Research Article

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Behavioral response of breeder toward development program of Ongole crossbred cattle in Yogyakarta Special Region, Indonesia

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Abstract: Ongole crossbred were endemic cattle in Java Island due to their good adaptation to the environment. The Government of Yogyakarta Special Region sought to develop cattle farms through an Ongole crossbred cattle development program in the Gunungkidul Regency to preserve this Ongole crossbred population. The study aimed to describe the behavior of breeders who participated in the Ongole crossbred cattle development programs on the post of this program. A sample of 40 small-breeder participants of this program was interviewed. The observed behaviors were all activities conducted by the breeders in carrying out the Ongole crossbred cattle farming. This study showed that breeders well implemented toward some core program, i.e., facilities management, cultivating forage, integrated animal service, and conserving productive female cows since program completion. However, due to limitations of capital ownership, the breeders were not well producing alternative fodder. Based on this result, the government was recommended to introduce a simple small farming capacity machine to small farmers to process the agricultural waste as animal feed.

Keywords: breeder, empowerment, Ongole crossbred cattle, Yogyakarta

1 Introduction

Cattle have an essential socio-economic function for rural communities in the Yogyakarta Special Region [1]. The number of livestock sub-sector workers in the Special District of Yogyakarta was 133,654 in 2017, increasing from 2016, which was 123,264. The cattle population in the province in 2017 reached 309,960 heads. Although the Special District of Yogyakarta was not the leading national producer, it was one of the provinces with surplus of cattle [2]. The Gross Regional Domestic Product of the livestock sub-sector in 2017 reached IDR 1643.5 billion, a significant increase from 2013 by IDR 1410.0 billion on fixed figures in 2010 [2]. For the agricultural sector, the livestock sub-sector is quite essential. In 2017, the livestock sub-sector contributed 22.63% of the Gross Domestic Product in the Agriculture, Forestry, and Fishery sectors [3].

Most of the cattle raised by the breeder of the Yogyakarta Special Region in the past were Ongole crossbred (called as *Peranakan Onggol* in Javanese term), but lately, breeders preferred to crossbred between female Ongole crossbred cow with Simmental or Limousin males through artificial insemination technology. The Government of Gunungkidul Regency sought to conserve and develop cattle farms of Ongole crossbred. In the long term, the program was meant to be a self-sufficiency effort for meat resources. In addition, the program was also an effort to improve the welfare of the breeders. The Ongole crossbred cattle was one type of cattle that have been bred from generation to generation by the people of Gunungkidul Regency [1]. The program was a continuation of the national programs being carried out, such as the meat sufficiency program in 2010 [4], and beef and buffalo self-sufficiency program, which were expected to be achieved in 2014.

Some studies show that cattle agribusiness development programs bring various impacts on the breeders. The *Gaduhan* (a Javanese term that meant a profit sharing pattern between the breeder and cow owner) in Manokwari, West Papua was able to increase the cattle population, employment and breeders' income, but had not yet reached the expected target [5]. Cattle breeders faced problems concerning program implementation, such

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as lack of socialization, planning, and program implementation. As a result, the program could not run optimally, as in Sekadau Regency [6]. As cattle is raised extensively and only as a side business makes it difficult to implement the livestock agribusiness program [7]. The cattle development programs did not significantly improve the income of breeders.

The success of the sustainable rural development program depended on the beneficiary's involvement and participation, starting from planning, implementing, monitoring and evaluating activities, and utilizing the results [8]. The breeder involvement at each stage of the program will increase the success of the program implementation, such as the intensification program in Rwanda [9] and the maintenance of the agricultural production infrastructure [10]. A farmer who participated in the veterinary management had higher milk production than a farmer who did not participate in this program [11].

Various studies on evaluating the cattle development programs have been carried out. Studies on the response of livestock farmers encompassed the attitude components, including cognitive, affective, and conative responses. Participation was investigated from socialization [6], planning, implementing, monitoring, evaluating, and sharing benefits [12]. Other research related to the economic impact of a program was the financial approach of the cattle development [5]. Animal health management programs impacted higher milk production, better quality, but poorer fertility performance and age of livestock [11].

The aforementioned research did not discuss small farmers' post-development program implementation on cattle farming, even though this behavior has long-term impact on cattle farming management. This research contributed knowledge related to the behavior as a result of the breeders learning in the cattle development program. The study aimed to describe the behavior of breeders who participated in Ongole crossbred cattle development programs on the post of this program. The subsequent sections will present the Research Method that described the data exploration and analysis, and Result and Discussion.

2 Methods

Ongole crossbred cattle have been developed by smallholder farmers in Central Java and East Java due to their good adaptability to environmental limitations. The Ongole crossbred cattle reared in the seed source area of Java Island showed specific characteristics [13] that are adaptable to extensive livestock production systems [14]. To maintain the preservation of Ongole crossbred cattle, the government conducted a breeder empowerment program of seed source development in several regencies of production center in Java Island, including Gunungkidul Rembang, Blora, Kebumen, Bojonegoro, Tuban, and Lamongan Regency. Farmer empowerment is defined as all means to improve self-direction, provide convenience and business progress, and improve the competitiveness and welfare of farmers [15].

This research was conducted by taking samples of areas in Gunungkidul Regency. This research was conducted on breeders who actively participated in the Ongole crossbred cattle development program in Gunungkidul Regency. The target of the Ongole crossbred cattle development program was set in Playen and Wonosari Districts, involving 25 breeder groups [1]. Samples of breeders were taken from two breeder groups chosen randomly from each of Wonosari and Playen Districts. By the program target, each group of 10 breeders was invited to participate in the Ongole crossbred cattle development program so that the total sample of breeders was 40 people.

In this study, data on the behavior of breeders were obtained by interviewing sample of farmers. The observed behaviors were the actions carried out by breeders in carrying out Ongole crossbred cattle breeding business, including some aspects, such as livestock facilities management, producing alternative fodder, cultivating forage fodder, and administering integrated fodder animal service, and conserving productive female cows. Each behavioral aspect was outlined into some indicators concerning cattle farming implementation. Any data on cattle farming implementation was measured by five alternative answers, which were categorized as fully implemented (score 5), mostly implemented (score 4), partly implemented (score 3), less implemented (score 2), and not implemented (score 1). The score of aspect of livestock development program was shown by the arithmetic mean of their indicator.

A descriptive analysis was conducted to describe the breeder's behavior. The percentage of score (P) achieved for each aspect of the livestock development program was calculated by formula as below:

$$P_s = \frac{X_i - X_{min}}{X_{max} - X_{min}} \times 100\%$$

In this formula, the X_i symbol indicates the arithmetic mean, the $X_{\min}$ symbol indicates the minimum score that could be achieved (i.e., 1), and the $X_{\max}$ symbol indicates the maximum score that could be achieved (i.e., 5). Based on the percentage of score achieved, the

breeders' behavior was categorized into 5 categories, which were poorly implemented (0–20%), almost poorly implemented (21–40%), moderately implemented (41–60%), well-implemented (61–80%), and perfectly implemented (81–100%).

3 Results and discussion

Most Ongole crossbred cattle are grown by smallholder farmers. Smallholder farmers in Indonesia keep between two and four heads of cattle and integrate livestock into crop production [14]. Ongole crossbreed is favored by breeders because farmers do not encounter many difficulties in reproductive performance and easy pregnancy compared to cattle of subtropical crossbreed [16]. Other advantages of Ongole crossbred cattle are their excellent adaptability to high tropical climates, heat resistance, resistance to mosquito and tick bites, and tolerance to high coarse fiber feed [17]. Smallholder farmers in Java mostly grow cattle either to produce meat or to support cropping with manure and draught power. Keeping cattle is also livelihood saving [14].

The Ongole crossbred cattle development programs in Yogyakarta Special Region aimed to increase the local cattle population, i.e., Ongole crossbred, as a long-term effort to self-sufficiency meat in Indonesia. This program was officially supported by the Minister of Agriculture of the Republic of Indonesia. This program was conducted due to smallholder farmers facing limited access to inputs, information, and services that were required to grow cattle [14]. Various activities were carried out to support the implementation of the program, including (i) livestock facilities management, (ii) producing alternative fodder, (iii) cultivating forage fodder, (iv) integrated animal services, and (v) conserving productive female cow. Farmers particularly consider the animals' productivity and healthiness in their understanding of animal welfare [18]. The farmers' motivation for improving animal welfare must be understood as a moral, economic, and regulatory question [19].

Farming technology guidance was initiated in 2013. It emphasized the importance of maintaining a clean cage environment, animal health, and group management, including group administration and efforts to increase group income. Alternative fodder was fermented forage fodder and agricultural waste. The Livestock Division of the Gunungkidul Regency's Agriculture and Food Service held a course on producing alternative fodder in 2016. Materials used to make alternative fodder could be in the form of forages such as grass and leaves and agricultural wastes such as straw, peanut shells, corncobs, and so on. The ingredients were then chopped using a chopper machine. After that, other ingredients were added in the form of bran, molasses, and starter bacteria. All ingredients were then mixed evenly and put into a tightly closed fermentation barrel. The fermentation process could take about a month. To support the production of alternative fodder, the government assisted in a chopper or cutting machine and fermentation barrel. Our result is in line with the research conducted in Uganda that one of the cattle farmers' priorities were fodder cultivation, feeding, and animal nutrition [20].

The cultivation of forage fodder was one of the efforts made to meet the forage needs for cattle. Fulfillment of forage would support cattle productivity so that the business of Ongole crossbred cattle could run well. To support the cultivation of forage, in 2017, the government aided in the form of providing forage seeds and supporting farm equipment, such as water pumps and hand tractors. Furthermore, integrated animal service was learned by the farmers in each group area. The implementation of integrated animal service was followed by cow breeders and goat breeders. Integrated animal service participants were not only limited to breeders who were the members of the livestock group but could also be followed by outside people in the location. In the cattle breeding farming, conserving productive female cows was an effort to produce cattle breeds continually. The government's aid in Ongole broodstock was given to groups of breeders for managing and raising broodstock.

3.1 Breeder behavior on farming technology implementation of Ongole crossbred cattle

The farming technology implementation in the raising of Ongole crossbreds could be described from the behavior of breeders in maintaining the cleanliness of the environment around the barn, the barn floor, fodder tub, drinking tub, and administering anthelmintic. Table 1 describes some farming technology implemented by small farmers.

Table 1 shows that both the breeders, who were aided by government and not, well implemented the technology of farming Ongole crossbred cattle . However, the behavior on the cleaning environment around cage and cage floor was moderately implemented for both types of breeders. These were due to cleaning the cage's environment and the cage's floor was done only occasionally

Table 1: Behavior on livestock facilities management of Ongole crossbred cattle farm

No.	Dimensions	Cattle supplied by government (n = 30)		Not supplied by government (n = 10)	
		Score (%)	Category	Score (%)	Category
1.	Breeders cleaned the environment around the cage	50.0	Moderately implemented	50.0	Moderately implemented
2.	Breeders cleaned the cage floor	55.0	Moderately implemented	42.5	Moderately implemented
3.	Breeders cleaned the fodder tub	67.5	Well implemented	70.0	Well implemented
4.	Breeders cleaned the drinking tub	75.0	Well implemented	95.0	Perfectly implemented
5.	Breeders administered anthelmintic	75.0	Well implemented	75.0	Well implemented
	Average score	64.5	Well implemented	66.5	Well implemented

by the breeders. They reasoned that cleaning the environment around the cage and the cage floor required free time. In addition, most of the cages owned by breeders were soil floored, so breeders thought that the cage floor did not need regular cleaning.

Practice on cleaning the fodder tub was well conducted by breeders since they often cleaned the fodder tub. Cleaning the fodder tub did not require a particular time, it was done before the farmers added fodders. Cleaning the fodder tub was done by cleaning the remnants which the cows did not eat. The behavior of breeders whom the government aided in cleaning the drinking tub was well implemented. In contrast, the behavior of breeders who were not assisted by the government was perfectly implemented. The difference in behavior was due to breeders who got aid cleaned the drinking tub once every 2 days, while farmers who did not receive any aid cleaned the drinking tub every time after feeding the cows. The behavior of both breeder types on administering anthelmintic was well implemented. These were due to farmers often giving cows anthelmintics to prevent intestinal worms every 4–6 months. Anthelmintic was usually given together during integrated animal service. The study results indicated that farmers did not care for the animal production infrastructure because they were not aware that the breeding infrastructure has an impact on bovine meat production at the farming level. Research showed that the type of cage was determined as an essential variable [21]. The environmental factor can impact cows' physiological behavior, finally resulting in impacting meat production [22].

3.2 Breeders' behavior on producing alternative fodders

The behavior of breeders in producing alternative fodder can be described from the activities of the breeders in producing alternative fodder and providing it as cattle feed. Table 2 figured the farmers' activity in producing alternative fodders.

The behavior of the breeders in alternative feed producing is almost poorly implemented, for both farmers who were assisted and not assisted by the government (Table 2). The difference in behavior was due to farmers who were assisted produced alternative fodders only occasionally, while those who did not receive help did not produce alternative fodders.

Feeding and nutrition of farm animals based on knowledge and good practices increased the production of animals [23]. The technical production system is the most important aspect affecting beef production at the farm level. The amount of the daily-consumed concentrate feed was determined as the most critical variable [21]. The implementation of good agribusiness raises the beef production of a cattle farm in the Grobogan Region [24]. The reason was that the production of alternative fodders required a particular time for the manufacturing process. The breeder also needed to prepare the

Table 2: Breeders' behavior in producing alternative fodders

No.	Dimensions	Cattle supplied by government (n = 30)		Not supplied by government (n = 10)	
		Score (%)	Category	Score (%)	Category
1.	Breeders produced alternative fodder	40.75	Moderately implemented	30.00	Almost poorly implemented
2.	Breeders fed cattle with alternative fodder	38.25	Almost poorly implemented	30.00	Almost poorly implemented
	Total	39.50	Almost poorly implemented	30.00	Almost poorly implemented

tools and materials to be used. The breeders in Gunungkidul found it troublesome. The behavior of both the breeders in using alternative fodders was almost poorly implemented. The reasons were that they rarely made it; they also assumed that cows were less fond of alternative fermented silage.

3.3 Breeders' behavior on cultivation of forage

The behavior of breeders towards the implementation of forage cultivation was described from the behavior of the breeders in growing and using the forage. Table 3 shows the cultivating practice of Yogyakarta Special Region breeders.

Table 3 shows that both the breeders well implemented the cultivation of forage. This was due to the breeders often cultivating forage in their own land. Cultivation was carried out on land devoted to growing forage or on the edge of agricultural land managed by the farmers.

Some forages are used as animal feed, including agricultural wastes (rice, maize, and peanuts) and grasses found in food crops and forests [25]. Inclusion of forage into fodder increases dry matter [26], the diets with a greater forage content enable high digestibility [27] and increases rumination time [26]. Breeders in Gunungkidul Regency who received aid in using forage fodder had well-cultivated forage, while the other parties had perfectly cultivated forage but they were limited to land of forage cultivation. For smallholder farmers, the essential factor to grow cattle was the availability of land for cultivating forage [28]. The rural high gradient land was used to cultivate forage production [29], and the smallholder farmers offered this limited forage to their cattle [30]. The biggest animal nutritional challenge seems to be a lack of access to grazing lands and no or very limited grains or forage crops grown for cattle feed sources [31]. The main reason was that smallholder breeders had limited access to the land for forage [14].

3.4 Breeders' behavior on implementation of integrated animal services

The behavior of breeders towards implementing integrated animal services was described from the behavior of the breeders in checking the health, pregnancy, and reproduction of cattle. Table 4 describes breeders' practice on administering integrated animal service.

Table 4 shows that the behavior of both the breeder groups was similar. These were due to all of them often checking the health condition of cows. This behavior showed that breeders were fully aware of maintaining the health of cows. Animal health and disease management may be important in conventionally managed cattle herds in Sweden [32]. The risks posed for disease introduction and spread are believed to be higher for smallholder livestock producers due to less appropriate animal health management practices [33].

Beef cattle farming can only run well if enough calves are born and growing well until it is marketed. The optimum reproductive performance of a female cow is an essential factor in a beef cattle business. Reproductive performance of Ongole crossbred cattle was better than Limousine crossbred cattle [34]. Breeders did not well conduct the checking of cattle reproduction. The only cattle reproduction performance that breeder observed was the period of anestrus postpartum after 1–2 months since it calved. The signs of estrus that were well known to breeders are clear fluid coming out of the vulva, swelling, decreased appetite, and climbing the feed. Breeders in Gunungkidul Regency well implemented checking pregnancy of their cows. The breeders checked pregnancy to ensure the success of artificial insemination and natural

Table 3: Breeders' behavior in cultivating forage fodder

No.	Dimensions	Cattle supplied by government (n = 30)		Not supplied by government (n = 10)	
		Score (%)	Category	Score (%)	Category
1.	Farmers cultivate forage fodder	67.5	Well implemented	65.00	Well implemented
2.	Farmers use the produced forage fodder	78.25	Well implemented	95.00	Perfectly implemented
	Total	73.00	Well implemented	80.00	Well implemented

Table 4: Breeder's behavior in administering integrated animal service

No.	Dimensions	Cattle supplied by government (n = 30)		Not supplied by government (n = 10)	
		Score (%)	Category	Score (%)	Category
1.	Breeders check cows' health	67.50	Well implemented	67.5	Well implemented
2.	Breeders check cows' pregnancy	75.75	Well implemented	80.0	Well implemented
3.	Breeders check cows' reproductive conditions	46.75	Moderately implemented	40.0	Almost poorly implemented
	Total	63.25	Well implemented	62.5	Well implemented

mating that has been conducted. In addition, pregnancy checks were performed to estimate the age of pregnancy for cattle.

3.5 Breeders' behavior on conserving productive female cows

The behavior of farmers in the implementation of preserving productive female cows was described from the behavior of breeders in raising female Ongole crossbred for broodstock and mating productive cows. The following was an explanation of the behavior of the breeders towards the implementation of saving productive female cows.

Table 5 shows that the behavior of both the breeders in the implementation of conserving productive cows was in the well-implemented category. The behavior of both the breeders in maintaining Ongole crossbreds as broodstock also belonged to the well-implemented category. This was due to that breeders often raise female Ongole crossbreds for broodstock. The breeders understood that calving interval of Ongole crossbreed was shorter than other types of cows, so they got pregnant again faster. Results of research showed that the fertility rate of Ongole crossbred cows was higher than that of Limousine cows [35].

Reproductive health was very important to get high pregnancy and calf birth. Many breeders understood good broodstock yield superior calve, but breeders did not practice either a good broodstock maintenance management or reproductive health management. Quality and availability of calves determined the success of the increasing population and production of cows. So far, the obstacle to increasing the population of cattle was the limited number of breed cows. One of the reasons was that many productive cows are slaughtered [36]. The behavior of breeders in Gunungkidul in mating productive cows was of well-implemented category, this meant that breeders would mate when they met broodstock estrous. In addition, farmers maximize the potential of productive female cows that still produce calves. The farmers will continue to raise the broodstock as long as female cows are able to produce calves, and sold them when they were infertile and replace them with younger ones. This behavior showed that breeders were aware of increasing the cattle population with limited capital. The higher numbers of cow per farm increased the efficiency of cattle farming [37].

Breeders involved in the development program of Ongole crossbred cattle in Gunungkidul Regency had well-practiced livestock growing management. The breeders well implemented the livestock facilities management, development of forage fodder, integrated animal services, and conserving productive cows, but they disliked to use agriculture by-product to produce alternative fodders. The availability of facilities and infrastructure that were suitable to smallholder farmers influenced the breeders to implement good livestock management as

Table 5: Breeders' behavior in conserving productive female cows

No.	Dimensions	Cattle supplied by government (n = 30)		Not supplied by government (n = 10)	
		Score (%)	Category	Score (%)	Category
1.	Breeders raise female Ongole crossbred for broodstock	71.75	Well implemented	62.5	Well implemented
2.	Breeders mate the productive female cows	71.75	Well implemented	72.5	Well implemented
	Total	71.75	Well implemented	67.5	Well implemented

they had learned in the development program. Farmers stated that they declined to produce alternative feed due to non-availability of equipment yet [20]. Moreover, breeders were reluctant to produce alternative fodders due to the cost, and unavailability of labor and motivation [38]. Farmer institution has a strategic role in empowering small farmers [15], so the government is advised to facilitate the farmer institutions an investment on small-scale agriculture machinery [39].

4 Conclusions

The Ongole crossbred cattle development program was officially supported by the Minister of Agriculture of the Republic of Indonesia to preserve the Ongole crossbred population. Various activities were carried out to support the program, including (i) facilities management, (ii) producing alternative fodder, (iii) cultivating forage fodder, (iv) integrated animal services, and (v) conserving productive female cow. This study showed that the breeders practice facilities management, integrated animal service, and conserving productive female cows. Although the smallholder farmers well cultivated forage, they were constrained with land owned for forage growth. Moreover, smallholder farmers were poor in producing alternative fodder due to high costs and complex operations. Smallholder cattle breeders need simple machinery to produce alternative fodder. It is suggested that government facilitate investment in the agriculture machinery industry that produces small capacity fodder treatment. This Ongole broodstock conservation program successfully brought farmers to conserve their female cattle but was insufficient to raise the Ongole crossbred population.

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