BUKTI KORESPONDENSI

Artikel : Farmer's perceptions on risk and determinants of risk management strategy in integrated cattle and crops farming systems

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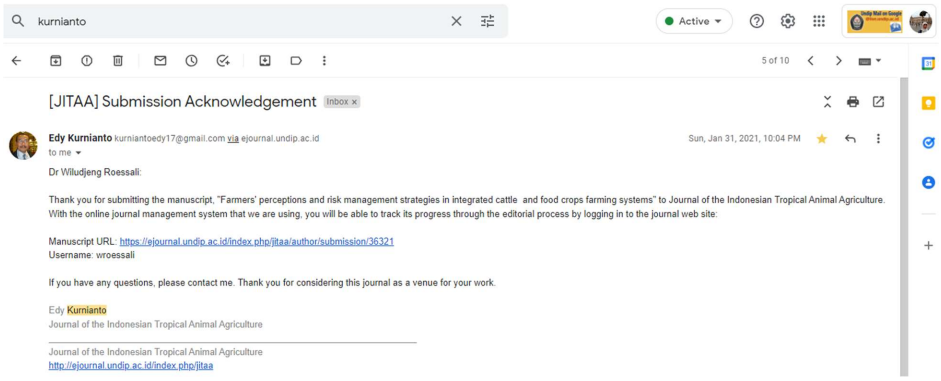

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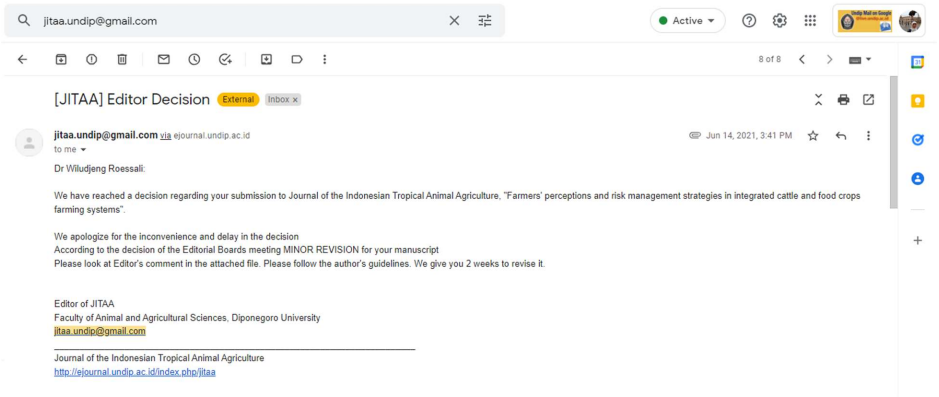

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Perceptions risk management strategies integrated cattle crop

Farmers' perceptions and risk management strategies in integrated cattle and food crops farming systems

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ABSTRAK

Penelitian ini dilakukan untuk menganalisis persepsi petani terhadap risiko praktik usahatani integrasi sapi dan tanaman pangan, serta menganalisis faktor-faktor yang mempengaruhi keputusan petani dalam menerapkan strategi manajemen risiko. Data primer diperoleh melalui wawancara ~~pribadi~~ dari 150 responden yang dibagi menjadi dua pola berdasarkan komposisi usahatani yang dipraktekkan. Pola I praktek usaha sapi-padi-jagung-padi dan Pola II praktek sapi-padi-jagung-kedelai di Kabupaten Grobogan, Jawa Tengah, Indonesia. Data dianalisis dengan menggunakan multinomial probit pada empat strategi manajemen risiko yang diadopsi terdiri dari kredit, asuransi, kemitraan, dan pendapatan di luar pertanian. Hasil penelitian menunjukkan bahwa 59.15 persen petani pola I dan 47.06 persen petani pola II mempresepsikan risiko usahatani karena iklim, pasar, biologis dan finansial dalam kagori tinggi. Keputusan petani dalam menerapkan strategi manajemen risiko dipengaruhi oleh jumlah ternak, partisipasi dalam kelompok tani ternak, persepsi petani atas risiko iklim, pasar, biologis dan finansial.

Kata Kunci: *Kata kunci : management, asuransi, risiko, integrasi, tanaman-ternak*

ABSTRACT

The research was conducted to analyze farmers' risk perceptions on farming practices of integration of cattle and food crops, and ~~also~~ to analyze ~~the~~ factors that influence farmers' decisions in implementing risk ~~management~~ strategies . Primary data were obtained through ~~personal~~ interviews from 150 respondents divided into two patterns based on the composition of the farms being practised. Pattern I practice cow-paddy rice-corn-rice business and Pattern II practices cow-paddy rice-corn-soybean in Grobogan Regency, Central Java, Indonesia. Data

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were analyzed using multinomial probit on the risk management strategies adopted consisting of credit, insurance, partnerships, and off-farm income. The results showed that 59.15 percent of pattern I farmers and 47.06 percent of pattern II farmers had high farming risk perceptions. Farmers 'decisions in implementing risk management strategies are influenced by farmers' perceptions of climate, market, biological and financial risks.

Keywords:management, insurance, risk, integration, crop-livestock

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INTRODUCTION

Smallholder agriculture is the key to local and global food security and is the engine for development and economic growth for most developing countries. The majority of Indonesian farmers are small farmers with less than one hectare of agriculture (Suryana, 2009, Hemas *et al*., 2019). The number of livestock that is kept is small (Widiati, 2014; Fatmasari *et al.,* 2018), which is integrated with food crops (Rusdiana *et al*., 2019; Widarni *et al*., 2020), plantation crops (Bamualim *et al.,* 2015; Nur *et al.,* 2018) and horticulture (Siswati and Nizar, 2012). They produce a large number of basic food crops by relying on ~~natural and~~ natural processes, agricultural biodiversity, local resources and local knowledge for farming.

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The increasing intensity of extreme climate ~~events~~ in recent years has led to an increase in drought and flooding in many parts of Indonesia (Sumastuti and Pradono, 2016). Climate variability is a major source of risk to smallholder farmers and pastoralists, particularly in dryland regions (Hansen *et al*., 2019), affecting the long-term economic viability of rainfed agriculture (Lotze-Campen *et al*., 2009). One of the districts in Central Java, Grobogan Regency experiences hydrometeorological drought almost every year (Pemerintah Kabupaten Grobogan,

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2016; Hastuti, *et al.,* 2017). The high dependence of agriculture on natural environmental conditions such as temperature, rainfall, pollution, pests, and diseases and ~~variability in prices~~ have a major impact on agricultural production (Mercer, 2010: Singla and Sagar, 2012). These economic and biophysical environmental variables cause agricultural activities to face various risks and uncertainties.

Some risk management strategies are reported to be carried out by farmers in managing their farms (Ashraf and Routray, 2013; Ullah and Shivakoti, 2014). The adoption of agriculture credit also positively impacts farmers' income and risk management (Akhtar *et al.,* 2019; Saqib *et al*., 2016). Insurance is one of the available risk management tools to reduce production risk caused by unpredictable ~~weather~~ (Kiran and Kotrakerebasegowda, 2012; Khan *et al*., 2013). Likewise, different planting times, diversification, irrigation, water preservation techniques, new plant varieties, adoption of new technologies (Saqib *et al*., 2016; Akhtar *et al.,* 2019). Furthermore, Magsakay *et al*. (2014) and Munandar *et al*. (2015) clarified that the crop-livestock integration system functions as a food security measure that acts as an alternative source of income against disasters bad weather conditions. Integrated agriculture forms are also suggested to restore agricultural systems sustainability (Bell and Moore 2012; Widarni *et al.,* 2020). Harjanto *et al.* (2019) and Suryana reported the business pattern with partnerships (2009). Furthermore, diversification of income from outside of farming is a risk management strategy (Gu-cheng *et al.,* 2019). Ullah *et al.* (2015) reported that farmers use precautionary savings and diversification as a risk management strategy to address flood risk. Risk management strategy is an important part of farmer decision making to minimize losses from farming practices. It is undoubtedly important for farmers to identify and manage the risks of their agricultural production (Drollette, 2009).

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The problem of farmers' vulnerability to natural disasters is very important to be studied to mitigate risks. Changes in agricultural conditions in recent years due to various external environment changes require farmers to adapt for the continuity of their business. However, the choice of the risk management system is usually based on farmers' perceptions of the source and impact of losses (Hall *et al*., 2003; Mase *et al.,* 2017), farmers' right attitude (Iqbal *et al.,* 2016). Farmers' perceptions and responses to risk are important in understanding their risky behaviour (Alimi and Ayanwale, 2005). Farmers' adoption of risk management strategies is, to a large extent, influenced by their socio-economic characteristics. In this context, the article aims to assess farmers' perceptions and decisions to determine farmers' risk management strategies. These findings will guide the government in taking policy initiatives to help farmers manage risk.

MATERIALS AND METHODS

A cross-sectional quantitative study was conducted in Grobogan Regency, Central Java. Based on 2018 Agricultural and Animal Husbandry Statistics data, it is known that Grobogan is a district with potential for beef cattle and food crop farming (rice, corn, soybean) which has reached the highest production in Central Java in 2019 (Dinas Pertanian Grobogan, 2020). The purposive method was used to determine the research location based on the data and guidance of the Field Agricultural Extension (PPL) staff regarding the distribution of the composition of farmers with cattle and food crop farming practices.

The survey was conducted in January - May 2019 to obtain socio-economic, demographic, institutional and household data using a questionnaire through interview sessions

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with the participant head of household decision-makers. Survey farmers are grouped into two groups: farmers with a cow-rice-corn-rice pattern (pattern I) and a cow-rice-corn-soybean pattern (pattern 2). Based on the location of the regency, there are 5 sub-districts selected purposively where two villages were taken in each district namely Nambuhan Village and Ngraji Village in Purwodadi District, Sulursari Village and Banjarejo Village in Gabus District, Panungglan Village and Sidorejo Village in Pulokulon District, Pilangpayung Village and Krangganharjo Village in Toroh District and Karangasem Village and Sambirejo Village in Wirosari District. Furthermore, in each subdistrict, 30 farmers were assigned a Multi-Stage Cluster Quota Sampling, so that the total respondents were 150 farmers. A total of 150 farmers were surveyed consisting of 82 pattern I farmers and 68 pattern II farmers selected randomly from the sample frame.

The farmers were asked to provide their perceptions of the main sources of risk affecting their agricultural activities. The four types of risks that farmers are known to face are climate, market, biological and financial risks. Farmers are asked to assess the incidence and severity of this risk. Climate risks are associated with losses arising from drought, heavy rain, flooding, temperature fluctuations that result in losses to livestock and crops. Market risk is related to the fluctuation of input and output prices, below average profit. Biological risks related to pests and diseases in cattle and crops. Financial risks related to fluctuations in working capital interest rates, unavailability of production loans. Ratings on a Likert scale from 1 (very low) to 5 (very high) based on their understanding of each source of risk. Following Cooper (2005), the given scores are then aggregated in a risk matrix and classified as low if the scores are 2 to 5 and high if they range from 6 to 10. Figure 1 shows the risk matrix. Thus, the variable of risk perceptions

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is a binary variable 1 if farmers considered a risk as high, and 0 otherwise (Ullah and Shivakoti, 2014).

Probit Model

This model was to estimate the probability that observation with specific characteristics will fall into one particular category. In this study, we used a probit model because the dependent variable as a risk management strategy adopted by farmers was dichotomous. Confirmation regarding the risk management strategy that has been adopted by the farmer, the set of alternatives is obtained four possibilities. Risk management strategy (1) credit, (2) insurance, (3) partnership, and (4) off-farm income. The role of agricultural credit has a significant effect on farmers' income, especially for those prone to disasters (Saqib et al., 2016) as financing can increase beef cattle production (Mayangsari et al., 2014). Agricultural insurance is a strategy to minimize risk (Kiran *et al,* 2012; An-nisa *et al,* 2015). The partnership program effectively increases the income of livestock farmers (Suardika *et al.,* 2015; Harjanto *et al.,* 2018). Off-farm income as income diversification has been a basic approach in managing risk (Fahad *et al.,* 2020). The bivariate probit model is given as:

$$y_{ij} = x_{ij}\beta_j + \varepsilon_{ij}$$

Where $y_{ij,}$ in this case, is binary variable for the risk management parameter *(j= 1, .., m)* chosen by the farmer *(i = 1, .., n),* x_{ij} is a 1xk as the observed variable vector that affects the chosen risk management strategies, β_j is the kx1 vector of the unknown parameter which are to be estimated, and εi is the unobserved error term. In this condition, each y_j is a binary variable, and thus eq. (2) is a system of m equations (m=2) to be estimated (Akhtar *et al.,* 2019).

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RESULTS AND DISCUSSIONS

Characteristics of Respondents

Respondent farmer households were classified into farmers who practic~~e~~ed cattle farming with rice, corn as pattern I, and integrations cattle with rice, corn, soybean crops as pattern II. The respondents' characteristics in Table 1 showed that the average age of pattern II is 52.24 relatively higher farmer pattern I, but not a significant difference. Farmers in both patterns are categorized as productive age. Data on education indicate that respondents completed their primary education (65.33 percent), and only 29,33 percent and 4 percent have attained junior and high school. It is believed that higher education possibly facilitates better access to information and often hypothesized to increase the probability of adopting new technologies (Daberkow and McBride, 2003; Amare and Simane, 2017. Household sizes ranged from 3 to 7 members, and an average of 4 members. The average land tenure per household in the ~~survey area~~ was 0.29 hectares (0.28 hectares for Pattern I and 0.30 hectares for Pattern II).

Livestock is an important component in agricultural activities (Asraf and Routray, 2013). ~~For farmers in the study locations,~~ Cattle farming is a diversification of the business that can generate relatively large income per year. The contribution of income from cattle in farming was 51.99 and 66.56 percent in the pattern I and pattern II, respectively, showing a significant difference of $p<0.00$. About 90 percent of respondents stated that they had difficulty ~~meeting their livestock feed~~ during the dry season. This condition causes farmers to immediately sell their livestock (52 percent), especially if their access to feed is limited in remote locations or pay additional costs for feed needs. The same condition was confirmed by Ashraf and Routray (2013~~). The~~ farmer will maintain the number of cows according to their ability to access their

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livestock forage. Competition for land use for food is more considered than for forage As-Syakur *et al*. (2011).

Farm-level perception of risk

In the descriptive analysis, we assessed farmers' perceptions of farm risk as an independent variable. Farmers' knowledge of the probability of events and their impact is illustrated in Figure 2. The study found that as many as 59.15 percent of farmers in a pattern I and 47.06 percent of pattern II farmers perceive that the risks they face in farming practices are in a high category. ~~Figure 2 showed that as many as 59.15 percent of farmers in pattern I and 47.06 percent of pattern II farmers perceive that the risks they face in farming practices are in a high category~~. Farmers' perceptions of the risks of farming practices based on climate, market, biology and finance in the two patterns have different compositions. In pattern I, the percentages assessing high category risk are market, biological risks, while in pattern II were climate, biological and financial risks. Habiba *et al.* (2012) confirm that farmers have different perceptions regarding climate change based on the physical environment, type and level of involvement in agricultural activities, which affect their financial well-being. According to Adger et al. (2009) farmers' perceptions, both long and short term, climate change is a fundamental pre-indicator in adaptation procedures. Perception can be said to be a cognitive process. Tripathi and Mishra (2017) mention that even though they have correct perceptions, sometimes people cannot respond to climate change due to lack of resources, lack of information or lack of capacity.

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Market or price risks reflect variations in agricultural output and input prices (Harwood *et al.,* 1999). However, these risks affect income variability in agriculture (Hall *et al*., 2003).

Depicted in Figure 2 as much as 93.9 percent in pattern I and 23.53 percent in pattern II have a high perception of market risk. The imbalance between the fluctuations in input factors, especially fertilizers and seeds, is compared to the production yield so that the profit margin is getting smaller. Farmers also find it challenging to access subsidized fertilizers. Santoso (2015) states that until now rice productivity is still primarily supported by chemical fertilizers where the current national rice production is greatly influenced by the realization of chemical fertilizer subsidies, namely urea, SP36, and ZA.

There are variations in the perception of biological risk among respondents in pattern I compared to pattern II. Overall, the perception of biological risk was higher in pattern I (61.76 percent). Diseases that generally occur due to parasites in livestock (73.3 percent) and flatulence (12 percent). Rats and leafhoppers on rice plants. Pests of seed flies, cob borer, stem borer and fall armyworms (FAW). The ex-ante strategy through disease control in livestock and the Movement for Control of Plant Pest Organisms (Gerdal Pests) on plants is a risk management strategy implemented by farmers.

Financial risk occured when money borrowed to finance agricultural businesses and small farmers who borrow money experiencing debt repayment difficulties (Kahan, 2008). As many as 57.32 percent in pattern I and 48.53 percent in pattern II have a low category of financial risk perceptions. Most of the farmers who borrowed money (88.5 percent) stated that they could repay their loans. This result is in line with the study of Mayangsari et al. (2014), in a condition where some farmers are unable to repay their credit, the farmers will sell their assets such as livestock or mortgage their land. A similar case was also reported by Nagahage and Dilrukshi (2012) in Sri Lanka, where some farmers paid back credit using other means such as labour, services and methods of mortgaging assets.

Factors affecting Risk Management Strategy

The results of the analysis of the application of risk management are presented in Figure 3. In the study location, there are several risk mitigation options and measures to protect against income volatility. For example, the credit package for the procurement of production factors was adopted as much as 43 percent, of which 70.27 percent obtained access from commercial institutions, while the rest came from farmer groups and family or relatives. Credit that is accessed by farmers, especially the farm credit program (KUT). There is no significant difference between the risk strategy adopter farmers for credit options in pattern I and pattern II farming. According to Mayangsari *et al*. (2014), accessing credit for cows or food plants has a requirement to join a farmer group. Farmers prefer access to credit at informal institutions because the requirements for obtaining it are not complicated. Informal institutions that play a role include agricultural input traders, agricultural product traders or traders who both function (Pratiwi *et al.,* 2019).

Since the release of an insurance program by the government in 2015, it aims to protect the risk of crop failure in rice farming insurance (AUTP). Then, in 2016 the Cattle Livestock Business Insurance (AUTS) was released as a risk protection for the death and loss of cows. These programs can be accessed through farmer groups or cattle groups as a requirement for participants. Insurance participants in the study locations were 45 per cent, both AUTP and AUTS participants. The level of farmer participation is still low due to various reasons. Such as mismatches are weaknesses in program implementation, and there is no coordination between the implementing insurance company and farmers and the problem of compensation (Ardiana and Agusta, 2018; Khan *et al.,* 2013). A study reported by Ambarawati *et al.* (2018) reveals that

most farmers ask for full subsidies from the government, not a 20 percent premium payment. In fact, in terms of rice insurance, the government subsidizes 80 percent, and 20 percent is the farmers' duty to pay premiums, guarantees, and claims.

Partnership in agricultural midwives is a concept of cooperation between two or more parties in certain business activities. The basic principle of partnership is a mutual need, complement, mutual benefit, and mutual strengthening (Azahari, 2000). Farmers in the study locations generally collaborate with production factor distributors and village collectors, also known as "middlemen." As many as 40 percent collaborated in the form of supply of production factors, especially seeds and fertilizers from partners, and calculated with agricultural production after harvest. Pasaribu (2015) states that farmers involved in a partnership pattern get social and economic benefits.

Off-farm income is mostly done by farmers and their families, especially their wives and adult children, during the dry season when they cannot yet plant. As many as 37 percent of farmers get off-farm income opportunities. Between the two patterns, farmers in pattern II (44 percent) have a higher chance than farmers in pattern I (21 percent) (Figure 4). This activity is mostly carried out by farmers in other developing countries, as Loison (2015) reported that rural farmer households in SSA-Southern Sahara Africa diversify their livelihoods in non-agricultural activities, including migration, especially to minimize risks and increase their income.

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Partnership dan off-farm income

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The probit model used in the study to assess the impact of socio-economic factors and their perceptions of risk is shown in Table 2. The equation results for risk management strategies show that lower levels of education and their perceptions of climate, market, and biological risks influence credit strategies' adoption. The higher their perception of climate and biological risks,

they are not interested in adopting farm credit. This consideration is based on the ability to repay their credit if the farm yield is unpredictable. On the other hand, the higher their perception of market risk follows the credit adoption decision. Harjanto *et al.* (2019) found ineffective cooperative relations between IBS-Islamic Boarding School st and the student's farmers communities. Tawaf (2018) found that the beef cattle partnership model between farmers and feedlot companies still finds financing problems when it is done intensively. The same thing was reported by Fitri *et al.* (2018) in the partnership pattern between corn farmers and companies. They still experience obstacles related to product distribution and payment, in contrast to implementing a partnership pattern between rice farmers and companies that have felt economic and technical benefits (Priandika *et al.,* 2015).

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The results show that the decision to adopt insurance is more influenced by their perception of climate risk, biological in an inverse relationship, where the higher their perception of climate risk and biological, the less interested in adopting insurance. However, the higher their perception of financial risk, the higher it is for insurance adoption. Agricultural insurance is one way of managing risk; however, insurance has a similarly out-of-reach history for those in rural areas like most financial services. Some insurance products are not yet accessible to rural communities due to a lack of distribution networks and high premium costs (Ardiana and Agusta, 2018).

The analysis results show that the smaller the income from farming cattle, the higher the perception of climate risk, and the biological risk they are less interested in engaging in partnerships. Conversely, the more their perception of market risk increases, the more considered partnership adoption.

The analysis of off-farm income shows that those with less education do not implement this risk management strategy, fewer cattle raised, and their perceptions of climate and biological risks. Meanwhile, farmers who actively participate in farmer groups open opportunities to earn off-farm income. In contrast to farm-level adjustments, farmers employ various adaptation practices outside of agriculture to address underproduction. Barrett *et al.* (2001) reported that diversification of income into non-crop production was an important livelihood strategy for rural households, particularly in Africa.

CONCLUSION

The characteristics of respondent farmers in both patterns are relatively the same except for pattern II farm income, which is significantly higher than pattern I. Farmers' perceptions of farming risks include climate, market, biological and financial risks. In pattern I (cattle-rice-corn-rice), the risk of farming they face is higher than in pattern II (cattle-rice-corn-soybean). The ranking of risk management strategies adopted by farmers in pattern I is a partnership, credit, insurance, and off-farm income. In pattern II, respectively, are off-farm income, partnership, credit, and insurance. The adoption of risk management strategies is influenced by farmers' perceptions of the farming risks they face. Perceptions of climate and biological risks are significant factors that form the basis for decisions on adopting credit, insurance, partnerships, and off-farm income strategies.

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Table 1. ~~Descriptive statistic of the variables~~

Commented [PP36]: Household farmers' characteristics

Variables	Pattern I (n=82)		Pattern II (n=68)		~~significan~~
	Mean	Std.dev	Mean	Std.dev	p value
Age (years)	50.99	10.71	52.24	10.18	0.643^{ns}
Education (years)	6.7	1.93	6.48	2.1	0.517^{ns}
Experience (years)	31.7	11.72	32.49	10.07	0.655^{ns}
Household size (number)	4.19	0.92	4.04	1.19	0.756^{ns}
Livestock (AU)	1.41	0.65	1.34	0.55	0.475^{ns}
Land size (hectares)	0.28	0.23	0.3	0.22	0.588^{ns}
Gender	0.93	0.26	0.91	0.29	0.737^{ns}
Participation in Farmer groups[a]	0.97	0.17	0.8	0.43	0.451^{ns}
Farm income (000IDR/year)	8,932	5,580	11,077	6,036	0.002***
Proportion of income from cattle farming (%)	52	12.8	66.56	17.7	0.000***

Note : [a)] 1=active; 0-other ; ns non significant; *** significant p<1%

Table 2. Parameter estimates of the probit model

Variables	Credit		Insurance		Partnership	Off-Farm Income	
Intercept	1.6225		3.5325	**	0.4120	1.3464	
	(1.3427)		(1.7251)		(1.3646)	(1.4382)	
Age	-0.0048		0.0161		0.0115	-0.0140	
	(0.0291)		(0.0357)		(0.0288)	(0.0301)	
Education	-0.0275	*	0.0247		0.0348	-0.1070	*
	(0.0592)		(0.0735)		(0.0601)	(0.0641)	
Experience	-0.0118		-0.0458		-0.0252	-0.0171	
	(0.0288)		(0.0365)		(0.0286)	(0.0297)	
Family member	0.0919		0.0813		0.1153	0.1092	
	(0.1171)		(0.1510)		(0.1169)	(0.1309)	
Land	0.9556		0.2786		0.5148	1.2997	
	(0.7662)		(0.9545)		(0.7751)	(0.8771)	
Cattle	-0.3791		-0.2406		-0.1994	-0.6654	**

	(0.2665)		(0.3457)		(0.2699)		(0.3174)	
Gender	-0.0236		0.6154		0.6117		0.6113	
	(0.4813)		(0.5786)		(0.4852)		(0.5222)	
Participation FG	-0.0086		-0.0093		-0.0130		0.0249	***
	(0.0084)		(0.0103)		(0.0085)		(0.0095)	
Cattle Income	0.2701		-0.3684		-0.9027	*	0.4042	
	(0.4714)		(0.6477)		(0.5059)		(0.4930)	
Perception of risk[a]								
Climate	-1.1657	***	-2.1449	***	-0.6449	**	-1.0836	***
	(0.3450)		(0.4884)		(0.3276)		(0.3348)	
Market	0.8052	*	0.4241		1.2937	**	-0.4448	
	(0.4614)		(0.5719)		(0.5203)		(0.5032)	
Biological	-1.2272	***	-2.5236	***	-1.4220	***	-1.5855	***
	(0.2890)		(0.4163)		(0.3022)		(0.3230)	
Financial	0.3424		0.5431	*	0.3801		0.3547	
	(0.2805)		(0.3305)		(0.2919)		(0.3192)	
Log likelihood	-75.7640		-48.0096		-72.8236		-64.1760	
LR $\chi 2$ ((13)	53.7415	***	110.6163	***	54.5229	***	68.7953	***
Pseudo R^2	0.2618		0.5353		0.2724		0.3490	

[a]dummy variable 1 for high criteria and 0 otherwise.

Standard errors are in parenthesis. *, ** and *** represent significant at 10%, 5% and 1% probability level respectively.

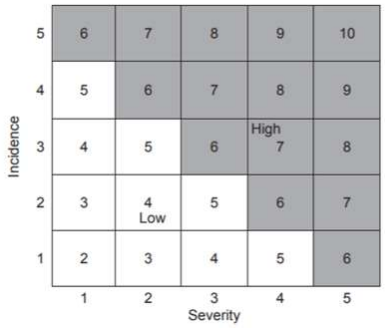


Figure 1. Risk matrix

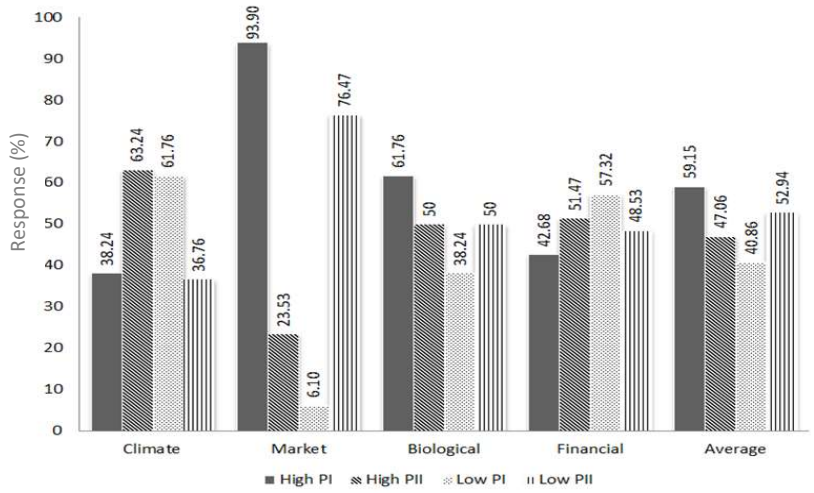


Figure 2. Composition in percent of farmers' risk perception in pattern I and pattern II

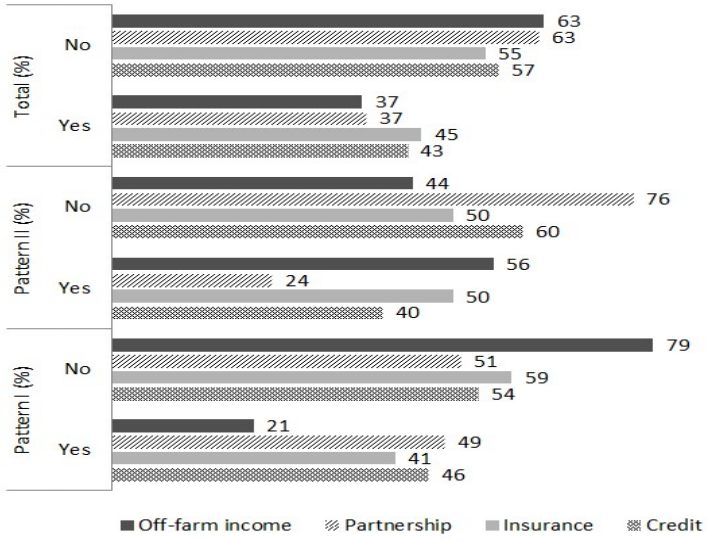
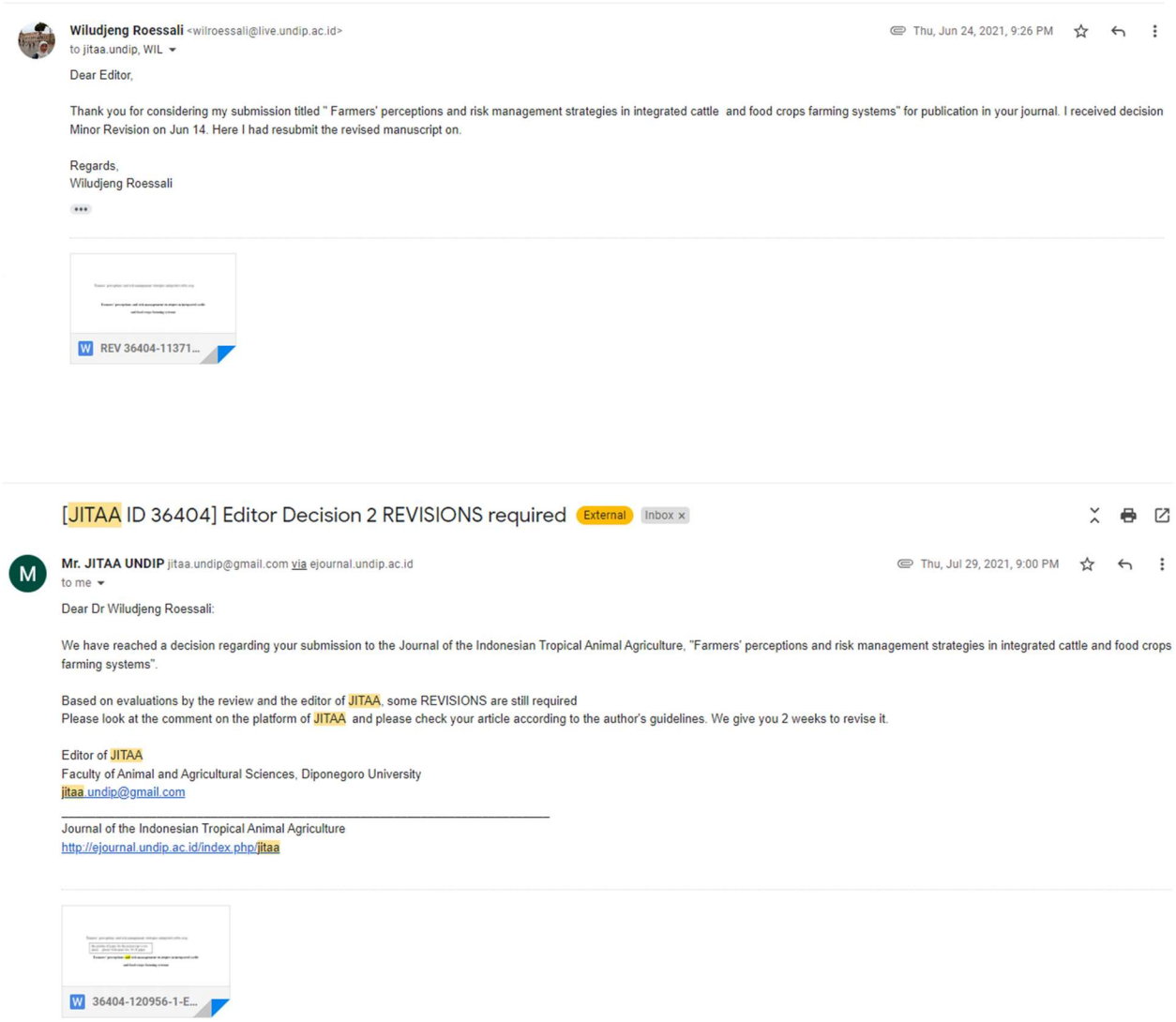


Figure 3. Adoption of risk management



Wiludjeng Roessali <wilroessali@live.undip.ac.id>
to jitaa.undip, WIL

Thu, Jun 24, 2021, 9:26 PM

Dear Editor,

Thank you for considering my submission titled " Farmers' perceptions and risk management strategies in integrated cattle and food crops farming systems" for publication in your journal. I received decision Minor Revision on Jun 14. Here I had resubmit the revised manuscript on.

Regards,
Wiludjeng Roessali

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[JITAA ID 36404] Editor Decision 2 REVISIONS required External Inbox ×

Mr. JITAA UNDIP jitaa.undip@gmail.com via ejournal.undip.ac.id
to me

Thu, Jul 29, 2021, 9:00 PM

Dear Dr Wiludjeng Roessali:

We have reached a decision regarding your submission to the Journal of the Indonesian Tropical Animal Agriculture, "Farmers' perceptions and risk management strategies in integrated cattle and food crops farming systems".

Based on evaluations by the review and the editor of JITAA, some REVISIONS are still required
Please look at the comment on the platform of JITAA and please check your article according to the author's guidelines. We give you 2 weeks to revise it.

Editor of JITAA
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Farmers' perceptions and risk management strategies integrated cattle crop

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Farmers' perceptions and risk management strategies in integrated cattle and food crops farming systems

ABSTRAK

Penelitian ini dilakukan untuk menganalisis persepsi petani terhadap risiko praktik usahatani integrasi sapi dan tanaman pangan, serta menganalisis faktor-faktor yang mempengaruhi keputusan petani dalam menerapkan strategi manajemen risiko usahatani integrasi sapi dan tanaman pangan. Data primer diperoleh melalui wawancara dari 150 responden yang dibagi menjadi dua pola berdasarkan komposisi usahatani yang dipraktikkan. Pola I praktik usaha sapi-padi-jagung-padi dan Pola II praktik sapi-padi-jagung-kedelai di Kabupaten Grobogan, Jawa Tengah, Indonesia. Data dianalisis dengan menggunakan multinomial probit pada empat strategi manajemen risiko yang diadopsi terdiri dari kredit, asuransi, kemitraan, dan pendapatan di luar pertanian. Hasil penelitian menunjukkan bahwa 59.15 persen petani pola I dan 47.06 persen petani pola II mempresepsikan risiko usahatani karena iklim, pasar, biologis dan finansial dalam kagori tinggi. Keputusan petani dalam menerapkan strategi manajemen risiko dipengaruhi oleh jumlah ternak, partisipasi dalam kelompok tani ternak, persepsi petani atas risiko iklim, pasar, biologis dan finansial.

Kata Kunci: *manajemen, asuransi, risiko, integrasi, tanaman-ternak*

Comment [V1]: what research methods are used? Please write it also in the abstract

Comment [V2]: please check the title of manuscript ... and that research objective

In the title, two things can be examined, namely perceptions of integration and integration risk management strategies. However, if the research objective is the perception of the risk of integrated farming, it will be different from the title of the manuscript

Comment [V3]: What do the authors mean by practice? What is being studied not from the results of farmers' farming?

Comment [V4]: Has insurance really been applied to farmers, especially those studied in Grobogan? because if the author reveals the insurance component is analyzed, it means the program must be real

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ABSTRACT

The research was conducted to analyze farmers' risk perceptions on farming practices of integration of cattle and food crops, and to analyze factors that influence farmers' decisions in implementing risk strategies to integrated farming of cattle and food crops. Primary data were obtained through interviews from 150 respondents divided into two patterns based on the composition of the farms being practised. Pattern I practice cow-paddy rice-corn-rice business and Pattern II practices cow-paddy rice-corn-soybean in Grobogan District, Central Java, Indonesia. Data were collected in January - May 2019 and were analyzed using multinomial probit on the risk management strategies adopted consisting of credit, insurance, partnerships, and off-farm income. The results showed that 59.15 percent of pattern I farmers and 47.06 percent of pattern II farmers had high farming risk perceptions. Farmers' decisions in implementing risk management strategies were influenced by farmers' perceptions of climate, market, biological and financial risks.

Keywords:management, insurance, risk, integration, crop-cattle

INTRODUCTION

Smallholder agriculture is the key to local and global food security and is the engine for development and economic growth for most developing countries. The majority of Indonesian farmers are small farmers with less than one hectare of agriculture (Suryana, 2009, Hemas *et al*., 2019). Rearing cattle per household farmer is

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In. the title of the manuscript uses the term cattle but in the body text there are terms cow and cattle ... which one is used for research?
Actually, both are difference rearing aspect
Please check it all

Comment [V9]: Has insurance really been applied to farmers, especially those studied in Grobogan? because if the author reveals the insurance component is analyzed, it means the program must be real

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with food crops (Rusdiana *et al*., 2019; Widarni *et al*., 2020), plantation crops (Bamualim *et al.,* 2015; Nur *et al.,* 2018) and horticulture (Siswati and Nizar, 2012). They produce a large number of basic food crops by relying on natural processes, agricultural biodiversity, local resources and local knowledge for farming.

The increasing intensity of extreme climate happens in recent years has led to an increase in drought and flooding in many parts of Indonesia (Sumastuti and Pradono, 2016). Climate variability is a major source of risk to smallholder farmers and pastoralists, particularly in dryland regions (Hansen *et al*., 2019; Lotze-Campen *et al*., 2009). One of the districts in Central Java, Grobogan District experiences hydrometeorological drought almost every year (Pemerintah Kabupaten Grobogan, 2016; Hastuti *et al.,* 2017). The high dependence of agriculture on natural environmental conditions such as temperature, rainfall have a major impact on agricultural production (Mercer, 2010: Singla and Sagar, 2012).

Risk management strategies are an important part of farmers' decision-making to minimize losses from agricultural practices (Drollette, 2009). Several risk management strategies have been carried out by farmers such as off-farm diversification (Ullah and Shivakoti, 2014; Akhtar et al., 2019).), adoption of agricultural credit (Saqib et al., 2016), insurance (Kiran and Kotrakerebasegowda, 2012; Khan et al., 2013), and partnership (Rai et al., 2017).

The pattern of crop and livestock integration is a risk management strategy that is widely adopted by small farmers (Saptana and Ilham, 2015; Widarni et al., 2020). The crop-livestock integration system functions as a food security measure that acts as an alternative source of income against disaster conditions, bad weather (Magsakay et

al., (2014) and Munandar et al., (2015). Integrated forms of agriculture are also suggested to restore the sustainability of agricultural systems (Bell and Moore, 2012)

The problem of farmers' vulnerability to natural disasters is very important to be studied in order to mitigate risks. Changes in agricultural conditions in recent years due to various changes in the external environment require farmers to adapt for the sake of their business continuity. However, the selection of a risk management system is usually based on farmers' perceptions of the source and impact of losses (Mase et al., 2017), and farmer attitudes (Iqbal et al., 2016). Farmers' perceptions and responses to risk are important in understanding their risk behavior (Alimi and Ayanwale, 2005). Farmers' adoption of risk management strategies is, to a large extent, influenced by their socioeconomic characteristics. This study aims to analyze the perceptions and decisions of farmers to determine risk management strategies in the management of integrated cattle and food crop farming. These findings will guide the government in taking policy initiatives to help farmers manage risk.

MATERIALS AND METHODS

A cross-sectional quantitative study was conducted in Grobogan District, Central Java from January to May 2019. Based on 2018 Agricultural and Animal Husbandry Statistics data, it is known that Grobogan is a district with potential for beef cattle and food crop farming (rice, corn, soybean) which has reached the highest production in Central Java in 2019 (Dinas Pertanian Grobogan, 2020). The purposive method was used to determine the research location based on the data and guidance of the Field Agricultural Extension (PPL) staff regarding the distribution of the

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composition of farmers with cattle and food crop farming practices. There were 5 sub-districts selected purposively where two villages were taken in each sub-districts namely Nambuhan Village and Ngraji Village in Purwodadi Sub-District, Sulursari Village and Banjarejo Village in Gabus Sub-District, Panunggalan Village and Sidorejo Village in Pulokulon Sub-District, Pilangpayung Village and Krangganharjo Village in Toroh Sub-District and Karangasem Village and Sambirejo Village in Wirosari Sub-District. Furthermore, in each subdistrict, 30 farmers were assigned a Multi-Stage Cluster Quota Sampling, so that the total respondents were 150 farmers. Survey farmers are grouped into two groups: farmers with a cow-rice-corn-rice pattern (pattern I) and a cow-rice-corn-soybean pattern (pattern 2). A total of 150 farmers were surveyed consisting of 82 pattern I farmers and 68 pattern II farmers selected randomly ~~from the sample frame and normally distributed.~~

The farmers were asked to provide their perceptions of the main sources of risk affecting their agricultural activities, i.e. cattle and crops. The four types of risks that farmers are known to face are climate, market, biological and financial risks. Farmers are asked to assess the incidence and severity of this risk. Climate risks are associated with losses arising from drought, heavy rain, flooding, temperature fluctuations that result in losses to livestock and crops. Market risk is related to the fluctuation of input and output prices, below average profit. Biological risks related to pests and diseases in cattle and crops. Financial risks related to fluctuations in working capital interest rates, unavailability of production loans. Ratings on a Likert scale from 1 (very low) to 5 (very high) based on their understanding of each source of risk. ~~Following Cooper (2005),~~ the given scores are then aggregated in a risk matrix and classified as low if the

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Comment [V15]: If a sample of 150 is divided into two groups and 5 sub-districts and 10 villages are taken, how is the sampling technique for each sub-district and village so that it can describe the 2 groups?

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scores are 2 to 5 and high if they range from 6 to 10. Figure 1 shows the risk matrix. Thus, the variable of risk perceptions is a binary variable 1 if farmers considered a risk as high, and 0 otherwise (Ullah and Shivakoti, 2014).

Probit Model

This model was to estimate the probability that observation with specific characteristics will fall into one particular category. In this study, we used a probit model because the dependent variable as a risk management strategy adopted by farmers was dichotomous. Confirmation regarding the risk management strategy that has been adopted by the farmer, the set of alternatives is obtained four possibilities. Risk management strategy (1) credit, (2) insurance, (3) partnership, and (4) off-farm income. The role of agricultural credit has a significant effect on farmers' income, especially for those prone to disasters (Saqib et al., 2016) as financing can increase beef cattle production (Mayangsari et al., 2014). Agricultural insurance is a strategy to minimize risk (Kiran *et al.*, 2012; An-nisa *et al.*, 2015). The partnership program effectively increases the income of livestock farmers (Suardika *et al.*, 2015; Harjanto *et al.*, 2018). Off-farm income as income diversification has been a basic approach in managing risk (Fahad *et al.*, 2020). The bivariate probit model is given as (Akhtar *et al.*, 2019):

$$y_{ij} = x_{ij}\beta_j + \varepsilon_{ij}$$

Where y_{ij} in this case, is binary variable for the risk management parameter $(j = 1, .., m)$ chosen by the farmer $(i = 1, .., n)$, x_{ij} is a 1xk as the observed variable vector that affects

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Comment [V19]: has insurance implemented in integration term , especially in the area of research???

oooo again for insurance, checks its implementation .... in theory it can but this is research, meaning it must be in accordance with what is being researched

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the chosen risk management strategies (Table 1), β_j is the kx1 vector of the unknown parameter which are to be estimated, and ε_i is the unobserved error term. In this condition, each y_i is a binary variable for risk management strategies (credit, insurance, partnership and off-farm ncome), and thus eq. (2) is a system of m equations (m=4) to be estimated (Akhtar *et al.*, 2019) as:

$$y_1^* = \alpha_1 + x\beta_1 + \varepsilon_1$$

$$y_2^* = \alpha_2 + x\beta_2 + \varepsilon_2$$

$$y_3^* = \alpha_3 + x\beta_3 + \varepsilon_3$$

$$y_4^* = \alpha_4 + x\beta_4 + \varepsilon_4$$

RESULTS AND DISCUSSIONS

Characteristics of Respondents

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Respondent farmer households were classified into farmers with cow-rice-corn-rice as pattern I, and cow-rice-corn-soybean as pattern II. The respondents' characteristics in Table 2 showed that the average age of pattern II is 52.24 relatively higher farmer pattern I, but not in a significant difference. Farmers in both patterns are categorized as productive age. Data on education indicate that respondents completed their primary education (65.33 percent), and only 29.33 percent and 4 percent have attained junior and high school. It is believed that higher education possibly facilitates better access to information and often hypothesized to increase the probability of adopting new technologies (Daberkow and McBride, 2003; Amare and Simane, 2017.

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Comment [V25]: Please update the references

Household sizes ranged from 3 to 7 members, and an average of 4 members. The average land tenure per household in the was 0.29 hectares (0.28 hectares for Pattern I and 0.30 hectares for Pattern II).

Cattle farming is a diversification of the business that can generate relatively large income per year. The contribution of income from cattle in farming was 51.99 and 66.56 percent in the pattern I and pattern II, respectively, showing a significant difference of $p<0.00$. About 90 percent of respondents stated that they had difficulty to feed the cattle during the dry season. This condition causes farmers to immediately sell their livestock (52 percent), especially if their access to feed is limited in remote locations or pay additional costs for feed needs. The same condition was confirmed by Ashraf and Routray (2013). Farmers will maintain the number of cows according to their ability to access their livestock forage. Competition for land use for food is more considered than for forage As-Syakur *et al.* (2011).

Farm-level perception of risk

In the descriptive analysis, we assessed farmers' perceptions of farm risk as an independent variable. Farmers' knowledge of the probability of events and their impact is illustrated in Figure 2. The study found that as many as 59.15 percent of farmers in a pattern I and 47.06 percent of pattern II farmers perceive that the risks they face in farming practices are in a high category. Farmers' perceptions of the risks of farming practices based on climate, market, biology and finance in the two patterns have different compositions. In pattern I, the percentages assessing high category risk are market, biological risks, while in pattern II were climate, biological and financial risks.

Comment [V26]: household members ranged from 3 to 7 with an average of 4 members

Comment [V27]: better write : the average household land tenure was ..

Comment [V28]: How is this sentence related to the previous sentence? does it mean that despite the difficulty of feeding, the income is still high? And the contribution more than 50%.???

Comment [V29]: to such conditions can describe the high contribution? It seem the opposite condition

Comment [V30]: does the statement apply to the concept of integration??? if the analysis between plants and livestock is distinguished, maybe yes ... in fact the existence of integration is usually to minimize feed shortages

Comment [V31]: please use the passive sentences for scientific writing. Check it all sentences

Habiba *et al.* (2012) confirm that farmers have different perceptions regarding climate change based on the physical environment, type and level of involvement in agricultural activities, which affect their financial well-being. According to Adger et al. (2009) farmers' perceptions, both long and short term, climate change is a fundamental pre-indicator in adaptation procedures. Perception can be said to be a cognitive process as ripathi and Mishra (2017) mentioned that even though they have correct perceptions, sometimes people cannot respond to climate change due to lack of resources, lack of information or lack of capacity.

Market or price risks reflect variations in agricultural output and input prices (Harwood *et al.,* 1999). However, these risks affect income variability in agriculture (Hall *et al.*, 2003). Depicted in Figure 2 as much as 93.9 percent in pattern I and 23.53 percent in pattern II have a high perception of market risk. The imbalance between the fluctuations in input factors, especially fertilizers and seeds, is compared to the production yield so that the profit margin is getting smaller. Farmers also find it challenging to access subsidized fertilizers. Santoso (2015) states that until now rice productivity is still primarily supported by chemical fertilizers where the current national rice production is greatly influenced by the realization of chemical fertilizer subsidies, namelyurea, SP36, and ZA.

There are variations in the perception of biological risk among respondents in pattern I compared to pattern II. Overall, the perception of biological risk was higher in pattern I (61.76 percent). Diseases that generally occur due to parasites in livestock (73.3 percent) and flatulence (12 percent). Rats and leafhoppers on rice plants. Pests of seed flies, cob borer, stem borer and fall armyworms (FAW). The ex-ante strategy

Comment [V32]: ~~please~~ check with the references which is correct

Comment [V33]: ~~what~~ causes the two patterns to have very different perceptions of the market ... generally for farmers in general do not have a bargaining position so that the market becomes a risk factor

~~were~~ patterns I and II analyzed in different seasons?

Comment [V34]: ~~look~~ at the two statements.. ~~are~~ they not contradictory?

So far, fertilizer prices have been controlled, so are there really fluctuations in fertilizer prices?

Comment [V35]: ~~what~~ is the measure of high perception of biological risk?

through disease control in livestock and the Movement for Control of Plant Pest Organisms (Gerdal Pests) on plants is a risk management strategy implemented by farmers.

Financial risk occured when money borrowed to finance agricultural businesses and small farmers who borrow money experiencing debt repayment difficulties (Kahan, 2008). As many as 57.32 percent in pattern I and 48.53 percent in pattern II have a low category of financial risk perceptions. Most of the farmers who borrowed money (88.5 percent) stated that they could repay their loans. This result is in line with the study of Mayangsari et al. (2014), in a condition where some farmers are unable to repay their credit, the farmers will sell their assets such as livestock or mortgage their land. A similar case was also reported by Nagahage and Dilrukshi (2012) in Sri Lanka, where some farmers paid back credit using other means such as labour, services and methods of mortgaging assets.

Factors affecting Risk Management Strategy

The results of the analysis of the application of risk management are presented in Figure 3. In the study location, there are several risk mitigation options and measures to protect against income volatility. For example, the credit package for the procurement of production factors was adopted as much as 43 percent, of which 70.27 percent obtained access from commercial institutions, while the rest came from farmer groups and family or relatives. Credit that is accessed by farmers, especially the farm credit program (KUT). There is no significant difference between the risk strategy adopter farmers for credit options in pattern I and pattern II farming. According to

Comment [V36]: what is the measure of low perception

Comment [V37]: which means there are no problems with credit returns But why is Mayangsaris reference where it is stated that there are problems in returning credit?

Comment [V38]: is this an abbreviation in english?

Comment [V39]: Where is the test result? the results written are normative

Mayangsari *et al.* (2014), accessing credit for cows or food plants has a requirement to join a farmer group. Farmers prefer access to credit at informal institutions because the requirements for obtaining it are not complicated. Informal institutions that play a role include agricultural input traders, agricultural product traders or traders who both function (Pratiwi *et al.*, 2019).

Since the release of an insurance program by the government in 2015, it aims to protect the risk of crop failure in rice farming insurance (AUTP). Then, in 2016 the Cattle Livestock Business Insurance (AUTS) was released as a risk protection for the death and loss of cows. These programs can be accessed through farmer groups or cattle groups as a requirement for participants. Insurance participants in the study locations were 45 per cent both AUTP and AUTS participants. The level of farmer participation is still low due to various reasons. Such as mismatches are weaknesses in program implementation, and there is no coordination between the implementing insurance company and farmers and the problem of compensation (Ardiana and Agusta, 2018; Khan *et al.*, 2013). A study reported by Ambarawati *et al.* (2018) reveals that most farmers ask for full subsidies from the government, not a 20 percent premium payment. In fact, in terms of rice insurance, the government subsidizes 80 percent, and 20 percent is the farmers' duty to pay premiums, guarantees, and claims.

Partnership in agricultural midwives is a concept of cooperation between two or more parties in certain business activities. The basic principle of partnership is a mutual need, complement, mutual benefit, and mutual strengthening (Azahari, 2000). Farmers in the study locations generally collaborate with production factor distributors and village collector, also known as "middlemen." As many as 40 percent collaborated in

Comment [V40]: Is it in English?

Comment [V41]: ????? is it ??? cattle group???

Comment [V42]: ??????????????? ???????/

Comment [V43]:
can it be said that the two programs are well implemented? if many weaknesses mean the program is not effective. Then what is the effect if insurance is a risk management strategy factor?

On field reality in various regions that the two programs have not run smoothly

Comment [V44]: more appropriate to use the word farming (usahatani) than business
please, check it all

the form of supply of production factors, especially seeds and fertilizers from partners, and calculated with agricultural production after harvest. Pasaribu (2015) states that farmers involved in a partnership pattern get social and economic benefits.

Off-farm income is mostly done by farmers and their families, especially their wives and adult ~~children~~, during the dry season when they cannot yet plant. As many as 37 percent of farmers get off-farm income opportunities, such as casual construction workers and farm laborers. Between the two patterns, farmers in pattern II (44 percent) have a higher chance than farmers in pattern I (21 percent) (Figure 3). This activity is mostly carried out by farmers in other developing countries, as Loison (2015) reported that rural farmer households in SSA-Southern Sahara Africa diversify their livelihoods in non-agricultural activities, including migration, especially to minimize risks and increase their income.

Partnership and off-farm income

The probit model used in the study to assess the impact of socio-economic factors and their perceptions of risk is shown in Table 3. The equation results for risk management strategies show that lower levels of education and their perceptions of climate, market, and biological risks influence credit strategies' adoption. The higher their perception of climate and biological risks, they are not interested in adopting farm credit. This consideration is based on the ability to repay their credit if the farm yield is unpredictable. On the other hand, the higher their perception of market risk follows the credit adoption decision. Harianto *et al.* (2019) found ineffective cooperative relations between IBS-Islamic Boarding School and the student's farmers communities. Tawaf (2018) found that the beef cattle partnership model between farmers and feedlot

Comment [V45]: really?
In the sample of farmers, it is stated that there is a rice-corn-paddy and rice-corn-soybean cropping pattern, meaning that the pattern is carried out in one year including the dry season. so, it is impossible for a farmer not to plant in the dry season. Beside, the farmer should rearing cattle … so, how can farmer get off farm income … unless those who work outside the farm are family members

Comment [V46]: Why ??? where is the discussion?

Comment [V47]: ?????????
is that a sub chapter

companies still finds financing problems when it is done intensively. The same thing was reported by Fitri *et al.* (2018) in the partnership pattern between corn farmers and companies. They still experience obstacles related to product distribution and payment, in contrast to implementing a partnership pattern between rice farmers and companies that have felt economic and technical benefits (Priandika *et al.*, 2015).

The results show that the decision to adopt insurance is more influenced by their perception of climate risk, biological in an inverse relationship, where the higher their perception of climate risk and biological, the less interested in adopting insurance. However, the higher their perception of financial risk, the higher it is for insurance adoption. Agricultural insurance is one way of managing risk; however, insurance has a similarly out-of-reach history for those in rural areas like most financial services. Some insurance products are not yet accessible to rural communities due to a lack of distribution networks and high premium costs (Ardiana and Agusta, 2018).

The analysis results show that the smaller the income from farming cattle, the higher the perception of climate risk, and the biological risk they are less interested in engaging in partnerships. Conversely, the more their perception of market risk increases, the more considered partnership adoption.

The analysis of off-farm income shows that those with less education do not implement this risk management strategy, fewer cattle raised, and their perceptions of climate and biological risks. Meanwhile, farmers who actively participate in farmer groups open opportunities to earn off-farm income. In contrast to farm-level adjustments, farmers employ various adaptation practices outside of agriculture to address underproduction. Barrett *et al.* (2001) reported that diversification of income

Comment [V48]: ~~so~~ it upside down? if the higher the farmer's perception of risk, the higher the adoption of insurance?

if indeed the results of such research, it means that it is true that insurance is not going well so what is the urgency of insurance in this research?

Comment [V49]: ~~what~~ is meant by farming cattle? if it is meant integration, then the concept should be used so that it doesn't seem like partial cattle

~~please~~, check it all

into non-crop production was an important livelihood strategy for rural households, particularly in Africa.

CONCLUSION

The characteristics of respondent farmers in both patterns are relatively the same except for pattern II farm income, which is significantly higher than pattern I. Farmers' perceptions of farming risks include climate, market, biological and financial risks. In pattern I (cattle-rice-corn-rice), the risk of farming they face is higher than in pattern II (cattle-rice-corn-soybean). The ranking of risk management strategies adopted by farmers in pattern I is a partnership, credit, insurance, and off-farm income. In pattern II, respectively, are off-farm income, partnership, credit, and insurance. The adoption of risk management strategies is influenced by farmers' perceptions of the farming risks they face. Perceptions of climate and biological risks are significant factors that form the basis for decisions on adopting credit, insurance, partnerships, and off-farm income strategies.

Comment [V50]: the statement need a verb to becomes a sentence

ACKNOWLEDGMENTS

The author would like to thank Diponegoro University through the Faculty Research Scheme in 2019 (Contract No. 43/UN7.5.5/PP/2019). We also thank the Grobogan District Agriculture Service and the Grobogan District Animal Husbandry and Fisheries Service. We would also like to express our gratitude to the Field Extension officers and farmer groups in the study locations and the students who helped with the survey activities.

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pay attention and check again the cited references, but not in the references

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Comment [V52]: ?????? please, the guide for author especially how to write references

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Comment [V53]: ~~has~~ been replaced

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RESPOND TO JITAA COMMENT

Code	JITAA Comment	Answer
V8	use the terms of cattle and cow to be consistent, because there are differences. cattle for “sapi” in general but cows are more likely to “induk sapi, betina” In. the title of the manuscript uses the term cattle but in the body text there are terms cow and cattle ... which one is used for research?	revised

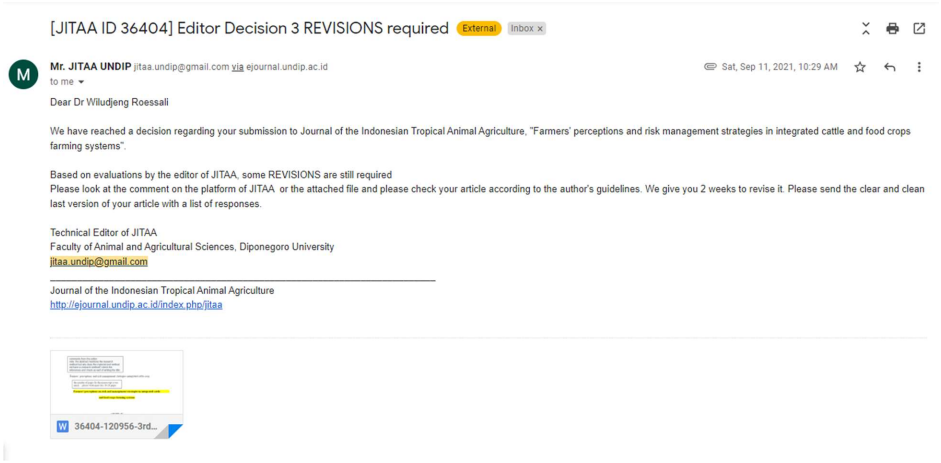
	Actually, both are difference rearing aspect Please check it all	
V9	Has insurance really been applied to farmers, especially those studied in Grobogan? because if the author reveals the insurance component is analyzed, it means the program must be real	described at V25
V10	In the introduction, the author has not explained in detail about the integration of livestock and crops related to perceptions and risk management strategies	already added in the second paragraph
V11	need a subject	added
V12	please check it for using ,	deleted
V13	Are input prices a component of the natural environment? ook at the statement and the sentence ... in the statement there is no verb so it is not a sentence	revised
V14	Has insurance really been applied to farmers, especially those studied in Grobogan? because if the author reveals the insurance component is analyzed, it means the program must be real Maybe in the country where the citation has been taken but what about in Grobogan? As comment on abstract	Yes, right. Some of the respondent farmers are AUTP and/or AUTS participants
V15	Please check that statement. Is that the sentences??? If so ,, what is the verb ..	deleted
V16	pay attention to the use of the word furthermore in two sentences in a row	the 1st furthermore has been deleted
V17	How do these goals relate to titles related to integration?	revised
V18	Please use Regency for kabupaten rahter than district. district usually use for kecamatan …	replaced
V19	pay attention to the writing of patterns 1 and 2 or I and II .. to be consistent	replaced
V20	Is there any sampling frame related to 2 groups or pattern??	revised
V21	If a sample of 150 is divided into two groups and 5 sub-districts and 10 villages are taken, how is the sampling technique for each sub-district and village so that it can describe the 2 groups?	Added (determined purposively with consideration of the type of integrated farming being carried out)
V22	at the beginning of the sentence avoid using the word following, the author can write: Cooper (2005) stated that	revised
V23	please try to find the update of references … not more than 10 year	changed
V24	who are We ????	revised

	please avoid personal pronouns in scientific writing	
V25	has insurance implemented in integration term, especially in the area of research???	In this study, the object of research is integrated farming in the annual cropping pattern cycle. So, the insurance referred to is not the pattern of integration but farmers as individuals who in the implementation of their farming have insurance premiums. In this study, some farmers pay for insurance whether it is rice farming insurance (AUTP) and or cattle farming insurance (AUTS).
V26	why just beef cattle ??? how about integration? The tittle explicitly ention integration	revised
V27	Please check how to write et al be consistence	revised
V29	Be consistence using the tenses	revised
V30	Is there any tested for significantcy?	Yes. Independent sample t-test
V31	Please update the references	revised
V32	household members ranged from 3 to 7 with an average of 4 members	revised
V33	better write : the average household land tenure was ..	revised
V34	How is this sentence related to the previous sentence? does it mean that despite the difficulty of feeding, the income is still high? And the contribution more than 50% ???	deleted
V35	In such conditions can describe the high contribution? It seem the oposite condition	This explains that farmers who find it difficult to feed, 52% of them sell cattle. The income from the calculated cattle is indeed greater as described previously.
V36	does the statement apply to the concept of integration??? if the analysis between plants and livestock is distinguished, maybe yes ... in fact the existence of integration is usually to minimize feed shortages	deleted
V37	please use the passive sentences for scientific writing. Check it all sentences	revised
V38	please check with the references which is correct	Rivised. Tripathi and Mishra
V39	what causes the two patterns to have very different	Revised

	perceptions of the market ... generally for farmers in general do not have a bargaining position so that the market becomes a risk factor were patterns I and II analyzed in different seasons?	I and II analyzed in the same seasons. The concept of market risk is related to input and output prices. So there could be differences in perception for farmers who are able to access cheaper input prices, for example obtaining subsidies for fertilizers and seeds compared to those who do not.
V40	look at the two statements.. are they not contradictory? So far, fertilizer prices have been controlled, so are there really fluctuations in fertilizer prices?	deleted
V41	what is the measure of high perception of biological risk?	already describe in risk matrix
V42	what is the measure of low perception	already describe in risk matrix
V43	which means there are no problems with credit returns But why is Mayangsari's reference where it is stated that there are problems in returning credit?	deleted
V44	is this an abbreviation in english? KUT	deleted
V45	Where is the test result? the results written are normative	Further describe in table 3
V46	Is it in English? AUTP	deleted
V47	?????? is it ??? cattle group???	deleted
V48	??????????????????????????/ 45 per cent	revised
V49	can it be said that the two programs are well implemented? if many weaknesses mean the program is not effective. Then what is the effect if insurance is a risk management strategy factor? On field reality in various regions that the two programs have not run smoothly	revised
V50	more appropriate to use the word farming (usahatani) than business	revised

	please check it all	
V51	really? In the sample of farmers, it is stated that there is a rice-corn-paddy and rice-corn-soybean cropping pattern, meaning that the pattern is carried out in one year including the dry season. so it is impossible for a farmer not to plant in the dry season. Beside, the farmer should rearing cattle … so, how can farmer get off farm income … unless those who work outside the farm are family members	deleted
V52	Why ??? where is the discussion? farmers in pattern II (44 percent) have a higher chance than farmers in pattern I (21 percent Why ??? where is the discussion?	revised
V53	dan	replaced
V54	isn't it upside down? if the higher the farmer's perception of risk, the higher the adoption of insurance? if indeed the results of such research, it means that it is true that insurance is not going well so what is the urgency of insurance in this research?	revised
V55	what is meant by farming cattle? if it is meant integration, then the concept should be used so that it doesn't seem like partial cattle please check it all	revised
V56	the statement need a verb to becomes a sentence	revised
V57	pay attention to the cited references, there are still many whose years are more than 10 years pay attention and check again the cited references, but not in the references	revised
V58	?????? please the guide for author especially hiw to write references	done
V59	??	revised

REVIEW 3



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Mr. JITAA UNDIP jitaa.undip@gmail.com via ejournal.undip.ac.id Sat, Sep 11, 2021, 10:29 AM
to me

Dear Dr Wiludjeng Roessali

We have reached a decision regarding your submission to Journal of the Indonesian Tropical Animal Agriculture, "Farmers' perceptions and risk management strategies in integrated cattle and food crops farming systems".

Based on evaluations by the editor of JITAA, some REVISIONS are still required
Please look at the comment on the platform of JITAA or the attached file and please check your article according to the author's guidelines. We give you 2 weeks to revise it. Please send the clear and clean last version of your article with a list of responses.

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36404-120956-3rd...

REVIEW 3 Tanggal 11 September 2021

comments from the editor

note: the abstract mentions the research method but why does the material and method not have a research method? check the references and check as

Farmers' perceptions and risk management strategies integrated cattle crop

the number of pages for the manuscript is too much ... please write more less 18-20 pages

Farmers' perceptions on risk and management strategies in integrated cattle and food crops farming systems

ABSTRAK

Penelitian ini dilakukan untuk menganalisis persepsi petani terhadap risiko usahatani integrasi sapi dan tanaman pangan, serta menganalisis faktor-faktor yang mempengaruhi keputusan petani dalam

Commented [V37]: what research methods are used? Please write it also in the abstract

Commented [SN38]: revised

Commented [V39]: please check the title of manuscript ... and that research objective

In the title, two things can be examined, namely perceptions of integration and integration risk management strategies. However, if the research objective is the perception of the risk of integrated farming, it will be different from the title of the manuscript

menerapkan strategi manajemen risiko usahatani integrasi sapi dan tanaman pangan. Penelitian ini menggunakan metode survei dengan melakukan wawancara terhadap 150 responden yang dibagi menjadi dua pola berdasarkan komposisi usahatani yang dipraktikkan. Pola I praktik usaha sapi-padi-jagung-padi dan Pola II praktik sapi-padi-jagung-kedelai di Kabupaten Grobogan, Jawa Tengah, Indonesia. Data dianalisis dengan menggunakan model probit pada empat strategi manajemen risiko yang diadopsi terdiri dari kredit, asuransi, kemitraan, dan pendapatan di luar pertanian. Hasil penelitian menunjukkan bahwa 59.15 persen petani pola I dan 47.06 persen petani pola II mempersepsikan risiko usahatani karena iklim, pasar, biologis dan finansial dalam katagori tinggi. Keputusan petani dalam menerapkan strategi manajemen risiko dipengaruhi oleh persepsi petani atas risiko iklim, pasar, biologis dan finansial.

Kata Kunci: *asuransi, integrasi, manajemen, risiko, tanaman-ternak*

ABSTRACT

The research was conducted to analyze farmers' risk perceptions and factors that influence farmers' decisions in implementing risk management strategies to integrated farming of cattle and food crops. This study used a survey method by conducting interviews to 150 respondents who were divided into two patterns based on the composition of the farming practice. Pattern I practice cattle-rice-corn-rice business and Pattern II practices cattle-rice-corn-soybean in Grobogan District, Central Java, Indonesia. Data were collected in January - May 2019 and were analyzed using probit model on the risk management strategies adopted consisting of credit, insurance, partnerships, and off-farm income. The results showed that 59.15 percent of pattern I farmers and 47.06 percent of pattern II farmers perceived the risk of farming due to climate, market, biological and financial in the high category. Farmers' decisions in implementing risk management strategies were influenced by farmers' perceptions of climate, market, biological and financial risks.

Keywords: crop-cattle, insurance, integration, management, risk.

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INTRODUCTION

Smallholder agriculture is the key to local and global food security and it is the engine for development and economic growth for most developing countries. The majority of Indonesian farmers are small farmers with less than one hectare of agriculture (Hemas *et al*., 2019). Rearing cattle per household farmer is relatively in a small scale which is integrated with food crops, plantation crops and horticulture (Rusdiana *et al*., 2019; Widarni *et al*., 2020). They produce a large number of basic food crops by relying on natural processes, agricultural biodiversity, local resources and local knowledge for farming.

The increasing intensity of extreme climate happens in recent years has led to an increase in drought and flooding in many parts of Indonesia (Sumastuti and Pradono, 2016). Climate variability is a major source of risk to smallholder farmers and pastoralists, particularly in dryland regions, affecting the long-term economic viability of rainfed agriculture (Hansen *et al*., 2019). Grobogan Regency-Central Java experiences hydrometeorological drought almost every year (Pemerintah Kabupaten Grobogan, 2016; Hastuti *et al.,* 2017). The price fluctuation and high dependence on natural environmental conditions such as temperature, rainfall, pollution, pests, and diseases give a major impact on agricultural production. These economic and biophysical environmental variables cause agricultural activities to face various risks and uncertainties.

Some risk management strategies are carried out by farmers in managing their farms. The common risk management strategies in Indonesia are adoption of agriculture credit, insurance, precautionary savings diversification, and integration (Akhtar *et al.,* 2019; Saqib *et al*., 2016). Risk management strategy is an important part of farmer decision making to minimize losses from farming practices (Magsakay *et al*., 2014; and Munandar *et al*., 2015). However, the choice of the risk management system is usually based on farmers' perceptions of the source and impact of losses (Mase *et al.,* 2017), farmers' right attitude (Iqbal *et al.,* 2016). Farmers' perceptions and responses to risk are

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important in understanding their behaviour. Farmers' adoption of risk management strategies is, to a large extent, influenced by their socio-economic characteristics. In this context, the article aimed to analyze farmers' risk perceptions and factors that influence farmers' decisions in implementing risk management strategies to integrated farming of cattle and food crops These findings will guide the government in taking policy initiatives to help farmers manage risk.

MATERIALS AND METHODS

A cross-sectional quantitative study was conducted in Grobogan Regency, Central Java from January to May 2019. Based on 2018 Agricultural and Animal Husbandry Statistics data, it is known that Grobogan is a Regency with potential for beef cattle and food crop farming (rice, corn, soybean) which has reached the highest production in Central Java in 2019 (Dinas Pertanian Grobogan, 2020). There were 5 districts selected purposively where two villages were taken in each district namely Nambuhan and Ngraji Village in Purwodadi District, Sulursari and Banjarejo Village in Gabus District, Panunggalan and Sidorejo Village in Pulokulon District, Pilangpayung and Krangganharjo Village in Toroh District and Karangasem and Sambirejo Village in Wirosari District. Furthermore, in each district, 30 farmers were assigned, so that the total respondents were 150 farmers. Survey farmers are grouped into two groups: farmers with a cattle-rice-corn-rice pattern (pattern I) and a cattle-rice-corn-soybean pattern (pattern II). A total of 150 farmers were surveyed consisting of 82 pattern I farmers and 68 pattern II farmers selected purposively. Farmer characteristics were tested using independent sample t-test.

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The farmers were asked to provide their perceptions of the main sources of risk affecting their agricultural activities, i.e. crops and cattle. The four types of risks that farmers are known to face are climate, market, biological and financial risks. Farmers are asked to assess the incidence and severity of this risk. Climate risks are associated with losses arising from drought, heavy rain, flooding, temperature

fluctuations that result in losses to livestock and crops. Market risk is related to the fluctuation of input and output prices, below average profit. Biological risks related to pests and diseases in cattle and crops. Financial risks related to fluctuations in working capital interest rates, unavailability of production loans. Ratings on a Likert scale from 1 (very low) to 5 (very high) based on their understanding of each source of risk. Akhtar *et al.* (2018) stated that the given scores are then aggregated in a risk matrix and classified as low if the scores are 2 to 5 and high if they range from 6 to 10. Figure 1 shows the risk matrix. Thus, the variable of risk perceptions is a binary variable 1 if farmers considered a risk as high, and 0 otherwise (Ullah and Shivakoti, 2014).

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Probit Model

This model was to estimate the probability that observation with specific characteristics will fall into one particular category. This study used a probit model because the dependent variable as a risk management strategy adopted by farmers was dichotomous. Confirmation regarding the risk management strategy that has been adopted by the farmer, the set of alternatives is obtained four possibilities. Risk management strategy (1) credit, (2) insurance, (3) partnership, and (4) off-farm income. The role of agricultural credit has a significant effect on farmers' income, especially for those prone to disasters as financing can increase production (Saqib *et al.,* 2016). Insurance is a risk mitigation strategy by transferring risk to a third party (An-nisa *et al.,* 2015). The partnership program effectively increases income (Suardika *et al.,* 2015; Harjanto *et al.,* 2018). Off-farm income as income diversification has been a basic approach in managing risk (Fahad *et al.,* 2020). The probit model is given as (Akhtar *et al.,* 2018):

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once again for insurance, checks its implementation ... in theory it can but this is research, meaning it must be in accordance with what is being researched

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$$y_{ij} = x_{ij}\beta_j + \varepsilon_{ij}$$

Where y_{ij}, in this case, is binary variable for the risk management parameter $(j = 1, .., m)$ chosen by the farmer $(i = 1, .., n)$, x_{ij} is a 1xk as the observed variable vector that affects the chosen risk management strategies (Table 1), β_j is the kx1 vector of the unknown parameter which are to be estimated, and εi is the

unobserved error term. In this condition, each yj is a binary variable for risk management strategies (credit, insurance, partnership and off-farm income), and thus eq. (2) is a system of m equations (m=4) to be estimated as: $y_4^* = \alpha_4 + x\beta_4 + \varepsilon_4$, $y_1^* = \alpha_1 + x\beta_1 + \varepsilon_1$, $y_2^* = \alpha_2 + x\beta_2 + \varepsilon_2$, and $y_3^* = \alpha_3 + x\beta_3 + \varepsilon_3$.

RESULTS AND DISCUSSIONS

Characteristics of Respondents

Respondent farmer households were classified into farmers with cattle-rice-corn-rice as pattern I, and cattle-rice-corn-soybean as pattern II. The respondents' characteristics in Table 2 showed that the average age of pattern II is 52.24 relatively higher farmer pattern I, but not in a significant difference. Farmers in both patterns are categorized as productive age. Data on education indicate that respondents completed their primary education (65.33 percent), and only 29,33 percent and 4 percent have attained junior and high school. It is believed that higher education possibly facilitates better access to information and often hypothesized to increase the probability of adopting new technologies (Amare and Simane, 2017). Household members ranged from 3 to 7 members with an average of 4 members. The average household land tenure was 0.29 hectares (0.28 hectares for Pattern I and 0.30 hectares for Pattern II). Cattle farming is a diversification of the business that can generate relatively large income per year. The contribution of income from cattle in farming was 51.99 and 66.56 percent in the pattern I and pattern II, respectively, showing a significant difference of $p<0.00$.

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Farm-level perception of risk

In the descriptive analysis, farmers' perceptions of farm risk was assessed as an independent variable. Farmers' knowledge of the probability of events and their impact is illustrated in Figure 2. The study found that as many as 59.15 percent of farmers in a pattern I and 47.06 percent of pattern II farmers

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perceive that the risks they face in farming practices are in a high category. Farmers' perceptions of the risks of farming practices based on climate, market, biology and finance in the two patterns have different compositions. In pattern I, the percentages assessing high category risk are market, biological risks, while in pattern II were climate, biological and financial risks. Habiba *et al.* (2012) confirm that farmers have different perceptions regarding climate change based on the physical environment, type and level of involvement in agricultural activities, which affect their financial well-being. Perception can be said to be a cognitive process as Tripathi and Mishra (2017) mentioned that even though they have correct perceptions, sometimes people cannot respond to climate change due to lack of resources, lack of information or lack of capacity.

Market or price risks reflect variations in agricultural output and input prices. However, these risks affect income variability in agriculture. Depicted in Figure 2 as much as 93.9 percent in pattern I and 23.53 percent in pattern II have a high perception of market risk. Rice farmers have a high level of dependence on subsidized fertilizers than soybean farmers. Concerns over the price fluctuations of subsidized fertilizers have led to higher perceptions of rice farmers towards risk.

There are variations in the perception of biological risk among respondents in pattern I compared to pattern II. Overall, the perception of biological risk was higher in pattern I (61.76 percent). Diseases that generally occur due to parasites in livestock (73.3 percent) and flatulence (12 percent), while rats and leafhoppers on rice plants. The ex-ante strategy through disease control in livestock and the Movement for Control of Plant Pest Organisms (Gerdal Pests) on plants is a risk management strategy implemented by farmers.

Financial risk occurred when money borrowed to finance agricultural businesses and small farmers who borrow money experiencing debt repayment difficulties (Kahan, 2013). As many as 57.32 percent in pattern I and 48.53 percent in pattern II have a low category of financial risk perceptions.

Factors affecting Risk Management Strategy

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were patterns I and II analyzed in different seasons?

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The results of the analysis of the application of risk management are presented in Figure 3. In the study location, there are several risk mitigation options and measures to protect against income volatility. For example, the credit package for the procurement of production factors was adopted as much as 43 percent, of which 70.27 percent obtained access from commercial institutions, while the rest came from farmer groups and family or relatives. There is no significant difference between the risk strategy adopter farmers for credit options in pattern I and pattern II farming. Accessing credit for cattle or food plants has a requirement to join a farmer group. Farmers prefer access to credit at informal institutions because the requirements for obtaining it are not complicated. Informal institutions that play a role include agricultural input traders, agricultural product traders or traders who both function (Pratiwi *et al.,* 2019).

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Since the release of an insurance program by the government in 2015, it aims to protect the risk of crop failure in rice farming insurance. Then, in 2016 the cattle insurance was released as a risk protection for the death and loss of cattles. These programs can be accessed through farmer groups as a requirement for participants. Insurance participants in the study locations were 45 percent, both rice insurance and cattle insurance. A study reported by Ambarawati *et al.* (2018) reveals that most farmers ask for full subsidies from the government, not a 20 percent premium payment. In fact, in terms of rice insurance, the government subsidizes 80 percent, and 20 percent is the farmers' duty to pay premiums, guarantees, and claims.

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Partnership in agricultural midwives is a concept of cooperation between two or more parties in certain farming activities. Farmers in the study locations generally collaborate with production factor distributors and village collector, also known as "middlemen". As many as 40 percent collaborated in the form of supply of production factors, especially seeds and fertilizers from partners, and calculated with agricultural production after harvest. Pasaribu (2015) states that farmers involved in a partnership pattern get social and economic benefits.

Off-farm income is mostly done by farmers and their families, especially their wives and adult. As many as 37 percent of farmers get off-farm income opportunities, such as casual construction workers and farm laborers. Between the two patterns, farmers in pattern II (44 percent) have a higher chance than farmers in pattern I (21 percent) because the working time of soybean farmers in the fields is less than rice farmers (Figure 3). This activity is mostly carried out by farmers in other developing countries, as Loison (2015) reported that rural farmer households in SSA-Southern Sahara Africa diversify their livelihoods in non-agricultural activities, including migration, especially to minimize risks and increase their income.

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The probit model used in the study to assess the impact of socio-economic factors and their perceptions of risk is shown in Table 3. The equation results for risk management strategies show that lower levels of education and their perceptions of climate, market, and biological risks influence credit strategies' adoption. The higher their perception of climate and biological risks, they are not interested in adopting farm credit. This consideration is based on the ability to repay their credit if the farm yield is unpredictable. On the other hand, the higher their perception of market risk follows the credit adoption decision. Tawaf (2018) found that the beef cattle partnership model between farmers and feedlot companies still finds financing problems when it is done intensively. They still experience obstacles related to product distribution and payment, in contrast to implementing a partnership pattern between rice farmers and companies that have felt economic and technical benefits (Priandika *et al.,* 2015).

The results show that the decision to adopt insurance is more influenced by their perception of climate risk, biological in an inverse relationship, where the higher their perception of climate risk and biological, the less interested in adopting insurance. When facing this risk, farmers prefer to take care of their own risk by using their money to buy pesticides and medicines rather than paying for insurance premiums. However, the higher their perception of financial risk, the higher it is for insurance adoption. Agricultural insurance is one way of managing risk; however, insurance has a similarly out-of-reach history for those in rural areas like most financial services. Some insurance products are not yet accessible

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if indeed the results of such research, it means that it is true that insurance is not going well so what is the urgency of insurance in this research?

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to rural communities due to a lack of distribution networks and high premium costs (Ardiana and Agusta, 2018).

The analysis results show that the smaller income, the higher the perception of climate risk and the biological risk, so they are less interested in engaging in partnerships. Conversely, the more their perception of market risk increases, the more considered partnership adoption. The analysis of off-farm income shows that those with less education do not implement this risk management strategy, fewer cattle raised, and their perceptions of climate and biological risks. Meanwhile, farmers who actively participate in farmer groups open opportunities to earn off-farm income. In contrast to farm-level adjustments, farmers employ various adaptation practices outside of agriculture to address underproduction.

CONCLUSION

The characteristics of respondent farmers in both patterns are relatively the same except for pattern II farm income, which is significantly higher than pattern I. Farmers' perception of farming risks includes climate, market, biological and financial risks. In pattern I (cattle-rice-corn-rice), the risk of farming they face is higher than in pattern II (cattle-rice-corn-soybean). The ranking of risk management strategies adopted by farmers in pattern I is a partnership, credit, insurance, and off-farm income. In pattern II, respectively, are off-farm income, partnership, credit, and insurance. The adoption of risk management strategies is influenced by farmers' perceptions of the farming risks they face. Perceptions of climate, market, biological and financial risks are significant factors that form the basis for decisions on adopting credit, insurance, partnerships, and off-farm income strategies.

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ACKNOWLEDGMENTS

The author would like to thank Diponegoro University through the Faculty Research Scheme in 2019 (Contract No. 43/UN7.5.5/PP/2019). We also thank the Grobogan Regency Agriculture Service and

the Grobogan Regency Animal Husbandry and Fisheries Service. We would also like to express our gratitude to the Field Extension officers and farmer groups in the study locations and the students who helped with the survey activities.

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- author order

- letters in place names

author Habiba : in the bibliography it is written Habiba and .... but in the body text it

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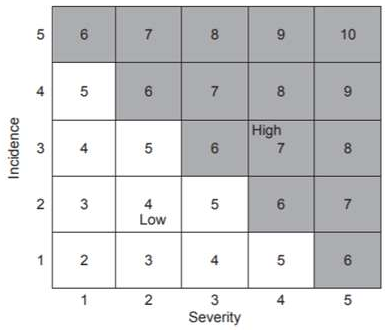


Figure 4. Risk matrix

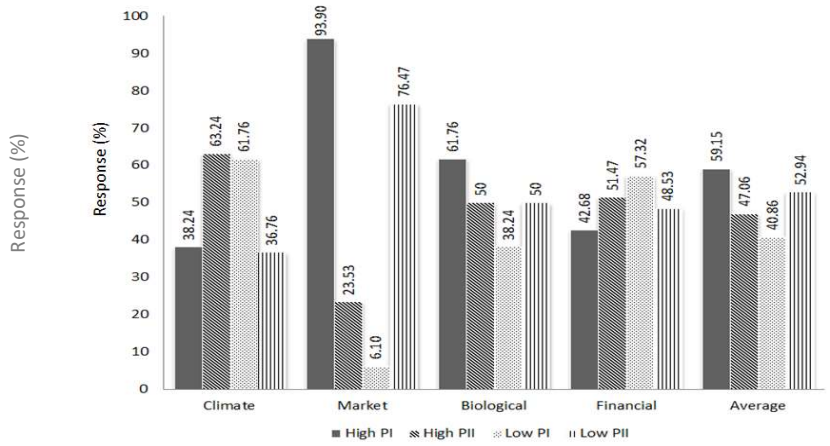


Figure 5. Composition in percent of farmers' risk perception in pattern I and pattern II

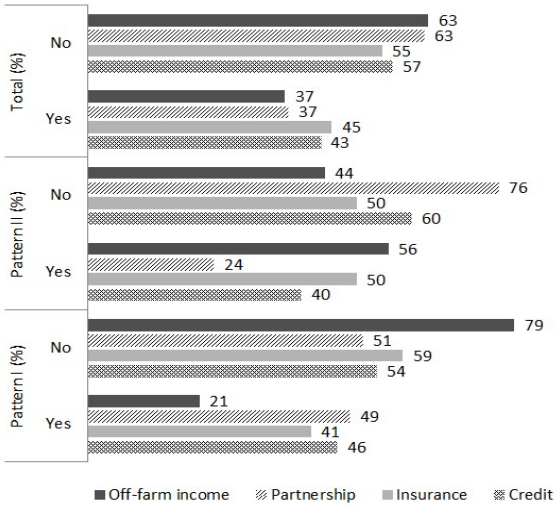


Figure 6. Adoption of risk management strategies in farming patterns I and II

Table 3. Descriptive statistics of variables

Variables	Description of used variables	
Farmer age	Continuous	Age of head of household in years
Farmer education	Continuous	Number of schooling years
Farm experience	Continuous	Number of farming years
Family size	Continuous	The number of members in the family in person
Number cattle	Continuous	Number of cattle owned in Animal Units (AU)
Land ownership	Continuous	Total land that managed by farmer in hectare
Gender	Dummy	1 if male and, otherwise 0
Farmer groups	Dummy	1 if the farmer actively participates in group, otherwise 0
Farm income	Continuous	All farmers' income from farming in IDR year^{-1}
Perception of Risk		

Climate risk	Dummy	1 if climate risk value more than 5, otherwise 0
Biological risk	Dummy	1 if biological risk value more than 5, otherwise 0
Price risk	Dummy	1 if price risk value more than 5, otherwise 0
Financial risk	Dummy	1 if financial risk value more than 5, otherwise 0
Strategy Management Risk		
Insurance	Dummy	1 if have insurance, otherwise 0
Credit	Dummy	1 if have agricultural credit , otherwise 0
Partnership	Dummy	1 if have partnership, otherwise 0
Off-farm income	Dummy	1 if have off-farm income, otherwise 0

Table 2. Descriptive Statistics of Variables in Pattern I and Pattern II

Variables	Pattern I (n=82)		Pattern II (n=68)		
	Mean	Std.dev	Mean	Std.dev	p value
Farmer age	50.99	10.71	52.24	10.18	0.643^{ns}
Farmer Education	6.7	1.93	6.48	2.1	0.517^{ns}
Farm Experience	31.7	11.72	32.49	10.07	0.655^{ns}
Family size	4.19	0.92	4.04	1.19	0.756^{ns}
Number Cattle	1.41	0.65	1.34	0.55	0.475^{ns}
Land size	0.28	0.23	0.3	0.22	0.588^{ns}
Gender	0.93	0.26	0.91	0.29	0.737^{ns}
Farmer groups	0.97	0.17	0.8	0.43	0.451^{ns}
Farm income[a]	8,932	5,580	11,077	6,036	0.002***
Cattle income (%)	52	12.8	66.56	17.7	0.000***

Note : [a)] in thousands IDR year^{-1}; ns non significant; *** significant at 1%

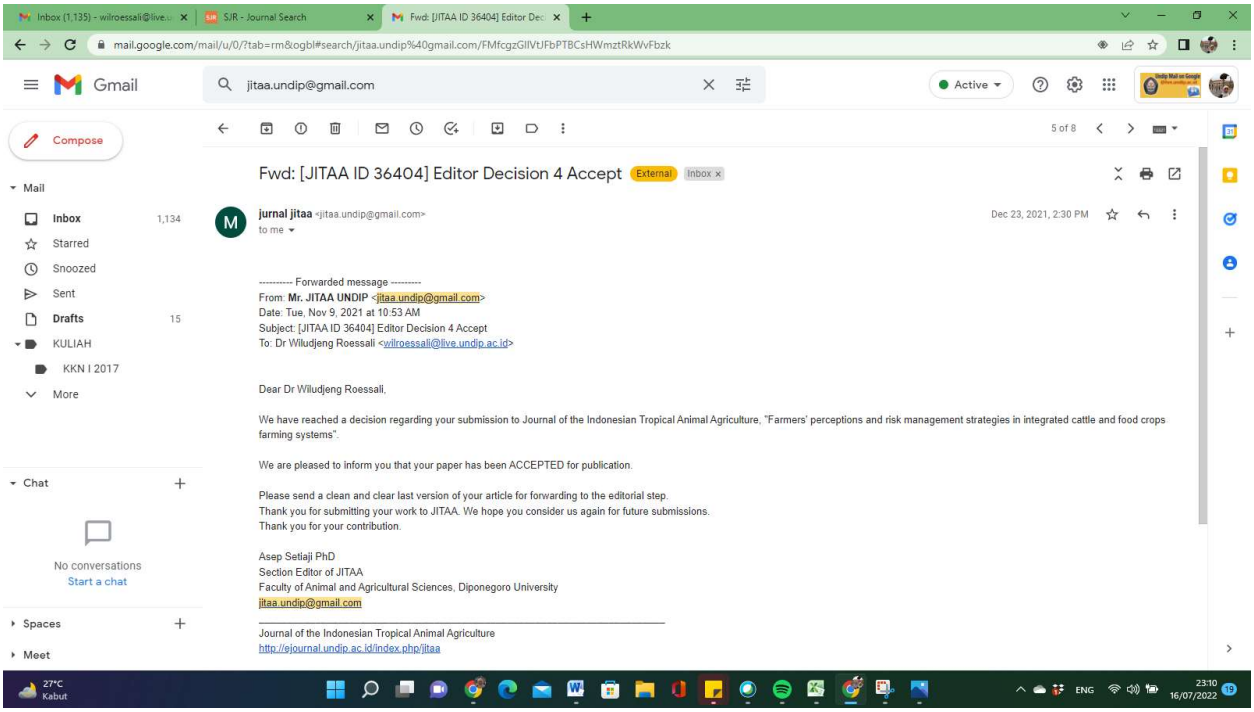
Table 3. Parameter estimates of the probit model

Variables	Credit	Insurance	Partnership	Off-Farm Income
Intercept	1.6225	3.5325**	0.4120	1.3464
	(1.3427)	(1.7251)	(1.3646)	(1.4382)
Age	-0.0048	0.0161	0.0115	-0.0140
	(0.0291)	(0.0357)	(0.0288)	(0.0301)
Education	-0.0275*	0.0247	0.0348	-0.1070*
	(0.0592)	(0.0735)	(0.0601)	(0.0641)
Experience	-0.0118	-0.0458	-0.0252	-0.0171
	(0.0288)	(0.0365)	(0.0286)	(0.0297)
Family member	0.0919	0.0813	0.1153	0.1092
	(0.1171)	(0.1510)	(0.1169)	(0.1309)
Land	0.9556	0.2786	0.5148	1.2997
	(0.7662)	(0.9545)	(0.7751)	(0.8771)
Cattle	-0.3791	-0.2406	-0.1994	-0.6654**
	(0.2665)	(0.3457)	(0.2699)	(0.3174)
Gender	-0.0236	0.6154	0.6117	0.6113
	(0.4813)	(0.5786)	(0.4852)	(0.5222)
Participation FG	-0.0086	-0.0093	-0.0130	0.0249**
	(0.0084)	(0.0103)	(0.0085)	(0.0095)
Income	0.2701	-0.3684	-0.9027*	0.4042
	(0.4714)	(0.6477)	(0.5059)	(0.4930)
Perception of risk[a]				
Climate	-1.1657***	-2.1449***	-0.6449**	-1.0836***
	(0.3450)	(0.4884)	(0.3276)	(0.3348)

Market	0.8052*	0.4241	1.2937**	-0.4448
	(0.4614)	(0.5719)	(0.5203)	(0.5032)
Biological	-1.2272***	-2.5236***	-1.4220***	-1.5855***
	(0.2890)	(0.4163)	(0.3022)	(0.3230)
Financial	0.3424	0.5431*	0.3801	0.3547
	(0.2805)	(0.3305)	(0.2919)	(0.3192)
Log likelihood	-75.7640	-48.0096	-72.8236	-64.1760
LR $\chi 2$ ((13)	53.7415***	110.6163***	54.5229***	68.7953***
Pseudo R^2	0.2618	0.5353	0.2724	0.3490

[a]dummy variable 1 for high criteria and 0 otherwise.

Standard errors are in parenthesis. *, ** and *** represent significant at 10%, 5% and 1% probability level respectively.



Fwd: [JITAA ID 36404] Editor Decision 4 Accept

jurnal jitaa <jitaa.undip@gmail.com> Dec 23, 2021, 2:30 PM

---------- Forwarded message ---------
From: **Mr. JITAA UNDIP** <jitaa.undip@gmail.com>
Date: Tue, Nov 9, 2021 at 10:53 AM
Subject: [JITAA ID 36404] Editor Decision 4 Accept
To: Dr Wiludjeng Roessali <wilroessali@live.undip.ac.id>

Dear Dr Wiludjeng Roessali,

We have reached a decision regarding your submission to Journal of the Indonesian Tropical Animal Agriculture, "Farmers' perceptions and risk management strategies in integrated cattle and food crops farming systems".

We are pleased to inform you that your paper has been ACCEPTED for publication.

Please send a clean and clear last version of your article for forwarding to the editorial step.
Thank you for submitting your work to JITAA. We hope you consider us again for future submissions.
Thank you for your contribution.

Asep Setiaji PhD
Section Editor of JITAA
Faculty of Animal and Agricultural Sciences, Diponegoro University
jitaa.undip@gmail.com

Journal of the Indonesian Tropical Animal Agriculture
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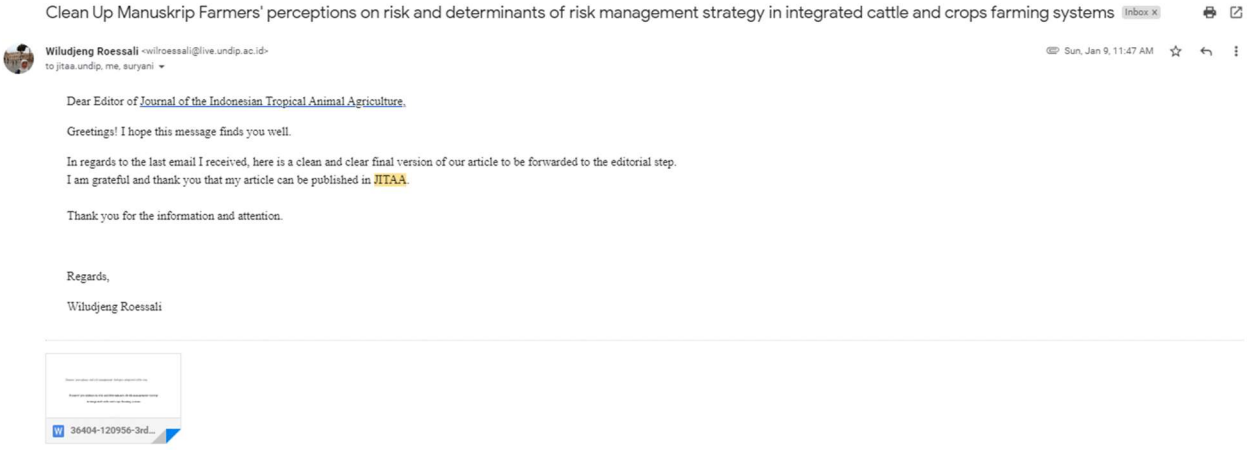

Clean Up Manuskrip Farmers' perceptions on risk and determinants of risk management strategy in integrated cattle and crops farming systems

Wiludjeng Roessali <wilroessali@live.undip.ac.id> Sun, Jan 9, 11:47 AM
to jitaa.undip, me, suryani

Dear Editor of Journal of the Indonesian Tropical Animal Agriculture,

Greetings! I hope this message finds you well.

In regards to the last email I received, here is a clean and clear final version of our article to be forwarded to the editorial step.
I am grateful and thank you that my article can be published in JITAA.

Thank you for the information and attention.

Regards,

Wiludjeng Roessali

36404-120956-3rd...

[JITAA ID 36404] Proof sheet and Charge of Publication

External Inbox ×

Mr. JITAA UNDIP jitaa.undip@gmail.com via ejournal.undip.ac.id
to me

Feb 18, 2022, 7:08 PM

Dear Dr. Roessali

We are sending the proof sheet of your article "Farmers' perceptions and risk management strategies in integrated cattle and food crops farming systems" to be corrected. Please check and send the information of the part of the proof sheet corrected in a separate sheet (page...., column...., row...., written....., correction .....).

We are also sending the letter regarding the charge for publication. Please complete your proof and payment steps by February 25, 2022, to be included in the next possible issue
Best regards,

Prof. Dr. Edy Kurnianto

Editor-in-Chief
(http://ejournal.undip.ac.id/index.php/jitaa)

Journal of the Indonesian Tropical Animal Agriculture
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2 Attachments


Roessali Adm.pdf


009 Roessali.pdf

Wiludjeng Roessali <wilroessali@live.undip.ac.id>
to JITAA

Sat, Feb 26, 11:17 PM

Dear Editor JITAA

We send the correction sheet from the article entitled "Farmers' perceptions and risk management strategies in integrated livestock and food crop farming systems" proof of correction on a separate sheet in the attached sheet.

2 Attachments


009 Roessali Corre...


Fee JITAA.docx

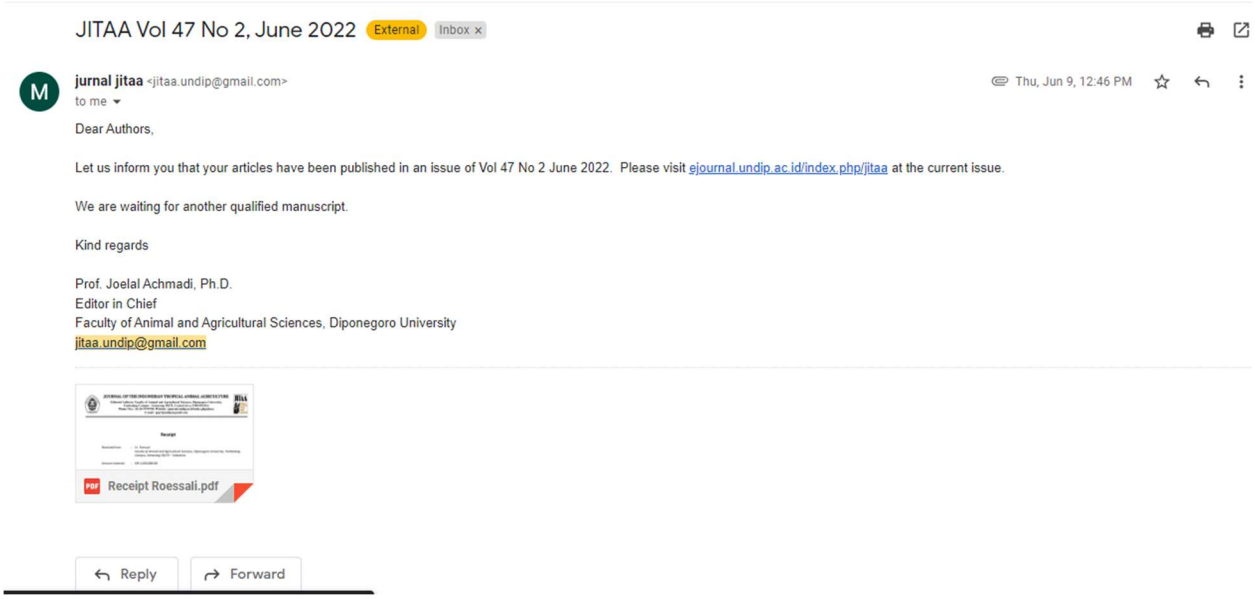
Page 274
Figure 1 should be centered

Page 277
Please move the Table 2 to previous page (276). Because the previous paragraph refers to Table 2, not Figure 2.

Page 276
Please move the Figure 2 to next page (277) or into "**Farm level perception of risk**" section.

Page 276
Please move the Figure 3 to next page (277) or into "**Factors affecting risk management strategies**" section.

Page 278
Please move the Table 3 to next page (279) after the paragraph "The probit model used in this study ..."


JITAA Vol 47 No 2, June 2022 External Inbox ×

jurnal jitaa <jitaa.undip@gmail.com>
to me

Thu, Jun 9, 12:46 PM

Dear Authors,

Let us inform you that your articles have been published in an issue of Vol 47 No 2 June 2022. Please visit ejournal.undip.ac.id/index.php/jitaa at the current issue.

We are waiting for another qualified manuscript.

Kind regards

Prof. Joelal Achmadi, Ph.D.
Editor in Chief
Faculty of Animal and Agricultural Sciences, Diponegoro University
jitaa.undip@gmail.com

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