The Competence of Balinese Cattle Farmers in Oeledsala Village, Taebenu District, Kupang Regency

Fadillah Andre Kurniawan; Siti Azizah[*]
[1] Social Economic Department, Faculty of Animal Science, Brawijaya University, Indonesia
*Corresponding author: siti.azizah@ub.ac.id.

Abstract
This research is located in Oeledsala Village, Taebenu District, Kupang Regency. This research aims to provide additional information for Bali Cattle breeders to be able to increase income by using a more targeted system and it is also hoped that the results of this research can help the government make decisions and policies in economic development for Bali Cattle breeders. The respondents we interviewed were 50 Balinese cattle breeders in Oeledsala Village. Data collection was carried out from 15 September 15, 2023, to 10, 2023. The data taken in this research were the level of technology (X1), Extension Experience (X2), and Breeder Competency (Y). The data were analyzed using descriptive analysis and regression analysis. The results of the research show that both the level of technology used by breeders and the experience of participating in extension program have a positive impact on increasing the potential of Bali cattle breeders, however, based on the hypothesis testing carried out, the variable that has a significant influence between the two independent variables used in this research is the variable of experience following livestock extension (X2) because it has a p-value < 0.05).

Keywords: *technology level; extension experience; farmers competence*

1. Introduction

The biggest challenge in the livestock business is how to encourage and improve the knowledge of farmers in managing their businesses. Currently, there is a tendency in livestock businesses to use a more traditional Rearing system. This is reflected in the relatively low number of livestock owned by farmers, the limited capital they have, and their lack of skills and knowledge in managing livestock cultivation. The level of understanding that farmers have about livestock cultivation businesses also varies greatly among them, especially at the village level. This difference is often due to the inheritance of Rearing efforts that have been passed down from previous generations. A study conducted by Dewi and her team in 2015 revealed this phenomenon [1].

According to data published by the Central Statistics Agency of Kupang Regency in "Taebenu District in Numbers" (2021), Oeledsala Village, located in Taebenu District, Kupang Regency, is divided into 5 hamlets, 5 RWs, and 11 RTs. The area of Oeledala Village generally consists of mountains and hills, with most of them in the form of slopes that have a sloping slope (less than 15°), and the height from sea level reaches 401 square meters, with an area of about 9100 square kilometers. In Oeledsala Village, residents generally work as farmers and Balinese cattle breeders as a side job. In 2020, the number of residents of this village was around 1449, consisting of 350 heads of families, with the population of Balinese cattle reaching around 957 heads, and the number of Balinese cattle breeders reaching 264 people [2].

According to Pangathousands et al. (2019), livestock breeding activities include aspects of calves, cage management, feeding, reproduction, livestock health, marketing, and business management. The people in Oeledsala Village, Taebenu District, Kupang Regency have various social backgrounds that affect the way they develop their beef cattle farming business. This variation causes the level of knowledge about raising to differ among beef cattle. This variation causes the level of knowledge about raising animals to differ among individuals, so the way they

apply them is also different. For this reason, research is needed to explore the impact of breeder characteristics on the competence of Balinese cattle breeding in Oledsala Village, Taebenu District, Kupang Regency.

According to [3], most entrepreneurs are usually between 22 and 55 years old. A person who runs a business outside of this age range may be less experienced or late in taking the necessary steps. When a person is in the age range of 55 or 60 years, the ability to learn and gain experience tends to decrease. Farmers who are still in productive age are the main asset in the development of livestock businesses because at this time they can coordinate and take effective steps. This shows that age plays a role in influencing the competence and performance of farmers. According to [4], the level of education provides important support for business success so that the ability to manage a business is better. [3] also emphasizes the importance of education for entrepreneurs, especially in maintaining business continuity and overcoming challenges that may arise. Informal education, such as extension programs and training, can be a means for farmers to obtain the information they need to improve their competence. [5] analyzed the relationship between entrepreneurial competence and business characteristics of dairy farmers, the results of the research showed the need to design and implement appropriate training programs to improve the entrepreneurial competence of farmers.

The concept of competence according to [6], competence is an inseparable part of a person's character and can anticipate individual behavior in various situations and tasks. Spencer and Spencer identified five main elements of competence, namely motives, traits, self-concept, knowledge, and skills. The term "causally related" suggests that three elements of competence (motives, traits, and self-concept) can be predictors of behaviors that demonstrate an individual's skills, which can ultimately affect performance. In short, having competence means tending to have good performance [7]. Competence also always involves motives that motivate individuals to act to achieve the desired goals. The term "criterion-referenced" indicates that competence can predict how good or bad a person's performance is.

According to [8], the characteristics of an entrepreneur have a positive correlation with the level of entrepreneurial competence. The stronger the characteristics possessed by an entrepreneur, the higher the level of skill possessed by the farmer. All indicators reflecting individual and entrepreneurial characteristics show a close relationship with the level of entrepreneurial competence, illustrating that these factors collectively support the improvement of the farmers' abilities. When entrepreneurial characteristics reach a higher level, the motivation of farmers to improve their skills in developing a business also increases. One of the characteristics of entrepreneurship that is closely related to the level of entrepreneurial competence of farmers is the desire to learn. This desire is a very significant determining factor in determining how high the motivation, consistency, and effort given by farmers to develop their businesses. The greater the desire of the farmer to continue learning, the more active his efforts are in obtaining new knowledge and skills, which will ultimately increase the level of the farmer's competence.

With the above considerations, a study has been conducted on the influence of the level of technology and experience in participating in livestock extension programs on the competence of Balinese cattle business in Oledssala Village, Taebenu District, Kupang Regency. The purpose of this study is to analyze the characteristics of Balinese cattle breeders and analyze the relationship between the characteristics of breeders and the competence of livestock businesses. The results of this study are useful as information for Balinese cattle farmers in Oeledsala Village, Taebenu District, Kupang Regency to increase their income, and can support the government in decision-making and policy formulation related to economic development for the farming community in Oeledsala Village, Taebenu District, Kupang Regency.

2. Materials and Methods

This research was carried out in Oeledsala Village, Taebenu District, Kupang Regency. The research location was chosen purposively. The reason for choosing this area is because of the

large population of Balinese cattle. In this village, there are around 957 Balinese cattle and 264 Balinese cattle breeders. This research will take place from September to November 2023.

The population in the study refers to the overall object available and has characteristics that can be fully studied. The population includes all research objects that can provide relevant data according to the interests of the research conducted by the researcher [9]. In this study, the population studied was Balinese cattle farmers in Oeledsala Village, Taebenu District, Kupang Regency, which amounted to 264 people.

The sample is part of the overall population and must accurately represent the characteristics of that population. According to [9], the ideal sample size for research ranges from 30 to 500. In studies involving correlation analysis or multiple regression, the minimum number of samples should be 10 times the number of variables studied. [10] also argue that if the research population is 100, the entire population should be taken. However, if the population is more than 100, the sample taken can range from 10-25%. Based on this, because the number of farmers in Oeledsala Village is 264 people and there are 4 independent and dependent variables, the sample taken in this study is 15% of the population, which is around 39.6 people, which is rounded up to 40 respondents. These respondents or samples were determined using the random sampling technique.

This study uses a quantitative approach to explore the influence of breeder characteristics on the competence of Balinese cattle farming businesses in Oeledsala Village, Taebenu District, Kupang Regency. The goal is to understand the relationship between the independent variable, namely the characteristics of the breeder, and the dependent variable, namely competence in the Balinese cattle business. Oeledsala Village was chosen as the location of the study because it is considered to represent the condition of Balinese cattle farms in the region. This study collected numerical data, which was then statistically analyzed to evaluate the relationship between the characteristics of breeders and their level of competence in the Balinese cattle business.

Primary data is information obtained directly by researchers. In the context of this study, primary data was collected through direct interviews using questionnaires to 50 respondents who raised Balinese cattle in Oeledsala Village. Meanwhile, secondary data was obtained from the Oeledsala Village office, including a general description of the village, geographical location, demographics, and village potential. In addition, secondary data is also taken from various sources such as references, documents from government and private agencies, and research results from higher education institutions.

Primary data was collected through interview techniques and questionnaire filling, with the selection of respondents being carried out in a simple random manner. Through these interviews and questionnaires, we sought to identify the characteristics of the farmers and their competence in managing Balinese cattle. Documentation is also used as a source of data and information, including various forms such as books, archives, official documents, numerical writing, and images in the form of reports and other information that can support the completeness and validity of research.

Variables are divided into two, namely independent variables and dependent variables. The independent variables include:
1. The level of technology of Balinese cattle breeders (X1) with sub-variables includes cages and feed (X1.1), breeding and reproduction (X1.2), and livestock health (X1.3).
2. Experience in Participating in Livestock Extension (X2) with sub-variables including extension programs by the government (X2.1) and extension programs by universities (X2.2).

While the bound variables, namely the competence of Balinese cattle breeders (Y), include:
1. Input management (Y1)
2. Rearing management (Y2)
3. Business analysis skills (Y3)

The statistical analysis used in this study is descriptive analysis and multiple regression. Descriptive analysis was used to answer the problem, of how the characteristics of Balinese cattle breeders are to their involvement in the farmer group in Oledla Village. These characteristics

include the age of the farmer, the education of the farmer, the length of breeding, the number of livestock, the level of technology used by the farmer, and the experience of participating in a livestock extension program. Meanwhile, multiple regression analysis is used to answer the formulation of problem 2, namely how to find out the influence of one or more independent variables (X) on one dependent variable, which is often symbolized as Y.

3. Results and Discussion
Overview of Farmer Location and Characteristics

Oeletsala Village was formed based on the Decree of the Governor of KDH Swatantra Tk. I East Nusa Tenggara Number: Und.2/1/27 dated November 4, 1964, concerning the establishment of model villages in all level II autonomous regions in the level I autonomous region of East Nusa Tenggara, which was later confirmed by the Regent's Decree. The boundaries of Oeledsala Village can be seen in the following Table 1:

Table 1. Boundaries of Oeledsala Village

Border	Village/Village	District
North	Adjacent to Kuaklalo / Oeltua Village	Taebenu
South	Adjacent to Bismarak Village	Nekamese
East	Bordering West Amarasi	West Amarasi
West	Adjacent to Oeltua Village	Taebenu

Source: Oeledsala Village Monograph, 2023

The condition of the population is one of the things that needs to be paid attention to by the local government and by the community itself. An increase in the population without being accompanied or balanced by an increase in quality resources and qualified jobs will have an impact on the economic growth and development of a region. The population of Oeledsala Village In 2023 consists of 1362 people spread across four hamlets. The male population is 670 people, while the female population is 692 people. The table of the number of inhabitants of Oeledsala village can be seen in Table 2 as follows:

Table 2. The population of Oeledsala Village

Sex	Population (people)
Number of men	670
Number of women	692
Total amount	1362
Number of families	344

Source: Oeledsala Village Monograph, 2023

The respondents in this study are residents of Oeledsala village, Taebenu district, Kupang Regency who work as Balinese cattle breeders, where the number of respondents in this study is 50 respondents. In this study, the characteristics of the respondents included age, education, breeding experience, number of family dependents, and the number of livestock ownership as shown in Table 3.

Age has a significant influence on a person's level of thinking ability and physical ability. In the opinion of [11], it is emphasized that the younger a person's age, the higher their enthusiasm to explore and learn new things that they do not yet know. This means that young farmers tend to be quicker in adopting the recommendations of extension activities because of the intrinsic urge to know more. In general, elderly people have physical abilities that are starting to decline, so they may have difficulty adopting new technologies. For young individuals, in addition to having strong physical abilities, they also tend to be more open to innovation and new technology. This is because they are not bound by old or traditional ways of doing an activity. The inability to accept new technology is often related to habits or mindsets that are already ingrained in a person as they age.

Based on Table 3, it can be seen that the respondents are dominated by farmers aged 31–50 years, amounting to 40 people or 80% of the total 50 respondents. Table 3 shows that younger respondents are more productive compared to older respondents. This is in line with the statement of [12], which explains that younger breeders usually have a greater passion and desire to learn new things. Therefore, they are faster to adopt innovations despite having less breeding experience. At a relatively young age, a farmer has energy and stamina that tends to be stronger compared to older breeders. In addition, at a younger age, a farmer is more free to seek additional experience, which allows them to advance their farm to a greater level.

In addition to age, education is also a key factor that has a great influence on productivity, especially in the context of raising Balinese cattle. Farmers with higher education levels tend to be more dynamic and active in various activities to seek information related to the latest technology and markets. They can adopt innovations and change their way of thinking and approach to dealing with problems, which in turn improves the management of cattle Racing more effectively and efficiently. [12] said that the higher the level of education of a farmer, the better the Rearing management will be. This is due to the ability of more educated farmers to adopt innovations and apply broader knowledge in daily practice. They have a more mature ability to solve problems and respond to changes in the environment and market.

Table 3. Respondent Characteristics Based on Age, Education Level, Experience Livestock, Number of Dependents, and Number of Livestock Ownership.

It	Characteristic	Number of people	Percentage
Age (Years)			
1.	20 – 30	2	4%
2.	31 - 40	20	40%
3.	41 – 50	20	40%
4.	51 – 60	5	10%
5.	61 – 70	3	6%
Education Level			
1.	SD	8	16%
2.	JUNIOR	16	32%
3.	SMA	22	44%
4.	PT S1	4	8%
Farming/Breeding Experience (Years)			
1.	1 – 5	0	0 %
2.	6 – 10	2	4%
3.	11 – 15	7	14%
4.	16 – 20	16	32%
5.	21 – 25	12	24%
6.	26 – 30	5	10%
7.	31 – 35	3	6%
8.	36 – 40	2	4%
9.	41 – 45	2	4%
10.	46 – 50	1	2%
Number of Dependents (Person)			
1.	0	3	6%
2.	1-2	22	44%
3.	3-4	20	40%
4.	5-6	5	10%
Number of Livestock Ownership (head)			
1.	1 – 2	13	26%
2.	3 – 4	31	62%
3.	5 – 6	6	12%

Source: Primary Data, 2023

Based on the results of the study, it is known that the highest level of education among the respondents of Bali cattle farmers is Senior High School (SMA), with a total of 22 people. The next level of education is Junior High School (SMP), with 16 people. Furthermore, there are 8 people with an elementary school education level and 4 people who have a higher education (S1). Based on the classification of education, it can be explained that most of the farmers in Oeledsala Village have undergone formal education, this can happen because most of the farmers in Oeledsala Village are still focused on the compulsory learning program described in the Kupang NTT Regional Regulation No.8 of 2006 concerning the Education System. Article 5 paragraph (1) reads "Community members aged 7 to 18 years are required to attend basic education until the end." The formal education that has been taken by the respondents shows the quality of the resources they have. According to the opinion of [13], to increase the production and productivity of the livestock raised, the educational factor is expected to assist the community in the livestock business. Therefore, Balinese cattle farmers in Oeledsala Village still need additional education such as coaching and knowledge sourced from related agencies in the form of an extension program that refers to the development of livestock skills in improving their performance.

Experience can be the best teacher, as stated by [14] who emphasized the importance of experience in animal husbandry. Sufficient breeding experience allows the farmer to learn from past mistakes and successes. By having adequate experience, farmers can develop meticulousness in their breeding strategies and be able to correct weaknesses that may have occurred in the past. The importance of experience in livestock farming cannot be underestimated, because through this experience farmers can accumulate valuable knowledge. The experience of a breeder is a valuable asset in carrying out livestock activities. The more experience you have, the more knowledge you accumulate. Experience provides lessons that cannot be obtained from theory alone. Experienced farmers will be better able to identify problems that arise, evaluate the right solutions, and make wise decisions in managing their farms.

From Table 3, it is known that 16 respondents have carried out Balinese cattle breeding activities for 16-20 years, which means that the experience gained during Balinese cattle breeding activities is quite long as said by [15] the longer the experience of raising livestock will affect the competence of breeders in managing their livestock so that it has an impact on behavior in good land management. In addition, based on the results of the study, there are 12 people, or 24% who have been doing Balinese cattle breeding work for 21 - 25 years.

Family dependents refer to all family members who are the direct burden of the respondent. The size of the number of family dependents has a significant influence on the way respondents' household income is allocated. This is in line with the view conveyed by [16], who stated that when the number of family members is smaller, the income level of farmers tends to increase. The small number of farmer family members will motivate farmers to increase their income.

In addition, Table 3 shows that the characteristics of respondents related to the number of dependents in the family in Oeledsala Village vary. A total of 3 respondents or 6% do not have dependents because they are still relatively young and have no family, but already have their livestock land. A total of 22 respondents or 44% have 1-2 dependents, consisting of children, wives, and the farmer himself as the head of the family. This is in line with the opinion of [17], who stated that the farming community was originally a small family, namely a family consisting of a father, mother, and at most 2 or 3 children. In this small family, usually, mothers and children are the dependents of life.

Livestock ownership level refers to the number of livestock raised by a breeder in one Rearing period. The amount of livestock ownership has a direct influence on the level of income and expenditure of farmers. The more livestock you have, generally the greater the potential income that can be obtained, but it is also accompanied by an increase in spending on feed, Rearing, and other needs. In addition, the number of livestock owned also plays a role in determining the extent to which technology can be applied in the Rearing process. Farmers with larger numbers of livestock tend to be better able to adopt modern technology that can increase efficiency and productivity. This ultimately has an impact on the quantity and quality of livestock production

produced. Thus, livestock ownership not only affects the financial aspects of the farmer but also the technical and production aspects of the livestock business [18].

The number of cattle owners is an indicator of the success rate of a cattle farming business [19]. From Table 3, it appears that the lowest number of livestock ownership is 1 head and the highest is 6 heads. The level of livestock ownership is divided into 3 groups with ownership of 1 – 2 heads, 3 – 4 heads, and 5 – 6 heads. The group with the ownership of 1-2 livestock amounted to 13 people or 26%, the group with the ownership of 3-4 livestock amounted to 31 people or 62%, and the group with the ownership of 4-5 livestock amounted to 6 people or 12%. The majority of respondents have a small amount of livestock ownership. This can be seen from the number of breeders who are included in the group with a level of ownership of 3-4 livestock, which is as many as 31 people or 62%.

Level of Technology Used

The level of technology used is one of the benchmarks in doing a job or profession. This is because the level of technology will affect the expenditure of a farmer, if the level of technology used is still relatively simple, the expenditure of the farmer is still relatively small and if the level of technology used is modern, the expenditure of the farmer may be higher or more. The level of technology can also be a benchmark for a farmer in carrying out.

The livestock activities are due to the level of more modern technology that can make it easier for farmers to carry out their livestock activities and get maximum results. The following is Table 4, which is the average score of the variable question of the level of technology used by farmers.

Table 4. Average Variable Question Score of Technology Level Used (x1)

No	Sub Variables	Likert Score				Total	Average
		1	2	3	4		
1.	**Sub Variables of Cage and Feed (x1.1)**						
	Cage Construction	50	0	0	0	50	1.00
	Cage Size	5	11	27	7	50	2.72
	Type of feed given	47	2	1	0	50	1.08
	The amount of feed that Given	1	25	16	8	50	2.62
	Utilization of cow manure	3	46	1	0	50	1.96
2.	**Nursery and Reproduction Sub Variables (X1.2)**						
	Criteria for Superior Cattle Breeds	2	2	8	38	50	3.64
	How to mate a cow	0	48	2	0	50	2.04
3.	**Health Sub Variables Livestock (X1.3)**						
	Vaccination	2	2	1	45	50	3.76
	Treatment of sick cows	0	17	23	10	50	2.86

Source: Primary Data, 2023

The variable level of technology used consists of three sub-variables, including cage and feed sub-variables, breeding and reproduction, and livestock health. Based on Table 4 for the sub-variables of cages and feed, there are five indicators, including indicators namely cage construction, cage size, type of feed used, amount of feed given, and utilization of cow manure. In Table 4 it can be seen that the construction of the cages of the respondents as a whole has a score of one, which means that all respondents have cages with simple construction, where the cages are grounded, do not have a roof, and are only limited by stones arranged as walls, this is because the farmers in this village prefer to release their livestock in the open field from morning to evening So that the necessary cages are only used to confinate cattle at night, and also because of the constraints of cost, so that farmers have not been able to build cages that are suitable for the needs of cows. This is very unfortunate because, in the research of [20], it was explained that a good cowshed meets the requirements according to the needs and safety of cows. If these two

things are not met, it can have an impact on physiological function disorders, including reproductive disorders.

On the other hand, for the size of the cage, there were as many as 27 respondents (54%) who had a score of 3 which means that most of the respondents had cages with a fairly large size, this is understandable because the research site is a rural area and they have a fairly large land. Judging from the type of feed given, as many as 47 respondents (94%) respondents only rely on a feed from forage, and only a small part combined with concentrates, this is because in the countryside forage feed is quite available, while concentrates in addition to having to come to the city (because in the village there is no one to sell), they also do not have money to buy concentrates, This is different from the research conducted by [21], which explained that the provision of forage alone is often insufficient, so the addition of other types of feed such as concentrates is needed. Next is the indicator of the amount of feed given, most of the 25 respondents (50%) have a score of 3, which means that the respondents feed their livestock quite a lot, which is between 5 to 5.9 kg/BK/head/day, while for the other respondents, they give a small amount of feed, this is because the research time is in the dry season so that forage feed, especially grass, is not available (dry), In addition, they have a narrow plot of land to grow forage feed. 50% of respondents can provide enough feed because they have land that can be used to grow forage. Furthermore, judging from the indicators of cow dung utilization, according to [22], all livestock business activities, especially those involving livestock such as cows, will produce waste in the form of animal manure. This waste is continuous, meaning that it is constantly generated during the operation of the farm. If not managed properly, this waste can pollute the surrounding environment, so it needs to be handled appropriately. Based on Table 4, most of the respondents (92%), namely 46 respondents, used cow manure as manure without further processing or processing into bokashi.

The second sub-variable is breeding and reproduction, from this sub-variable, there are two indicators, namely the indicator of superior seed criteria and the method of cattle mating. Based on the results of the study as shown in Table 4, namely 38 respondents (76%) know the characteristics of superior cattle breeds, this is because the average farmers have been raising cattle for a long time, in addition, because they often get information about the characteristics of superior breeds from the livestock extension program that has been followed. [23] stated that through the selection process of superior calves in Balinese cattle cultivation, it is hoped that it can contribute to farmers obtaining livestock that have superior characteristics and provide significant added value in their use. As for the indicator of how to marry cows, most of the respondents, namely 48 respondents (96%) naturally mate their cows, this is because there are no officers who can do injectable mating in the village, besides the cost of injectable mating is considered expensive for their size. While there are a small number of respondents 2 people (4%) mate their cows using injectable mating because they have confidence that injectable mating will be able to produce superior calves, and indeed they can afford to spend money on the cost of mating cows, this is strengthened by the research of [24] which explains that Artificial Insemination (IB) is an appropriate technology that can be used as an effort to improve quality and livestock productivity. The benefits obtained from the IB program include improved genetic quality and efficiency in the use of males.

The third sub-variable is health, in this sub-variable, there are two indicators, namely the indicator of vaccine administration and the indicator of treatment of sick cows. Based on the results of the study that can be seen in Table 4, most of the respondents, namely 45 respondents (90%) vaccinate their cattle on average once a year, According to [25] vaccination is an effective action as a form of protection for livestock, this is carried out routinely every two months by officers from the Kupang Regency farm who make visits to vaccinate the cows in the village. As for the treatment indicators of sick cows, respondents carried out various treatments, as many as 23 respondents (46%) treated by giving dewormers, and herbal medicines, some of which were 17 respondents (34%) only treated their cows using herbal medicines in their environment. A total of 10 respondents (20%) of respondents treated by giving herbal medicines, dewormers, and antibiotics. Health is an important factor in cattle Rearing. Cows with weak conditions are

vulnerable to attacks of various diseases, so special attention is needed about cattle diseases, prevention, causes of diseases, and their treatment [26].

Experience of Participating in Animal Husbandry Extension

One of the factors that affects a person's livestock level is the experience of participating in a livestock extension program. The livestock extension program is one of the efforts of the government or other agencies in terms of advancing the existing livestock sector. The livestock extension program is a learning process that aims to enable livestock business actors to organize themselves in accessing technology, information, capital, and other resources. In addition, this extension program also aims to increase productivity and business efficiency. Table 5 shows the average score of the variable question of experience participating in the livestock extension program.

Table 5. Average Variable Score of Experience in Participating in Livestock Extension (X2)

It	Sub Variables	Likert Score				Total	Flat-flat
		1	2	3	4		
1.	**Sub Variable of Extension by Government (X2.1)**						
	Duration of extension program	2	6	9	33	50	3.46
	Extension program materials	1	10	39	0	50	2.76
	Contemporary extension program materials	12	33	5	0	50	1.86
	Benefits of extension program materials	5	28	15	2	50	2.28
	Method of delivering material	4	19	27	0	50	2.46
2.	**Sub Variable of Extension by College (X2.2)**						
	Duration of extension program	1	8	13	28	50	3.36
	Extension program materials	1	10	38	1	50	2.78
	Contemporary extension program materials	11	35	4	0	50	1.84
	Benefits of extension program materials	5	30	14	1	50	2.22
	Method of delivering material	4	16	30	0	50	2.52

Source: Primary Data, 2023

The variable of experience participating in livestock extension program used consists of two sub-variables, namely the sub-variable of extension program by the government and extension program by universities. Based on Table 5 for the first sub-variable, namely the extension program by the government consists of 5 indicators, including the duration of the extension program, extension program materials, the current of extension program materials, the benefits of the extension program, and the method of delivering the material, Based on Table 5, it can be seen that the extension program duration indicator of the respondents as many as 33 respondents (66%) has a score of three, which means that most of the respondents agree with the duration of extension program with a time range of 1-1.5 hours, Where the time is considered efficient by the respondents because the respondents' activities are mostly carried out for livestock, so if the duration is too long, it will interfere with the respondent's activities and if it is too short, it is feared that the respondents do not understand what is discussed in the extension program. As for the extension program material, as many as 39 respondents (78%) had a score of 3, which means that most of the respondents agreed with the extension program material provided, where most of the respondents assessed that the material provided could be additional information, knowledge, and skills in carrying out livestock activities. According to [27], the development of entrepreneurial competence of cattle farmers can be achieved through extension programs that use strategies that are by the objectives. The importance of developing entrepreneurial competencies in the context of cattle farming cannot be ignored, considering that the livestock sector is a sector with great potential in its contribution to the economy of a country. The extension program program is one of the effective methods for improving the entrepreneurial competence

of cattle farmers. Through extension programs, farmers can be given a deeper understanding of entrepreneurial aspects relevant to cattle farming businesses, such as business management, product marketing, financial planning, and technological innovation. Extension programs that are organized in a structured and systematic manner can help farmers develop the skills and knowledge needed to manage their businesses more effectively.

Judging from the current extension program material provided as many as 33 respondents (66%) have a score of two, this is very unfortunate because the current material provided is considered inappropriate by the respondents, many of the materials are already known by the respondents so that they do not add too much insight to the respondents. Furthermore, judging from the indicators of the benefits of extension materials, as many as 28 respondents (56%) had a score of 2, most of the respondents assessed that the material provided by extension workers provided additional insights and also materials that were delivered, but extension workers did not provide additional technology or innovations to farmers. And the last one seen from the indicator of the material delivery method as many as 27 respondents (54%) had a score of 3, where most of the respondents agreed with the method used by the extension workers, namely the time, place, and technique of delivering the material that the extension was carried out was right and also the delivery method was right so that the respondents easily understood the material provided by the extension workers, this is comparable to the research of [28] which explained that the communication method which is effectively needed by extension workers in carrying out extension activities, and the level of education of an extension worker has a significant impact on the effectiveness of extension.

Based on Table 5, the second sub-variable, namely extension program by universities, consists of 5 indicators, including the duration of the extension program, extension program materials, the current extension program materials, the benefits of extension program materials, and the method of delivering the extension program. As seen in Table 5, the first indicator is the duration of the extension program where as many as 28 respondents (56%) have a score of 4, most of the respondents agree with the duration of an extension program above 1.5 hours, this is because longer duration the respondents will be able to add more insight and information. Next on the indicators of extension materials. According to [29], the level of understanding of extension material has a great influence on the attitude of extension workers. This is because a person's attitude plays an important role in determining the next step, including in terms of implementing innovation. Based on Table 5, as many as 38 respondents (76%) had a score of 3, which means that most of the respondents agreed or accepted the material provided by the extension worker and also the extension program material was considered to be able to add information and insight to the respondents. Furthermore, in the current indicator of the extension material, as many as 35 respondents (70%) have a score of 2, the same as in the previous sub-variable, most of the respondents do not know the current material presented by the extension worker because the respondents do not know whether the material presented has been proven to be true and has been tested by experts. Furthermore, in the indicator of the benefits of extension program materials, as many as 30 respondents (60%) had a score of 2, where the material presented added insight to the respondents and was conveyed clearly, but the material presented did not add new technology and innovations to the respondents. Furthermore, the last indicator is the method of delivering the material. According to [30], before carrying out their duties and functions, extension workers need to design extension program programs or methods as practical guidelines so that extension program runs effectively and efficiently. Based on Table 5, as many as 30 respondents (60%) had a score of 3, where it can be seen that the method of delivering material by extension workers is considered quite good by respondents because the location, time, and method used by extension workers are appropriate so that they can provide additional information to respondents.

Farmer Competence

The farmer competency variable used consists of 3 sub-variables, namely input management, Rearing management, and business analysis ability. Based on Table 6, the first sub-variable is input management consisting of 7 indicators, namely the ability to identify superior cattle breeds,

the ability to obtain cattle breeds, the recording of purchases (calves, food, and medicines), the ease of obtaining feed, the ease of obtaining medicines and vaccines, the adequacy of capital for business, and the ability to mate cows.

Table 6. Average Farmer Competency Variable Question Score (Y1)

It	Sub Variables	Likert Score				Total	Flat-flat
		1	2	3	4		
1.	**Management Sub Variable Input (Y1.1)**						
	Ability to identify superior calves	2	6	34	8	50	2.96
	Ability to obtain calves	49	0	1	0	50	1.04
	Recording the purchase of calves, feed and medicine	44	3	1	2	50	1.22
	Ease of obtaining feed	7	7	36	0	50	2.58
	Ease of obtaining medicines and vaccines	8	7	35	0	50	2.54
	Capital adequacy for business	4	5	10	31	50	3.36
	Ability to mate cows	0	48	2	0	50	2.04
2.	**Management Sub Variables Rearing (Y1.2)**						
	Ability to obtain feed forage and feed production	49	1	0	0	50	1.02
	Ability to process impurities cow	2	48	0	0	50	1.96
	Livestock management process	1	1	0	48	50	3.9
	Activeness in finding out Management Techniques	2	20	28	0	50	2.52
3.	**Ability Sub Variable Business Analysis (Y1.3)**						
	Ability to analyze business cattle	12	38	0	0	50	1.76
	Ability to market livestock cow	48	2	0	0	50	1.04

Source: Primary Data, 2023

Based on Table 12, it can be seen that in the indicator of the ability to identify superior cattle breeds as many as 34 respondents (68%) have a score of 3, so it can be known that most of the respondents already know the characteristics of superior cattle breeds because the respondents have long experience in carrying out livestock activities and also the respondents get information from extension program and fellow farmers, this is strengthened by the research of [31] which states that the quality and availability of cattle calves will determine the success of increasing the production of a farm. The next indicator is the ability to obtain cow calves. Based on Table 6, it was found that 49 out of 50 respondents (98%) obtained a score of 1. This happens because most respondents get their cattle calves from the animal market, with very few getting them from outside the region or the government. The next indicator is the recording of the purchase of calves, feed, and medicines. There were 44 respondents (88%) who obtained a score of 1 in this regard. This is because the majority of respondents use traditional methods in raising cattle, so recording expenses is not considered important. Furthermore, there is an indicator of ease of obtaining feed. In principle, feed sources can be available in the form of forage and/or concentrates, provided that the feed meets the nutritional needs of the livestock being raised [32]. Based on Table 6, as many as 36 respondents (72%) obtained a score of 3 in this case. This is due to the availability of forage land or grass as animal feed in rural areas, making it easier for respondents to get animal feed with appropriate quality and at a distance that is not too far from their farms. Furthermore, the next indicator is the ease of obtaining medicines and vaccines.

According to [33], poor health status can result in daily weight loss, emaciation, susceptibility to disease, death of livestock and their offspring, impaired reproductive status, and low livestock reproduction and productivity. Therefore, adequate treatment with medicines and vaccines is needed. Based on Table 6, as many as 35 respondents (70%) had a score of 3, which indicates that most respondents can easily get medicines and vaccines on time, and the location of medicines and vaccines is not far from their farms, making it easy to access. Furthermore, for the adequacy of business capital indicators, Table 6 shows that 31 respondents (62%) have a score of 4, which indicates that most respondents have sufficient capital readiness to raise livestock, including calves, cages, feed, medicines, and vaccines. The last indicator is the ability to mate cows, based on data in Table 12, as many as 48 respondents (96%) have a score of 2. This is because most of the respondents still use natural mating techniques. After all, technology for artificial insemination (IB) is not widely available and difficult to find, especially in rural areas where respondents live.

In the aspect of Rearing management, effective management includes aspects of cages, feed, and governance of Balinese cattle Rearing [34]. There are four indicators in this sub-variable, including the ability to obtain feed and produce feed, the ability to manage cow waste, the livestock management process, and the level of activity in finding and learning livestock management techniques. From Table 6, it can be concluded that in the indicator of the ability to obtain forage feed and produce feed, as many as 49 respondents (98%) got a score of 1. This is due to the majority of respondents who obtain forage feed from their land and rarely buy from other sources. In this village, the commonly used feed is forage feed, while the concentrated feed is rarely used due to a lack of supply in the market.

The next indicator is the ability to process cow manure, based on Table 6 there are 48 respondents (96%) have a score of 2, this is because most of the respondents process their livestock manure by processing it into manure/organic fertilizer, this is done because processing cow manure into organic fertilizer is one-way

processing that is easy to do so many are carried out by the surrounding community. Next is the indicator of the livestock management process, as many as 48 respondents (96%) have a score of 4, this is because most of the respondents carry out livestock-raising activities as their main livelihood, and also the average farmer takes care of his livestock independently and the cage used is still fairly simple so that farmers have to take care of their livestock every day so that livestock do not starve and get sick. The last indicator is the activeness of finding out livestock management techniques, based on Table 6 it can be seen that 28 respondents (56%) have a score of 3, this is because most of the respondents are quite active in seeking livestock information by reading livestock books, watching television (TV), and participating in livestock extension program so that they can add insight and information to the respondents in carrying out livestock management.

In the last sub-variable, namely the ability to analyze business, in this sub-variable, there are 2 indicators, namely the ability to analyze the cattle business and the ability to market cattle. According to [35], the success of the beef cattle farming business can be measured using several alternatives, such as cost, production level, and the amount of profitability. The first indicator is the ability to analyze the cattle business. Based on Table 16, as many as 38 respondents (76%) have a score of 2. This is because most respondents are only able to calculate profits and expenses in livestock, but have not been able to calculate the break-even point (BEP) and cost-benefit ratio (BC Ratio). The next indicator is the ability to market cattle. Based on Table 16, as many as 48 respondents (96%) have a score of 1, because the majority of farmers wait for buyers to come directly or order their livestock, and very rarely sell livestock in the market or through online/e-commerce media. The use of online media can make it easier for farmers to reach consumers and market their livestock. This is reinforced by the research of [36] explaining that digital marketing can provide convenience for business actors in monitoring and meeting the needs and desires of their potential consumers.

The Relationship between Farmers' Competence and Technology Level and Experience in Participating in Extension

The results of multiple linear regression analysis to determine the relationship between Farmer Competence and Technology Level and Experience in Participating in Extension in Oeladsala Village, are shown in Table 7 below.

Table 7. Results of multiple linear regression analysis

Regression Coefficient	t-value	p-value (t)	Information
Intercept	7.589	0.0065	-
X1	0.206	0.1557	Insignificant
X2	0.517	0.0000	Significant
	F-value = 55.58		
	p-value (F) = 0.0000		
	R2=0.7028		

Based on Table 7, a multiple linear regression model can be made for the competence of Balinese cattle farmers (Y) as follows.

$$Y = 7.589 + 0.206X1 + 0.517X2$$

This equation shows that if the level of technology used by farmers (X_1) increases by 1 unit, then the competence of Balinese cattle breeders will increase by 0.206 units, assuming other variables are fixed. If the experience of participating in the farmer extension program (X_2) increases by 1 unit, then the competence of Balinese cattle breeders will increase by 0.517 units, assuming that other variables are fixed. The intercept value of 7,589 shows that without technology and experience in participating in livestock extension programs, Balinese cattle farmers in Kupang Regency already have the competence capital to run a Balinese cattle business.

Based on the regression model obtained, it can be seen that both the level of technology used by farmers and the experience of participating in extension programs have a positive impact on improving the competence of Balinese cattle breeders. However, based on the hypothesis test carried out, the variable that had a significant influence on the two independent variables used in the study was the variable of experience participating in the livestock extension program (X_2) because it had a p-value < 0.05.

In addition, the model for the competence of Balinese cattle breeders resulting from this study has $R^{2 = 0.7028}$ or 70.28%. This value shows that 70.28% of the diversity of farmer competence can be explained by the level of technology used and experience in participating in an extension program, while the remaining 29.72% is explained by other variables outside the model. Because the R2 value is more than 50%, it can be said that the model produced in this study is good.

Technological diffusion is a pathway where the technological systems created are interconnected in certain ways from time to time among farmers in a livestock business community scheme [40]. Diffusion and the use of technology are considered efforts to increase yields, enrich family incomes, and maintain food security [37]. The application of the latest knowledge is essential to increase the profitability of smallholder farmers, generate comprehensive and reasonable profits for society, and minimize pressure on renewable energy reserves [38].

However, this study shows that the level of technology does not have a significant effect on the competence of the Bali cattle business, this is because farmers still use simple farming methods. This is in line with the results of research by [41][42]. Livestock technology innovations, including new disease control technologies, are only used in the field on a limited basis due to a

lack of extension efforts. Farmers obtain general information such as cattle crossing, local breed improvement, foot and mouth disease (FMD) vaccines, cattle farm management, and feeding systems mostly from extension workers and some researchers, as well as neighbors or fellow farmers. Farmers also know about several other types of innovations, but they do not have sufficient knowledge about these innovations, so they cannot rely on these innovations to obtain benefits [42].

Another factor is the economic factor, the economic factor is also a barrier to the application of technological innovation in the Balinese cattle business in Oeledsala village because this factor is the main factor in decision-making [43]. For example, the availability of funds or loans for livestock businesses will affect farmers' decisions to adopt technological innovations. Based on several examples of extension programs that have been carried out in Oeledsala village such as extension programs on the application of artificial insemination, ideal cage construction, animal feed processing, waste treatment, and how to treat livestock, it is found that most farmers prefer to adopt only in terms of knowledge, but if farmers are advised to buy tools or materials used in extension program, Farmers tend not to do it, due to the constraints of economic factors that are still low. In addition, according to [44], there is a fear of adopting technology due to past failure experiences, unpreparedness in facing change, reluctance to take risks, and a sense of complacency with current conditions that make it more difficult for farmers to adopt new technological innovations.

4. Conclusion

The characteristics of respondents based on the age of most (80%) are 31-50 years old, based on education 44% have a high school education, based on the experience of farmers 32% have 16-20 years of experience, based on the number of family dependents 40% have 1-2 dependents, and based on the number of livestock ownership 62% have 3-4 livestock. The results of the multiple linear regression analysis show that the level of technology used by farmers and the experience of participating in extension programs have a positive influence on improving the competence of Balinese cattle breeders. However, the variable that had a significant effect was the variable of experience in participating in the livestock extension program, while the variable of technology level did not have a significant effect on the improvement of farmer competence at an error rate of 0.05.

Reference

[1]   Dewi, N. L. Y. A., Suparta. I. N., dan Inggriati. N. W. T. (2015). Pengambilan Keputusan Peternak Dalam Melakukan Usaha Peternakan Sapi Bali Di Desa Penuktukan, Kecamatan Tejakula, Kabupaten Buleleng. *Peternakan Tropika*. 3 (2): 216 – 232.
[2]   Tahusalawane, J. W., Muhammad. S., dan Robinson. K. M. (2021). *Kecamatan Taebenu Dalam Angka. Kupang NTT*. BPS Kabupaten Kupang.
[3]   Alma, B. (2010). *Kewirausahaan Untuk Mahasiswa dan Umum*. Bandung. Alfabeta.
[4]   Riyanti. (2003). *Kewirausahaan dari Sudut Pandang Psikologi Kepribadian*. Jakarta: PT. Grasindo (Gramedia Widiasarana Indonesia).
[5]   Bergevoet, RHM. (2005). Entrepreneurship of Dutch Dairy Farmers. *Disertasi*. Wageningen University. Wageningen (NL).
[6]   Spencer, LM., and Spencer. SM. (1993). *Competence Work: Model for Superior Performance*. John Wiley and Sons, Inc.
[7]   Moeheriono (2009). *Pengukuran Kinerja Berbasis Kompetensi*, Cetakan Pertama. Bogor: Ghalia Indonesia.
[8]   Azizah, S. (2024). *Kemitraan Broiler Indonesia: Tinjauan Komunikasi Pembangunan*. Yayasan Drestanta Pelita Indonesia.
[9]   Sugiyono, (2014). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.
[10]   Arikunto dan Suharsini. (2010). *Prosedur Penelitian Suatu Pendekatan Praktik*, Rineka Cipta, Yogyakarta.

[11] Akimi dan Ruri (2018). Motivasi Peternak Dalam Budidaya Domba Di Kelompok Tani Sido Maju I Desa Ngablak Kecamatan Ngablak Kabupaten Magelang. *Jurnal Pengembangan Penyuluhan Pertanian*. 15 (28): 32-43. https://doi.org/10.36626/jppp.v15i28..13

[12] Mulyawati, I. M., Mardiningsih. D, dan Satmoko. S. (2016). Pengaruh Umur, Pendidikan, Pengalaman Dan Jumlah Ternak Peternak Kambing Terhadap Perilaku Sapta Usaha Beternak Kambing Di Desa Wonosari Kecamatan Patebon. *Agromedia.* 34 (1): 85-90

[13] Nurdayati., Nadia. I. F, dan Supriyanto. (2020). Pengaruh Karakteristik Peternak Terhadap Motivasi Beternak Kambing Perah. *Jurnal Pengembagan Penyuluhan Pertanian*. 17 (32): 121-136.

[14] Murwanto, A. G. (2008). Karakteristik Peternak dan Tingkat Masukan Teknologi Peternakan Sapi Potong di Lembah Prafi Kabupaten Manokwari. *Jurnal Ilmu Peternakan*. 3 (1): 8-15. https://doi.org/10.46549/jipvet.v3i1.349

[15] Pratiwi, E. R (2012). Perilaku Petani Dalam Mengelola Lahan Pertanian di Kawasan Rawan Bencana Longsor (Studi Kasus Desa Sumberejo, kec. Batur, Kab. Banjarnegara-Jateng. *Jurnal Bumi Indonesia*. 1 (3): 1-10.

[16] Harmoko. (2017). Tingkat Motivasi Petani dalam Beternak Sapi di Kecamatan Sambas Kabupaten Sambas. JSEP: *Jurnal Sosial Ekonomi Pertanian*. 10(1). https://doi.org/10.19184/jsep.v10i1.5217

[17] Ahmadi, A. H. (2003). Sosiologi Pendidikan. Jakarta: PT. Rineka Cipta.

[18] Kaliky, R dan Hidayat. (2002). Karakteristik Peternak Sapi Perah di Desa Kepuh Harjo Kecamatan Cangkringan Kabupaten Sleman. *Balai Pengkajian Teknologi Pertanian Yogyakarta*, Yogyakarta.

[19] Makatita, J. (2021). Pengaruh Karakteristik Peternak terhadap Perilaku Dalam Usaha Peternakan Sapi Potong di Kabupaten Buru. *Jurnal Agrokompleks Tolis*. 1 (2): 51-54. http://dx.doi.org/10.56630/jago.v1i2.149

[20] Suharyati, Sri., dan Madi. H. (2016). Pengaruh Manajemen Peternak Terhadap Efesiensi Reproduksi Sapi Bali di Kabupaten Pringsewu Provinsi Lampung. *Jurnal Penelitian Pertanian Terapan*. 16 (1): 61 – 67. https://doi.org/10.25181/jppt.v16i1.77

[21] Guitar, F., Suwignyo. R. A, Suheryanto, dan Munandar. (2014). Reduksi Gas Metan (CH4) dengan Meningkatan Komposisi Konsentrat dalam Pakan Ternak Sapi. *Jurnal Peternakan Sriwijaya*. 3 (1): 14-24. https://doi.org/10.33230/JPS.3.1.2014.1728

[22] Sutrisno, E., dan Ika B. P. (2019). Pembuatan Pupuk Kompos Padat Limbah Kotoran Sapi Dengan Metode Fermentasi Menggunakan Bioaktivator Starbio Di Desa Ujung–Ujung Kecamatan Pabelan Kabupaten Semarang. *Jurnal Pasopati*. 1 (2): 72-79.

[23] Khairina, D. M., Pramukti I.C..Hatta, H.R. & Maharani, S., (2021). Model Pengambilan Keputusan Pemilihan Bibit Unggul Sapi Bali Menggunakan Metode Weighted Product. *Jurnal Teknologi Informasi dan Ilmu Komputer,* 8 (5), 879-886. https://doi.org/10.25126/jtiik.2021853512

[24] Hoesni, F. (2015). Pengaruh Keberhasilan Inseminasi Buatan (IB) Antara sapi Bali Dara Dengan Sapi Bali Yang Pernah Beranak Di Kecamatan Pemayung Kabupaten Batanghari. *Jurnal Ilmiah Universitas Batanghari Jambi*.15 (4): 20-27.

[25] Cantona, M. H., Maxs U. E. S, Tri U, Tarsisius C. T, dan Antin Y.N. W. (2020). Evaluasi Titer Antibodi Pasca Vaksinasi Septicaemia epizootica Pada Sapi Bali Di Kota Kupang. *Jurnal Kajian Veteriner*. 8 (1): 69-80. https://doi.org/10.35508/jkv.v8i1.2292

[26] Ginting, R. B., Ritonga, M. Z., Putra, A., Pradana, T. G. (2019). Program Manajemen Pengobatan Cacing pada Ternak di Kelompok Tani Ternak Kesuma Maju Desa Jatikesuma Kecamatan Namorambe. *Journal of Animal Science and Agronomy Panca Budi* 4 (1):43-50.

[27] Muatip, K., Basita G. S., Djoko. S., dan Pang S. A. (2008). Kompetensi Kewirausahaan Peternak Sapi Perah, Kasus Peternak Sapi Perah Di Kabupaten Bandung jawa Barat. Jurnal Penyuluhan. 4 (1): 21-29.

[28] Rasyid, A. (2012). Metode Komunikasi Penyuluhan Pada Petani Sawah. *Jurnal Ilmu Komunikasi.* 1 (1): 1-55.

[29] Dwiwati, D. M., Suparta. N, dan Putra. I. G. S. A. (2016). Dampak Teknik Penyuluhan Focus Group Discusion (FGD) Terhadap Perubahan Pengetahuan, Sikap Dan Penerapan Pada Penyuluh Dan Peternak Sapi Bali Di Bali. *Majalah Ilmiah Peternakan*. 19 (1): 28-33.

[30] Zulfikar, Siti. A., dan Pang. S. A. (2018). Persepsi Petani terhadap Kompetensi Penyuluh Pertanian Tanaman Panganди Kabupaten Aceh Utara. *Jurnal Penyuluhan*. 14 (1): 159-174.

[31] Nafiu, L., Achmad. S. A, Musram. A, dan Deki. Z. (2020). Pemberdayaan Peternak Melalui Bimbingan Teknis Seleksi Bibit Sapi Bali Pada Kawasan Sentra Bibit Sapi Bali Di Kabupaten Konawe Selatan. *Jurnal Pengamas*. 3 (2): 145-156.

[32]   Wahyuni, E., dan Muhammad. A. (2020). Manajemen Pemberian Pakan Sapi Bali. *Jurnal Peternakan Lokal*. 2 (1): 1-7.

[33]   Kamalasari, W., Fikri. A, dan Firda. J. (2020). Faktor-Faktor Yang Mempengaruhi Pengambilan Keputusan Peternak Dalam Melakukan Program Vaksinasi Jembrana Pada Sapi Bali. *Jurnal Peternakan Lingkungan Tropis*. 2 (1): 50-62.

[34]   Ramadhan, N., Ni Made. A. K, dan Yuni. M. (2021). Identifikasi Faktor Yang Mempengaruhi Keuntungan Pada Usaha Pembibitan Sapi Bali Di Desa Taman Sari Kecamatan Gunung Sari Kabupaten Lombok Barat. *Jurnal Agribisnis dan Peternakan*. 1(3): 72-76.

[35]   Mayulu, H., Ergi, Muh Ichsan H, dan Agus S. (2020). Analisis Finansial Usaha Sapi Potong Peternakan Rakyat Di Kecamatan Sebulu Kabupaten Kutai Kartanegara. *Journal of Tropical AgriFood*. 2(1): 16-25. http://dx.doi.org/10.35941/jtaf.2.1.2020.3624.16-25

[36]   Rusmanah, E., Arie W. I, dan Fredi. A. (2019). Implementasi Digital Marketing Guna Peningkatan Peluang Pasar Produksi Hasil Ternak Puyuh Masyarakat Desa Galuga. *Jurnal ABM Mengabdi*. 6 (1): 14-25.

[37]   Fisher M, Kandiwa V. (2014). Can agricultural input subsidies reduce the gender gap in modern maize adoption? Evidence from Malawi. *Food Policy*. 45:101-111. http://dx.doi.org/10.1016/j.foodpol.2014.01.007

[38]   Asfaw S, Shiferaw B, Simtowe F, Hagos M. (2011). Agricultural technology adoption, seed access constraints, and commercialization in Ethiopia. *J Dev Agric Econ* 3:436–447.

[39]   Mariano MJ, Villano R, Fleming E. (2012). Factors influencing farmers' adoption of modern rice technologies and good management practices in the Philippines. *Agric Syst*. 110:41–53. http://dx.doi.org/10.1016/j.agsy.2012.03.010

[40]   Bortamuly AB, Goswami K. (2015). Determinants of the adoption of modern technology in the handloom industry in Assam. *Tech Forecast Soc Change*. 90:400–440. http://dx.doi.org/10.1016/j.techfore.2014.04.018

[41]   Bolorunduro PI, Iwuanyanwu IEJ, Aribido SO, Adesehinwa AOK. (2004). Effectiveness of extension dissemination approaches and adoption levels of livestock and fisheries technologies in Nigeria. *J Food Agric Env*. 2:298–302.

[42]   Quddus, M.A., (2022) Dissemination of Technological Innovations of Livestock in Bangladesh: Adoption Levels and Behavioral Precision. Proc. Natl. Acad. Sci., India, Sect. *B Biol. Sci*. 92, 461–472. http://dx.doi.org/10.1007/s40011-022-01357-z

[43]   Setiana L., Saleh D. M., Nugroho A. P., & Lana D. L. (2020). Factors in the Adoption of Beef Cattle Artificial Insemination (AI) Technology in Brebes Regency. *Jurnal Penyuluhan*. 16(1), 16-23.

[44]   Ingabire, M. C., Yonggong, L., Pesha, J. C., & Hardi, A. (2018). Factors affecting adoption of artificial insemination technology by small dairy farmers in Rwanda: A case of Rwamagana District. *Journal of Economics and Sustainable Development*, 9, 46–53.