FACTORS INFLUENCING BIOSECURITY ADOPTION ON LAYING HEN FARMERS

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ABSTRAK

Penelitian ini bertujuan untuk mengetahui beberapa faktor yang mempengaruhi adopsi biosekuriti pada peternakan ayam ras petelur di Kabupaten Sidrap - Sulawesi Selatan. Lokasi penelitian selain terkenal sebagai pusat peternakan ayam ras petelur, juga menjadi salah satu kabupaten yang pernah terserang wabah flu burung. Populasi peternak ayam ras petelur pada dua kecamatan yang populasinya terbanyak yaitu Baranti dan Maritengngae sebanyak 600 peternak. Total sampel adalah 60 responden (10%) dari populasi. Sampel ditentukan secara stratified random sampling. Data diperoleh melalui observasi dan wawancara dengan menggunakan kuesioner. Data dianalisa menggunakan skor status biosekuriti. Status biosekuriti diperoleh dari tindakan biosekuriti yang terdiri dari 9 macam, yaitu: sarana produksi peternakan, lalu lintas ke kandang, jarak antara sumber penyakit ke kandang, keadaan kandang, biosekuriti disekitar kandang, biosekuriti antara pagar dan kandang, biosekuriti di pintu kandang, lalu lintas dalam kandang dan pencegahan penyakit. Untuk menganalisa data, digunakan regresi linier berganda. Hasil penelitian menunjukkan bahwa adopsi biosekuriti dipengaruhi oleh jender, umur, pendidikan, pengalaman beternak, pendapatan peternak, jumlah tanggungan keluarga, dan modal sosial. Kontribusi variabel ini terhadap adopsi biosekuriti adalah 20%, hanya pendapatan peternak, jumlah anggota keluarga dan modal sosial yang berpengaruh nyata terhadap adopsi biosekuriti (P<0.05).

Kata kunci: adopsi, biosekuriti, peternak, ayam petelur

ABSTRACT

The present study was undertaken to identify factors that influences biosecurity adoption on laying hen farmers in Sidrap district, South Sulawesi. This district was choosen because beside it was famous as the center of laying hen farms, it was also as one of districts in South Sulawesi which suffered from Avian influenza outbreak. Total samples were 60 respondents. The samples were choosen through stratified random sampling from two subdistricts which had the most populous of layer smallholders, namely Baranti and Maritengngae. Data were obtained through observations and interviews using a questionnaire. Data were analyzed using a score based on biosecurity status. Biosecurity status was obtained based on the adoption of biosecurity measures which consisted of 9 stages: farm inputs, traffic onto farms, distance from sources of pathogens to shed, exposure of farm, biosecurity at farm boundary, biosecurity between farm boundary and shed, biosecurity at the shed door, traffic into the shed and susceptibility of the flock. Multiple regression model was employed to analyze the data. The study revealed that the adoption biosecurity were associated with gender, age, education, farming experience, farm-income, family size and social capital. These variables contributed 20% variation in biosecurity adoption of laying hen farms. However, only farm income, family size and social capital were the major factors influencing to the adoption of biosecurity (P<0.05).

. *Keywords: adoption, biosecurity, farmers, laying hen*

INTRODUCTION

Laying hen is one of animal protein sources in the form of meat and egg. The Indonesian government has implemented various programs to increase the production of chicken to fulfill the demand for meat and egg which always increase in relation with the population growth. However, the implementation of the program faces problems, one of them is Avian influenza outbreak. To overcome these problems, biosecurity measures has been declared to be applied to poultry farms in all of provinces since Avian influenza outbreak in 2005.

Biosecurity is the key within the poultry industry in preventing the spread of disease and infections. Biosecurity is made up of three components: segregation, cleaning and disinfection (FAO, 2008). Although biosecurity is one of the major factors in protecting poultry from AI infection, it is not practicable to implement many improved biosecurity measures in backyard poultry flocks. Therefore, an effective alternative is to increase the resistance of birds by implementation of regular and comprehensive AI vaccination strategies (Iqbal, 2009).

Adoption is a mental process through which an individual passes from hearing about an innovation to its adoption (Rogers, 1962 in Karki and Bauer, 2004). There are five adoption stages namely: awareness, interest, evaluation, trial and error, and the last is adoption (Ban and Hawkins, 1999). According to Lestari *et al.* (2011), biosecurity adoption level among layer smallholders in South Sulawesi was classified as a partial adopters.

There are number of factors that influence the extent adoption of technology, such as characteristics of technology attributes, the adopters or clientele, which is the object of change, the change agent (extension worker, professionals, etc); and the socio-economic, biological and physical environment in which the technology take place (Cruz, 1987 cited by Chi and Yamada, 2002). Aksoy *et al.* (2011) argued that the education status, animal breed and benefiting from the government support policies were also found to be statistically significant. Eze and Okudu (2008) stated that farm income, stock and educational levels were the most valuable variables determining the poultry farmers technology adoption potential. The classification performance of the model was 83.33%. Kafle (2011) pointed out there were three factors

namely farmers' participation in organic farming related trainings and visits, farm size and compatibility of organic farming to their situations as the main determinants of adoption of organic farming among farmers.

Howley *et al.* (2012) found that both characteristics of the farmer as well as structural farm factors all found to significantly affect the probability of a farmer adopting this agricultural innovation. Mazvimavi and Twomlow (2009) stated that institutional support and agro-ecological location have strong statistical influence on the adoption intensity of different CF components. Lawal and Oluyole (2008) found that the significant determinants of adoption of research results were age of farmer and visitation by scientists. Access to credit, participatory approaches to research and regular training/ visits on use of technologies were found to be also important for adoption of technologies. Johnson *et al.* (2010) claimed that operation size and dependency upon income from the stocker operation, in particular, influence the adoption of recommended practices. Matata *et al.* (2010) stated that lack of farmer awareness of the technology, inability of farmers to wait for two years before obtaining direct benefits from the technology were the major constraints to planting improved fallows. According to Ersado *et al.* (2003), time spent sick and opportunity costs of caring for sick family members are significant factors in adoption. Sickness, through its impact on household income and labor allocation decisions for healthcare and other activities, significantly reduces the likelihood of technology adoption.

Olele and Emah (2007) found that level of education, age of farmers, farm size, farm income and extension contact were the major determinants of fish production technologies adoption at 0.05 level of significance. Agwu (2004) argued that only farm size and level of formal education positively and significantly influenced adoption of improved cowpea technologies. Teklewold *et al.* (2006) argued that farmers' decision on adoption of poultry technology was positively affected by sex of the household head, family size, availability of supplementary feed, credit and extensions service and extent of expected benefit from poultry and negatively affected by market problem. Munasib and Jordan (2011) concluded that community involvement had positive effect on the decision to adopt sustainability agricultural practice, and it

also had a positive effect on the extent to which farmers adopt these practices. Padmaja and Bantilan (2008) stated that build up social capital played an important role in influencing impacts from the technology because of the ways in which social network and social relationship facilitated technology disemination.

Sidrap district is famous as the most populous of layer farms in South Sulawesi province. Total layer smallholders is 1,334 with the population is 3,439,556 chickens (Dinas Peternakan Kabupaten Sidenreng Rappang, 2011). In 2005, Sidrap district became one of districts in South Sulawesi province which suffer from Avian influenza outbreak and affects to several loss from their layer farms. This survey was conducted in Sidrap district South Sulawesi province to know factors influencing adoption of biosecurity measures on laying hen farmers.

MATERIALS AND METHODS

In this paper, the multiple regression model was used to determine the factors influencing the adoption of biosecurity on laying hen farmers. The adoption level was calculated from Farm Biosecurity Status Score (FBSS) adopted from Patrick and Jubb (2010). The dependent variable was the adoption index which was expressed as a percentage of adoption level measures out of a specific maximum of bioseurity measures (Rahman, 2007). The empirical model was specified as:

$$Y_i = \beta_1 GENER_i + \beta_2 AGE_i + \beta_3 EDUC_i + \beta_4 EXPR_i +$$

$$\beta_5 SOCAP_i + \beta_6 FARMSIZE_i + \beta_7 FARMINC_i + \varepsilon_i$$

Where:
- Yi was the dependent variable. It was expressed as a percentage of biosecurity measures adopted out of 9 risk stages. The independent variables used in the model with their expected signs are presented below:
- GENDER was expressed as a binary variable with 1 if the farmer was male, 0 otherwise. Expected sign for gender was ambiguous.
- AGE was expressed as the length of their life (year). Age was assumed to have negative effect on adoption.
- EDUC was expressed as the periode of farmers having formal education (year).

Education was hypothesized to have a positive effect on adoption.
- EXPR was expressed as the length of farmers took care of their poultry (year), experience was assumed to have a positive effect on adoption.
- SOCAP was expressed as farmers' trust with their community (score), social capital was assumed to have a positive effect on adoption.
- FAMSIZE was expressed as number of farmers family (person), family was assumed to have a positive effect on adoption.
- FARMINC was expressed as amount of revenue from chicken and egg selling, farm-income was assumed to have a positive effect on adoption.

Total samples were 60. The sample was 10% choosen from two subdistricts with the most populous layer smallholders, namely Maritengngae and Baranti subdistricts which had total population of 600 layer farmers (Arikunto, 2002). The sample was choosen through *stratified random sampling*. The survey was conducted by trained enumerators in 2010. A pre-test questionnaire with closed-ended questions was used to capture information from laying hen farmers on socio-economic characteristics such as farmers characteristics, the farm, and adoption of biosecurity measures including 9 stages. The multiple regression models were estimated using SPSS for windows (Riduwan and Akdon, 2009).

RESULTS AND DISCUSSION

Socio-characteristics of laying hen farmers

Data of the socio-economic characteristics of laying hen farmers were shown in Table 1, indicating that 44.67% of respondents was in productive period. Rasyaf (1997) stated that between 20 – 55 years was a productive period, under 20 years was not a productive period, because this was a schooling period, while above 55 years, they were not productive period anymore.

On the average, respondents spent their formal education for 10.2 years, indicating that they graduated from junior high school. Respondents on the average had 8.2 years of experience in raising laying hen, indicating that they have a good experience, so they knew how to handle their farms. On the average, score of social

Table 1. Socio-characteristics of Laying Hen Farmers

Name of variables	Mean	Standard deviation
Age (year)	44.67	10.95
Educational status (year)	10.2	3.71
Experience in layer farms (year)	8.2	5.19
Social capital (score)	33.5	5.5
Family size (person)	4.1	1.32
Farm income (IDR/month)	1,285,800	734,142

capital was 33.5, indicating that respondents trust and commitment to each other was medium. Family size was 4.1 person on average, indicating that respondents came from small family. On average income of respondents was IDR 1,285,800 per month from their farms, indicating that their income was low.

Adoption Index

Adoption index was expressed as a percentage of measures out of a specific maximum of bioseurity measures. The research revealed that the most highly adopted of biosecurity measures was traffic onto the farm (75.2%). This mean 7 out of 10 respondents adopted traffic onto the farm which consisted number of household members working on the farm, number of sources of non-poultry income, permission for collector to enter farm, permission for Dinas to enter farm, and permission for relative of labourer to enter farm. While the least adopted of biosecurity measures was biosecurity at farm gate (42.1%). This mean that 4 out of 10 respondents adopted biosecurity at farm gate which consisted of fence and lock, number of entrances, parking and vehicle washing, sign around perimeter, footbath to enter farm, unsold eggs do not get returned to farm, shower and change room for visitors and employees, using their own cages when selling live chickens, cages and equipment returning form market cleaned and disinfected before reentering farm. The mean of adoption index was 63.4%, implies that 6 out of 10 laying hen farmers had adopted biosecurity measures. This figure was higher than that of Musaba (2010) and Rachman (2007) findings which was 56.0% and 55.87% respectively.

Results of the Multiple Regression Analysis

The multiple regression analysis was performed to know factors influencing to adoption of biosecurity measures by laying hen farmers. The result of the multiple regression analysis was presented in Table 2.

As it was shown in Table 2, the coefficient of determination (adjusted R-square = 0.20) indicated that 20% variation in the overall adoption index of biosecurity measures could be explained by seven independent variables included in the model, while 80% was influenced by other factors which was not analyzed in the model. The results in Tabel 2 showed that all of the coefficients have the expected signs, except education and family size.

Table 2 showed that independent variable namely gender, age, education, experience, farm income, family size and social capital simultaneously have significant influenced (P<0.05) on biosecurity adoption. However, only farm income, family size and social capital were significant influenced partially on biosecurity adoption (P < 0.05). This showed that to adopt biosecurity, farmers should concern about farm income, family size and social capital.

The coefficient of farm income was found to be significant (P<0.05) and positively related to adoption level. Controlling other factors, the coefficient of regression was 0.33. This mean that the addition of farm income by IDR 1,- would increase adoption of biosecurity by 0.33%. This findings supported with Eze and Okudu (2008), Olele and Emah (2007) and Supradit et al. (2006).

The coefficient for family size was found to be significant (P<0.05) and negatively related to adoption level. Controlling for other factors, the coefficient was -0.34. This mean that the addition of 1 person of a family, would reduced 0,34% adoption rate of biosecurity. A negative sign for family size suggested that adoption was higher among smaller family size. This might because

Table 2. Multiple Regression Analysis of Factors Influencing to Adoption of Biosecurity Measures on Laying Hen Farmers

Variables	Standarized Coeficients	Standar Error	T-value	Significance
Constant	46.53*	16.99	2.74	0.01
Gender	0.2	6.30	1.61	0.11
Age	- 0.27	0.12	- 1.91	0.06
Education	- 0.01	0.33	- 0.02	0.09
Experience	0.20	0.22	1.68	0.10
Farm income	0.33*	0.00	2.35	0.02
Family size	- 0.34*	0.89	- 2.78	0.01
Social capital	0.26*	0.22	2.18	0.03

Adjusted R^2 = 0.20; F = 3.16*; N = 60; * significance level at 5%

larger family size would increase the spread of disease than the small ones. As it was known that human activities were the main route for the spread of the virus (Bleich *et al.*, 2009). It was implied that the less the people entered the farm, the less the spread of the virus. This result was in contrast with Teklewold *et al.* (2006).

Social capital has a significant (P<0.05) positive effect on adoption of biosecurity measures. Controlling for other factors, the coefficient was 0.26. This entails that the increasing of social capital by 1 point, can lead to the increasing of biosecurity measures adoption by 0.26%. This findings in parralel with Munasib and Jordan (2011) and Padmaja and Bantilan (2008).

CONCLUSION

Econometeric analysis using multiple regression model showed that biosecurity adoption on laying hen farmers was influenced by socio-economic factors.

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