



# DAIRY CATTLE FARMERS' BEHAVIOUR AND FACTORS AFFECTING THE EFFORT TO ENHANCE THE ECONOMIC OF SCALE AT GETASAN DISTRICT, SEMARANG REGENCY

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## ABSTRAK

Penelitian ini bertujuan untuk mempelajari perilaku peternak sapi perah dan faktor yang mempengaruhinya dalam upaya meningkatkan skala ekonomi usaha. Metoda survey digunakan dalam penelitian ini dan diterapkan pada 75 peternak sapi perah di Kecamatan Getasan, Kabupaten Semarang. Sampel dipilih secara acak dari 3 desa yaitu Jetak, Batur dan Tajur, masing-masing 25 peternak. Data dianalisis dengan regresi model logit, menggunakan 15 indikator perilaku dan faktor sosial ekonomi sebagai prediktor (variabel bebas), yaitu umur peternak, pendidikan formal, jumlah anggota keluarga, pengalaman beternak, jumlah sapi yang dipelihara, produksi susu dan penguasaan lahan. Penelitian menunjukkan bahwa 40,04% peternak merupakan pengambil risiko yang bagus, 33,07% menengah dan 20,89% jelek. Perilaku peternak untuk meningkatkan skala ekonomi usaha dipengaruhi secara nyata oleh umur peternak, produksi susu dan jumlah sapi yang dipelihara. *Odds ratio* dari umur, produksi susu dan jumlah sapi secara berturut-turut adalah 0,93; 1,32 dan 1,37. Nilai-nilai ini mengandung arti bahwa setiap penambahan umur 1 tahun diikuti dengan kehilangan kemauan mengambil risiko sebesar 0,93 kali; setiap kenaikan produksi susu sebesar 1 liter akan diikuti dengan kenaikan kemauan mengambil risiko sebesar 1,32 kali dan setiap kenaikan jumlah sapi yang dipelihara sebesar 1 ST akan diikuti dengan kenaikan kemauan untuk mengambil risiko sebesar 1,37 kali.

*Kata kunci: perilaku peternak, skala ekonomi usaha, sapi perah, model logit*

## ABSTRACT

The objectives of the research were to investigate the behavior of dairy farmers and factors affecting the effort to enhance the economic of scale. Survey was conducted on 75 dairy farmers at Getasan District, Semarang Regency. Samples were drawn in random from villages of Jetak, Batur and Tajur, 25 farmers each. The data were analyzed by logit model regression, using 15 indicators of behavioural approach and socio-economic factors as predictors (independent variables) i.e. ages, formal education, family size, experience in cattle rearing, number of cattle raised, production of milk and land occupation. The result showed that 40.04% of the farmers were good, 33.07% were moderate and 20.89% were low risk takers. The farmers' behaviour in enhancing economic of scale significantly influenced by the farmers' age, milk production and number of cattle reared. The odds ratio of ages, milk production and number of cattle reared were 0.93; 1.32 and 1.37, respectively. These values indicated that as values of ages increased as much as 1 year, the values of the willingness on risk taking will decrease as much as 0.93 times; the values of milk production increase as much as 1 litre, the values of the willingness on risk taking will increase as much as 1.32 times; and the values of the number of cattle increased as much as 1 AU, the values of the willingness on risk taking will increase as much as 1.37 times.

*Keywords: farmers behaviour, economic of scale, dairy cattle, logit model.*

## INTRODUCTION

Semarang Regency has contributed 32.74%

in milk production in Central Java, the second biggest after Boyolali Regency (39.13%). Milk production in Semarang regency has increased

from 21,365,000 litres in 2005 to 30,039,000 litres in 2009, or in the average 8.89% per year (Biro Pusat Statistik Jawa Tengah, 1990). The production ranged from 9.25 to 9.67 litres per head per day (Pertiwi *et al.*, 2009; Nugroho *et al.*, 2011).

The increase of income can be a drive for farmers to do their farming better, and enhance their innovation in risk-taking that lead to productivity improvement. Optimal production can be achieved in practice by the adoption of technology. Musyafak and Ibrahim (2005) stated that the acceleration of adoption of innovation is influenced by the characters of respective innovation such as its compatability with farmers' socioeconomy, bio-physics, and culture factors, while Rogers and Shoemaker (1981) stated that farmers' decision to accept or reject the technology is gradual and incremental process.

Behaviour is any action performed by someone in facing any situation that is generally influenced by 3 factors namely knowledge, attitudes and practices (Mardikanto, 1993). The knowledge gained from formal or nonformal education will affect the way a person think and manage their farm (Hernanto, 1984). Attitude is a potential driver of an individual to react to the environment (Mardikanto, 1993). Berkowitz as cited by Azwar (2000) argued that attitude is a form of evaluation or feeling of interaction. This means that a person's attitude toward an object is a feeling of support or favorable and the feeling does not support or unfavorable to the object.

Skills of a person are gained from the experience of doing something. Thau (2004) stated that farming experience is a factor affecting milk production. Moreover Thau argued that milk production also affected by farmers' education, the existing of capital and credit, the role of extension agents and farmers' attending on training.

Agricultural businesses have a big risk due to their dependent on natural conditions. The behaviour of the farmers in overcoming the problems is the reflection of their willingness to take the risks (Fleisher, 1990). Similar opinion also expressed by other researchers. Soekartawi *et al.* (1993) stated that farmer's decision to accept or reject the risk, among others, influenced by the strength of their economic substitutions. While, Lionberger in Mardikanto (1993) argued that the attitude of farmers in overcoming the problems in farm production is a form of the courage to face the risks.

Any decision to increase the scale of business of dairy cattle requires considerations related to risk taking. This study aimed to determine the behaviour of farmers in increasing the economic of scale of their farming business and the factors that influence their decision making.

## MATERIALS AND METHODS

### Location and Samples

Getasan District was selected purposively to be the location of the study with consideration that this area constitutes the milk production center in Semarang Regency. Three villages i.e. Jetak, Batur and Getasan were selected purposively from this district as the location of the research, due to their contribution in dairy production. In these villages there were 180, 113 and 183 farmers respectively (Getasan District, 2011). Twenty five respondents were selected in random from each village. The primary data were collected by questionnaire and interview. The concept of farmer characteristics used in this study were farmers' age, education, family size, cattle breeding experience, number of cattle raised, milk production and the land occupation.

Behavioural criteria defined by the level of willingness to deal with 15 problems encountered in efforts to develop the scale of business, i.e. the price of cattle, the purchase system, the cost of artificial insemination, costs for forages, costs for concentrate feed, labor costs, extra costs, sources of fiber, investment for cattle housing, investment for equipment, the adoption of production technologies, milk handling, milk sales, cattle sales and capital resources.

### Method of Analysis

This study employed qualitative questions to figure out the concepts of farmers' behaviour related to any effort to enhance the business scale. The question was equipped with three answer choices, where each answer was scored between 1 and 3. The one that expresses the high level of willingness to take the risks was assessed 3, the medium was assessed 2 and the lowest was assessed 1.

The number of questions asked was 15, so that the score will be ranged from 15 to 45. This range will be divided into 3 categories as follows:

1. Values 15 – 25 were the aversion
2. Values 26 – 35 were the neutral
3. Values 36 – 45 were the high level of

Table1. The Profile of Dairy Farmers in Getasan District

Characters	Villages		
	Jetak	Batur	Tajuk
Age (years)	42.4	45.52	42.0
Education (%):			
Primary School	72	64	68
Secondary	24	24	28
High school or more	4	12	4
Experience in Dairy Farming (years)	10.1	8.6	8.88
Family Size (people)	4.2	4.52	4.28
Land Occupation (Hectare)	0.8	1.4	1.0

willingness to take the risks.

The factors that influenced the farmers' behaviour in risk taking was analysed using the logit model where its equation is as follows (Greene, 1997; Prasmatiwi, 2000):

$$P_i = F(Z_i) = F(\alpha + \beta_1 X_i) \\ = 1/(1+e^{-Z}) = 1/1+e^{-(\alpha + \beta_i X_i)}$$

Where:

$P_i$  = the probability of the farmers to take risks based on the  $X_i$

$e$  = 2.718 (basis of logarithm)

$Z_i$  = the opportunities for farmers to take the risks in the dairy business, where  $Z = 1$  for the farmers who have high level of willingness to take risks, and  $Z = 0$  for farmers who are neutral or aversion.

$X_i$  = behavioural determinants of the farmers in deciding risk taking

To get the above equation, the logarithmic transformation must be conducted as follows:

$$\text{Log} [P_i/(1 - P_i)] = Z_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n$$

$X_i$  is independent variables that determine the decision deal with the risk taking, consisting of:

- X1 = Age of farmers (years)
- X2 = Education (years)
- X3 = Farming experience (years)
- X4 = Family size (people)
- X5 = Milk production (litres / unit)
- X6 = Number of lactating cows (head)
- X7 = Number of cows raised (AU)
- X8 = Land occupation (Hectare)

The significance of the independent

variables' influence was tested by the McFadden R-squared using program of Eviews 5.

## RESULTS AND DISCUSSIONS

### Profile of Respondents

The characteristic diversity of the respondents figured out the variety of livestock rearing processes and performances. Average age of respondents was 43.29 years. Most of respondents (94.67%) were in their active age, ranged from 25-60 years. All of respondents had finished elementary school, but only some of them had finished high school or college (Table 1). The main occupation of respondents was as dairy farmers (94.67%), only in small portion (5.33%) as private employees, civil servants etc. Farmers in the village of Batur managed the land on average larger (1.4 ha) compared to farmers in the village of Jetak (0.8 ha) and the village of Batur (1.0 ha). The farmers at Getasan run a small scale of dairy business, each household kept no more than 7 cattle, with the average of 2.37 lactating cows. The scale of dairy businesses in this region was difficult to develop due to the use of family labor. They divided the works between husband, wife and their grown children, where they might have another activity. Each family in this area had 4 members in rate, ranged from 3 to 8 people. Only 14.67% of the respondents used waged labour.

The dairy cattle business in this area has been done for generations. All of the respondents had experience in the maintenance of the dairy farmers ranged at 3-20 years, or 9.19 years on average. Experience affects the speed of

Table 2. Business Profile of Dairy Farming in District Getasan

Variables	Village		
	Jetak	Batur	Tajuk
Number of cows raised (AU)	4.24	4.31	4.21
Lactating cows (head)	2.41	2.37	2.33
Milk production (l/head)	8.37	8.7	9.4
Cost (IDR000/year)	22229.84	21956.2	18803.72
Income (IDR000/year)	31829.23	33388.80	35445.22
Income (IDR000/month)	2652.44	2782.4	2953.77

Table 3. Number of Respondents Based on Their Responses in Risk Taking on Important Variables

Variables	Level of Decision in Risk Taking					
	Low	(%)	Intermediate	(%)	High	(%)
Livestock Prices	6	8.0	15	20.0	54	72.0
Purchasing System	6	8.0	15	20.0	54	72.0
Artificial Insemination Cost	1	1.3	56	74.7	18	24.0
Farages Cost	0	0.0	8	10.7	67	89.3
Concentrate Feed Cost	0	0.0	52	69.3	23	30.7
Labor Cost	42	56.0	17	22.7	16	21.3
Extra Cost	32	42.7	21	28.0	22	29.3
Fiber Sources	0	0.0	26	34.7	49	65.3
Animal Housing	45	60.0	17	22.7	13	17.3
Equipments	39	52.0	9	12.0	27	36.0
Adoption on Technology	0	0.0	11	14.7	64	85.3
Milk management	0	0.0	9	12.0	66	88.0
Milk Marketing	38	50.7	4	5.3	33	44.0
Sales of Animals	0	0.0	72	96.0	3	4.0
Sources of Investments	26	34.7	40	53.3	9	12.0
Rate	16	20.9	25	33.1	35	46.0

technology adoption. Experience in general will encourage the knowledge, attitudes and skills, and in its turn the farmers have decision making better. Experience, knowledge and skills of farmers tended to increase according to age.

Levels of education are important factors that indicate the quality of human resources. van den Ban and Hawkins (1996) explained that education makes farmers better understand the

problem and then think about the solution. Levels of formal education of dairy farmers in the study site is relatively low, majority of the farmers (68%) just completed the elementary school.

Mardikanto (1993) explains that the higher level of knowledge of a person the easier they adopt of new innovations. While, the lack of knowledge among farmers led to their reluctance on innovation adoption. That is why farmers who

Table 4. Analysis of Opportunities to Increase the Economic Scale

Variable	Coefficient	Std. Error	Wald	z-Statistic	Odds (Ratio)
Constant	-2.815248	3.054633	-0.921632	0.3567	0.05989
Age	-0.067762*	0.037906	-1.787628	0.0738	0.93448
Education	0.081974	0.493952	0.165956	0.8682	1.08543
Experience	0.005290	0.086671	0.061035	0.9513	1.00530
Family Size	0.143034	0.287426	0.497639	0.6187	1.15377
Milk Production	0.279271*	0.169434	1.64826	0.0993	1.32217
Lactating Cows	0.019837	0.414507	0.047857	0.9618	1.02004
Number of Cows	0.315041**	0.139002	2.26645	0.0234	1.37032
Land Occupation	-0.228064	0.52995	-0.430351	0.6669	0.79607
McFadden R-squared		12.4403			
Probability(LR stat)		0.212021			

\* (P<0.1); \*\* (P<0.05)

have limited knowledge did not change much in their productivity.

The number of cattle ownership on the villages of Jetak, Batur and Tajuk were not much differ, in average 4.25 AU per farmer.

The production of milk was relatively low, i.e. 19.43 litres per farmer per day or an average of 8.82 litres per head per day. The cows raised in this area were the descendant of FH. This production is lower than FH crossbred (FHC) in other regions as reported by Kuswahyuni *et al.* (2009) and Widyobroto *et al.* (2010). Even in 2006, Whitono (2007) reported that the rate of milk production at Wonosobo region was 10.02 litres. Prasetyo *et al.* (2005) reported from their research in Semarang Regency that the rate of cattle reared was 2.32 AU per farmer with the milk production of 7.68 litre/head/day. According to Thau (2004), another factors affecting milk production were the level of education, farming experience, the existing of capital and credit, extension agents, and training of farmers.

### Farmers Conative Behaviour

Conative behaviour is a response to something in the forms of actions and statements (Azwar, 2000). Behaviour is any action performed by someone in the face of situations that are generally influenced by knowledge, attitudes, and skills. Behaviour arises because of the need to be met in a person.

The conative behaviour of the farmer at Getasan villages related to their effort to scale up

their dairy business can be seen in Table 3. The table showed that most of farmers (46.04%) had a high level in risk taking behaviour.

Based on cattle prices, as much as 72% of farmers were willing to pay an expensive price. Farmers consider that to obtain high production will only be obtained from cattle that have genetically good quality which in general will have a relatively expensive price. Most farmers bought cattle in cash.

Production costs can be defined as all expenditures of farmers for the production process (Hernanto, 1989). Perception of farmers towards the production costs was very diverse. Most of the farmers (74.4%) had intermediate category in response to the cost of artificial insemination. This due to the facts that service per conception of artificial insemination was quite high. They stated that they had to have 3-4 services to make their cattle pregnant.

Most of farmers (89.3%) had high category in response to the cost for forages. They argued that the provision of adequate forages was the base of dairy production, so that they always try to meet the daily needs of forages of their cows. The response of the farmers to the cost of concentrate feed was also fairly good, showed by the 69.3% of them were in intermediate and 30.7% in high category. Concentrate feed was believed to increase milk production, but the price was higher than the price of forages. Related to the responses to labor cost, about 56% of the farmers were in low category, and 22.7% were in

intermediate category. This is understandable considering the small scale of their business, so that they take care of their animals using only family labor. Approximately 42.7% of the farmers were in low category in response to the extra costs. In general they do not appreciate the village and other levies.

Investments on animal housing and equipments are substantial expenditure for dairy business. Only 17.3% of farmers are included in the high category on their responses to the investment on cattle housing and 36.0% on the equipments. They assumed that the investment for both factors had a non significant relation to the increasing of milk production.

Most of the farmers (85.3%) belong to high category in their response to the adoption of technology to increase milk production. They are courage enough to adopt technology, especially related to feed technology. Farmers have adopted the technology of straw fermentation and ration formulation. Similarly, 88.0% of farmers also had high responses on milk management. They realized that dairy products are very sensitive to dirt and odors, so that they conducted prevention efforts from polluted environment. However, there were dualism in connection with the responses to the sales of milk, 50.7% of farmers belong to low category low and 44.0% belong to high category. This related to the fact that most of farmers were still highly depended to cooperative in milk marketing, while the others were seeking alternative from their dependency. Soekartawi (2005) stated that the speed of innovation adoption also depends on the courage to take risks.

#### **Parameter Estimation by Logit Model Regression Analysis**

The results of logit regression analysis were shown in Table 4. It showed that the number of cattle raised was the variable that had significant influence on the effort to increase the scale of business in the significant level of 5%, while the age of farmers and level of milk production had significant influence in the significant level of 10%.

Odds ratio (OR) of 0.93 on variable of farmers' age was an indication that 1-year increase in age of farmers will lose the opportunities their courage to expand business as much as 0.93 time. The value of 1.32 on variable of milk production meant that 1 litre increase in milk production likely will increase the

opportunity of their courage to expand business 1.32 times as much. While, OR of 1.37 on variable of number of cattle reared was the indication that 1 head increase on cattle raised most likely will increase the opportunity of farmers' courage to expand their business 1.37 times as much. Roessali *et al.* (2011) reported that age of farmers has no significant influence on their willingness to expand their business, while Mukson *et al.* (2010) on contrary reported that age has significant influence on production of milk. According to Soekartawi (1988), older farmers tend to be less courage to adopt and diffuse new technology. Taylor (1975) stated that little evidence was found to support the notion that older managers are less facile information processors and decision makers.

The effort to elevate the milk production needs the farmers' passion to seek the development of production technology and management. As Just and Zilberman (1983) argued that there was a relationship between economic size and technology adoption, because large businesses were prone to adopt new technology earlier than smaller ones. However, Koundouri *et al.* (2006) stated that when agricultural technology adoption has been examined under uncertainty, the willingness to expand the economy of scale has negative relationship with farmers' age and land occupation, but has positive relationship with farmers' formal education, experience and family size.

#### **CONCLUSION**

Most of dairy cattle farmers in Getasan have a good willingness to take risks related to their efforts to scale up their business. Age factor had a negative influence, while milk production and number of cattle raised had a positive influence on the opportunity to expand the business scale.

The findings of this research indicated that younger farmers most likely had bigger opportunity to scale up their business. However, they still need to be supported to enhance their knowledge and technological through trainings and informal courses. They also need supports to help their access to financial sources.

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