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Developing agribusiness of vegetables and seasonal fruits for strengthening economy of smallholder farmer households post the 2018 earthquakes and pandemic Covid-19 era in upland North Lombok West Nusa Tenggara

Halil Halil¹, Taslim Sjah¹, Nurtaji Wathoni¹, Sukartono² and Akhmad Sauffi³

¹Study Program of Agribusiness, Socioeconomic of Agricultural Department, Faculty of Agriculture University of Mataram, Indonesia

²Study Program of Soil Science, Faculty of Agriculture University of Mataram, Indonesia

³Study Program of Management, Faculty of Economy and Business University of Mataram, Indonesia

E- mail: khalilagribis@yahoo.com ; hkhohli50@gmail.com

Abstract. The general objective of the research were to analyse the acceleration of economic recovery and food security of smallholder farmer households post the 2018 earthquake and COVID-19 pandemic era through empowering farmer groups of dry land horticulture agribusiness based. The specific objective was determining and analysing the effect of the Pentahelix approach, synergy among Higher Education Institution, Local Government, Agricultural Extension officer, Bank and private enterprise in empowering farmers. Its mission were Better Farming, Better Business and Better Living. It was the longitudinal action research by implementing Participatory Action Research. The data was recoded from farmers target groups and 60 smallholder farmers in three villages nearby the pilot project village. The cross classification between food expenditure and sufficiency of energy consumption was used to measure the degree of food security of household. It's concluded that developing agribusiness of upland horticulture has high potential for reinforcement of economic recovery of smallholder farmer's household post the 2018 earthquakes and during pandemic COVID-19 era. Implementing Triple Helix and Pentahelix approach have a positive impact for strengthening and recovering economy of smallholders farmers households. They were in enough food category which depicted by 85.50% degree of energy consumption. Food security based on distribution of household food need was in the category of low expenditure of food (less than 60%). Food security of household based on cross combination between the degree of energy consumption and the proportion of food expenditure were 61% of them were resistance to food security, 30.85% of household were vulnerable of food security, and 6.20% of households were troubled of food security and 61.25% of them were lack of food. They realize that North Lombok region is a tourism destination, so that they have high intrinsic motivation for growing vegetable crops and seasonal fruits. Therefore, supplying high economic value of vegetables and fruits, quality insurance and friendly environment of vegetables and fruits are needed to be sustained through implementing the penta helix approach.

1. Introduction

The 2018 earthquake and COVID-19 pandemic seriously impacted the decreasing economy of rural community of dry land in North Lombok. The impacts were greater than the multidimensional crisis of 1998 because they greatly impacted the habitual activities of the village community, thus devastated the economy of rural community. The 2018 earthquake disaster had a negative impact on the economy



of farmer households in the rural area of upland North Lombok because they lived in refugee camps for a long time, collapsed houses and restoration of housing during 2019. It was followed by the pandemic COVID-19 era since the end of 2019 which continued during 2020 and 2021 until early 2022. It specially has an impact on all aspects of daily activities such as the restricted socializing directly. It has resulted in decreasing income of communities where many people have been laid off and work not full. The study of COVID-19 pandemic impact in the Gemah Beach tourism area concluded that it had an impact on all aspects, especially a very big difference in the value of the income of small business actors [1]. The average business actor experienced a decline of up to 50% - 75% due to its impact in the tourism area. Similarly, a research in West Nusa Tenggara community [2] also concluded that it has a significant effect on people's lives, both those with civil servant and non-civil servant backgrounds and those who live in rural and urban areas. Their income significantly decreased because it prevented the community to earn money and layoffs.

Both disaster and pandemic caused presently less optimal utilization of dry land for farming activities compared to its availability. Meanwhile, dry land agriculture is the main source of livelihood for smallholder households in the rural of North Lombok. Therefore, agribusiness of horticultural vegetable crops and seasonal fruits on dry land of North Lombok has been being developed for strengthening economy of rural community. Its objective is to overcome the "big puzzlement" on those issues which are induced by both disaster and COVID-19 pandemic. Therefore, rural community empowerment through implementing an appropriate strategy in developing horticultural agribusiness is crucial effort to overcome economic problem of rural community of North Lombok. To do so, the collaboration of academic institution, local government and agricultural extension is a Triple Helix method innovation for empowering rural community of dry land of North Lombok.

Today's northern part of Lombok, apart from being a food production center, is also a tourist destination because of its clean beaches and comfortable accommodation. In addition, the existence of Lombok International Airport (LIA) and five-star hotels on the southern coast of the island of Lombok make this area become marketing center for various local agricultural products such as processed food and horticultural products. However, tourism activities in the North Lombok area still do not involve many farming communities living in the vicinity. While various tourism activities hardly utilize local resources or products, even fresh vegetables and seasonal fruits are dominantly imported from outside the region and even imported. Allowing tourism activities without involving local resources will lead to inequality in the income of local communities and immigrants which in turn creates social jealousy and disharmony relations between local communities and migrants (tourists).

This condition is an opportunity to develop horticulture based on high economic value of fresh vegetables and seasonal fruits to strengthen and restore the economy of small farmer households in the dry land of North Lombok. Therefore, the development of seasonal vegetable and fruit horticulture can be done through the involvement of the farmer community or farmer groups in the tourism buffer area of North Lombok.

One form of local community involvement in the North Lombok tourism area is to increase the ability of farming communities to produce horticultural crops (seasonal vegetables and fruits) with high economic value in dry land. However, the sustainable development of horticulture in this area is still faced with limited irrigation water for farming in the dry season. Most of the agricultural land in the area is dry land which is currently considered less productive. However, by improving proper technical culture and utilizing shallow well water scattered in this area, farming activities in the area can be more productive and the planting period can be extended until the next rainy season. The presence of deep wells can extend the planting period and grow crops outside of the season. Water savings can also be done by improving technical culture such as applying mulch and choosing adaptive horticultural crops.

Data on the distribution of shallow wells are available from previous studies. There are a number of shallow wells around the North Lombok Tourism Area which have sufficient water discharge for irrigation of horticultural crops [3]. In addition, there are the potential for shallow groundwater reserves with sufficient discharge to irrigate crops even with a limited population [4]. In some dry land locations, pump well water has been used to irrigate watermelon or melon, chili, tomato, Japanese cucumber plants in the dry season. Various systems of growing horticultural crops

have been applied in dry land. If the borehole has a significant discharge, the planting period on dry land can be extended from once planting a year to twice or even three times a year.

In relation to developing horticultural agribusiness, various studies that have been and are being carried out are related to the characteristics of agro-climatic and agricultural ecosystems for the purpose of food security and food sovereignty in the dry land area of North Lombok Regency. However, there is no research in the area that focuses on activities that synergize the development of the tourism industry with the development of agro-tourism based on horticultural agribusiness that produces healthy vegetables and fruits that are low in chemical residues by involving and empowering farming communities to strengthen the economic empowerment of farmer households.

Therefore, a research was conducted on the development of horticultural agribusiness of seasonal vegetables and fruits to strengthen and accelerate the economic recovery of dry land farmer households in Kayagan District, North Lombok with the general objective of the research were to analyse the acceleration of economic recovery and food security of smallholder farmer households post the 2018 earthquake disaster and COVID-19 pandemic era through empowering farmer groups of dry land horticultural agribusiness based. The specific objective was determining and analysing the effect of the synergy among academic institution, Local Government, Agricultural Extension officer and private enterprise with the mission of Better Farming, Better Business and Better Living.

2. Literature review

2.1. Community empowerment concepts

To analyze the developing horticultural agribusiness on dry land for strengthening economy of rural community in North Lombok, this study follows a two-step approach informed by adaptive community empowerment analysis and food security paradigm analysis. Community empowerment is a new concept and theory in the approach of economic development that encapsulates social values [5]. In relation to the concept, there are three dimensions of empowerment exist and are interdependent: self-empowerment through individual action, mutual empowerment that is interpersonal, and social empowerment in the outcomes of social action [6].

The empowerment activities have main mutual expectations. There are four main expectations achieved through the sustainability of community empowerment as a development model in Indonesia [6]. Firstly, the implemented programs need to be able to reduce the number of poor people in Indonesia. Secondly, it needs to encourage the birth of inclusive development through the creation of marginalized groups, in disadvantaged areas. Thirdly, it needs to realize public services, by strengthening transparent and accountable community service delivery systems in their respective work areas. Fourthly, it needs to strengthen the local capacity by increasing the social capital of various institutions. Furthermore, the main objective of community empowerment is to strengthen the power of the poor and weak groups. Therefore, to complete the understanding of empowerment, it is necessary to determine the concept of the weak group and the powerlessness experienced [6].

To achieve those expectations and the main objective, community empowerment uses five-step problem solving model: identifying problems, defining strengths and weaknesses, setting goals, implementing interventions of stakeholders, evaluating successes on a collaborative level. Specifically, this paper draws from the community empowerment theory social work involves using intervention methods to guide rural community toward achieving socio economic needs. It focuses on helping marginalized rural community at individual, group and community levels gain the personal, interpersonal and economic recovery to improve their lives. Additionally, the model seeks to challenge systems that prevent rural dry land community from having their needs met.

Data from document analyses and focus group discussions are first utilized to do so. These initial methods allow for in-depth evaluation and increased validity through triangulation [7]. Second, the governance paradigm elicited then serves as a basis for participatory envisioning and designing of pathways to adaptive vegetable agribusiness governance implementation. This is done through semi-structured interviews framed to facilitate a process in which multiple stakeholders define the challenges, strengths, goals, indicators, and evaluation methods of moving toward adaptive dry land farming governance. Participatory evaluation allows for greater external validity, enhanced selection of indicators, social learning, informed decision-making, and empowerment of disenfranchised stakeholder groups [8]. The data collected from the interviews are triangulated to corroborate and test

the validity of previous findings and then inform the overall conceptualization of horticultural agribusiness on dry land North Lombok 's governance paradigm. The team of research work to enhance people's wellbeing and reduce their health risks associated with the impact of disaster and the COVID-19 pandemic, thereby contributing to better population health.

We develop and implement cross-cutting normative, fiscal and legal measures and capacity development tools. We evaluate and analyse the household food security in economic recovery, community engagement strategies and good governance for welfare. and foster rural dry land food security in the settings of every-day life.

2.2. Food security concepts and measuring food security

In Law No. 7 of 1996 concerning food [9], food security is a condition of fulfilling food for households which is reflected in sufficient availability, both in quantity and quality, safe, equitable and affordable. Food security for households is influenced by many factors such as land ownership (physical) supported by an appropriate climate and human resources. Agricultural policy also determines production or market actors to provide sufficient food.

There are two methods for measuring food security, Quantitative and qualitative methods. According to Smith and Ferro-Luzzi (2002) [10], the quantitative method uses a household expenditure survey or the Household Expenditure Survey (HES) and individual food intake [10]. Smith (2002) suggests to measure food security from household expenditure surveys by using four variables [10], namely (1) total household energy consumption, (2) energy sufficiency level, (3) food diversification, and (4) the percentage of expenditure on food.

A cross-classification of two food security indicators is used to measure the degree of food security at the household level. They are the share of food expenditure and the adequacy of energy consumption (Jonsson and Toole, 1991 in Maxwell et al, 2000). The following table measures the degree of food security.

Table 1. Measuring the degree of food security at the household level

Energy Consumption Rate	Proportion of Food Expenditure	
	Low (<60% Total expenditure)	High (≥60% total expenditure)
Enough (>80% energy sufficiency)	Food Safe	Food Vulnerability
Less (≤80% energy sufficiency)	Less Food	Food vulnerable

Source: Jonsson dan Toole (1991)

Table 1 shows that the limit of 80% of energy consumption (per adult equivalent unit) will be combined with the share of food expenditure > 60% of total household expenditure, resulting in the following criteria: (1) Households are food insecure, namely if the proportion of food expenditure low (less than 60% of household expenditure) and consume enough energy (>80% of the energy adequacy requirement), (2) Households are food insecure, i.e. if the proportion of food expenditure is high (more than 60% of household expenditure) and consumes sufficient energy (>80% of the energy adequacy requirement), (3) the household lacks food, i.e. if the proportion of food expenditure is high (more than 60% of household expenditure) and consumes less energy (≤ 80 % of the energy adequacy requirement), (4) the house food insecure household, namely when the proportion of food expenditure is high and the level of energy consumption is less.

Food security at the household level essentially shows the household's ability to meet food sufficiency. This ability is influenced by many very complex factors, but in general it is related to changes in behavioral aspects of food production, consumption and resource allocation in households. Although the status of food security is classified as guaranteed food security at the regional level, it is not sufficient to guarantee food security at the household level [11]. The same thing was also conveyed [11] that although the availability of rice per capita per day (kg) in an area is relatively sufficient based on the standards used, not every household has access to this food and contributes to the adequacy of rice per capita per day (kg) which is adequate for can be consumed and the individual is free from food and nutritional deficiencies.

3. Methods

This research was a Longitudinal Action Research by implementing Triple and Penta Helix Partnership Approach. In the first year research, the Triple Helix was implemented, the collaboration among Academic Institution, Local government, and Agricultural Extension Worker. In the second year research, the penta helix partnership approach was implemented, the collaboration among Academic Institution, Local government, and Agricultural Extension Worker, Private Enterprise, and Bank. Participatory Action Research (PAR) approach by involving farmers participatory approach was implemented.

3.1. *The location and time of research*

The research was conducted in Salut Village and Gumantar Village. Those villages are the area of developing agribusiness of fresh vegetables and seasonal fruits. And also, those are the tourism buffer in North Lombok. The research was carried out in the tourism buffer area of Northern Lombok. The core planting experiment was carried out in the rural of Gumantar Village and Salut Village, Kayangan District, which had drilled wells and pump wells. This study took place throughout the season and off-season (April to November). If the erect plant has not yet or is still producing fruit, the growth of this crop will be maintained until the end of this research period in the second year.

3.2. *Research design*

This research was designed as a long-term action research (longitudinal action research) for 3 (three) years by applying the Participatory Action Research (PAR) with farmers community participation approach. The research design refers to the specific objectives of the research to achieve the general objectives (main objectives). The design and research methods each year can be described as follows.

The initial stage, namely in the first and second months of the first year of research (before production activities through pilots project), the researcher conducts socialization of activities to farmers and village government in the research location. Then, quantitative and qualitative research methods were applied through surveys with in-depth interview techniques to obtain Base Line data on the socio-economic conditions of the area and farmer households. The next activity is a Focus Group Discussion (FGD) to absorb information from farmers and the obstacles commonly faced in farming. The results of the FGD are expected to provide an overview in improving the training materials before proceeding with experiments (pilots) in the rural land area of North Lombok.

3.3. *The types of data and analysis method*

The types of data needed for economic analysis and business strategy include: Variable costs (all costs for production inputs such as seeds, multimicrobial fertilizers, pesticides, plastic mulch, rope, bamboo); overhead costs such as permanent labor, electricity rental and diesel for extracting well water; costs of casual daily labor; Total Gross Margin; Net Farm Cash Income; Farm Operating Surplus; Net Profit and mandays.

The data was not only recoded from farmers target groups, but also gathered from 60 household surveys in two villages nearby the pilot project village. The cross classification between food expenditure and sufficiency of energy consumption was used to measure the degree of food security of household. To measure the degree of food security at the household level, a cross-classification of two food security indicators is used, namely the share of food expenditure and the adequacy of energy consumption based on table 1. The regression analysis of Multinomial Logistic was used to analyze the factors affecting food security degree of households.

4. Results

4.1. *Strategy to strengthen the economic empowerment of dryland farmer households*

The results and outputs of the first year of research achieved in this study are Horticultural Commodities as pilot results in the form of fresh vegetables and seasonal fruits ready to be marketed, such as Cayenne Pepper, Tomato, Long Bean, Japanese Cucumber, Melon and California Papaya. The fresh fruits and vegetables are produced on farmers' land by involving the target group farmers. Farmers are facilitated by researchers and technicians as well as PPLs who work in the research

villages. The purpose of facilitating farmers in cultivating horticultural commodities is to realize Better Farming for farmers. Strengthening farmers' skills in farming (cultivating crops) in rainfed dry land, so that farmers are more skilled in doing farming on their land according to technical instructions.

The presence of researchers as facilitators, assistance from local governments and other stakeholders makes farmers more willing, enthusiastic and motivated to produce horticultural commodities of high economic value on their farms by relying on pump irrigation water. Another factor is that North Lombok as a destination for domestic and foreign tourists is the opportunity to make the dry lands of North Lombok a center for the production of fresh vegetables and seasonal fruit with high economic value. However, to capture market opportunities and tourism-based economic development opportunities in North Lombok, farmers have relatively weak capabilities in terms of capital, especially pump irrigation facilities such as pipes and water storage equipment from pump wells to farm locations.

The intervention of local government and involving private companies for marketing the vegetables and seasonal fruit absolutely needed due to farmer households facing lack of capital, irrigation facilities and lack of market information. Therefore, the Triple Helix approach in the first year of research and Penta Helix approach in second year research are considered more appropriate to be applied to strengthening the economy of farmer households through the development of dry land horticultural agribusiness. Penta Helix (Figure 1) is a collaborative approach among higher education institutions, local governments, agricultural extension workers and private companies. Private companies are indispensable for marketing their products by farmers between and the hotelier in the form of partnerships with figure 1 images.

Researchers from higher education institutions guide farmers in applying technology for cultivating vegetables and seasonal fruits to achieve Better Farming which is indicated by the realization of the high quantity and high economic value of vegetables and seasonal fruits. Thus, farmers can receive optimal income at a reasonable selling price because farming is not only oriented to Better Farming, but the most important thing is Better Business to achieve Better Living (welfare). The production performance of each horticultural commodity is presented in the appendix in the form of photo documentation. Meanwhile, production data, production costs and farm income are presented below.

4.2. Costs and benefit of vegetables and fruit farming

Data for cost and income analysis of horticultural commodities farming were obtained from two sources, namely data from surveys of vegetable farmers outside the pilot project, and data recorded from the pilot project results on farmers' lands target group (Group of Horticultural Farmers Sumur Desa TM 151 Beda Cincang and Sembik Bidadara 1 Selat Village, Kayangan District).

4.3. Survey results outside of pilot farms

Table 2. Performance of production, costs and income of horticultural commodities farming in Kayangan District in 2021.

No	Variables description	Cayenne		
		Pepper	Tomatoes	Long beans
1	Average land area (Ha)	0.36	0.37	0.35
2	Production per Cultivated Land area (Kg)	523	685	925
3	Production per Hectarea (Kg/Ha)	1,453	1,851	2,643
4	Unit Price (Rp/Kg)	22,190	5,370	3,850
5	Revenue per cultivated land area (Rp)	11,605,370	9,941,757	3,561,250
6	Variable costs per cultivated land area (Rp)	2,940,522	4.380.750	1.486.519
7	Fixes Costs per cultivated land area (Rp)	320,478	539.250	439.276
8	Total Costs per cultivated land area (Rp)	3,261,000	4.920.000	1.925.795
9	Total Costs per Hectare (Rp/Ha)	9,058,333	13.297.297	5.502.271
10	Profit per cultivated land area (Rp)	11,605,370	3,678,450	1,635,455
11	Profit per Hectarea (Rp/Ha)	32,237,139	9,941,757	4,672,729

Table 2 illustrates that a vegetable commodity that has the potential to accelerate and strengthen the economy of farmer households in dry land is cayenne pepper because the average selling price per unit is relatively high. The price is more expensive than the price of consumption rice per kilogram. The duration of harvesting cayenne pepper tends to be longer compared to other vegetable commodities, so that farmers have the opportunity to obtain various levels of market prices.

The harvesting period for tomatoes is shorter than cayenne pepper, so farmers can rotate crops in a year. Farmers have the ability and willingness (motivation) to produce to take advantage of market opportunities and the availability of irrigation water in the form of “deep ground water” with pump well facilities. Likewise, with long bean vegetables. The duration of harvest is almost the same as the duration of the tomatoes harvest. A detailed explanation is presented based on the results of observations of the pilot in the farmer's land. The following points describe the results of observations on horticultural farming pilots for 5 (five) vegetable commodities, namely Cayenne Pepper, Tomato, Long Bean, Melon and California Papaya.

4.4. Cost and income of farming horticultural commodities

In the following table, 5 (five) main commodities are shown which are thought to increase the household income of farmers in dry land, namely Cayenne Pepper, Tomato, Long Bean, Japanese Cucumber and Rock Melon. Meanwhile, the California Papaya commodity is presented in a separate table because the production unit uses fruit (not kilograms).

Table 3. The performance of production, costs and farm income of horticultural commodities farming in a pilot in Rural Salut, Kayangan District in 2021.

No	Variables Description	Nama Komoditas Hortikultura				
		Cayenne Pepper	Tomatoes	Long Bean	Japan Cucamer	Rock Melon
1	Average of cultivated land area (Ha)	0.05	0.10	0.05	0.05	0.20
2	Production per cultivated land area (Kg)	185	465	625	785	2,978
3	Produksi per Ha (kg)	3,700	4,650	12,500	15,700	14,890
4	Price per unit (Rp/kg)	25,037	5,370	3,450	2,750	4,250
5	Total Revenue per cultivated land area (Rp)	4,631,845	2,497,050	2,156,250	2,158,750	12,656,500
6	Total Revenue Per Hectare (Rp)	92,636,900	24,970,500	43,125,000	43,175,000	12,656,500
7	Costs of production per per cultivated land area (Rp)	2,967,687	1,220,800	1,425,795	1,567.000	8,500,000
8	Biaya Produksi per hertare (Rp)	59,353,740	12.208.000	28.515.900	31.340.000	42,500,000
9	Farm Income per cultivated land area (Rp)	1,664,158	1.276.250	730.455	591.750	4,156,500
10	Farm Income per Hectare (Rp)	33,283,160	12,762,500	14,609,100	11,835,000	20,782,500

The table above illustrates that each vegetable commodity cultivated by farmers on dry land with pump well irrigation has a relatively large opportunity to accelerate and strengthen the economic empowerment of farmers. Vegetable farming income, both per cultivated land area and per hectare, is determined by dominant factors, namely the the farm gate price per unit product (Farm Gate Price). It appears that the largest farming income is farming income of Cayenne Pepper, followed by long beans, tomatoes and Japan cucumbers.

Long bean vegetables have a relatively similar harvest duration to the tomatoes harvest duration. The farmers face various price levels during the on-farm production process. The following are the results of observations of the planting period, harvest period and the price of long bean vegetables on a pilot on land owned by farmers in the dry land area. Farmers can set a planting schedule in each season for one year (12 months) by utilizing pump well irrigation. They can choose their planting schedule so that during harvesting season they do not face over supply which results in low prices.

4.5. Proportion of food expenditure of farmers' households food insecure

Table 4. Average monthly total expenditure of farmer households in the community economic zone of kayangan district.

No	Expenditures	amount (Rp)	Percentage (%)
1	Food Expenditure	1.239.100	61.67
2	Non-Food Expenditure	770.219	38.33
	Total	2.009.319	100.00

Source: Processed primary data, 2021

Total expenditure is expenditure for food and non-food consumption. Table 15 illustrates that the percentage of expenditure on food (61.67%) is greater than the percentage of non-food expenditure (38.33%). This illustrates that the higher the proportion of food expenditure, the lower the level of household welfare. Food and non-food expenditures are influenced by dependents and income in the family.

4.6. Household food consumption

Table 5. Average of energy and protein consumption of farmers' households in Salut and Gumantar Village Kayanan North Lombok

No.	Kind of Food	Energy Intake (Kcal/cap/day)	Energy contribution (%)	Protein intake (gram/cap/day)	Protein contribution (%)
1	Rice	1,186.55	65.85	12.6	15.75
2	Assorted tubers	86.27	4.79	11.7	14.63
3	Animal food	85.34	4.74	28.6	35.75
4	Oil and Fat	76.12	4.22	0	0.00
5	Fruits, Oil Seed	28.3	1.57	0.8	1.00
6	Assorted nuts	178.4	9.90	15.5	19.38
7	Sugar	68.2	3.79	0	0.00
8	Vegetables and fruits	24.3	1.35	0	0.00
9	Others	68.3	3.79	10.8	13.50
	Total	1.802	100.00	80	100.00

Source: Processed primary data, 2021

The consumption of energy and protein can be viewed from the food consumption. The table above shows that the average energy intake of farmer households in the dry land villages of North Lombok is 1.802 kcal/cap/day. Rice has the greatest contribution, which contributes 65.85% of the total energy intake, while the greatest in daily consumption and the average protein intake of farmer households in dry land area. the largest contributor comes from animal food at 35.75%.

Table 6. Average energy and protein consumption of farmers' households in the dry land area of Kayangan District, North Lombok

Nutrient content	Consumption	Recommended Nutrient Consumption level	Nutrient Consumption Level (%)
Energy (kcal/cap/day)	1,802	2,550	70.66
Protein (gram/cap/day)	80	65	123.08

Sumber: Processed primary data, 2021

The consumption average of energy and protein of a farmer's household is obtained from the amount of energy and protein contained in the food and beverages consumed by each member of the farmer's household. Nutritional Consumption Level (NCL) is a comparison between the nutrients consumed and the recommended nutritional adequacy rate. Table 17 illustrates that the energy consumption level of 70.66% is classified as lacking because it is lower than the recommended nutritional consumption. This reflects that not many types of food are consumed by farming households. While the level of protein consumption is in the good category because the level of protein consumption of 123.08% exceeds the recommended nutritional adequacy rate.

4.7. Food security of farmers' households

Table 7. Food Security Levels of Farmers' Households in the research location, Kayangan District, North Lombok

Energy Consumption Rate	Proportion of Food Expenditure	
	Low (<60% Total expenditure)	High (≥60% total expenditure)
Enough (>80% energy sufficiency)	61.71% Food Safe	32.85% Food Vulnerability
Less (≤80% energy sufficiency)	13.38% Less Food	56.95% Food Insecurity

The food security of farmer households is in the category of Food Insecurity and Lack of Food when viewed from the amount of household income per month on average having an income of less than 1 (one) million rupiah per month and on average receiving government rice assistance. This shows that the level of household income greatly affects the level of household food security of women farmers in dry land areas.

Judging from the results above, it can be concluded that most of the farmers' households are classified as food insecure, due to the very high share of food expenditure of farmer households and the lack of fulfillment of household energy consumption. This is based on a Food Expenditure Share (FES) of more than 60% and an Energy Consumption Level (ECL) of less than 80% of the recommended Nutrient Adequacy Rate.

Farmer household incomes are classified as good, with the level of food security classified as food insecurity due to the greater annual income spent on food fulfillment per month. This can be seen from farm income as much as 70.05% per year which is part of the main source of income allocated to meet food expenditures of 61.67% of food expenditure per month, which causes food insecurity. Food insecurity conditions are often related to the problem of poverty. However, food insecurity does not always have to be accompanied by the problem of poverty. Food insecurity conditions can occur in situations where poverty is no longer than the main problem [12].

5. Conclusions

1. Developing vegetales includes chili peppers, tomatoes, cucumbers and long beans, and seasonal fruits, rock melons and watermelon, in dry land rural areas have high opportunity to accelerate and strengthen economic empowerment of farmer households. They already understand that North Lombok is a tourist destination area that needs to be supported by the provision of high economic value, healthy and environmentally friendly fresh vegetable and seasonal fruit products. The market demand for these horticultural commodities is relatively large, either for household consumption, super markets, or restaurants and hotels.
2. North Lombok, one of the tourism buffer areas, is huge opportunity to optimally produce vegetables and fruit to support the tourism industry. However, farmer groups need technical assistance to implement better farming in producing healthy fresh vegetables and seasonal fruits to gain better business for achieving better living. Farmers continuously produce fresh vegetable and fruit commodities, but they have not been able to produce quality vegetable commodities that are in line with hotel and restaurant demand. In addition, hotels and super markets need many vegetable and seasonal fruit such as Rock Melon, Seedless Watermelon, Lettuce, Sukini, California Papaya, Gavendish Banana,
3. The energy consumption level of 70.66% is classified as lacking because it is lower than the recommended nutritional consumption. This reflects that not many types of food are consumed by farming households. While the level of protein consumption is in the good category because the level of protein consumption of 123.08% exceeds the recommended nutritional adequacy rate.
4. The distribution of household food security based on Energy Consumption Level (FCL) is mostly in the food shortage category, reaching 13.38% (<80% of the energy adequacy rate). The energy absorption of farmer households in the dry land villages of North Lombok is 1,802 kl/cap/day, which is lower than the recommended energy consumption rate of 70.66%. Meanwhile, the distribution of food security in farmer households based on the protein consumption level, which is 123.08% is in the category of sufficient protein (> 57 grams/cap/day and 30.95% is in the position of lack of protein (<57 grams/cap/day. The protein absorption of farmer households in rural dry land in North Lombok is 80 grams/cap/day or the level of protein consumption is 123.08% or categorized as food insecure.
5. Food security performance of farmer households based on cross combination between Energy Consumption Level (ECL) and Proportion of Food Expenditure, namely Food Resistant (61.71%), Food Vulnerable (32.85%), Food Insecurity (56.95%) and Lack of Food (13.38%).

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