Adoption of Animal Husbandry Innovations by Dairy Farmers in Pasuruan Regency, East Java Province

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ABSTRACT

The aim of this study was to determine the type of innovations in dairy technologies adopted by dairy farmers in Pasuruan Regency, East Java Province. The object being observed was the dairy farmers in Pasuruan Regency. This research was a descriptive quantitative research with survey method. The collection of data through observation, questionnaires, and interviews. The level of adoption of innovation seen by the continuation of the use of these technologies by farmers until the time of research. The results showed that innovation such as concentrate feed, artificial insemination (AI) and biogas were the innovations that still used by most farmers in the amount of 95.0% (feed concentrates), 78.3% (Artificial Insemination) and 33,3% (Biogas). While innovations such as ammoniation and fermentation of hay, concentrate feed, complete feed, the selection of superior cattle seeds, feed barn, compost making, recording, good cowshed, Milking machine, chopper engine and coffee skin fermentation on average 80% have never been used by dairy farmers in Pasuruan Regency. This innovation can be used as extension materials in the area.

Keywords: Adoption, Innovation, Dairy farmers

INTRODUCTION

Dairy Farm in Indonesia, 90% is a dairy farm with the management of traditional business. Dairy farms with traditional maintenance system and low ownership scale have an effect on low production. According to data from the Dirjen Peternakan dan Kesehatan Hewan (2012), domestic milk production only reaches 1,017,930 tons/year, lower than domestic milk demand of 3,120,000 tons/year.

Dairy milk production needs to be improved, as an industry of course dairy farms needs to be managed better. Improvement of dairy cattle business to be more advanced and profitable can be done through the application of technological innovation. Technological innovation in the field of animal husbandry is already well developed. Dairy farmers certainly need technology to increase productivity. Technology adoption is needed by farmers to increase milk production and their salary. In practice, however, dairy farmers currently do not fully understand the use of these technologies. Maintenance of dairy cows on smallholder farms still uses technology that is simple and based on experience. Traditional knowledge is indispensable, but innovation and modern knowledge need to be harnessed and synergized with local knowledge to increase productivity.

The adoption of livestock technology innovation is an effort to improve business productivity, because the adoption of innovation is expected to improve the quality and quantity of products which also will give increasing effect to dairy farmer's salary and the progress of dairy farm business.

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The purpose of this study is to determine the level of adoption and the types of technological innovations in agriculture adopted by dairy farmers in Pasuruan Regency. The adoption rate seen from the continuation of the use of these technologies by the dairy farmers until the time of the research.

MATERIALS AND METHODS

This research was a descriptive quantitative research using survey method. The survey method in this research was used to collect data or information about large populations using relatively small samples. The object of this research were dairy farmers in Pasuruan Regency. The sample of the population was limited to 60 dairy farmers, which are 30 dairy farmers who lived in highland and 30 dairy farmers who lived in the lowland of Pasuruan Regency. Dairy cow has become a superior product as well as icon Pasuruan Regency. Dairy cows that live in Pasuruan are able to adapt to lowland areas with the ability of milk production remains optimal. Types of technological innovations studied include ammoniation and fermentation of hay, concentrate feed, complete feed, selection of superior cattle seeds, feed barn, artificial insemination (AI), compost making, biogas, recording, good cowshed, milking machine, chopper engine and coffee skin fermentation.

The data were taken consist of primary data and secondary data. Primary data got directly through interviews, filling questionnaires and observations directly to the field (observation). In addition, the data also be strengthened by secondary data from relevant agencies such as cooperative, farmer's group and Department of Animal Husbandry.

RESULTS AND DISCUSSION

Characteristic of dairy farmers

Characteristic of dairy farmers include age, formal education, farming experience, main occupation and their number of family members. Farmer's characteristic data can be seen in Table 1.

Table 1. Dairy farmer's characteristic

Characteristic	Number of person	Percent (%)
Age Group (year)		
<20	1	1,7
20-29	11	18,3
30-39	18	30,0
40-49	13	21,7
50-59	11	18,3
60-69	5	8,3
>70	1	1,7
Education Group		
No schooling	8	13,3
Elementary School	37	71,7
Junior high School	9	15,0
Senior high school	5	8,3
College/university	1	1,7
Farming Experience (year)		
<5	6	10,0
5-10	11	18,3
11-15	14	23,3
16-20	7	11,7
21-25	9	15,0
26-30	5	8,3
>30	7	11,7
Main occupation		
Dairy farmer	53	88,3
Rice farmer	3	5,0
Cooperative staff	2	3,3
Private company staff	1	1,7
Government officer	1	1,7
Number of family members		
<3	8	13,3
3	15	25,0
4	15	25,0
5	11	18,3
6	7	11,7
>6	4	6,7

Table 1 shows that the majority of dairy farmers in Pasuruan Regency are between 30-39 years old (30%) and still relatively young with 11-15 years of farming experience (23.3%). The majority of education level of dairy farmers are primary school graduates (71.7%). Becoming dairy farmers are the main occupation of 88.3% farmers. Their number of family members between 3 to 4 people.

Adoption of animal husbandry innovation

Adoption, in the process of agricultural extension in essence can be interpreted as a process of behavior change either in the form of knowledge (cognitive), attitudes (affective) and skills (psychomotoric) in a person who has received innovation from extension agents by the target community. Acceptance here implies not just "know" but to actually implement or apply properly and live it in life and their farming (Mardikanto, 1993). While innovation is an idea, method or object that is regarded as something new, it is not always the result of recent research (Van den Ban and Hawkins, 1999).

Table 2. Knowledge and introduction of innovations

Animal Husbandry Innovations	Haven't know yet		Already Knowing	
	Number of person	%	Number of person	%
Hay ammoniation	58	96,7	2	3,3
Hay fermentation	52	86,7	8	13,3
Concentrate feed	-	-	60	100,0
Complete feed	53	88,3	7	11,7
Feed barn	50	83,3	10	16,7
Selection of superior cattle seeds	43	71,7	17	28,3
Artificial Insemination	2	3,3	58	96,7
Biogas	22	36,7	38	63,3
Compost making	46	76,7	14	23,3
Recording	46	76,6	14	23,3
Good cowshed	44	73,3	16	26,7
Milking machine	32	53,3	28	46,7
Chopper engine	31	51,7	29	48,3
Coffee skin fermentation	58	96,7	2	3,3

From the results of the research shows that the innovation about concentrate feed (100,0%), Artificial Insemination (96,7%) and Biogas (63,3%) are the innovations that have been known by most dairy farmers. While other innovations less than 50% of breeders who already know the innovation. Even innovations such as ammoniation of hay and coffee skin fermentation are 96.7% of dairy farmers not yet aware of the innovation.

The innovation-decision process begins with the knowledge stage which occurs when an individual (or other decision-making unit) is exposed to an innovation's existence and gains some understanding of how it functions (Rogers, 1995).

Table 3. Innovation source

Animal Husbandry Innovations	Not used (%)	Neighbours (%)	Cooperative Staff (%)	Animal Husbandry Officer (%)	Animal Husbandry Department (%)	Animal Husbandry Institution/Animal Husbandry Product Processor (%)
Hay ammoniation	96,7	-	1,7	-	-	1,7
Hay fermentation	86,7	1,7	8,3	-	-	3,3
Concentrate feed	-	18,3	76,7	-	-	5,0
Complete feed	88,3	3,3	8,3	-	-	-
Feed barn	83,3	3,3	10,0	-	1,7	1,7
Selection of superior cattle seeds	71,7	1,7	13,3	8,3	-	5,0
Artificial Insemination	3,3	6,7	45,0	35,0	3,3	6,7
Biogas	36,7	21,7	35,0	-	1,7	5,0
compost making	76,7	5,0	15,0	-	1,7	1,7
recording	76,6	5,0	11,7	1,7	-	5,0
good cowshed	73,3	5,0	15,5	1,7	-	5,0
Milking machine	53,3	13,3	21,7	1,7	1,7	3,3
chopper engine	51,7	23,3	20,0	-	3,3	1,7
coffee skin fermentation	96,7	-	1,7	-	1,7	-

Extension research indicates that various sources of information are indispensable when listening and when deciding to adopt or reject an innovation (Van den Ban and Hawkins, 1999). From table 3 shows that Cooperative staff has a big role as a source of innovation for dairy farmers, compared with Animal husbandry Officer or Animal Husbandry Department. The majority of dairy farmers in Indonesia are members of Dairy Cooperatives. The cooperative is an organization that acts as a mediator of between farmers with milk processing industries (Guntoro et al., 2016)[a]. It also serves as a mediator between the

innovation and the farmers. The role of cooperatives as a mediator needs to be improved by improving the quality of human resources of the Dairy Cooperative itself and increasing the extension intensity to dairy farmers.

Table 4. Continuation of technology usage

Animal Husbandry Innovations	Not Used (%)	Have not been used (%)	Still in use (%)
Hay ammoniation	100,0	-	-
Hay fermentation	100,0	-	-
Concentrate feed	5,0	-	95,0
Complete feed	98,3	-	1,7
Feed barn	93,3	-	6,7
Selection of superior cattle seeds	81,7	-	18,3
Artificial Insemination	21,7	-	78,3
Biogas	63,3	3,3	33,3
compost making	96,7	-	3,3
Recording	90,0	-	6,0
good cowshed	83,3	1,7	15,0
Milking machine	73,3	16,7	10,0
chopper engine	80,0	13,3	6,7
coffee skin fermentation	100,0	-	-

Table 4 shows that the innovation on feed concentrate and artificial insemination is still used by more than 70% dairy farmers in Pasuruan Regency. Biogas technology is also still used by more than 30% of farmers. While other innovations more than 70% farmers do not use these innovations. The reason the farmers do not adopt the innovation because they do not know about the innovation and not interested in it. They think the innovation too complicated, time consuming, expensive, difficult in finding raw materials and have no money. Lack of information about an innovation can caused by poor extension services. Most of the farmers have no access to extension services which is the major source of information. The positive and significant relationship was observed between extension services provided by extension department and adoption level (Muddassir et al., 2017).

The adoption of agricultural technology depends on a range of personal, social cultural and economic factors, as well as on the characteristics of the innovation itself (Pannell et al., 2006 in Guntoro et al., 2016)[b]. A number of studies have analyzed the relationship between the characteristics of an innovation and its adoption rate. The characteristics of these innovations include: (1) *Relative advantage* is the degree to which an innovation is perceived as better than idea it supersedes; (2) *Compatibility* is the degree to which an innovation is perceived as consistent with the existing values, past experiences and needs of potential adopters; (3) *Complexity* is the degree to which an innovation is perceived as relatively difficult to understand and to use; (4) *Triability* is the degree to which an innovation may be experimented with on a limited basis; And (5) *Observability* is the degree to which the results of an innovation are visible to others (Rogers, 1995).

CONCLUSIONS

This research results showed that innovation such as concentrate feed, artificial insemination (AI) and biogas are the innovations that are still used by most farmers. While innovations such as ammoniation and fermentation of hay, concentrate feed, complete feed, the selection of superior cattle seeds, feed barn, compost making, recording, good cowshed, Milking machine, chopper engine and coffee skin fermentation on average 80% have never been used by dairy farmers in Pasuruan Regency. The dairy farmers did not adopt the animal husbandry innovation because of lack information about these innovations. So the animal

husbandry extension services need to be improved. This innovation can be used as extension materials in the area.

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