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Farmers' perceptions of Bali cattle breeding technology characteristic in Barru regency

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Abstract

Bali cattle breeding is the way to improve the genetic quality of the germplasm. This study aimed to determine farmers' perceptions of the characteristics of breeding technology in Barru. The method used a survey of farmers who participated in the breeding program in Barru. The respondents were 69 randomly selected from 460. The variables were farmers' perceptions of the level of relative advantage, compatibility, complexity, trialability and observability using Likert scale, (high 3, medium 2 and low score 1). The results showed that perceptions of relative advantage differed between core member (high) and Regular members (low). Perceptions of complexity different between core members (medium) and Regular members (high). Perceptions of compatibility are at the same level, at a low level, and perceptions of trialability and observability are at a medium level. To improve cattle breeding activities, socialization must continue, so that they can feel the benefits of.

Keywords: Barru, technology characteristics, breeding, germplasm, Bali cattle

Introduction

Bali cattle are native to Indonesia and have several advantages such as superior reproduction, high quality carcasses and the ability to utilise low quality feed. However, in its development, the performance of Bali cattle raised by the community has gradually declined in production and productivity. Previous scholar [1] stated that inbreeding due to uncontrolled mating on smallholder farms causes birth weight, weaning weight, and yearling body weight to tend to decrease. The management of Bali cattle farms by smallholder farms which reached 99% [2] with non-optimal feeding, fluctuations in the quality and quantity of feed [3] causes the performance of Bali cattle to decline over time. Systematic efforts by the government in collaboration with farmers are needed to increase production and productivity, one of which is through Bali cattle breeding in the community or Village Breeding Centre.

Barru Regency is one of the regions designated by the government as a Bali cattle breeding centre in Indonesia. The Directorate General of Animal Husbandry and Animal Health of the Ministry of Agriculture through Decree No. 619/Kpts/PK.210/F/03/2016 and Barru Regency Regional Regulation No. 2/2016 has established Barru Regency as a Bali cattle breeding centre. Based on the technical guidelines for the implementation of Bali cattle breeding in Barru Regency, some of the activities that must be carried out by farmers and technical officers systematically include recording, intensive handling of animal health, a controlled and controlled mating system (through Artificial Insemination or AI and Natural Mating) and improved feed and better maintenance management. Farmers are obliged to bring their cattle to be recorded and weighed regularly every 4 (four) months. The mating system must use AI using superior cattle straw or natural mating with registered males. Farmers are required to plant superior grass and provide additional feed, especially for pregnant and lactating cows. Assistance officers are required to conduct record keeping, livestock health services, AI and other technical services needed by farmers.

The implementation of breeding technology in Bali cattle farmers in Barru Regency can encounter several obstacles. Bali cattle farmers in Barru Regency are accustomed to raising female cattle with a semi-intensive and even extensive rearing system. At night, cattle are penned up and during the day they are grazed in a limited area by being tied up in the farmer's grazing area [4]. This method is chosen by farmers because it is cheaper and easier for farmers to do. As a result, AI is difficult to apply because farmers cannot observe the timing of their cattle in heat [5]. The sale of Bali cattle by farmers is mostly sold to traders

and not to direct consumers so that the price of cattle is mostly set according to the estimated body weight of cattle so that breeding cattle are not valued as breeding cattle that have a high ability to pass on superior traits to their offspring.

Farmers' perceptions of the features of technology are among the variables influencing their adoption. Technology attributes that affect technology adoption include a technology's relative benefit, compatibility, complexity, trialability, and observability [6]. Adoption can rise in proportion to the relative benefits that the technology offers. Similar to this, farmers will adopt new technology based on how closely their practices and customs align with the technology. In order for farmers to readily adopt technology, they need to be able to perform technology trials and easily observe changes in the field.

This study aims to determine the perceptions of farmers who are core members and Regular members of Bali cattle farmer groups towards technology characteristics in Barru Regency. It is expected that the description of farmers' perceptions can be used as a recommendation for assistance programmes that can be carried out by the government to increase the adoption of Bali cattle breeding technology in Barru Regency.

Research Methods

The survey method was used to describe farmers' perceptions of cattle breeding technology characteristics in Barru Regency. The survey was conducted among farmers who are core members and Regular members of participating cattle breeding farmer groups in Tanete Riaja District, Barru Regency. There were 460 farmers spread across 18 farmer groups in Lompo Tengah and Kading villages in Tanete Riaja district which are Bali cattle breeding centres. From the 460 population, 15% of the respondents were selected and quota sampling was used to determine which farmers were core members and which were Regular members of the research sample. There was 37% of the selected sample were core members (26 people) and 63% were Regular members (43 people). The criteria for core members were chairperson, vice chairperson, secretary or deputy secretary, treasurer or deputy treasurer. Meanwhile, ordinary members are those who are Regular members.

Farmers' perceptions of technology characteristics used were relative advantage (advantages over previous technology in terms of economic, social, and convenience in implementing it), compatibility (consistent with farmers' knowledge, experience, and values), complexity (complexity in understanding and implementing), trialability (the ability of farmers to test on their cattle in a limited manner) and observability (implementation of breeding and breeding results can be observed well by farmers) [6]. The overall variables were measured using a three-level Likert scale of high/good score 3, medium score 2 and low or less score 1. The accumulated Likert scale in each sub-variable is displayed in the form of a continuum scale by comparing between core organisers and ordinary members.

Results and Discussion

Respondent Characteristics

The average age of farmers who are core members is significantly lower than that of Regular members (p<0.05). This means that farmers who are core members have a lower age than farmers who are only Regular members. In terms of education, the number of farmers who are Regular members with low education (not graduated from elementary school, elementary school and junior high school) is 76.8% while those who are core members are 61.5%. In fact, 11.6% of farmers who are core members have tertiary education. In terms of family members, number of cattle and business experience, there is no difference between core members and Regular members of the cattle breeding farmer groups.

Table 1: Characteristics of core members farmers and Regular members farmers who conducting cattle breeding in Barru Regency

Characteristics	Core members		Regular Member		
	Average	SD	Average	SD	Sig
Age of farmer*	43.96	8.45	48.74	13.18	0.049*
Number of Cattle^{ns}	4.15	2.22	4.19	1.79	0.13^{tn}
Family Members^{ns}	4.62	1.30	5.12	1.45	0.584^{tn}
Business Experience^{ns}	8.38	3.92	7.35	3.72	0.829^{tn}
Education level					
Not in School	0 (0%)		4 (9.3%)		
Elementary school	11 (42.3%)		19 (44.2%)		
Junior High School	5 (19.2%)		10 (23.2%)		
Senior High School	7 (26.9%)		8 (18.6%)		
Higher Education	3 (11.6%)		2 (4.7%)		
Total Respondents	26		43		

Farmers' Perception of Relative Advantage

Relative advantage is defined as the degree to which an innovation is perceived to be better than the innovation it replaces [6, 7]. Advantages can be in the form of economic or social status of the person adopting a technology. In this study, the relative advantage is defined as the benefits gained from participating in the cattle breeding programme, both economic and social benefits.

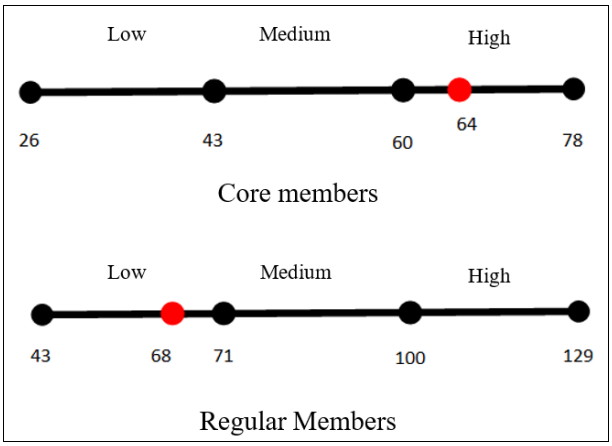

Fig 1: Continuum values of core and Regular member farmers' perceptions of relative advantage

Figure 1 shows that farmers who are the core members believe that the cattle breeding farmer group's use of breeding technology yields high relative advantage. Cattle that are generated through the cattle breeding program are more valuable than cattle who do not go through it. The program begins with enhancing the cow's nutrition and

continues with health checks, measurements, and the issuance of a Breeding Certificate. Since the core members have been involved in the initiative since its inception in 2016, calves born in 2017 have begun to be sold in 2019, allowing them to reap the financial rewards of the breeding cattle produced. However, because they entered the program later than other farmers, Regular members have not felt the financial effects of the breeding operations. The calves that were born have not yet been sold since farmers who are regular members of the cattle farmer association typically joined the breeding program in 2017 and 2018. Members of the cattle farmer group have not yet reaped the financial benefits from the employment of breeding technology because the resulting breeding cattle have not yet been sold. However, breeding cattle perform better than cattle who did not participate in the breeding program in terms of metrics like birth weight and weaning weight [8, 9].

Farmers are more inclined to accept technology that offers more relative benefits than earlier technologies, claims [10]. Farmers must instantly experience the relative benefits, particularly in terms of the economy, particularly for conservation programs (such as organic farming and breeding) and new technologies that take a while to show results [11, 12]. Otherwise, farmers will find it challenging to adapt to the new technology. One conservation strategy that takes a while to execute is cattle breeding. From the moment a cow becomes pregnant until she gives birth to a breeding cattle, it takes at least three years.

Farmers' Perception of Compatibility Level

Perceived compatibility is the degree to which the technology is consistent with existing values, past experience, and the needs of the recipient [6, 7]. In this study, the level of technology compatibility is measured based on the level of compatibility of breeding technology with farmers' experience in raising cattle so far and the technology needs perceived by farmers in raising Bali cattle.

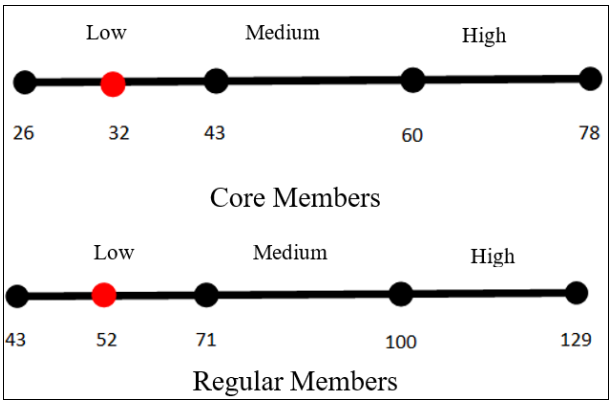

Fig 2: Continuum values of farmer perceptions of core Members and Regular members on the level of compatibility of breeding technology.

Based on Figure 2, it is known that the level of compatibility of the breeding technology with the technology that has been implemented by farmers is at a low level, both farmers who are core members and Regular members. Farmers perceive that breeding technology is new and different from the maintenance system implemented so far. Farmers perceive breeding technology to be different from their habits in raising Bali cattle. Farmers are not used to weighing their livestock regularly and feeding them according to their resources. Cattle health maintenance has been based on events and is not done regularly. Farmers feel that the breeding technology package written in the technical guidelines [2] is different from what farmers have been doing.

Technology is readily embraced if it is thought to be consistent with what farmers already do with regard to technology; if not, it will be challenging to adopt if it is thought to be distinct from what has been done thus far [6]. Farmers are more likely to implement Integrated Pest Management (IPM) practices when ecological conservation technology is integrated into the program [13]. This is because farmers perceive IPM technology as being easier to utilize. In order for farmers to effectively apply the breeding technology, rigorous socialization is required to boost the acceptance of cattle breeding technology among both core members farmers and regular members. Therefore, farmers can readily use the method [7, 14].

Farmers' Perception of Complexity Level

Farmers' perception of technological complexity is the degree to which an innovation is perceived as relatively difficult to understand and use. A new idea may be categorised into a complex-simple unit. Certain innovations are easily understood by certain recipients, while others are not. The complexity of an innovation is negatively related to its speed of adoption. This means that the more complicated an innovation is for an individual, the slower it will be adopted [6, 15].

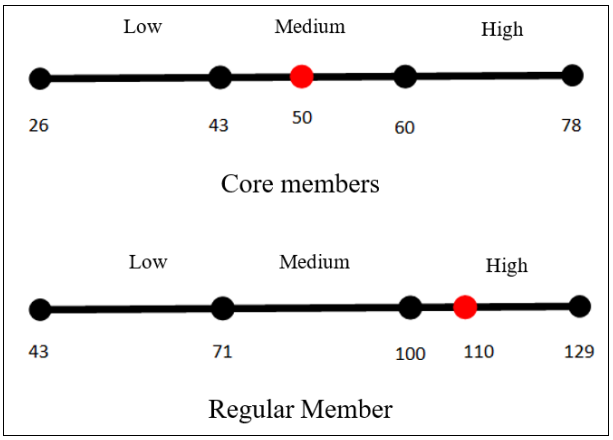

Fig 3: Continuum line of core and Regular member farmers' perceptions of the level of complexity of cattle breeding technology

Figure 3. explains that there are differences in the perceptions of core members farmers and regular members towards the level of complexity of Bali cattle breeding technology in Barru Regency. Core members farmers have a moderate perception of the complexity level of breeding technology while farmers who are regular members have a high perception of the complexity level of the technology. The difference in perception is due to the different time of adopting the breeding technology. The core members are the first community group to adopt breeding technology in Barru Regency since 2016. Meanwhile, the regular members began to adopt breeding technology from 2017 to 2018. The

difference in adoption time causes farmers who are core members to have experience in applying breeding technology so that they perceive it as no longer too complicated to carry it out. A complex technology will be increasingly mastered by farmers and will eventually move to the next complexity, especially in sustainable agricultural technology packages run by farmers [15]. One of the factors that support the adoption of agricultural insurance is the uncomplicated insurance claim procedure [16]. If the breeding technology package is perceived by farmers as uncomplicated, the adoption of breeding technology will increase.

Farmers' Perception of Trialability

Trialability is one of the factors that determine whether or not a technology is adopted. trialability is the degree to which an innovation can be trialed within certain limits by farmers [6].

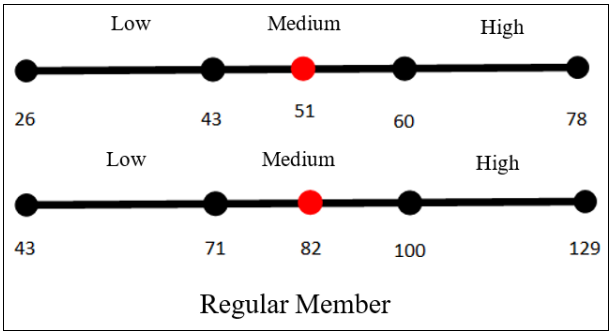

Fig 4: Continuum line of farmer perceptions of core members and Regular members on the level of trialability of cattle breeding.

Figure 4, shows that the breeding technology is perceived by core members farmers and regular members as having a moderate degree of trialability. This means that some technologies can be trialed by farmers and others cannot be trialed. Feeding superior grasses and concentrates can be trialed by farmers on their cattle because resources are available. Farmers grow elephant grass and are able to make simple concentrate formulations to trial on their cattle. However, farmers are not able to keep their own records because they do not have cattle scales. Farmers are also unable to inject vitamins or vaccines because they do not have the resources. To conduct health records and maintenance, farmers need assistance from technical officers or breeding field assistants. Increasing the adoption of breeding technology can be done by increasing the trialability of the breeding technology. The result of a previous study [17] show that the adoption of agricultural conservation technology is influenced by the ability of the technology to be tested by farmers before adoption. If farmers are able to test the technology before adoption and see the relative advantages of the results of conservation technology trials, then technology adoption can be increased. Other researcher [18, 19] also stated that the trialability of information technology utilisation in precision agriculture is influenced by the testability of the technology.

Farmers' Perception of Observability

Observability is the degree to which the results of an innovation can be seen by others. The easier it is for someone to see the results of an innovation, the more likely that person or group of people will adopt it because technology that is easy to observe will be easy to communicate to others [6, 7].

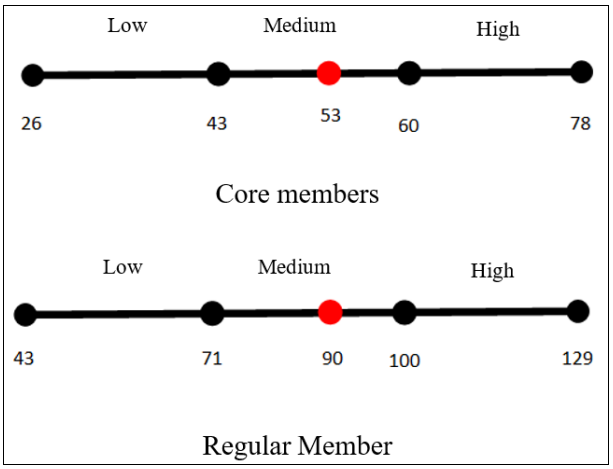

Fig 5: Continuum line of farmer perceptions of core members and Regular members on the level of observability of cattle breeding.

In Figure 5, it can be seen that the observability of the results of the cattle breeding technology is in the medium category by both farmers who are core members and Regular members. This means that some parts of the breeding technology can be observed and some technologies cannot be observed. Farmers can directly observe improved feed and health care. With better feed, the growth of cattle looks very different compared to cattle that are not well fed. Similarly, in terms of health maintenance, cattle whose health is maintained (equipped with vitamins and deworming) have better growth than cattle that receive health maintenance. However, weighing, recording, and artificial insemination using Bali cattle straw cannot be directly observed. Farmers do not know the benefits of weighing or recording cattle performance. Similarly, Artificial Insemination with Bali cattle straw based on farmer observations is no different from natural mating.

The observability of breeding results needs to be increased for Bali cattle farmers to accept breeding technology. Ecologically friendly farming methods can be seen, which can lead to a rise in the adoption of new technologies [20]. However, that technology adoption is unaffected by the observability of integrated cattle and crop farming in Karang Anyar [21].

Conclusion

Perceptions of relative advantage differ between core members (high) and regular members (low). Similarly, perceptions of the level of complexity differed between core members (medium) and regular members (high). Perceptions of technology compatibility are at the same level for both core members and Regular members, namely at a low level, perceptions of trialability and observability are at a medium level for both core members and regular members. In order for cattle breeding activities to be sustainable, socialisation of activities must continue, especially among farmers who are Regular members of the cattle farmer group so that they can feel the benefits of breeding and have a good comprehension in implementing

Bali cattle breeding.

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