

Rundown Event
The 2nd International Conference for Smart Agriculture, Food, and Environment
Universitas Sultan Ageng Tirtayasa
Banten Province, Indonesia

Serang, 4 November 2021

Time	Session	Person in Charge (PC)	Venue
08.00 - 08.30	Registration	PC Onsite: Zoom Host LPPM and PUSDAINFO Team PC Registration: LPPM Team 1) Marina Dwita Jannah, M.Pd PC Certificate : IT staff 1) Fakhru Fepriyanto, S.P	Universitas Sultan Ageng Tirtayasa
08.30 – 09.00	Opening ceremony - Singing National Anthem “Indonesia Raya” Welcoming Speech: 1) Head of Committee of IC-SAFE 2) Head of Center of Excellence for Local Food Innovation	PC: Dr. Ade Husnul Mawadah, M.Hum MC: Siti Aisah, M.Hum 1) Dr. Alimuddin, M.T 2) Prof. Dr. Meutia, S.E, M.P	Universitas Sultan Ageng Tirtayasa

Time	Session	Person in Charge (PC)	Venue
13.00-14.15	Parallel Session I: Invited Speakers (4 Universities) 1. Prof. Dr. Bernatal Saragih, M.Si (Universitas Mulawarman) 2. Dr. Nurhayati, S.TP, M.Si (Universitas Jember) 3. Dediek Tri Kurniawan, M.M (Universitas Negeri Malang) 4. Yuyu Romdhonah, S.TP., M.Si., Ph.D. (Universitas Sultan Ageng Tirtayasa)	Moderator: 1. Dr. Rida Oktarida, M.Si	Universitas Sultan Ageng Tirtayasa
14.15– 15.30	Parallel Session II:	Zoom Host : LPPM and Pusdainfo Team	Parallel Room

Local Food Innovation to Achieve the Sustainable Development Goals



Bernatal Saragih*

2nd International Conference for Smart Agriculture, Food, and Environment (ICSAFE)

4 November 2021

*Bernatal Saragih (Guru Besar Faperta Unmul)

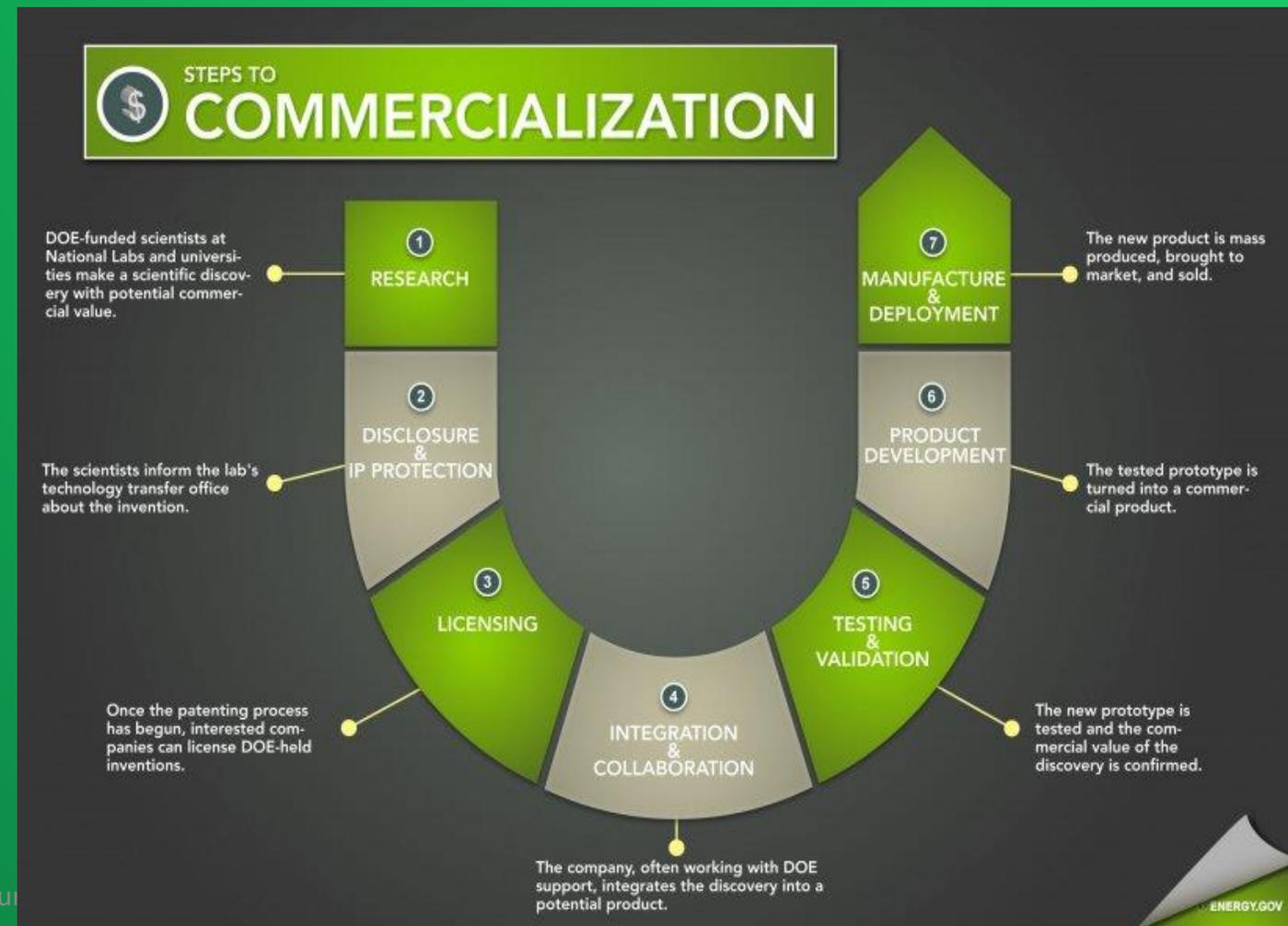
OUT LINE

- Introduction
- Food and Nutrition Fulfillment Challenge
- Food Innovation: Challenge
- Closing Remark

INTRODUCTION

What is Local Food and Innovation ?

- **Local food** is food that is produced within a short distance of where it is consumed, often accompanied by a social structure and supply chain different from the large-scale supermarket system
- **Innovation:** Invention + Commercialization

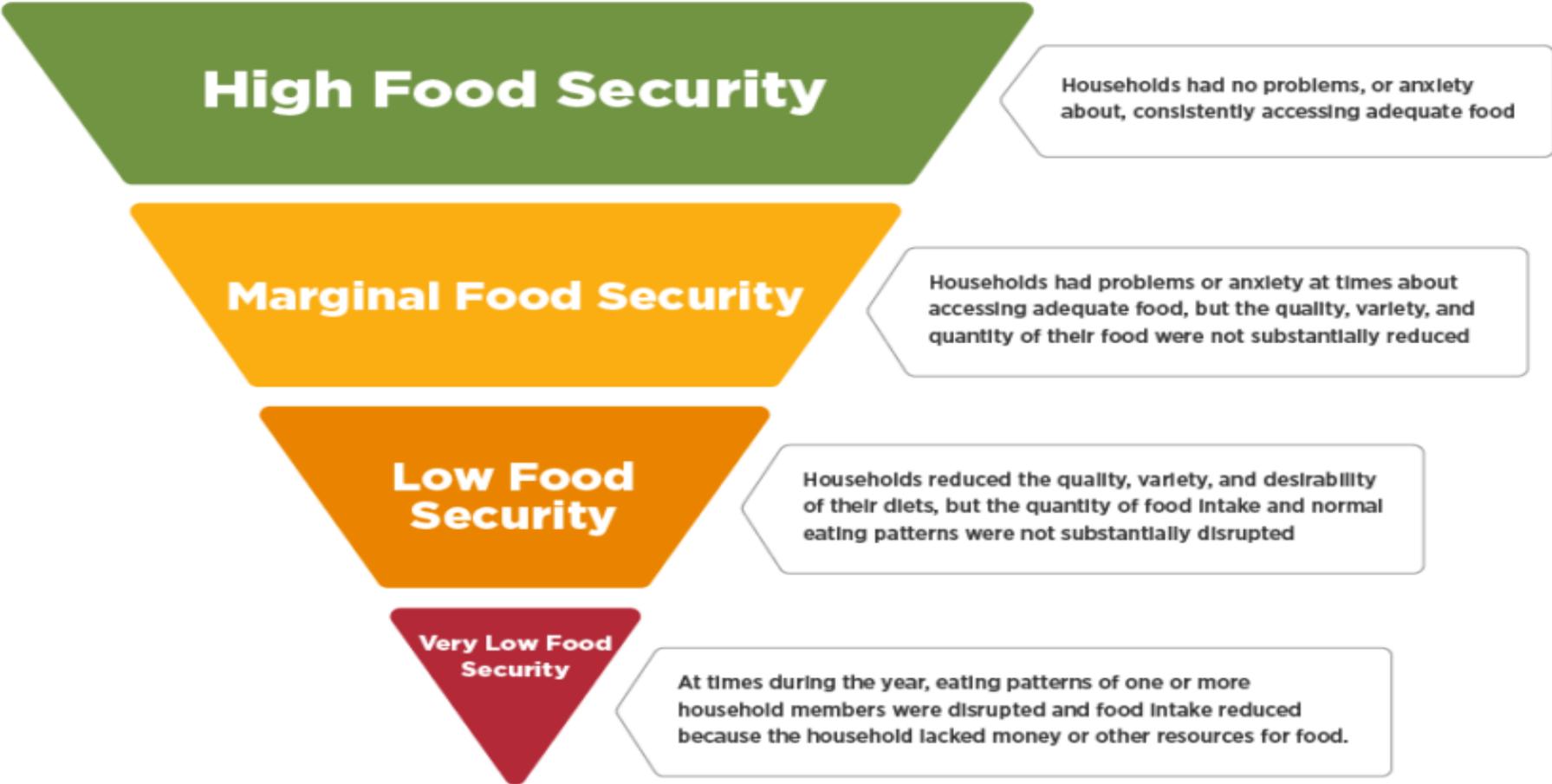


INTRODUCTION

Sustainable Development Goals (SDGs)



INTRODUCTION



Source: Adapted from the USDA Economic Research Service.

INTRODUCTION

□ Global food security challenges

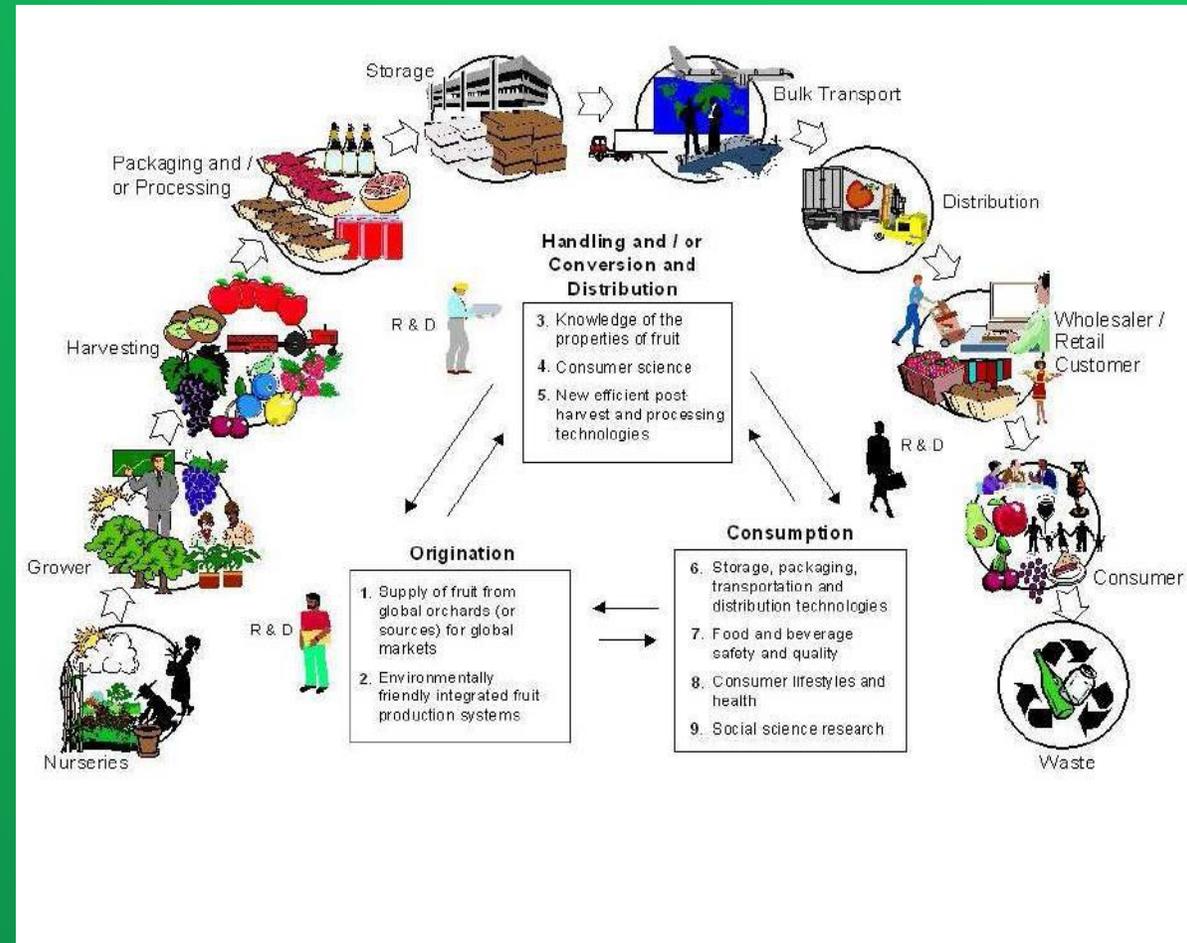
- ✓ Increasing global food demand
- ✓ Diet changes: Nutritional problems
- ✓ Climate change
- ✓ Food access
- ✓ Availability of clean water
- ✓ Decrease in land area and soil fertility
- ✓ Food loss and waste
- ✓ Covid-19 pandemic?



INTRODUCTION

□ Food Security Challenge; Covid-19

- Covid : The main problem is loss of income and disruption in domestic and international food supply chains
- COVID-19 increased the number of poor people for Indonesia before Covid was already in the (single digit) 9.2% and is now back in the double digits (around 12%).
- WFP estimates that the loss of income and remittances due to COVID 19 could increase the number of people acutely food insecure from 135 to 265 million in low- and middle-income countries.
- A priority for mitigating the decline in access to food from loss or discontinuation of income is to improve social protection programmes.



Food and Nutrition Fulfillment Challenge

Global food availability is dwindling and global food prices are rising, making the poor the most vulnerable

Food security refers to a condition in which “all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO, 1996)

Food insecurity occurs due to: lack of resources (including financial and other resources such as transportation); lack of access to nutritious food at affordable prices, lack of access to food due to geographical isolation; and lack of motivation or knowledge about a nutritious diet

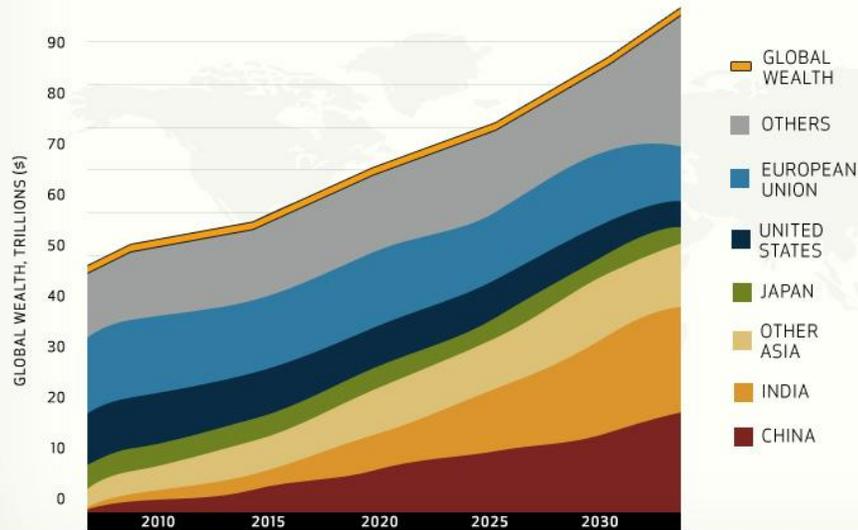
❑ Global food security challenges: Increasing global food demand

- We can calculate the total world food needs consumed by humans per capita per year in developed countries 900 kg while in poor areas or areas 460 kg per capita per year.
- IF WE ESTIMATE INDONESIAN FOOD NEED TOTAL PERKAPITA 500 Kg/YEAR=1.36 Kg/DAY
- Indonesia food needs : 149,242,438 Tons (Total population 2021: 271,349,889 people)
- The results of the author's calculations with the total population of Indonesia at the beginning of 2021 = 271,349,889 people, with consumption of 92.9kg/capita rice needs in one year 25,208,405 Tons
- 3 months = 6,302,101 Tons.

Global food security challenges: Increasing global food demand

“Robert Malthus's theory about population growth rate? He stated "The population growth rate is like a geometric sequence, and the rate of food growth is like an arithmetic sequence".

FOOD DEMAND



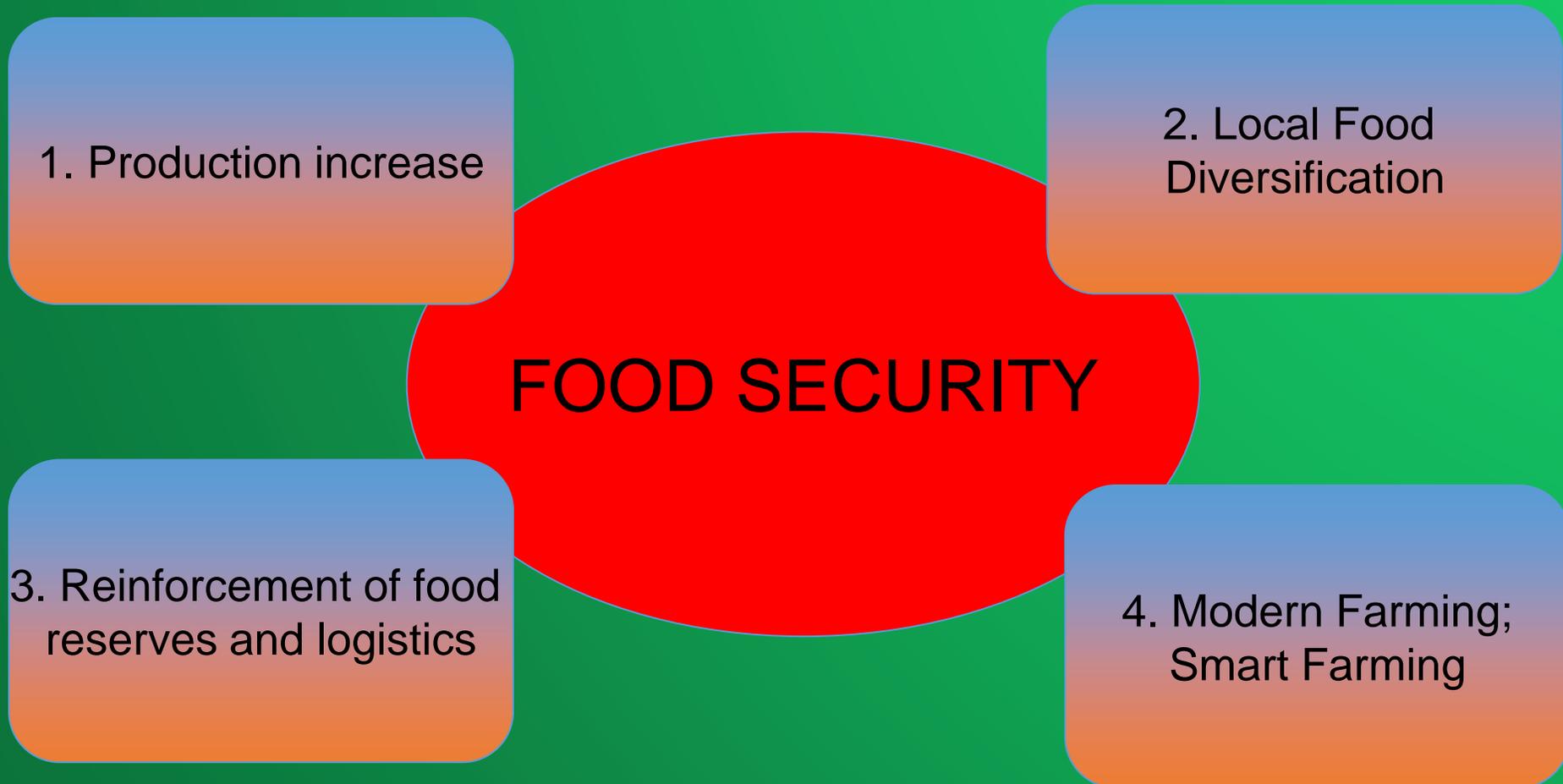
By **2030**, the global economy could double in size, and India and China will swell to represent around 40% of global middle-class consumption, up from less than 10% in 2010. This will significantly alter the composition of global diets.

PER CAPITA CONSUMPTION

By 2030, average per capita food consumption in developing countries is expected to grow, with only one in seven people consuming less than 2500 calories per day.



Strategy to increase food security



Strategy to increase food security

1. SHORT-TERM:
SOS or emergency agenda,
maintain food price stability and
build buffer stock.

2. MEDIUM TERM:
Continuing the post-Covid-19
labor intensive, local food diversification,
help food availability in deficit areas,
anticipating drought,
keeping the spirit agricultural work
through production assistance and
agricultural machinery,
encourage family farming,
assisting the smooth distribution of food,
increase agricultural exports,
strengthen Kostratani.

3. LONG-TERM:
Among other things with
encourage improvement 7%
production per year and
reduce yield losses to 5%.



FOOD INNOVATION

- Product innovation can be interpreted as an effort made by business actors to improve, improve, and develop products that have been produced so far.
- **Innovation = invention + commercialization**



LOCAL FOOD

1 NO POVERTY



2 ZERO HUNGER



3 GOOD HEALTH AND WELL-BEING



Noted: Food security is **strongest when food is produced and distributed locally**. Locally grown food is fresher and so more nutritious. It builds the local economy as money circulates to farmers and businesses in the area. And it helps build relationships among people, making communities stronger and healthier places to live

Food Innovation Challenges

Local Food: food consumed by local people in accordance with local potential and wisdom (Indonesian Food Law No. 18/2012)

NEGARA TERBESAR NO. 3 DI DUNIA KEANEKARAGAMAN HAYATI (BIODIVERSITY)



77 Jenis
Sumber Karbohidrat

75 Jenis
Sumber Protein

110 Jenis
Rempah dan bumbu

40 Jenis
Bahan minuman

389 Jenis
Buah-buahan

228 Jenis
Sayuran

26 Jenis
Kacang-kacangan



Food diversification is a program that is intended so that people are not fixated on only one type of staple food and are encouraged to also consume other foodstuffs as a substitute for staple foods that have been consumed so far



Massive use of local food is able to make a positive contribution to strengthening national food sovereignty considering that Indonesia is food for local food such as from cassava, sweet potato, sago, etc



Food innovation and social engineering formulas can be applied to the targeted area so that an ideal food diversification area can be formed according to local culture

FOOD INNOVATION



Pekarangan
Pangan Lestari
(P2L)

Pengembangan
Usaha Pangan
Masyarakat

Pengembangan
Korporasi
Usahatani

Lumbung Pangan
Masyarakat

Pengembangan
Industri Pangan
Lokal

Pertanian
Keluarga

Sustainable
food yard

Community Food
Business Development

Farming Business
Cooperative Development

Community
Food Barns

Local Food
Industry Development

Family
Farming

PENGEMBANGAN INDUSTRI PANGAN LOKAL (PIPL 1000) BERBASIS UMKM



2020
200 PIPL



2021
200 PIPL



2022
200 PIPL



2023
200 PIPL



2024
200 PIPL

**1000 PIPL
thn 2024**



What is being done to increase food innovation?

- Incentives for food processing industries and innovators to use local raw materials and encourage the growth of upstream production
- Production development and partnerships with off takers to get market guarantees and fair prices
- Gathering support from related Ministries/Agencies to develop food innovation programs
- Increase collaboration and synergy with other institutions and stakeholders including industry in order to strengthen the innovation ecosystem
- Healthy food products made from local plants such as sago, cassava, which are produced in forms and flavors that are known to the public

Local Food

The several kinds of Dayak ethnic food in Kutai Barat District:

- Namit Jabau Penyek (Rice mixed with crushed Cassava)
- Cassava Rice in Grated, Nasi sobot (Rice mixed Cassava)
- Bubur Jagaq (Jagag Porridge)
- Bubur Jagonkg (Corn Porridge)
- Pusok Jabau Topak Sampur Toyuk Tekayo (Cassava leaves mashed mix eggplant sparrow)
- Uur Lajak (Galangal boiled)
- Cucumber korut onions meaq (Cucumber grated mixed sliced onions)



Source: Saragih *et al*, 2017

- Basuq Tolakng/Rebukng (Vegetable Bamboo shoots)
- Ocoq Jabau Sampur Teniq (cassava leaves mashed mixed umbut tree teniq)
- Tread Kinas lepet Jabau (Fish Smoke /Salai Kuah cassava cassava)
- Fish Smoke/Kinas tapaq
- Lusat Kinas (Fish Cooked In Bamboo)
- Pojot Kinas Nete Dawent Jeloq (Fish of wrapped in banana leaves)
- Tinting pulut / Tara (rice sticky rice cooked in Bamboo)



FOOD INNOVATION

Local Food

The several kinds of Dayak ethnic food in Kutai Barat District:

Source: Saragih *et al*, 2017

- Gula Nyui/Gula Tapoq (palm sugar blended grated coconut)
- Lepton (snacks made from glutinous rice in depth There is a brown sugar)
- Tumpiq (snacks made of glutinous rice, mixed brown sugar or salt)
- Dongkoq (Sticky glutinous rice, then pounded, with the aim of being fused and wrapped in leaves)
- Bahapm (Rice glutinous young pounded until the plate is then mixed with grated coconut and brown sugar)

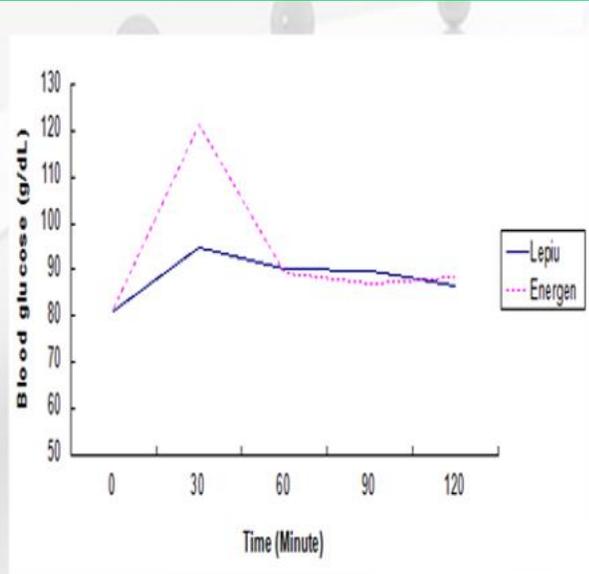


- Sagotng (Roasted rice flour is then mixed with coconut and brown sugar)
- Pais Ketan (Kelopaq Pulut), Wajik Ketan (Wajik Pulut)
- Ketoq durian / ketoq kalank.
- Tempoyak durian (durian fermented)
- Sambal Tempoyak Durian (sauce tempoyak)
- Gula gait, etc.

FOOD INNOVATION

• Lepiu

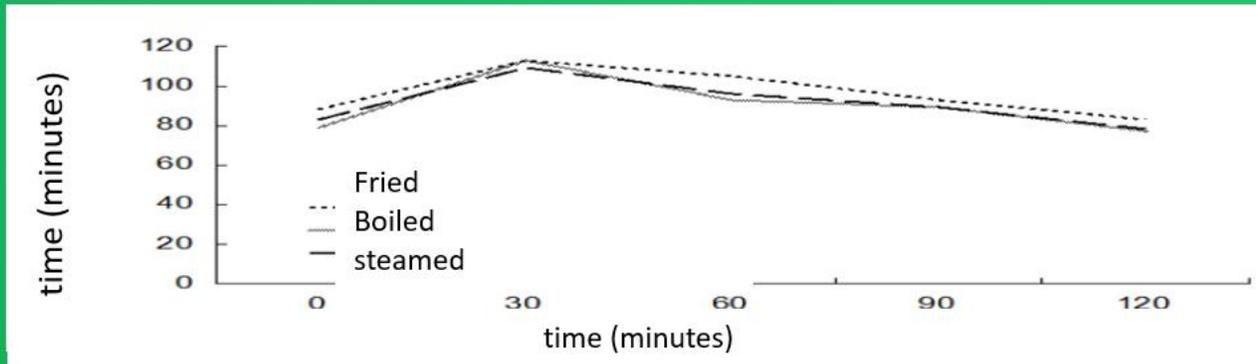
- Lepiu flour has saponins, flavonoids, phenols and alkaloids.



Comparison of response of the average blood glucose in subjects after consumption of cereal Lepiu and Energen (Saragih, et al, 2014)

- **IG Lepiu /Seed : 32**

Effect of Lepiu Treatment Method on blood glucose response (Saragih, et al, 2014)



The comparison Flour Lepiu, Lai (Durio kutejensis), tuber Banana, Haruan Fish and Sweet Potato (Saragih et al 2017)

Flour	Nutrition components (%)					
	Charbohydrate	Protein	Fats	Water content	Ash conten	Fiber content
Lepiu	65.80	4.26	7.05	19.15	1.40	0.30
Lai seed	66.65	13.17	8.49	7.60	0.57	3.52
Banana Tuber	79.65	3.42	1.27	9.65	1.15	5.28
Haruan fish	54.06	26.45	7.28	10.25	1.56	0.40
Sweet Potato	77.86	4.42	0.89	6.77	4.61	5.45

Flour	Phytochemicals				
	Steroids	Saponins	Flavonoids	Phenol	Alkaloids
Lepiu	-	++	++	++	++
Lai Seed	-	++	++	+	+++
Banana tuber	-	+	+++	+++	+
Haruan fish	-	-	-	-	-
Sweet potato	-	-	+	+	-

Tiwai

- Saragih *et al.* (2014) twice consumption daily of tiwai herbal drink in 7 days, it could reduce total cholesterol of 5.33 mg/dL.



- Tiwai can also be used as food additives as food coloring (Saragih *et al.*, 2013)

Flour	Phytochemicals				
	Steroids	Saponins	Flavonoids	Phenol	Alkaloids
Tiwai	-	-	+++	+++	++

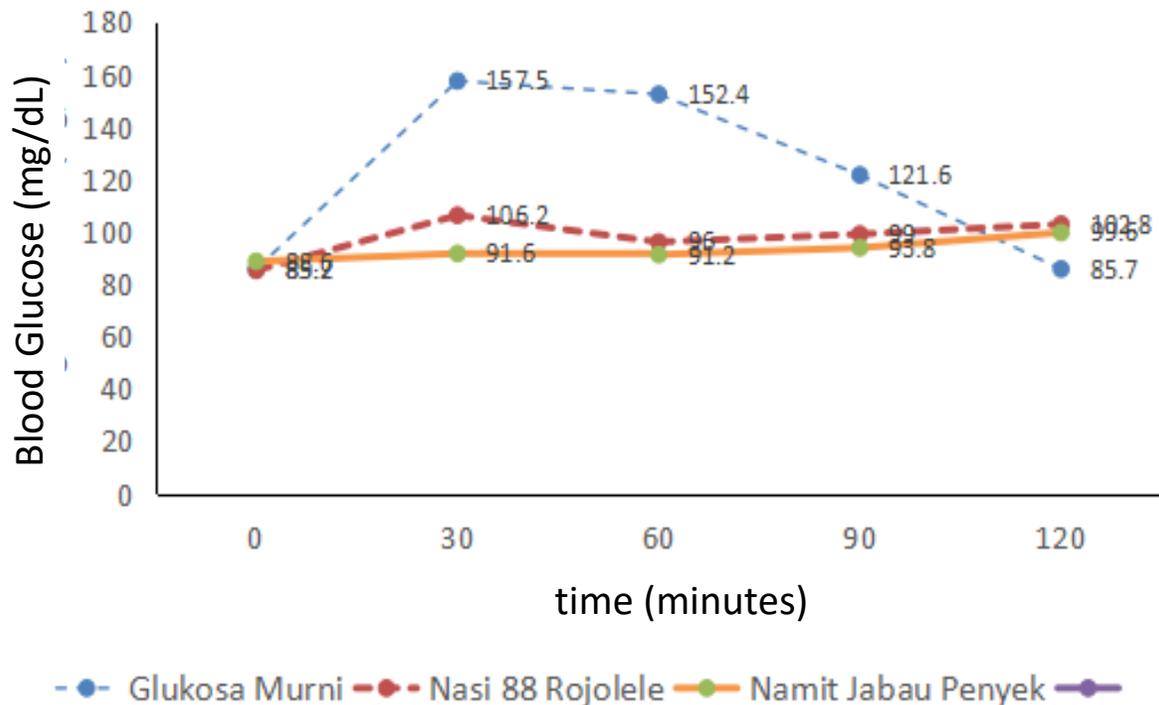
BawangDayaK
(tiwai) Sebagai Pangan Fungsional



Bernatal Saragih

No	Tiwai Herbal Drink	Antioxidant activity (IC50); Brewed in water
1	Sun drying*	103.27
2	Oven*	104.03
3	Roasted**	85.22
4	Tiwai powder**	102.24
5	Tiwai Instan**	183.01
Saragih, 2011*; Saragih, 2020**		

- **Cassava: Cassava Rice**



- Namit jabau penyek/cassava granules has water content 13.40%, ash 0.45%, fat content 0.88%, crude fiber content 4.53%, protein content 0.79%, carbohydrate levels 84.50% and energy 349kcal (Saragih et al, 2017)
- Glycemic index namit jabau penyek with low criterion that is 23,64 (Saragih et al, 2017)





Cassava Leaf: Cookies



Table 1. Effect of addition of cassava leave (CL) flour on nutrition content (% w/w) of CL cookies.

Nutrition	(Wheat flour: cassava puree: cassava leaf flour) (g)				
	50:50:0	49:49:2	48:48:4	47:47:6	46:46:8
Water Content (%)	3.39±0.81	2.58±0.53	4.07±0.15	4.83±0.09	5.12±0.16
Ash content (%)	1.73±0.12	1.80±0.26	1.56±0.19	1.46±0.15	1.63±0.25
Fat content (%)	20.76±0.25	12.60±0.20	12.13±0.15	11.50±0.20	10.67±0.15
Protein content (%)	9.13±0.41 ^c	9.15±1.29 ^b	9.35±0.45 ^b	9.74±0.55 ^{ab}	10.94±0.88 ^a
Fiber content (%)	1.20±0.10 ^e	2.10±0.10 ^d	2.43±0.15 ^c	3.27±0.15 ^b	3.75±0.15 ^a
Carbohydrate (%)	64.75±1.14 ^c	73.86±1.87 ^a	73.09±1.46 ^a	72.28±0.66 ^{ab}	71.64±1.07 ^b
Energy (kcal)	480.30±7.49 ^a	445.47±2.08 ^b	438.07±0.52 ^c	431.60±1.57 ^{cd}	426.31±1.81 ^d

CL cookies were prepared in 100 g composite flour basis. Data (\bar{x} ±SD) were calculated from 3 replications. Data were analysed by ANOVA continued by Tukey test ($p=0.05$). Data within the same row followed by different letter are significantly different ($p<0.05$).

- Cassava Leaf Cookies GI: 77

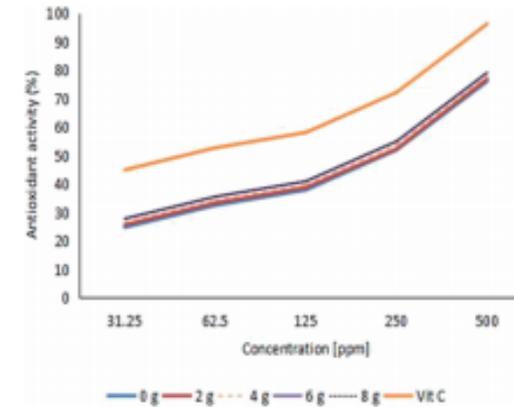


Fig. 1. Antioxidant activity of CL cookies with formula (46 : 46 : 2).

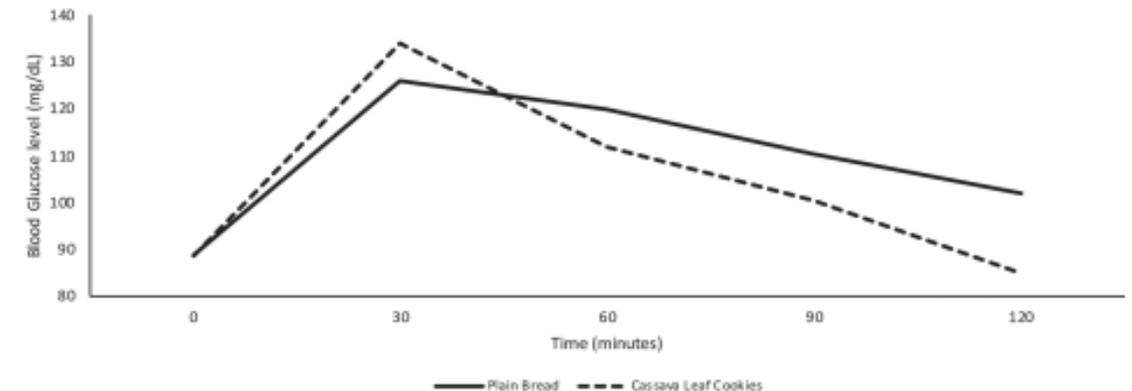
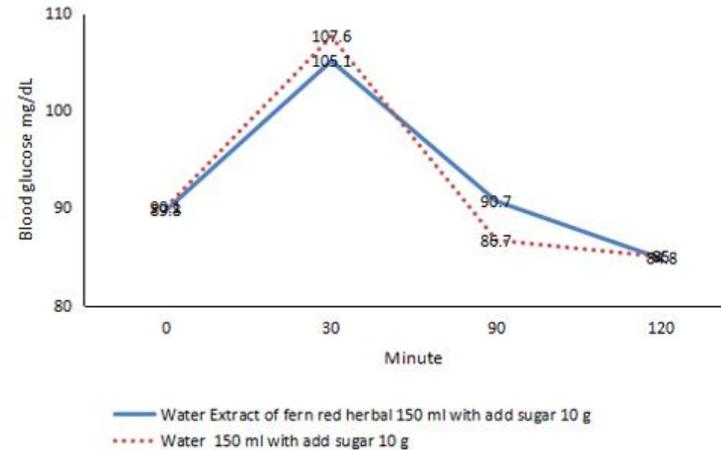


Fig. 2. Respondent's blood sugar response after consumption of CL cookies with formula (46 : 46 : 2) and plain bread.

□ Kelakai/Pakis (Fern)



- Average fasting blood glucose volunteers 0 minutes before consuming red fern herbs with a sugar concentration of 10 g is 89.8 ± 10.3 mg / dL, then at minute 30 after drinking herbal fern red blood sugar volunteers have an increase of about $105, 1 \pm 12.3$ mg / dL with a difference in blood sugar increase of 14.4 mg / dL (Saragih et al, 2017).



Phytochemicals, Quality and Glycemic Response Fern Red Herbal (*Stenochlaena palustris*) (Saragih, et al, 2017)

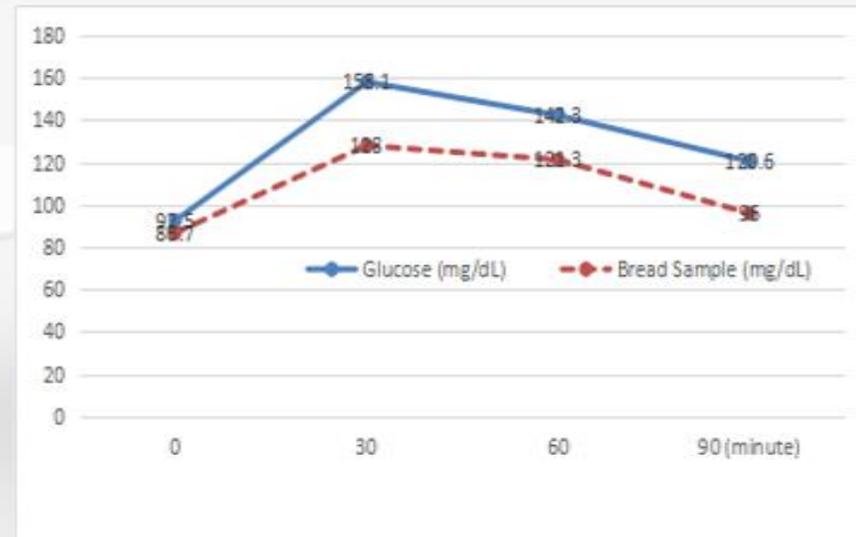


Crop	Fatty acid											
	Myristate C14:0	Palmitate C16:0	Palmitoleate C16:1n7	Stearate C18:0	Oleate C18:1n9	α -Linoleate C18:2n6	α -Linolenate C18:3n3	γ -Linolenate C18:3n6	Dihomo- γ -linolenate C20:3n6	Arachidonate C20:4n6	Eicosapen- taenoate C20:5n3	n6/n3 ratio
	(μ g/g dry wt)											
Ostrich fern (%)	103b ^z 0.2	11559a 26.9	235a 0.6	341b 0.8	2165b 5.1	10713a 25.0	7011b 16.4	791a 1.8	1331a 3.1	7177a 16.8	1384a 3.2	2.4a
Purslane (%)	114a 0.4	874b 3.3	0b	584a 2.3	2804a 10.8	3807b 14.7	17983a 69.2	0b	0b	0b	0b	0.21b

^zFor each fatty acid, comparison of crop means was performed by the LSD test with differences being declared at the 5% α probability level. Crop means for each fatty acid with different letters are significantly different.

(DeLong, et al, 2011)

□ Pumpkin



- Glycemic response after and before consumption bread formulations. Resulting bread has a score of 65, the glycemic index of food with moderate criteria (Saragih et al, 2016)

Effect comparison pumpkin flour and wheat flour on the quality of bread and the glycemic index (Saragih et al, 2016)

Local Rice : Adan Hitam

- GI= 54

Local Rice

Nutritional Value and Functional Properties of Rice Adan Black (Saragih *et al*, 2013)

Nutrition Content	Unit	Value
Water	%	12,60
Ash	%	0,8
Fat	%	1,4
Protein	%	8,10
Carbohydrate	%	74,47
Calories	kcal/100g	342,88
Fe(iron)	mg/1000g	3.61
Vitamin B1(Thiamin)	mg/100g	0.23
Soluble dietary fiber	g/100g	2.42
Insoluble dietary fiber	g/100g	0.91
Fiber total	g/100g	3.33
Amylose	g/100g	10.81
Starch total	g/100g	76.28
Amylopectin	g/100g	65.47



Banana Hump



- Starchy tubers after harvest banana fruit kepok provide the best quality with a lower water content is 0.98 % , and the absorption capacity of water is higher by 253.33 % . 0.99 to 1.41 % , ash content 0.48 to 0.67 % , rendemen 9.56 to 12.30 % , water absorption 166-260 % , fiber 23.9 to 39.4 % , and the banana tubers flour can be used for making cookies (Saragih, 2013).



Tabel 1. Hasil rata-rata karakteristik tepung bonggol pisang dari berbagai varietas

Karakteristik	Varietas Bonggol Pisang				
	Kepok	Raja	Mahuli	Susu	Ambon
Kadar serat (%)	29,62±1,5a	19,11±1,3e	26,36±1,4b	22,05±1.1d	24,06±2,1c
Kadar air (%)	1,09±0,02c	1,41±0,09a	1,25±0,1b	1,39±0,2a	1,41±0,2a
Kadar abu(%)	0,67±0,1a	0,44±0,1b	0,54±0,2b	0,47±0,1b	0,48±0,2b
Rendemen (%)	12,56±0,8e	12,30±0,9a	10,20±0,8d	10,70±0,7c	11,63±0,9b
Daya serap air (%)	260,0±11,0a	173,0±8,9cd	223,0±9,7b	183,0±8,8c	166,0±8.4d

Keterangan: huruf yang sama pada baris yang sama menunjukkan berbeda tidak nyata (0,05)

- 40% wheat flour : 60% banana hump flour can be well received by the panelists, water content 16.94±1.30%, ash content 0.35±0.06%, crude fiber content 13.56±0.24% , protein 2.10±0.31%, fat 17.28±0.05%, carbohydrates 63.30±1.62% and energy 417.20±5.4 cal/100g brownies, GI: 56 (Saragih et al. al, 2018)



Kepok

Raja

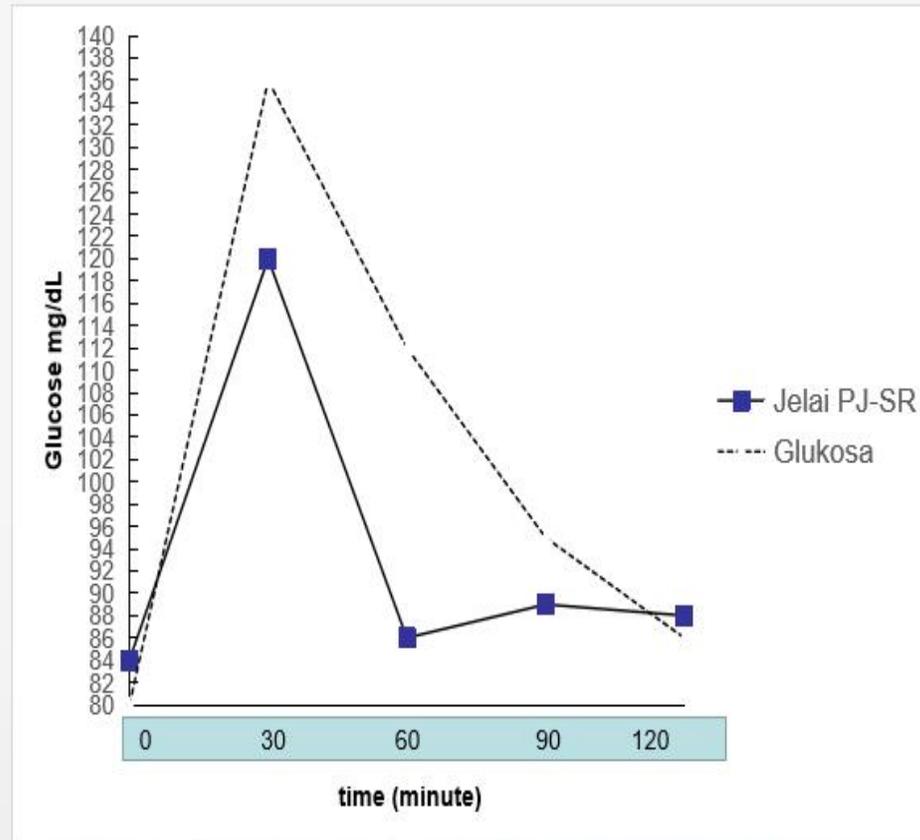
Mahuli

Susu

Ambon

Gambar 1. Tepung Bonggol pisang pada pembesaran 100 kali

☐ Jelai (*Coix lacrima*)

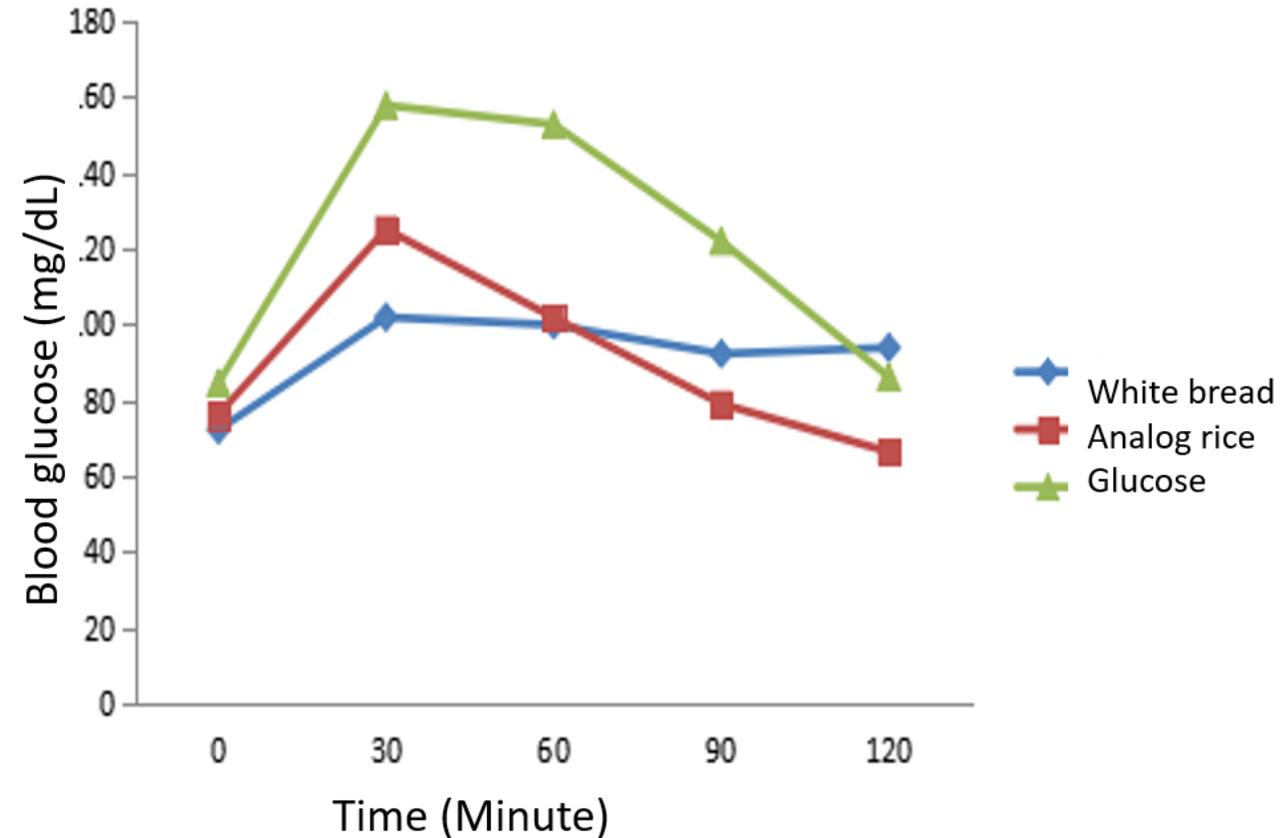


- IG Jelai : 54,69 (Saragih, 2017)



Local Food Combinations

- Formulation of Purple Sweet Potato Flour (*Ipomoea batatas* L. Poir) and Barley Flour (*Coix lachryma-Jobi* L.) on physicochemical, sensory, index and glycemic properties of Mocaf Analog Rice Load
- Formulation 50 gr mocaf flour + 40 gr purple sweet potato flour + 10 gr barley flour, GI = 33.15



Saragih, et al, 2019

Comparison of Value Added from Local Food

Who gets the most profit ?

On Farm
Local
Food

Upstream local
food
agribusiness

Local food
downstream
agribusiness

Closing Remarks

- ❑ The pandemic reminds us of the importance of innovation and food security to support our survival
- ❑ Local food is not only for food diversification but must be present as a downstream food intervention to be the best, different, branding, quality to improve the welfare of farmers/community

