Security Relating to Possibility of Energy Crops Cultivation in Indonesia

Dedkova S.[*], Mazancova J.

Department of Sustainable Technologies, Faculty of Tropical AgriSciences, Czech University of Life Sciences, Prague

[*]E-mail: sarka.dedkova@gmail.com

The study focuses on discussed issue of food versus energy security. Due to the rapid increase in population in Indonesia, the matter of food security as well as energy security is very urgent. This paper discusses three dimensions (food availability, food access, food utilization) characterizing food security among the small-scale farmers. Depending on the level of mentioned aspects, the potential for energy crops cultivation for biofuel production is evaluated. The survey was carried out in North Sumatra province in Indonesia, where 75 farmers were interviewed. To obtain information, the participatory research methods were applied; these included semi-structured questionnaire, semi-structured interview and observation. Several indicators were used for assessment of each of food security dimension. The survey ascertained that the local farmers are secured at all three dimensions of food security. However, a certain part of farmers live closely above the poverty line. It also denotes moderate expenditures on food. Furthermore, certain aspects leading to food security (such as access to education or drinking water) should be improved. The research results also show that the farmers are not familiar with the possibility of growing crops for energy purposes, although they have capacities for such cultivation. Due to the fact that farmers' agricultural production is primarily used for sale and not for subsistence, there is a potential for change in the composition of farmers agricultural production in favour of energy crops. Therefore, the higher government capacities should concentrate on spreading and strengthening knowledge among the farmers about the possibility of energy crops cultivation in the context of enhancing biofuel policy. Thus, the energy security, especially at local level, could increase.

Keywords*: food security, food availability, food access, food utilization, biofuel, Indonesia*

Acknowledgement: This work was done due the financial support of Foundation: Nadání Josefa, Marie a Zdeňky Hlávkových and Faculty of Tropical AgriSciences.

Analysis of Information Flow of Biogas Plant Issue in Central Vietnam – a Case Study in ThuaThien Hue Province

Roubik H.[1], Mazancova J.[1], Banout J.[1], Verner V.[2]*

[1]Department of Sustainable Technologies, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague
[2]Deparment of Economics and Development, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague

[*]E-mail: hynek.roubik@seznam.cz

Correctly working information flow is a key source of development process and potential improver of life quality. Anaerobic digestion (AD) is considered as one of the most significant improving technology of environment, as it solves waste management problems while producing biogas and digestate as fertilizer for agricultural use. Hence, it is very important for rural development in central Vietnam.

There are a high number of biogas plant (BGP) owners with need of leadership and facilitation of the proper handling of BGPs. This survey was carried out to find out an information flow of BGP issue, its weaknesses, strengths and possible critical nodes on owners of BGP (n = 100) and its local and provincial facilitators (n = 9) in districts HuongTra and PhongDien (central Vietnam) from July to September 2012. Methods of data collection included focus group discussions, semi-structured personal interviews and questionnaire surveys. Collected data were processed with utilization of Statistica 10. The information flow scheme was made in CorrelDRAW. The survey was investigating information flow between BGP users and local facilitators being responsible for BGP administration in the region. The survey revealed information fragmentation, especially about digestate management issue, caused mostly by poor knowledge. Poor knowledge is not only a problem of BGP users, but also of facilitators and local authorities. BGP users showed satisfaction with trainings, but they were also asking for more practical information. According to data from the survey, there was created a scheme of information flow in province. This scheme could be used for optimization of information flow and for implementing innovative technologies, methods and approaches; especially for digestate management. Our study suggests improvement of skills of facilitators, who represents the main information link between BGP owners and implementers and have direct impact on trainings of BGP owners and masons as well. Also our study recommends optimization of information flow, because properly working information transmission can be a key source of development process and potential improver of human life quality.

Keywords: *anaerobic digestion, digestate management, facilitators, ThuaThien Hue province, information transmission*

Improved Design of Mechanical Seed Drill Distribution System for Agricultural and Energy Crops

Gheorghita A.[1], NovotnY O.[2], Ivanova T.[2], Kolarikova M.[2], Havrland B.[2], Serbin V.[1], Pobedinsky V.[1]*

[1]State Agrarian University of Moldova, Faculty of Agriculture Engineering and Auto Transportation
[2]Czech University of Life Sciences Prague, Faculty of Tropical AgriSciences

[*]E-mail: gh-andrei@rambler.ru

Sowing takes a special place in the technology of crop establishment due to an importance and sensitivity of the work. The seeding is an agro-technical process, which includes a distribution of seeds in the top layer of soil, creation the optimal conditions for its germination and plant development. One of the extremely important conditions is plant density, which determines the nutritional area for a single plant. Planter functions include: metering the seed and delivering the seed to the furrow. Seed metering must meet the following agro-technical requirements: assure the uniform displacement of the seeds to coulters, assure stable seed deliver regardless to field topography, appropriate inclination angle of the sowing machine or forward speed and to not injure the seeds. Taking into the account the above-mentioned facts, the object of the present work was a seed drill machine with distribution system of grooved rollers with different angle of groove orientation (16, 19, and 22 degrees) and experimental movable flaps. The seed drill was tested in the field conditions using barley sowing in agro-technical terms on the area of 1 ha. The geometrical parameters of the grooved cylinders (U_c) and mobile flap (U_{cl}) of the used experimental distribution devices were as following: a) U_c = 22º, U_{cl} = - 9º; b) U_c = 16º, U_{cl} = 0º. It was concluded that the mass and uniformity of the sown plants with experimental devices is higher than those sown with standard distribution devices. It was also observed a correlation between the uniformity and mass of plants. The row 1 (Uc = 22º, UCL = - 9º) has the biggest mass and the best uniformity of plants, even if the number of plants is about the same as on the rows sown with standard equipment. Improved design of upper mentioned machine could be successfully used not only for agricultural crops, but also for energy crops, which are currently highly demanded in all climatic conditions including tropics and subtropics.

Keywords: *seed drill, seed metering, fluted roller, distribution uniformity*

Sustainability of Agricultural Extension Services in Kembata Tembaro Zone, Ethiopia

Peskova L.[1], Mazancova J.[1], Slavik M.[2]*

[1]Department of Sustainable Technologies, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague
[2]Institute of Education and Communication, Czech University of Life Sciences Prague

[*]E-mail: lpeskova@ftz.czu.cz

Kembata Tembaro zone, where the research has been located, is characterized mainly by high overpopulation and lack of land. The farmers' situation is unsatisfied in terms of state of their land and yield. Extension services are an important part of agricultural

practices of small-hold farmers providing a unique source of information and know-how transmission. Many studies focus on development of agricultural extension services but ensuring sustainability of services should go in parallel. The extension services in Ethiopia are one of the strongest in the world (one from the highest number extension agents responsible for advising per one inhabitant), top-down planned and free of charge. This study aims to find possible ways of long-term self-sustainability. Which factors would influence the farmer´s payment of development agent advices/visits? Research is based on a hypothesis that free services are of lower quality as perceived by recipients in most cases 125 small-hold farmers were interviewed by formal and informal structured interview. Other used methods included observation and focus group discussion. The data collection was done in period of September – December 2012 in five kebeles of woreda Angacha, KTZ zone. The quantitative data were evaluated in SPSS by cross-tabs, odds-ratio, correlation, descriptive statistics and finally by SWOT analysis. The results indicate that there exist possible ways in achieving better sustainability of extension services. The farmer´s symbolical payment for a DA visit brings opportunities in farmer´s and DA's increasing motivation to demand quality. Farmers usually do not complain to authorities because they do not feel mandatory for it. Moreover, extension workers are demotivated by a small salary and by not enough cooperation from farmers. Extension services are given more likely to model farmers who are richer farmers and who are theoretically willing to pay for it. Farmers willing to pay for extension services are also more innovative and critical. The symbolical payment for extension services could improve the quality of agricultural extension services and longer-term sustainability. The further research for finding possible benefits or failures in paid systems is recommended. The results could serve as a material for implementers of advisory services in Ethiopia.

Keywords: *Ethiopia, agricultural extension services, sustainability*

Acknowledgement: The research has been supported by Internal Grant Agency of the Czech University of Life Sciences Prague (Faculty of Tropical AgriSciences, Department of Sustainable Technologies) No. 20135112 (Research of Alternative Technologies Acceptation, Appropriate Innovative Technologies in Rural Areas of Ethiopia in regard to Development of Extension Services) and by development project "Enhancement of Quality and Extent of Extension Services in Angachaworeda, Kembata Tembaro" funded by Government of the Czech Republic.

Economic Impact of Beekeeping Extension on Farmer's Livelihood in AngachaWoreda, KembataTembaro Zone, Ethiopia

Wichsova M.[*]*, Mazancova J., Peskova L.*

Department of Sustainable Rural Development, Czech University of Life Sciences Prague

E-mail[*]: wichsova.marie@gmail.com

Off-farm income is one of widely discussed ways to reduce poverty in developing countries. Beekeeping can be one of additional income possibility for small-scale farmers in South-Ethiopian highlands. Ethiopia is also considered as one of the biggest exporters of natural honey in Africa. Overpopulation in Ethiopia leads to lack of farmable land. Introduction of modern beehives with the small footprint could significantly increase household budget. This study focuses on the economic aspects of traditional and modern ways of beekeeping in rural areas in Ethiopia and their comparison. Three representative sub-areas were selected and small-scale beekeepers were questioned using the semi-structured questionnaire and supplemented by the information obtained from beekeeping experts on many administrative levels and with own observations. Data were analyzed using program SPSS version 20. Among 92 respondents 53% of them keep traditional beekeeping technique, 16% use modern beehives and 31% beekeepers have both of them. Of total 339 beehives 81.4% were traditional and 18.6% modern. Seasonal production was 4.9 kg per one modern beehive in comparison with 1.9 kg per traditional hive. Mean price of 1 kg of honey from modern beehive represents $3.31, while 1 kg of honey from traditional hive costs $3.05. Share of off-farm income in total income may rise up to 24% while selling honey from beehives. Main constrains were animal pests, pesticides and adverse natural conditions. However both techniques have their limitations there is unused potential in specialized beekeeping if training on modern beehives management is provided. There is also recommended investigation of productivity and number of seasons.

Keywords: *Beekeeping, modern beehive, traditional beehive, off-farm income, honey production*

Acknowledgement: The study was supported by Czech Development Cooperation, research was done within the project No.: 20135112.

Use and Properties of Partially Dehydrated Digestate from Biogas Plants

Cerna I.[*]*, Pecen J.*

Department of Sustainable Technologies, *Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague*

[*]E-mail: icerna@ftz.czu.cz

This paper reflects on issues associated with use of digestate as a product of the anaerobic process in biogas plant and possibilities of its use. Study is focused on acquisition of basic knowledge of physico-mechanical properties of granulated digestate and water sorption process in different external conditions. To achieve the aims of this study, different experimental methods were used. To investigate physical properties was digestate in briquette form analyzed in laboratory by typical measuring methods using basic meter or weight scales. Then three types of experiments were applied, which roughly correspond to the objectives of study. Granulated digestate was exposed to water sorption in conditions simulating different possibilities of absorbing water, to non-limited, partially limited and completely limited conditions. By these experiments were observed changes in measured values. All measured values were compared to initial values of briquettes and compared with samples of different materials. The most important result of this study is detection of significant water sorption potential of digestate briquettes, in comparison to other used materials. Briquette of digestate can absorb dependently on external conditions up to 5 multiple of water of its initial mass in relevantly short time, in average this time is 165 minutes. In soil conditions briquette adsorbs water from its rounding, bounding this water by physical bounds in internal space of briquette and has always higher moisture than surrounding soil, by 30-40%. Compressed digestate well demonstrated ability to absorb water and possibility of easy decomposition in the soil, which can be utilized in agriculture.

Keywords*: dehydrated digestate, briquettes from digestate, biogas plants, sorption of water by biomass briquettes*

Solar Drying of Freshwater Fish in Cambodia

Hubackova A. [1*]*, Banout J.* [1]*, Chrun R.*[2]*, Petrtyl M.*[3]*, Kalous L.*[3]*, Chaloupkova P.*[4]

[1]*Department of Sustainable Technologies, Faculty of Tropical AgriSciences, Czech University of Life Sciences, Prague*
[2]*Department of Food Biotechnology, Faculty of Agro-Industry, Royal University of Agriculture (RUA), Cambodia*
[3]*Department of Zoology and Fisheries, Faculty of Agrobiology, Food and Natural Resources, Faculty of Agro-Industry, Czech University of Life Sciences, Prague*
[4]*Department of Economics and Development, Faculty of Tropical AgriSciences, Czech University of Life Sciences, Prague*

[*]E-mail: hubackovaa@ftz.czu.cz

The aim of this work is to evaluate drying as an alternative method of fish preservation in Phnom Penh, Cambodia with respect to acceptability of the resulting fish products to Cambodian consumers, species of fish and types of seasoning for which the method yields organoleptic properties most preferred by the final consumer. Both acceptability and species best suited for preservation were determined using sensory analysis by a trained group of Czech and Cambodian students. Drying progress and water content were determined via gravimetric analysis. Weight, temperature and relative humidity were monitored during the drying process. All of the fish species were found to provide an acceptable final product. It was also found that tilapia was the most positively evaluated species of fish tested. The average times needed for achieving a water content of 18% - needed for product stability - were determined to be approximately 30, 31, 29, 23 and 21 hours for Swamp eel (*Monopterus albus)*, Nile tilapia (*Oreochromis niloticus*), Walking catfish (*Clarias batrachus*), Channa (*Channa lucius*) and Climbing perch (*Anabas testudineus*) respectively. All of the fish species were found to provide an acceptable final product. It was also found that tilapia was the most positively evaluated species of fish tested.

Keywords*: aquaculture, fisheries, food processing, organoleptic properties*

Abstract of Analysis of Potential of Implementation of Innovative Agricultural Technologies North Sumatra, Indonesia

Kubatova G.[1]Mazancova J.[2]*

[1]Faculty of Tropical AgriSciences, Czech University of Life Sciences, Prague
[2]Department of Sustainable Technologies, Faculty of Tropical AgriSciences, Czech University of life Sciences, Prague

[*]E-mail: mazan@its.czu.cz

The Republic of Indonesia is the largest economy in Southeast Asia region. The main sector of its economy is industry, nonetheless agriculture represents a basic pillar of Indonesian economy as well as it employs approx. 40% of population. Taking in consideration the annual population growth of just about 1%, the high demand for food is expected. Hence the agricultural development becomes a crucial question as seen in National Medium-Term Priority Framework for 2010-2014 created with the assistance from Food and Agricultural Organization of the United Nations. This paper strives to analyze current situation of Indonesian small-scale farmers, and to highlight the innovation capacity of regencies of Toba Samosir and Samosir. Summary of available information about innovation technologies and innovation capacity analysis were gathered from secondary literature sources. Primary data were collected in field survey conducted in region of North Sumatra, Indonesia. To obtain the necessary information, Participatory Rural Appraisal approach was used. This set of methods includes semi-structured questionnaires, informal conversation interview as well as participatory observation. The survey revealed that the farmers´ main problems are i) insects (rats, birds) and plant diseases; ii) long period of drought season and on the other hand heavy rains during the rainy season, both causes harvest losses, and the last most frequently mentioned issue is iii) unstable price of crops selling at the market. Moreover, the variability of growing crops is small and only in few cases sufficient amount of water was secured. Due to the fact that farmers´ agricultural production is primarily used for sale and not for subsistence, there is potential of change for more variable composition of crops. Thus the vulnerability of farmers caused by mutable prices could be partially solved as well as harvest losses (some crops are less sensible to climate blips). In addition extension services which could deepen the farmers´ knowledge about innovative technologies is desirable.

Keywords: *Innovative agricultural technologies, North Sumatra - Indonesia, sustainable development, permaculture, innovative capacity*

Acknowledgment: The study was supported by Internal Grant from Podpora Mobility Studentů of Czech University of Life Sciences.

Evaluation of Activities of the Training Centre AgroIhutan, North Sumatra

Maierova, K.[1], Mazancova, J. [2]*

[1]Department of Economics and Development, Faculty of Tropical AgriSciences, Czech University of Life Sciences, Prague
[2]Department of Sustainable Technologies, Faculty of Tropical AgriSciences, Czech University of Life Sciences, Prague

[*]E-mail: maierova.k@gmail.com

Indonesia is one of the countries belonging to developing countries that have unlike the developed countries a steadily growing economy, for year 2013 estimated 62%. On the other hand, approximately 50% of total Indonesian population lived in 2011 in rural areas, where the main source of income is agriculture and where poverty is concentrated. In these areas agriculture education is really important and especially practical trainings of agricultural techniques. One of the sites of practical agricultural education in Indonesia is a private agricultural training centre AgroIhutan in North Sumatra. It has 15 hectares of arable land and is used for practical agriculture courses for high school students. The centre operates as a small-scale farm, and has to combine activities to be financially sustainable and at the same time provide enough demonstration fields and procedures for practical training. Nowadays it fulfils only its demonstration role. The research was done by direct presence of the author in the area of North Sumatra, where the centre is placed. The three target groups of survey were people involved in operation of the centre: director, employees and workers, and external authorities. The main objectives of our research were to analyze and evaluate all activities of the centre, and determine the biggest obstacles in its sustainability. Other objective was to make a SWOT analysis. As the main weaknesses of centre were

determined financial situation, lack of labour force and unutilized resources. Based on these facts we created a business plan including cash flow estimation and suggestion for redistribution of arable land to ensure financial and food sustainability. Based on opportunities issues were suggested to enlarge the demonstration activities as a beekeeping, fruit growing, animal husbandry or processing and distribution of agriculture products. These steps and changes should ensure the financial sustainability and food self-sufficiency of the agriculture centre and provide a stable background for agriculture education in this region.

Keywords*: agriculture education, practical training, agribusiness, sustainability*

Acknowledgement**:** The study was supported by Hlávkova Nadace

Is Tourism a Suitable Strategy for Empowerment of Resource-poor Communities in Tropics? Experience from North Sumatra, Indonesia

Kratky L.[*]

Department of Economic Development, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague

[*]E-mail: KratkyL@seznam.cz

Development of tourism has direct consequences on rural livelihood, environmental situation, cultural habits, policy decision-making, economics and etc. This is evident from the countries and/or regions where rapid development of tourism is significant factor. The main objective is to assess the attitudes of the stakeholders in surroundings of Lake Toba (especially community on Samosir Island) in North Sumatra province regarding to tourism impact on rural development. All stakeholders that were significantly involved in tourism, i.e. households, government officials, tourists, hotels and restaurants were interviewed and with those who were motivated as well as of significant for in-depth survey were asked to fill out the semi-structured questionnaire. Until these days, all data were statistically processed via simple statistical analysis. Data collection was conducted from July to August 2013 on Samosir island around the city of TukTuk, which was identified as the most prospective. A representative of Tabo Cottages was selected as the key informant. Based on other studies as well as according to local conditions, the relevant indicators used as classification criteria were planted crop structure, planted crops, yields and amount of harvest, future expectations. As a most appropriate strategy was therefore seen bottom-up approach, therefore after mapping the local situation there was set up cooperation with Tabo Cottages which proceeded from the questionnaire concerning hotels and restaurants as most adequate. Through several meetings with the key informant the analysis of hotels needs in daily and weekly usage (mainly fruit and vegetable) was developed. Afterwards, due to her willingness to cooperate there were also six farmers selected who were motivated enough and able to cooperate with the hotel. To all participating stakeholders we introduced the pros and cons of such cooperation. For farmers, the most beneficial was a regular income for fixed prices. Therefore they are able to plan for further future. The hotel is likely to follow the trend of western countries in choosing local delivery men, local food which is popular within clients. Therefore not only strategy of improvement of livelihood via tourism was found, but also sustainable development was introduced to the stakeholders as hotel Tabo Cottages and its management.

Keywords: *tourism, rural development, tourism economics, cooperation, stakeholder analysis, Samosir, Indonesia*

Acknowledgement: The study was supported by Grant Programme of Department for Foreign Affairs of Czech University of Life Sciences provided to participants of Summer School in Indonesia and by special scholarship for scientific research for students of CULS

Developing Application in Advanced Programming Language for Ubiquitous Computing

Nepal A.[1*]*, Merunka V.*[2]

[1]*Department of Economics and Development, Faculty of Tropical AgriSciences, Czech University of Life Sciences, Prague, Czech Republic*
[2]*Department of Information Engineering, Faculty of Economics and Management, Czech University of Life Sciences, Prague, Czech Republic*

[*]E-mail: nepal@ftz.czu.cz

The paper examines the potential usefulness of hand held devices such as mobile phones and tabs in education sector while demonstrating the need to overhaul the data sharing and content delivery techniques for ubiquitous computing. Traditionally designed educational systems are unable to cater the on site real access of data for better transparency in admissions, program registration, exams, grading of semester work of students, interaction and evaluation of the courses, and, furthermore for the dissemination of the information among teachers, students or parents. Evaluation of the semester work and tracking the students' projects and attentiveness, interest towards the course on the spot can lead to the fair judgment and at the same time. Moreover, it can also help teacher to improve the course module to be more efficient for the students. There is clear need for the adoption of the new technologies for the fast reliable onsite real time communication between student and teachers. Keeping this on mind the research was conducted to adopt the project called "Semestral Work Tracking System" for the very famous two mobile operating Systems (OS), Android and IOS. From the 200 structured questionnaire conducted online among the university students and teachers was documented that students were very interested to implement new interactive tool helping them to evaluate the lectures immediately while teachers revealed that they were very eager to use the system because of possibility to (i) do grading and (ii) to know students better. Furthermore, the collected data also revealed that both OS were equally in use. A prototype application was developed for IOS devices to demonstrate its need. Based on the xxx, we can confirm high level of acceptance of the system by both teachers and students. Based on our results, we can conclude that technologies could be well adopted for the better interaction between teachers and students.

***Keywords**: ICT, IOS, Android, operational system, mobile application, ubiquitous computing, student-teacher interaction, questionnaire survey, Czech Republic*

Developing of Suitable Agricultural Marketing Information System for Citrus Crop in Lattakia Region, Syria

Sulaiman H.[*], Doucha T., Kandakov A.

Department of Economics and Development, Faculty of Tropical Agrisciences, Czech University of Life Sciences Prague Czech Republic

[*]E-mail: sulaiman@ftz.czu.cz

The fruit production is one of the main profit-generating sectors in agriculture. Citrus production in Lattakia region has a big potential to become an important income generator within the national economy of the country. However, it should be noted that the lack of sufficient and on-time information on citrus markets in targets region represents a crucial problem for local citrus producers. As a result, their ability to access new markets has remained limited as they cannot recognize competitive, but promising, markets at a right time. Moreover, they face inadequate information regarding to frequent fluctuations in citrus supply and demand as well as significant differences and volatility in prices across local markets. In general, for farmers it is difficult to predict competitors' actions and thus they changes to succeed are limited. Data collected on daily basis were subjected to Statistical analysis, using SPSS.18 Software. Prices average, skewness, variance, standard deviation, kurtosis, coefficient of variance showed that volatility was affected by season, citrus varieties, markets, years and inflation rates. Therefore, a functional MIS, may be necessary to improve farmers position at markets, despite that, AMIS itself face several criticism …

***Keywords**: citrus production, information system, market imperfections, information, demand and supply, competitiveness, Lattakia region, Syria.*

Biodiversity of Small Mammals in Cacao Agroforests in Peruvian Amazon

Paterova L.[1], Lojka B.[1], Husband T.P.[2]*

[1]Faculty of Tropical AgriSciences Czech University of Life Sciences Prague, Czech Republic
[2]Department of Natural Resources Sciences, University of Rhode Island, United States of America

[*]E-mail: Pateroval@ftz.czu.cz

A large proportion of the deforestation of tropical rainforests is caused by small-scale farmers. Traditional slash-and-burn systems with prolonged fallow periods are no longer feasible in most parts of the tropics. However, agroforests could have great potential to increase the productivity of farming systems and sustain continuous crop production. The varieties of trees in agroforests are higher and the distribution of the plants on the landscape is more chaotic, following natural patterns. Cacao (*Theobroma cacao*) agroforests that maintain a high proportion of shade trees in a diverse structure is being viewed as a sustainable land use practice. The basic hypothesis was the question if the cacao agroforests are able to support the biodiversity of small mammals in Peruvian Amazon. The main objective of this study was to assess the impacts of the forest conservation on small mammal communities by comparing tree species richness, diversity and composition between primary and secondary forests, cacao agroforests and slash-and-burn fields in San Alejandro, Peruvian Amazon. We trapped small mammals in 16, 25 × 25 meter plots on the four land use systems using Sherman and Tomahawk traps during three months. Trirty one individuals were trapped of 14 different species (genera Marsupialia and Rodentia). All of them were rodents or marsupials mammals. According to the species diversity indexes, the species composition of cacao agroforests is comparable with the secondary forest. From the observations a different species composition in primary forest was obvious, but the cacao agroforests seems to be a better alternative for conservation of biodiversity than traditional intensive agriculture. In this context our study forms a good scientific background for further monitoring of ecological changes in the human modified landscape of the Peruvian Amazon region.

Keywords: *Amazon basin, neotropical mammals, Sherman trap, species diversity, species richness, Theobroma cacao, Tomahawk trap*

Production Characteristics of Almarbian Sheep Breed in Yemen Cconditions

Alkhewani T.[1], Momani Shaker M.[1], Alshami A.[2]

[1]Department of Animal Science and Food Processing, Faculty of Tropical AgriSciences, Czech University of Life Sciences, Prague
[2]Section of Livestock, Central Highland Regional station, Yemen

[*]E-mail: alkhewani@ftz.czu.cz

The objective of this study was to evaluate the production characteristics of Almarbian sheep breed in Yemen condition. The study was conducted at the agricultural research station at Yemen Agricultural Research & Extension Authority (CHRS), Dhamar 100 km south of the capital city, Sana'a. This study was conducted in 2011 on 29 ewes 1 to 6 of age and 5 sires of Almarbian breed sheep. All the sheep were kept in a semi-intensive system, grazing natural pasture from 8:00 to 13:00 a.m. and from 15:00 to 17:00 p.m. besides rangeland grazing; the animals received additional feeds as supplements. The reproductive traits were calculated as well as productivity traits according to Arab Center for the Studies of Arid Zones and Dry lands (ACSAD 1996), by using the equations. The results indicated the fertility ratio of 90%, however, fecundity rates were 93% at birth and 86% at weaning. Four per cent of ewes gave birth to twins, with sex rate 46:54 (male: female). Stillbirth and mortality lambs were 4% and 4%, respectively. The results also showed that sheep increased their average weight from 23.1 kg (pre-mating) to 24.8 kg (post-mating). Additionally the growth traits studied, birth weight, weaning weight, the average weight of single lambs at birth were 2.83 kg and 2.5 kg for males and females, respectively, whereas for weaning lambs it was 11.59 kg, and 10.54 kg, for males and females, respectively. However, twin lambs had an average weight of male lambs at birth, 2.0 kg and 10 kg at weaning. So, daily gain was 100 g / day, and 90 g / day for single male and females at birth, respectively, whereas it was 90 g / day for twin male lambs. The results also showed wool production per head averaged 0.457 kg and 0.680 kg for females and males, respectively. We recommend continuation of study on the Almarbian sheep breed.

Keywords: *Almarbian sheep, growth, production, reproduction.*

Actual Demography and Genetics within the Semi-captive Population of the Western Derby Eland (*Taurotragus derbianus derbianus*) as a Part of Species Conservation Strategy

Brandlova K.[1,3], Fedorova T.[1,3], Junková Vymyslicka P.[2,3],Zackova M.[1,2,3], Hejcmanova P.[1,3]*

[1]Czech University of Life Sciences Prague, Faculty of Tropical AgriSciences, Department of Animal Science and Food Processing, Kamýcká 129, 165 21, Praha Suchdol, Czech Republic; fedorova@ftz.czu.cz
[2]Czech University of Life Sciences Prague, Faculty of Environmental Sciences, Department of Ecology, Kamýcká 1176, 165 21, Praha Suchdol, Czech Republic
[3]Derbianus CSAW, o.s., Kamýcká 129, 165 21, Praha Suchdol, Czech Republic

[*]E-mail: brandlova@ftz.czu.cz

While the last wild population of the Western Derby eland (*Taurotragus derbianus derbianus*) survive in the Niokolo Koba National Park in number about 170 individuals, two progressively growing populations in semi-captivity in Senegal reached almost 100 of animals. Effective population management and a thorough knowledge of the status and biology of this species are essential for Western Derby eland (WDE) conservation and future actions. We calculated the current demographic and genetic characteristics of this population. The pedigree data were processed in SPARKS 1.6 and further corroborated in PMx software for pedigree analyses. A total of 116 offspring of the WDE were born from 2000 to 2013 in semi-captive population in Bandia and Fathala reserves, Senegal. Mating showed synchronization ($p < 0.05$) and the majority of calves were born from November to January (88%). Average age at conception of females was 36 months (± 9 S.D.). The youngest and the oldest age of parturitions were noted in 25 months and 16 years, respectively. The overall calf mortality was 6.9% (n = 8). The annual non-calf mortality since 2001 was 3.26 % (± 3.29 S.D.) with the main period during the top dry season till the top rainy season (from June to August). Female mortality was often connected with reproduction (vaginal prolapses, abortions or parturition), accidents or old age; male mortality was mostly connected with injuries caused by intra-specific fights. Analyses of the life table indicated that the deterministic annual population growth rate was 1.31 (31.37% ± 12.66 S.D.). The overall mean level of inbreedi0ng in the population was 0.1454 and the mean kinship was 0.2070 on average. All these data has unique value for WDE conservation programme and they are an important part of the WDE Conservation Strategy. This strategy is the main output of the workshop which took place in Senegal in January 2013 and brought the complex status review of the WDE as well as the conservation strategy plan with vision, goals, objectives and activities which should ensures the Western Derby eland survival.

Keywords*: giant eland, reproduction, Senegal, conservation programme*

Acknowledgments: We thank the CULS Prague, Directorate of National Parks of Senegal, SPEFS, Knowsley Safari Park, Chester Zoo Foundation, Prague, Ostrava and Plzeň Zoo and many others for support, also Ministry of Foreign Affairs and the Ministry of Environment of the Czech Republic, project Postdok ČZU (ESF and MEYS CZ.1.07/2.3.00/30.0040), the CULS Prague CIGA 20135010, CIGA 20134217, and CIGA 20114203 for funding.

Assessment of Livelihood Strategies in Selected Rural Areas in Syria

Ibrahim K., Mazancova J.*

Department of Sustainable Technologies, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague

*E-mail: kindah.ibrahim@gmail.com

The diversification of income sources becomes of major importance in rural areas since agriculture alone is unable to meet rural people's needs. Aiming to assess the role of livelihoods strategies in rural development and poverty alleviation in selected areas in Syria, the present study discusses the role of income diversification in poverty reduction and income inequality. Using the asset-based approach as the main framework, qualitative and quantitative methods were employed for the purpose of this study. In addition to secondary data, primary data was collected in five rural areas in Syria, a sample of 444 households was chosen to represent five distinguished farming systems, and the interviews used a structured and comprehensive questionnaire. The results reveal that diversification of income sources is connected with the households status and endowments, poor households depends mainly on labor-intensive and low-waged activities, while non-poor households rely on their assets to engage in more profitable activities especially self-employment. The study also finds evidence that engaging in non-farm activities increases inequality among households and decreases poverty; the use of income decomposition analysis revealed that livestock and waged non-farm income are inequality-decreasing sources to overall income sources, while non-farm self-employment is inequality-increasing source of income. These results combined with findings from households' asset description suggest that poor households lack the access to capitals (i.e. irrigated land, financial capital, etc) which means that it is important to focus on non-agricultural activities in order to become better-off. Moreover, results from econometric analysis evidently indicated that better education has a positive impact on poverty status as well. These results imply that the attainment of higher education level will move poor people out of poverty and improve their well-being.

Keywords: *Syria, rural areas, livelihoods diversification, non-farm income, poverty, income inequality*