

# Status of Rice Food Security of Small Farmer Households under Intermediate Level of Mechanization in Kampar Region, Indonesia

Ujang PAMAN<sup>1</sup>

*Department of Agribusiness, Islamic University of Riau, Pekanbaru, Indonesia*

## Abstract

Rice is the most important staple food in Indonesia and it has become a key indicator of food security across the country. In Kampar Region, most small farmers are facing challenges to meet their household's rice food security due to shrink size of rice farm and stagnate rice productivity resulting limited application of mechanization technology. This paper attempts to examine the status of rice food security of small farmer households under intermediate level of mechanization in Kampar Region, Indonesia. Field surveys were conducted in two districts, i.e. Bangkinang and Kuok of Kampar region during April to June 2018. A total of 50 small farmers, consisting of 25 small farmers from each of the districts, were purposively selected for samples. Data were collected through personal interview and analyzed by using descriptive – quantitative techniques. Under current level of mechanization, the rice production was found to average 1,376 kg with cultivated area of 3,699 m<sup>2</sup> on average. Based on the rice production and per capita rice consumption of 114.6 kg/year, about 56% of small farmers could fulfill a rice food need of their households as long as 12 months or more. However, about 44% of small farmers could fulfill the rice food need less than 12 months and even 22% of them could only suffice for less or equal to 6 months. It was also found that it was required about 487 m<sup>2</sup> to fulfill the annual per capita rice consumption under the present rice productivity of 3,75 ton/ha. There is a need to increase the level and application of mechanization technology in order to enhance rice productivity and eventually effect to rice food security of small farmer households in survey area.

*Keyword: Rice Food Security, Small Farmer Households, Mechanization, Kampar Region*

## Introduction

Rice is one of the most remarkable of cultivated crops in the world (Fonjong and Athanasia. 2007). It is because the rice is the most important staple food for more than 50% of the world's population and will continue to increase in the coming decades together with increasing population that is estimated to be more than 9 billion in 2050. Rice is also the critical source of livelihood for one billion people around the world, with

---

<sup>1</sup> The article is presented at the International Congress on Engineering and Food in Melbourne, Australia, on 23 – 26 September 2019.

production dominated by rural and resource-poor households. Therefore, growth in agricultural productivity in real terms has a positive impact on rice production and eventually ensures household food security (Morioka and Kondo, 2017). It is become important that the advancements in agricultural productivity play a critical role in promoting food security at the individual and household levels.

Sustained increases in agricultural production and productivity require the continuous development of mechanization technology to meet the production challenges in various agro-climatic regions and encourage adoption by farmers. Machine use in agricultural production, for instance, plays an important role in the increase in productivity and reduction of unit cost of production resulting profitable making farming viable. The impact of machine use on the production, productivity, cost and profitability in paddy production was reported (Basu and Nandi, 2014).

Present level of mechanization and crop yield in many countries are quite low and varies significantly from crop to crop and in big countries it varies from region to region in the same country (Singh and Zhao, 2016). According to Lantin (2016), there are four levels of mechanization based on power source and degree of control by human intervention, namely low, intermediate, high and full mechanization levels. The intermediate level is the operation that is carried out by a mechanical power sources in combination with a non-mechanical source and controlled by human, e.g. threshing using stationery axial-flow thresher where feeding of straw-and-grain materials, supplementary cleaning and bagging are performed by human power.

Food security is the ability to secure an adequate daily supply of food that is affordable, nutritious and hygienic (Mamba and Peter, 2016). The major elements of food security are food availability, food access, food utilization and protection of access. Food availability for farm households in rural areas means assurance that they can access sufficient food through their own production or through purchase from markets, given sufficient purchasing power (Agada and Igbokwe, 2016). The lack of resources and little market accessibility are among the major factors that affect small farming household food security. In addition, Family size, monthly income, food prices, health expenses and debt are main factors influencing the food security status of rural households (Ahmed et al, 2017).

Like in many other developing countries, rice in Indonesia is also one of the most important food crops as a source of livelihood and the staple food for the majority of population. The rice need will continue to increase in the future together with increasing population and developing food industries. Currently, one of the major challenges of Indonesia is to ensure its rice production to produce enough amount to feed the population. Accordingly, majority of rice farms that are managed farmers is small in scale with relatively low productivity. The conditions can make difficulty to fulfill the need of rice consumption that achieves as much as 114.6 kg per capita per year on average in the country.

However, the question is how small farms can become viable and sustainable in the face of various challenges to fulfil rice food security. This research attempts to examine the status of rice food security of small farmer households under intermediate level of mechanization in Kampar Region, Indonesia.

## **Materials and Methods**

Field surveys were conducted in two districts, i.e. Bangkinang and Kuok of Kampar region during April to June 2018. The locations are rice production centers in Kampar Region and the application of farm machines for rice operations is relatively high. A total of 50 small farmers, consisting of 25 small farmers from each of the districts, were purposively selected for samples. The selected farmers used farm machines in rice farming operations. Primary data were collected through personal interview with farmers by using questionnaires. The data collected were tabulated and analyzed by using descriptive – quantitative approach and simple regression technique.

## **Results and Discussion**

### *Small farmer's characteristics and paddy field profile*

Most small farmers interviewed were women and aged from 28 to 29 years old with an average of 45 years. Woman has a dominant role to manage rice farming operations. Their formal education ranged from 2 to 12 years with an average of 8 years. They had an adequate experience to cultivate rice as long as 16 years on average with ranging from 2 to 45 years. Family member of farmer sample ranged from 2 to 8 person with an average of 5 person. The number of family members has an effect on rice consumption and household expenditure. The bigger family members tends to require more rice and much more family expenditure.

Most small farmers are cultivated rice on rain-fed paddy field. Consequently, frequency of rice growing depends extremely on season. Generally, there are two seasons for growing rice i.e., wet and dry seasons. If rain falls along year without dry season, the rice can be grown twice a year. However, cultivating rice on wet season is most common because water supply is sufficient for tillage operation as well as rice growing until harvesting. For growing rice on dry season, farmers always face some difficulties primarily insufficient water supply into the paddy field, so rice production and productivity may become lower. Therefore, some farmers prefer to grow soybean, maize or green bean during the dry season.

Famers have a small scale of paddy field area at arrange of 0.11 to 1 hectare with an average of 0.37 hectares. The paddy field is mostly owned by farmers themselves that previously was accepted from legacy or bought from other farmers. Most farmers (31 farmers) then divided the paddy field into a smaller plot to facilitate for supplying water into the field primarily having a slightly inclined surface. The plot of owned farmers ranged from 2 to 30 plots with an average of 13 plots.

### *Mechanization development and level*

The major farm machines in Kampar region consists of 4-wheel tractors, 2-wheel tractors, irrigation pumps, combine harvesters, power threshers and rice milling units as presented in Fig. 1. The largest number of available farm machines in the region is power threshers, followed by irrigation pumps and 2-wheel tractors. They have significantly increased during the period of 2010-2018. The smallest one is 4-wheel tractors with total number in 2018 is only 12 units and increased from 1 unit in 2010. The rice milling units have increased from 66 units in 2010 to be 73 units 2018 or increased as 10% during the period. While, combine harvesters have been available since 2017 and the machines have reached as 19 units in 2018. The combine harvester is more important in the future because the machine can concurrently perform harvesting and threshing operations.

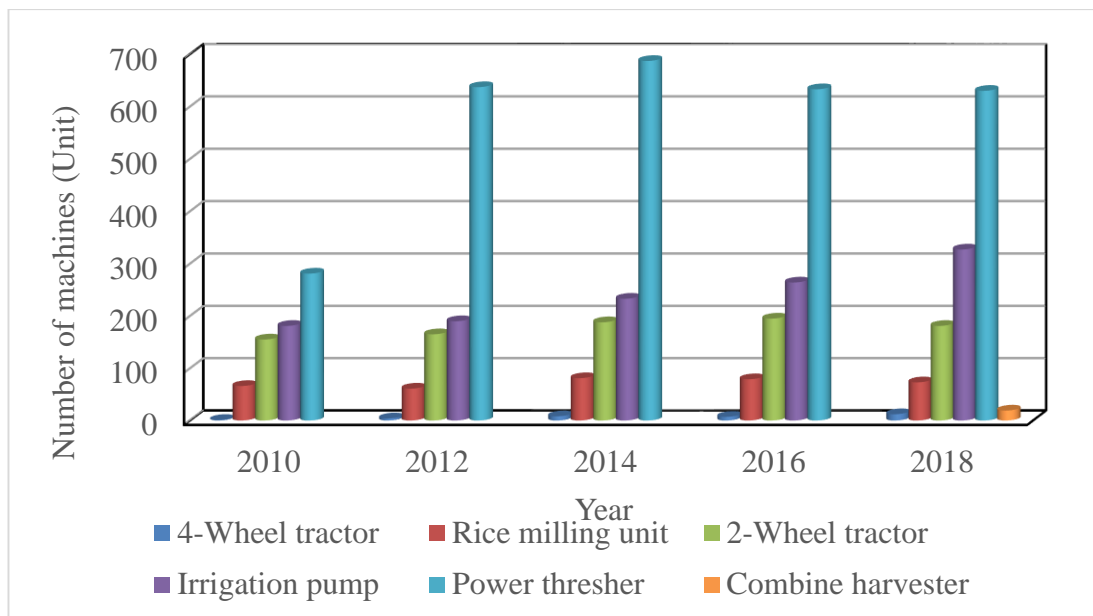


Figure 1. The development number of farm machines in Kampar Region during a period of 2010 - 2018

Figure 2 shows that the number of farm machines was not sufficient to achieve full mechanized. It is, for example for 2-wheel tractor, required at least 100 units per 1000 ha of paddy field area to reach full mechanized. While, current number of farm machines was mostly less than 100 units per 1000 ha with an average of 36 units. Power thresher has only achieved more than 100 units per 1000 ha of paddy field area, accounting for 114 units. Therefore, the current mechanization condition remains at intermediate level. Under this condition, rice productivity is difficult to reach maximum level because rice farming operations cannot be completely performed by mechanical power. It was found that rice productivity obtained small farmers was only 0.35 ton/ha on average, ranging from 0.12 to 0.62 ton/ha.

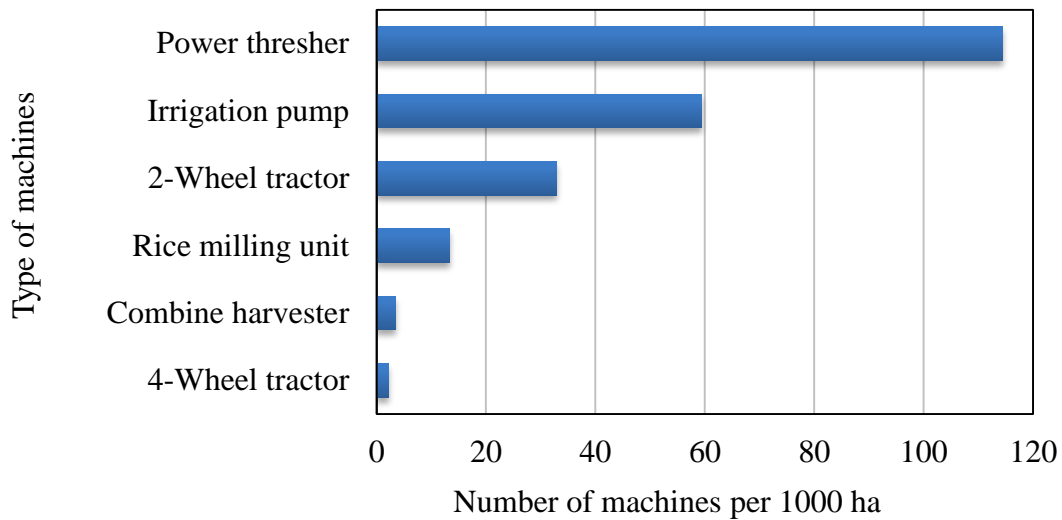


Figure 2. Number of farm machines per 1000 ha of farm area

Rice productivity may be affected by scale of rice farming cultivated area. The smaller cultivated area can make operation more effective and application of production input more appropriate. Figure 3 indicates that rice productivity tends to decrease with increasing rice farming cultivated area. Although the relationship have statistically no significant, but the scale of cultivated area had an effect on rice productivity.

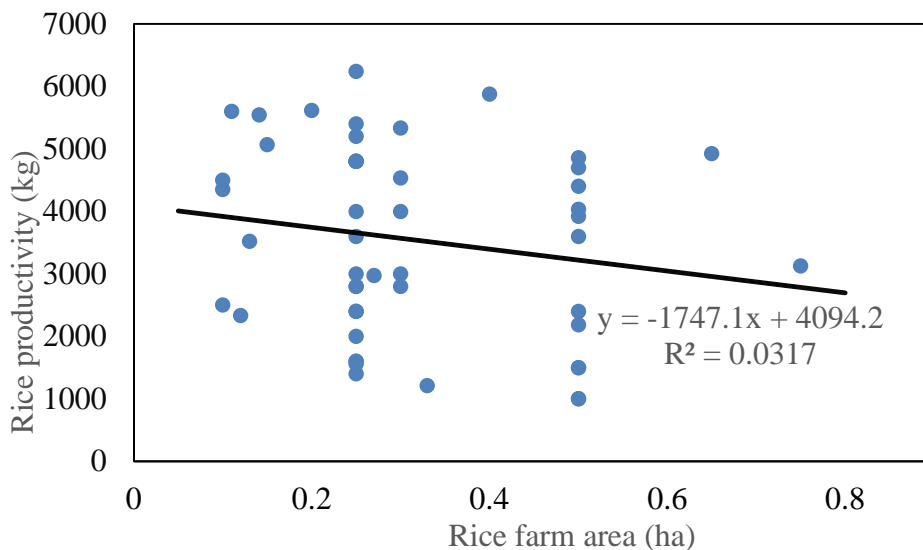


Figure 3. Relationship between farm cultivated area with rice productivity

Figure 4 shows that about 44% of small farmer households could fulfil rice need for less than one year and even 22% of them could fulfil less than 6 months. They included into insecurity level in rice food availability. It means that the deficiency of rice need will

be bought from market due to rice is staple food for small farmers in the survey area. They must increase rice productivity for two-fold or more especially for less than 6 months in order to meet rice need in sufficient level and make viable and sustainable in rice food security. The more intensive and wide range of application of farm machines into rice farming operations is the best way to increase rice yield.

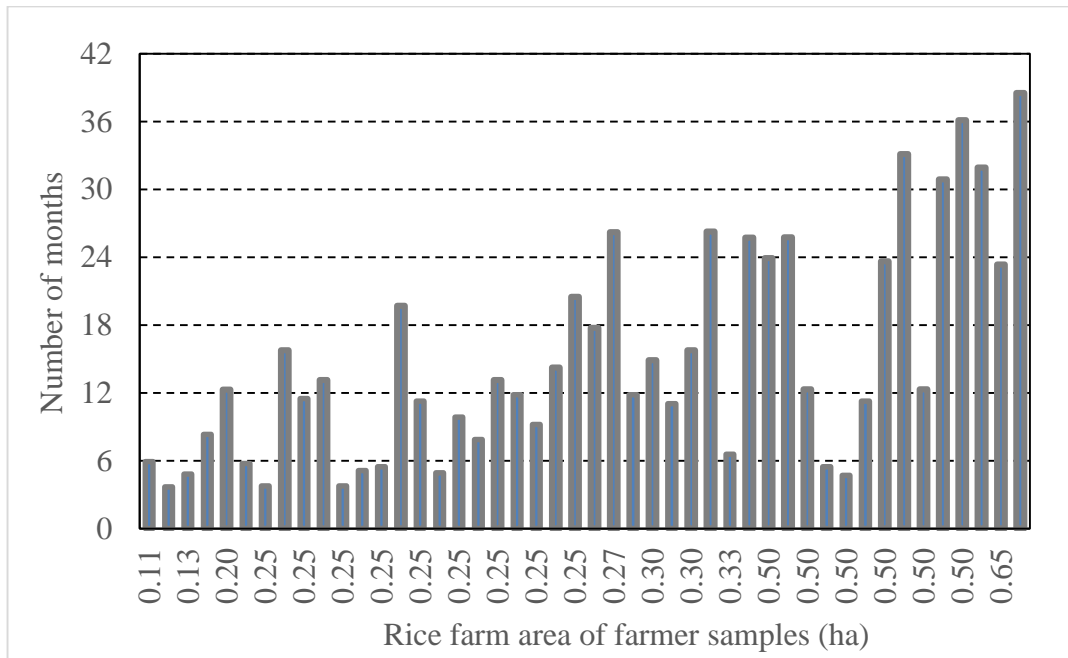


Figure 4. Rice food security of small farmer households

## Conclusions

Under current level of mechanization, the rice production was found to average 1,376 kg with cultivated area of 3,699 m<sup>2</sup> on average. There was a low correlation between rice farming area and production, although statistically is not a significant effect. Based on the rice production and rice consumption per capita of 114.6 kg/year, about 56% of small farmers could fulfill a rice food need of their households as long as 12 months or more. However, about 44% of small farmers could fulfill the rice food need less than 12 months and even 22% of them could only suffice for less or equal to 6 months. It was also found that it was required about 487 m<sup>2</sup> to fulfill the annual per capita rice consumption under the present rice productivity of 3,75 ton/ha. There is a need to increase the level and application of mechanization technology in order to enhance rice productivity and eventually effect to rice food security of small farmer households in survey area.

## References

Agada, M and E. Igbokwe. 2016. Influence of food culture and practices on household food security in North Central Nigeria. *Journal of Food Security*, 4(2): 36-41.

- Ahmed, U. I., L. Ying, M. K. Bashir, M. Abid, and F. Zulfiqar. 2017. Status and determinants of small farming households' food security and role of market access in enhancing food security in rural Pakistan. *PLoS ONE*, 12(10): 1 – 15.
- Amare D., and W. Endalew. 2016. Agricultural mechanization: assessment of mechanization impact experiences on the rural population and the implications for Ethiopian smallholders. *Engineering and Applied Sciences*, 1(2): 39-48).
- Basu, B and A. Kr. Nandi. 2014. Farm mechanization and rationality of labor use in Indian Agriculture: a frontier analysis of cost of cultivation data. *Indian Journal of Agricultural Economics*, 69(3): 336-346).
- Emami, M., M. Almassi, H. Bakhoda, and I. Kalantari. 2018. Agricultural mechanization, a key to food security in developing countries: strategy formulation for Iran. *Agriculture and Food Security*, 7(24):1-12.
- Fonjong, L. N. and M. F. Athanasia. 2007. The fortunes and misfortunes of women rice producers in Ndop, Cameroon and the implications for gender roles. *Journal of International Women's Studies*, 8(4): 133-147).
- Lantin, R. M. 2016. Agricultural mechanization in the Philippines, Part II: Current Status. *Agricultural Mechanization in Asia, Africa and Latin America*. 47(2): 87-108.
- Mamba, S. F. and G. Peter. 2016. Poverty, food security, survival activities and HIV and aids in Swaziland. *Journal of Food Security*, 4(1): 1-12.
- Morioka, M. and T. Kondo. 2017. Agricultural productivity growth and household food security improvement in Nepal. *Review of Development Economics*, 21(4): e220-e240.
- Singh, G., and B. Zhao. 2016. Agricultural mechanization situation in Asia and the Pacific Region. *Agricultural Mechanization in Asia, Africa and Latin America*. 47(2): 15-25.



**ICEF13**  
INTERNATIONAL CONGRESS  
ON ENGINEERING AND FOOD

MELBOURNE, AUSTRALIA  
23-26 SEPTEMBER 2019

*Engineering Innovations  
for Food Supply Chains*

# Certificate of Attendance

This is to certify that

**Dr Ujang Paman**

attended the

**13th International Congress on Engineering and Food (ICEF13)**

Melbourne Convention Exhibition Centre, Australia  
23-26 September 2019

A handwritten signature in black ink, reading "Roman Buckow".

Dr Roman Buckow  
Chair, 13th edition of the International Congress on Engineering and Food Organising Committee



# Monday 23 September 2019

0730-1730	Registration and Exhibition   Foyer, Level 1
0830-0915	Opening Ceremony
Room	Meeting Room 105 & 106, Level 1
0915-1025	Plenary Session
Room	Meeting Room 105 & 106, Level 1
1025-1100	Morning Tea   Foyer, Level 1
1100-1230	Concurrent Sessions
	Concurrent 1F
Session	Short oral 1 Advances in food process engineering
Room	Meeting Room 101, Level 1
Chair	TBC
	Quantification of osmotic pressure of whey under forward osmosis for whey concentration <b>Anna Artemi</b>
	Impact of temperature combined with bipolar membrane electroacidification on selective separation of whey proteins <b>Claudie Aspirault</b>
	Novel natural emulsifiers derived from biomass-based by-products: case of argan ( <i>Argania spinosa</i> ) nut shell powder <b>Meryem Bouhoute</b>
	Forward osmosis for dairy processing – a pilot scale study on milk and whey concentration <b>George Chen</b>
	Effect of pre-heat treatment of skim milk on reverse osmosis membrane filtration performance and storage stability of concentrated milks <b>Morten Vormsberg Christiansen</b>
	Physical, textural, and microstructural properties of extruded puffed products affected by inclusion of high biological value proteins <b>Ingrid Contardo</b>
	Megasonic-assisted aqueous extraction of canola oil from canola cake <b>Fouad Gaber</b>
	ElectroHydroDynamic enhancement of heat and mass transfer in food process: a review <b>Olivier Rouaud</b>
	Unique surface features in spray dried camel milk powder <b>Hasan Jubaer</b>
	Screening of mixed surfactants based reverse micellar system for Lactoperoxidase extraction from whey <b>Shwetha Karanth</b>
	Coupled transport and CFD modelling framework for intermittent microwave convective drying of plant based food <b>Azharul Karim</b>
	Transport of intracellular water during drying of food material: an experimental investigation <b>Md Imran Hossen Khan</b>
	The formation and stability of carbon dioxide nanobubbles designed for potential applications in food processing <b>Khanh Kim Thi Phan</b>
	Impact of pH and ionic strength on temperature dependent diffusion of micellar bound casein monomers into the serum phase during microfiltration <b>Simon Schiffer</b>
	On the length-dependent milk protein deposit layer in hollow fiber membranes <b>Roland Schopf</b>
	Technical-scale extraction of bovine $\alpha$ S-, $\beta$ - and $\kappa$ -casein using decanter technology <b>Thomas Schubert</b>
	Identification of mechanisms of multistage structure-formation in processed cheese model products <b>Stefanie Sedlmeier</b>
	Influence of food microstructure on thermal inactivation dynamics of <i>Listeria monocytogenes</i> in the SHAKA reciprocal agitated retort <b>Jan Van Impe</b>
	Increased inactivation of bacterial endospores by ohmic heating <b>Felix Schottroff</b>
1230-1345	Lunch   Foyer, Level 1
1345-1515	Concurrent Sessions
	Concurrent 2F
Session	Short oral 2 Engineering properties of food and packaging
Room	Meeting Room 101, Level 1
Chair	TBC
	Continuously distributed glass transition and caking of maca ( <i>Lepidium meyenii</i> Walpers) powder <b>Alex Eduardo Alvino Granados</b>
	Dielectric properties of mango pulp ( <i>Mangifera indica</i> L.) and mango nectar for microwave heating at 915 and 2450 MHz <b>Tiago Augusto Bulhões Bezerra Cavalcante</b>
	Mechanical wheat flour modification and its effect on flour properties and bread quality <b>Yi Chen</b>
	Effect of glyceryl monostearate on fat crystallization behavior and stability of whipped-frozen emulsions <b>Jinju Cheng</b>
	Confined compression as an analytical tool to quantify juice release kinetics from meat and meat analogues <b>Steven Cornet</b>
	New insight on the use of statistical correlation functions to describe structural complexity of food and to estimate their essential properties <b>Antonio Derossi</b>
	Effect of fat globule size on whippability of dairy creams <b>Pramesh Dhungana</b>
	Physicochemical impact of slip additives in migration through packaging material made from high-density polyethylene <b>Nabeen Dulal</b>
	Production of functionalized low viscosity gelatin: thermo-mechanical and rheological properties <b>Javier Enrione</b>
	A new route to develop renewable non-isocyanate polyurethanes for food packaging applications <b>Mehran Ghasemlou</b>
	Food structure assessment for the optimization of dairy products and manufacturing processes <b>Sally Gras</b>
	The fluid mechanics of mayonnaise mixers – the effect of stator slot width <b>Andreas Håkansson</b>
	Effect of native fat globule size on foaming properties of milk <b>Minh Thao Ho</b>
	The relationship between shelf life of fresh cut red meat and different packaging during refrigerated storage <b>Nidhi Jindal</b>
	Vibrations as a cause of texture defects during yogurt manufacturing <b>Adrian Körzendörfer</b>
	Analysis of vertical compression of corrugated fiberboard tubes using digital image correlation <b>Celia Kueh</b>
1515-1545	Afternoon Tea   Foyer, Level 1
1715-1915	Welcome Reception   Foyer, Level 1

## Tuesday 24 September 2019

0730-1730	Registration and Exhibition   Foyer, Level 1
0900-1015	Plenary Session
Room	Meeting Room 105 & 106, Level 1
1015-1050	Morning Tea   Foyer, Level 1
1050-1220	Concurrent Sessions
	Concurrent 4F
Session	Short oral 3 Food engineering for nutrition and health
Room	Meeting Room 101, Level 1
Chair	TBC
	Cell disruption improves in vitro bioaccessibility of $\omega$ 3-LC-PUFA and carotenoids in the microalga nannochloropsis <b>Tom Bernaerts</b>
	Liposome based delivery of $\alpha$ -linolenic acid and $\alpha$ -lipoic acid through food system <b>Anandharamakrishnan C</b>
	Enzyme-based production of nutraceuticals from organosolv pretreated forest biomass <b>Paul Christakopoulos</b>
	Extrusion based food layered manufacturing of casein-whey protein mixtures differing in pH, protein content and denaturation parameters <b>Kilian Daffner</b>
	Hydration kinetics and nutrient loss with increased temperature for two popular seed bean ( <i>phaseolus vulgaris</i> ) varieties <b>Lavaraj Devkota</b>
	Role of bacterial cellulose fibrils on the retrogradation of starches with different amylose content <b>Paulo Diaz-Calderon</b>
	Engineering plan protein-based yoghurt products for nutrition and health <b>Stephan Drusch</b>
	Systematic study on the extraction of phycoerythrin from <i>Gracilaria gracilis</i> for natural food colorants <b>Maria Manuel Gil</b>
	From food to medicine: Use of functionalized polyclonal antibodies from cow's milk for the treatment of bacterial infections <b>Hans-Jürgen Heidebrecht</b>
	Effects of the degree maturity and the drying process on the composition of the aroma components in Japanese pepper ( <i>Zanthoxylum piperitum</i> DC) <b>Moegi Horibe</b>
	Beer and beer-based beverage containing lignans <b>Milan Houska</b>
	In vitro investigation of the behavior of nanocellulose in human gastrointestinal tract and the influence on food digestion <b>Fanbin Kong</b>
	Seaweed and sweet potato: key ingredients for promoting a healthier diet in processed foods <b>Susana Mendes</b>
	Effect of xanthan gum on rheological property and bioaccessibility of $\beta$ -carotene loaded filled hydrogel <b>Shinjae Park</b>
	Obtaining and characterization of mango peel powder, as a functional ingredient and dual additive added in natural yogurt <b>Carlos Alberto Ruiz Galvan</b>
	In vitro fecal fermentation of high pressure processed fruit peels dietary fibers <b>Viridiana Tejada-Ortigoza</b>
	Protein digestibility of <i>Arthrospira maxima</i> evaluated in a dynamic simulated human digestion model <b>Nicolás Troncoso-León</b>
	Hypoallergenic and low protein ready-to-feed (RTF) infant formula by high pressure pasteurization: A novel product <b>Md Abdul Wazed</b>
1220-1335	Lunch   Level 1, Foyer
1335-1505	Concurrent Sessions
	Concurrent 5F
Session	Short oral 4 Food process systems engineering and modelling
Room	Meeting Room 101, Level 1
Chair	TBC
	Performance of quadruple-effect evaporator in sugar juice evaporation process operating in the counter-current flow arrangement <b>Somchart Chantasiriwan</b>
	Investigation of reduced heat transfer due to fouling in multiple effect evaporators of sugar manufacturing process using combined experimental and mathematical approach <b>Aruma Baduge Gayathri Chathurika Jeevani De Silva</b>
	Modelling of ohmic heating and kinetics of texture change of solid food products <b>Aberham H Feyissa</b>
	Heat transfer modeling of black pepper seeds in star valve type cryogenic precooler <b>Bhupendra M Ghodki</b>
	Selection and breakage functions of foods during human mastication <b>Muhammad How</b>
	Integrating text mining and network analysis for ethnomedicinal profile of Bambara groundnut in Mpumalanga province, South Africa <b>Victoria Jideani</b>
	Techno-economic analysis of the enzymatic production of dairy oligosaccharides for nutritional supplements <b>Masih Karimi Alavijeh</b>
	Modeling and simulation of temperature and lethality distributions in a unit for continuous flow pasteurization of mango puree <b>Tamires Kawahara Oishi</b>
	Reduced order phase-field models for crystallisation <b>Estefania Lopez-Quiroga</b>
	A framework for multi-objective optimization of small-scale food processes <b>Martial Madoumier</b>
	Application of the genetic algorithm for smart packaging optimisation <b>Gonzalo Martinez-Hermosilla</b>
	A simplified CFD numerical modelling of airflow and heat transfer in a vented pallet of cheese <b>Jean Moureh</b>
	Package design testing through Monte Carlo simulations for horticultural pre-cooling <b>Jamal Olatunji</b>
	Effect of water content and droplet size on fat phase transition and water mobility in water-in-oil emulsions monitored using NMR technique <b>Bhaveshkumar Panchal</b>
	Mechanistic 3D modelling of solid foods with varying shape and size using statistical shape analysis: roasting of whole chicken breast meat <b>Felix Rabeler</b>
	An overview of thermal inactivation kinetic parameters determination <b>Nikolaos Stoforos</b>

1505-1535	Afternoon Tea   Foyer, Level 1
1535-1705	<b>Concurrent Sessions</b>
	<b>Concurrent 6F</b>
<b>Session</b>	<b>Short oral 5</b> <b>Novel food processing technologies</b>
<b>Room</b>	Meeting Room 101, Level 1
<b>Chair</b>	TBC
	Kinetic modelling on colour development during frying of pulsed electric fields (PEF) pre-treated potatoes <b>Setya Budi Muhammad Abduh</b>
	Emerging technologies for extraction of bioactive compounds from New Zealand Manuka tree leaves ( <i>Leptospermum scoparium</i> ) <b>Noor Al-Saud</b>
	Enhancing clean-in-place efficiency through microbubble pre-rinsing <b>Monique Mi Song Chung</b>
	Post-processing feasibility of dual-nozzle-extruded 3D printed beef products <b>Arianna Dick</b>
	Butylparaben improves the thermal inactivation rate of <i>Escherichia coli</i> O157:H7 in low-moisture foods <b>Qiao Ding</b>
	Sweet potato starch as a structural enhancer for 3D printing of surimi <b>Xiuping Dong</b>
	Release of carvacrol from nanoemulsions: effect of nanoemulsions formulation <b>Francesco Donsi</b>
	New potential of using Pulsed electric fields to modify the thermal properties of flour fractions of oat <b>Sheba Mae Duque</b>
	How barrier discharge plasma affects ochratoxin A production of <i>Aspergillus niger</i> or <i>Penicillium verrucosum</i> on barley <b>Julia Durek</b>
	Subcritical water extraction of bioactive compounds from kākūka ( <i>Kunzea ericoides</i> ) leaves <b>Sinemobong Essien</b>
	Non-thermal preservation of wine using high pressure processing and pulsed electric fields <b>Sanelle van Wyk</b>
	Feasibility of using pulsed electric fields as a pretreatment technique during edible films development <b>Stephen Giteru</b>
	Enhancement of anti-inflammatory and antioxidant activities of prickly pear fruits by high pressure applications: a phytochemical approach <b>Andrea Gómez Maqueo</b>
	Performance evaluation of mare milk concentration by single- and multi-pass forward osmosis <b>Lukas Gosmann</b>
	The effects of pulsed electric fields on the properties of the porous corn starch <b>Zhong Han</b>
	Synergistic effect of high pressure processing and two spice extracts on quality and shelf life of low-salt sausage during storage <b>Peijun Li</b>
	Concentration-induced sodium alginate gel inhibits retrogradation of rice starch by in situ immobilization of starch molecular state <b>Qinlu Lin</b>
	Effect of starch modification in the whole white rice grains on physicochemical properties of two contrasting rice varieties <b>Malik Adil Nawaz</b>

## Wednesday 25 September 2019

0800-1730	Registration and Exhibition   Foyer, Level 1
0830-1020	<b>Plenary Session</b>
<b>Room</b>	Meeting Room 105 & 106, Level 1
1020-1055	Morning Tea   Foyer, Level 1
1055-1225	<b>Concurrent Sessions</b>
	<b>Concurrent 7F</b>
<b>Session</b>	<b>Short oral 6</b> <b>Novel food processing technologies</b>
<b>Room</b>	Meeting Room 101, Level 1
<b>Chair</b>	TBC
	Synergistic low intensity non-thermal food processing for enhanced microbial inactivation <b>Nitin Nitin</b>
	The application of pulsed electric fields (PEF) in volatile acidity control during wine making substitute for sulfur dioxide (SO <sub>2</sub> ) addition <b>Debao Niu</b>
	The investigation of electro tolerance development of <i>Escherichia coli</i> by RFEF in saline water <b>Adel Rezaeimotlagh</b>
	Electric heating- assisted extraction of biocompounds from seaweeds <b>Cristina Rocha Vicente</b>
	Continuous pulsed electric field decontamination of liquid whey protein formulations – influence of process parameters and media properties on inactivation efficiency <b>Felix Schottroff</b>
	Degradation of aflatoxin in corn using high voltage cold plasma: efficacy and reaction mechanisms <b>Hu Shi</b>
	Energy requirements of equivalent HPP, PEF, ultrasound and thermal pasteurization processes <b>Filipa Silva</b>
	Radiofrequency tempering of frozen blocks of cod <b>Svein Kristian Stormo</b>
	Electromagnetic Fields Assisted Blanching - Effect on the Dielectric and Physicochemical Properties of Cabbage <b>Yuchuan Wang</b>
	Fingerprinting as a tool to assess merlot wines produced from PEF treated grapes <b>Biniam Kebede</b>
	Characterization of soybean oil treated with high voltage atmospheric cold plasma treatment and hydrogen gas <b>Ximena Yopez</b>
	The formation and characterization of antioxidant pickering emulsions : effect of the interactions between gliadin and chitosan <b>Yang Yuan</b>
	Assessing the inactivation efficiency of Ar/O <sub>2</sub> plasma gas-liquid interaction on <i>Listeria monocytogene</i> cells: sublethal injury and inactivation kinetics <b>Pan Yuanyuan</b>
	Understanding the mechanical performance of raw and cooked potato cells for the design of biomimetics <b>Ioanna Zafeiri</b>
	Effect of immersion ohmic heating on thawing rate and properties of frozen tuna fish <b>Nafiseh Zamindar</b>
	Presence of sodium chloride and high hydrostatic pressure improve the stability of chlorophyll <b>Yan Zhang</b>
	Pepper seed oil extraction by pressure-assisted, ultrasound-assisted and conventional solvent methods <b>Liang Zhao</b>
	High pressure processing improves quality and storage stability of sodium-reduced chicken sausages <b>Ying Zhou</b>
	The synergistic effect of combining low and high radio frequency electric fields on microbial inactivation of <i>Escherichia coli</i> in saline water <b>Adel Rezaeimotlagh</b>

1225-1340	Lunch   Level 1, Foyer
1340-1510	Concurrent Sessions
	Concurrent 8F
Session	Short oral 7 Food engineering properties, nutrition and packaging
Room	Meeting Room 101, Level 1
Chair	TBC
	A novel mechanistic understanding for the stabilization of emulsions and foams by native or aggregated whey proteins <b>Franziska Kurz</b>
	The influence of fatty acid profile of vegetable oils on the kinetic stability of emulsions containing bio-based ionic liquids <b>Antonio Meirelles</b>
	Crispiness and microstructure of breaded deep-fried chicken nuggets <b>Michael Ngadi</b>
	The use of rutin hydrate pickering particles to combat lipid oxidation in food emulsions <b>John Noon</b>
	Opportunities in nut shells and woods: cost-effective, durable, and smart lignin-based materials for food packaging <b>Farshad Oveissi</b>
	Thermoplastic starch films modified with polyhedral oligomeric silsesquioxanes hybrids <b>Isaac Pardo</b>
	Protein concentration and protein-hydrocolloid interactions on the tribo-rheometry behaviour of resulting protein solutions <b>Sangeeta Prakash</b>
	Comprehending the effect of operational characteristics of alginate-based edible coating formulations containing thyme essential oil <b>Nazia Tabassum</b>
	Flexible starch-polyurethane films for packaging application: including their formulation, characterisation and compostability <b>Nyok Ling Tai</b>
	Production of concentrated brewer spent yeast protein hydrolysate with a low content of RNA <b>Gabriela Vollet Marson</b>
	Milk protein fractionation by crossflow microfiltration – low low-frequency pulsation can ease the fouling dilemma <b>Maria Weinberger</b>
	Dynamic gauging for studying rapidly swelling or shrinking layers <b>David Ian Wilson</b>
	Cleaning walls by intermittent impinging jets <b>David Ian Wilson</b>
	Role of the protein composition and rheological properties on the structuring of soy-based meat analogues in extrusion processing <b>Patrick Wittek</b>
	Fouling of ion-exchange membranes during the processing of fresh whey solutions <b>Sahar Talebi</b>
	Modelling the airflow distribution in a pallet arrangement in forced-air cooling operations <b>Nicolas Tapia</b>
	Airflow resistance characteristics of sliced sweet potato for CFD modeling of a novel solar-driven drier in Ethiopia <b>Petros Tegenaw</b>
	Gas transfer modelling in foods with a heterogeneous porous microstructure <b>Pieter Verboven</b>
1510-1540	Afternoon Tea   Foyer, Level 1
1540-1710	Concurrent Sessions
	Concurrent 9F
Session	Short oral 8 Sustainability, security, and supply chains
Room	Meeting Room 101, Level 1
Chair	TBC
	Creating sustainable fresh food supply chain during transportation to reduce food waste: a conceptual framework <b>Reham Alsbua</b>
	Effects of moisture contents on extruded meat alternatives made from Maillard-reacted beef bone hydrolysate and plant proteins <b>Jie Hong Chiang</b>
	Emerging food processing techniques to target more sustainable food systems <b>Alexander Mathys</b>
	Prediction of drying rate of nectarines ( <i>Prunus persica</i> var. <i>nucipersica</i> ) from real-time ambient weather factors during direct sun drying <b>Rebecca Milczarek</b>
	Sustainable use of hermetia illucens insect biomass for feed and food: extensive life cycle Assessment <b>Sergiy Smetana</b>
	An original program to train and support small food entrepreneurs in central and west Africa <b>Jean-Francois Grongnet</b>
	Phase behaviour of Bambara groundnut starch-soluble dietary fibre nanocomposite <b>Yvonne Maphosa</b>
	The marketing of carrots and the advantage of using bottle water and used plastic materials in the Federal Capital Territory Abuja Nigeria <b>Michael Oke</b>
	<b>Status of rice food security of small farmer households under intermediate level of mechanization in Kampar region, Indonesia</b> <b>Ujang Paman</b>
	ICT-enabled food processing technologies for short food supply chain practitioners <b>Dimitrios Argyropoulos</b>
	Discrimination of fresh and frozen-thawed beef based on ultrasound imaging <b>Zongbapo Sun</b>
	Transcriptomic analysis reveals key genes related to antioxidant mechanisms of pitaya quality improving by trypsin during storage <b>Xin Li</b>
	Foresight study: Influence of the new information and communications technology on the food value creation network <b>Katrin Mathmann</b>
	Technical review of shea butter processing methods and product utilization along the supply chains including potential for improved techniques <b>Adesoji Olaniyan</b>
	Design and development of a non-heated solid-state fermentor for nigerian indigenous fermented food condiment <b>Abimbola Olokoshe</b>
	Application of air nanobubble water for the improvement of microalgae culture <b>Jiangyu Zhu</b>
	The importance of processing of microalgae in the design of healthy food products with desired rheological properties <b>Tom Bernaerts</b>
	Approaches for food scientists to model gut microbiota dynamics <b>Viridiana Tejada-Ortigoza</b>
1900-2300	Gala Dinner   Aerial