# ANALYSIS OF KEY FACTORS FOR THE SUCCESS OF DAIRY BUSINESS IN THE LOWLANDS OF MALANG REGENCY

**Pratami Rizkia Kurnia**\*, Postgraduate Student
**Hartono Budi**, **Winarto Priyo Sugeng**, Lecturers
Faculty of Animal Science, University of Brawijaya, Malang, Indonesia
\*E-mail: rizkiakurnia123@gmail.com

**ABSTRACT**

This study aims to find out the key factors that influence the sustainability of the dairy business in the lowlands of Malang Regency. The research was conducted on January 20-February 20, 2022, in Kalipare, Gondanglegi, and Bantur Districts. The location was selected using purposive with the criteria of the location being at an altitude of <400masl, which is lowland. The research method used is a quantitative descriptive survey. Information was obtained from respondents through a Focus Group Discussion with a total of 6 respondents consisting of the livestock and animal health service, the head of the livestock unit, and the head of the livestock group. The results of this study are the key factors that influence and support the sustainability of dairy cattle in the lowlands of Malang Regency are 1) Variable A (air temperature and humidity) with a global strength score of 1.86; 2) Variable B (distance between cage and settlement) with a total global strength score of 1.72; 3) Variable C (forage availability) with a total global strength score of 2.31; 4) Variable D (average dairy cow ownership) with a total global strength score of 2.98; 5) Variable E (amount of subsidy) with a total global strength score of 2.44, and 6) Variable F (marketing information system) with a total global strength score of 1.02.

**KEY WORDS**

Key factors, sustainability, dairy cows, lowland.

The white liquid secreted by the mammary glands or udder is called milk. Milk has a high nutritional value because milk contains a variety of complete and balanced food substances such as proteins, fats, carbohydrates, minerals, vitamins, and a complete amino acid content that is needed by the human body (Chrisna, 2016).

Milk consumption in Indonesia has increased compared to the previous year. Based on data from the Central Statistics Agency (2021), it is explained that national milk consumption in 2019 was at the level of 16.23 kg/per capita/year; in 2020, it increased to 16.27 kg/per capita/year. The need for cow's milk in Indonesia in 2020 was 4,385,730 tons, while domestic fresh milk production was 947,685 tons. Milk imports were carried out to cover the shortage of milk, amounting to 3,438,045 tons. This is because the increase in milk demand has yet to be offset by increased milk production in the country. Milk imports need to be restricted and prevented because high milk imports will impact reducing dairy business. Therefore, an alternative that can be done is to increase national milk production (Mardhatilla, 2018).

Domestically produced milk comes mostly from dairy businesses. Milk production from other dairy livestock, such as dairy buffalo and dairy goats, is relatively small and has yet to see its contribution in meeting the demands of milk consumers. Efforts to increase national milk production, population, and dairy business must be further improved (Karuniawati & Anna, 2013). The dairy industry in Malang Regency is still the largest in East Java. In Malang Regency, the dairy business develops in almost all districts, starting from Ngantang, Karangploso, Dau, Lawang, Tumpang, Jabung, Wajak, Bantur, Poncokusumo, Gondanglegi, and Ngajum (Sutanto & Hendraningish, 2011).

The dairy cattle business is generally cultivated in highland areas because the highland areas have an optimal temperature and humidity suitability for dairy cow productivity. The dairy business cultivated in highland areas is relatively dense, causing problems in farmers' environmental, social, and economic fields (Nurtini & Mujtahidah, 2014). The density of dairy

cattle businesses in the highlands causes the need to find alternative areas for developing dairy cattle businesses, namely lowlands.

The dairy business in the lowlands has been developed as in Malang Regency and spread across Kalipare, Gondanglegi, and Bantur Districts with an area height of < 400 meters above sea level. According to data from the Central Statistics Agency 2021, the population of dairy cows owned by each sub-district is in Kalipare District as many as 340 heads, Gondanglegi District 680 heads, and Bantur District as many as 1010 heads. Seeing the phenomenon of the dairy business in the lowlands, it is necessary to study the key factors for the success of dairy cattle businesses in the lowlands of Malang Regency.

## MATERIALS AND METHODS OF RESEARCH

The study was conducted in Kalipare, Gondanglegi, and Bantur Districts which have an altitude of >400masl (Istiawan & Kastono, 2019) and are lowland areas. The study was conducted on January 20-February 20, 2022.

The research method uses quantitative descriptive surveys. The respondents used in this study were six purposively selected experts consisting of the livestock and animal health office, the head of the livestock unit, and the head of the farmer group to determine the attributes of the sustainability dimension. The criteria used include 1) having experience and competence according to the field being studied; 2) having a reputation, position/position, and competence by the field studied and having shown credibility as an expert or expert in the field under study; 3) have a commitment to the problems studied, and (4) be neutral and willing to accept the opinions of other respondents (Ramadan, 2015).

Primary data was obtained through a Focus Group Discussion (FGD) conducted with experts to determine the variables to be used in determining the key factors for the sustainability of dairy cattle businesses in the lowland districts of Malang.

Secondary data were obtained from documentation at the research site and literature relating to the sustainability analysis of dairy businesses. The data collected is in the form of data on the lowlands dairy business and from various literatures, such as journals or books related to this research.

Table 1 – Assessment of the Direct Influence of Inter-Factor Dairy Farming Systems

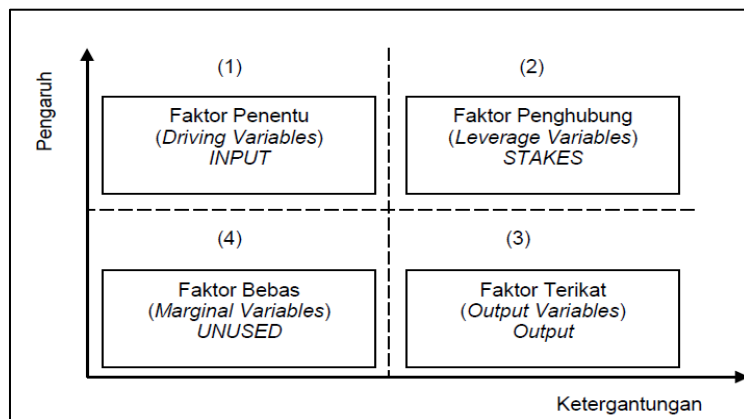| From<br>Towards | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| A | ▓ | | | | | | | |
| B | | ▓ | | | | | | |
| C | | | ▓ | | | | | |
| D | | | | ▓ | | | | |
| E | | | | | ▓ | | | |
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Figure 1 – Level of Influence dan Inter-factor Dependence in the System (Burgeois & Jesus, 2004)

Determination of key sustainability factors is carried out using *participatory prospective analysis*. The analysis is used to determine important factors that affect dairy farming in the lowlands. The prospective analysis involves expert respondents to know, investigate, and anticipate changes to systems capable of providing quick results (Bourgeois & Jesus, 2004). The determination of key factors using prospective analysis has several stages. First, the important factors derived from *leverage* analysis are collected for assessment by selected experts. An assessment of important factors is carried out, taking into account the direct impact of leverage factors on other leverage factors. Secondly, experts assessed the influence of factors in the system (score 0-3) using a certain matrix.

Godet (1999) the influence between factors given scores by expert respondents, including: (a) a score of 0 if there is no influence, (b) a score of 1 if it has a small effect, (c) a score of 2 if it has a moderate effect, and (d) a score of 3 if it has a very strong effect.

Identification of direct influences between factors in the system at the first stage of prospective analysis using the direct influence assessment matrix (Table 1). Expert respondents were directly involved in determining the direct influence between factors by scoring 0–3 on the matrix. Determining important factors using the help of *Microsoft Excel software add-ons* will generate a degree of influence and dependence between factors in the system with the analysis results, as reflected in figure 1.

According to Burgeois and Jesus (2004), the results of the analysis of various factors or variables show that the factors or variables that are in (1) quadrant I of the drive contain the most powerful important factors or driving *variables* in the system because they have a strong influence with low dependence, (2) quadrant II control contains strong variable factors. After all, they have strong leverage and dependence (*leverage variables*), (3) quadrant III output contains small influential factors with high dependence and (4) marginal quadrant IV contains factors that have small influences and dependencies.

## RESULTS AND DISCUSSION

Key variables are determined through a Focus Group Discussion conducted with six experts and then determined variables that contribute to or affect the sustainability of the dairy business in the lowlands. From the opinions of each expert, as many as 18 variables can be identified that are considered decisive, as presented in table (2).

Table 2 – Identification Results Variables

| Code | Variable | Definition/Description |
|---|---|---|
| A | Air Temperature and Humidity | Air temperature and humidity for maintaining a dairy business |
| B | Distance between Cages and Settlements | The distance between the location of the cage and the location of housing or settlement |
| C | Availability of Forage Feed | Availability of feed such as elephant grass, kolonjono grass, field grass and legumes |
| D | Average Ownership of Lactation Cows | The average ownership of cows that already produce milk |
| E | The Amount of Subsidy | The amount of assistance provided from commodities or the government to dairy farmers |
| F | Dairy Cattle Business Capital | Personal expenses incurred to build a dairy business |
| G | Family Participation in Animal Husbandry | The participation or role of the family in helping to run a dairy business |
| H | Community Protests | The form of disapproval of the community towards the dairy farming business that is located in the neighborhood where theresidents live |
| I | Age of the breeder | To find out the age of dairy farmers in Kalipare, Gondanglegi and Bantur Diatricts |
| J | Application of Artificial Insemination | Artificial insemination has or has not been applied to the livestock business |
| K | Ownership of Communication Tools | Communication tools or technology owned by breeders such as handphone and laptops |
| L | Intensity of Administration of Medicines and Vitamins | The degree of frequent breeders in giving medicines and vitamins |
| M | The Role of Government Officials | The participation of government officials in supporting dairy farming |
| N | Farmer Involvement in Counseling | Involvement of farmers in participating in counseling held from government agencies, communities or academics |
| O | Guidance or Counseling From The Government | The frequency of guidance or counseling from the government to dairy farmers to help advance the dairy business |
| P | Livestock Card Information System | Information about proof of livestock ownership in which there is the name of the farmer, address, type of livestock and nation of livestock |
| Q | Bookkeeping Information System | Information containing about the condition of assets, capital, milk yield per day, milk prices and income from the sale of milk |
| R | Marketing Information System | Information about how farmers market milk and the reach of farmers in marketing milk. |

The next analysis is an analysis of the level of *influence* and *dependence* between the variables in Table 2. The results of the analysis are presented 3 matrices, the matrix of the degree of influence and direct dependence, the matrix of the level of influence and indirect dependence and the matrix of the level of influence and total dependence (direct and indirect). The following is presented a matrix of the results of the analysis of influence and dependence between total variables (direct and indirect) in Table (3).

Table 3 – Matrix of Results of Analysis of Influence and Dependence Between Total Variables

| Influence / Dependence | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 3 | 3 | 6 | 6 | 5 | 3 | 3 | 3 | 3 | 2 | 2 | 5 | 3 | 3 | 3 | 4 | 4 | 2 |
| B | 3 | 3 | 5 | 6 | 3 | 3 | 3 | 6 | 3 | 2 | 2 | 3 | 2 | 3 | 3 | 4 | 4 | 3 |
| C | 6 | 6 | 3 | 6 | 4 | 6 | 4 | 4 | 6 | 5 | 4 | 3 | 5 | 3 | 4 | 4 | 4 | 3 |
| D | 6 | 6 | 6 | 3 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 6 | 5 | 6 | 6 | 6 | 6 | 5 |
| E | 5 | 3 | 4 | 6 | 3 | 6 | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 3 |
| F | 0 | 1 | 3 | 3 | 3 | 0 | 2 | 0 | 1 | 2 | 3 | 3 | 0 | 0 | 0 | 1 | 4 | 4 |
| G | 2 | 2 | 3 | 3 | 3 | 3 | 0 | 0 | 3 | 0 | 2 | 2 | 0 | 0 | 0 | 1 | 4 | 3 |
| H | 2 | 3 | 3 | 3 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 1 | 1 | 1 | 4 | 3 |
| I | 0 | 0 | 3 | 2 | 1 | 3 | 3 | 1 | 0 | 1 | 3 | 2 | 0 | 1 | 0 | 2 | 4 | 4 |
| J | 0 | 0 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 0 | 2 | 3 | 2 | 2 | 2 | 3 | 5 | 3 |
| K | 1 | 0 | 1 | 1 | 1 | 2 | 2 | 1 | 3 | 2 | 0 | 1 | 2 | 2 | 1 | 1 | 4 | 4 |
| L | 2 | 0 | 2 | 2 | 2 | 2 | 2 | 0 | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 2 | 3 | 2 |
| M | 0 | 2 | 3 | 2 | 3 | 2 | 1 | 2 | 0 | 3 | 2 | 2 | 0 | 3 | 3 | 2 | 4 | 3 |
| N | 1 | 0 | 1 | 1 | 2 | 0 | 1 | 1 | 3 | 1 | 2 | 1 | 3 | 0 | 3 | 2 | 4 | 3 |
| O | 0 | 2 | 1 | 2 | 3 | 1 | 1 | 2 | 3 | 3 | 1 | 1 | 3 | 3 | 0 | 2 | 3 | 2 |
| P | 1 | 1 | 2 | 3 | 1 | 1 | 0 | 0 | 3 | 3 | 1 | 2 | 1 | 1 | 1 | 0 | 6 | 5 |
| Q | 1 | 1 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 5 |
| R | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 6 | 3 |

Based on the matrix in Table 3, the following results are presented as the calculation of the total global strength score used to rank the variables. The variable with the highest score is the strongest variable, with the greatest influence and relatively low dependence.

Table 4 – Total Variable Strength Score Calculation Results

| Variable (1) | Total | | Global Power (4) | Total Global Power (5) |
|---|---|---|---|---|
| | Global Influence (2) | Global Dependence (3) | | |
| A | 53 | 31 | 0,05 | 1,86 |
| B | 50 | 31 | 0,05 | 1,72 |
| C | 69 | 46 | 0,07 | 2,31 |
| D | 84 | 48 | 0,08 | 2,98 |
| E | 70 | 42 | 0,07 | 2,44 |
| F | 21 | 38 | 0,01 | 0,42 |
| G | 23 | 34 | 0,01 | 0,52 |
| H | 18 | 31 | 0,01 | 0,37 |
| I | 20 | 39 | 0,01 | 0,38 |
| J | 21 | 36 | 0,01 | 0,43 |
| K | 20 | 34 | 0,01 | 0,41 |
| L | 18 | 37 | 0,01 | 0,33 |
| M | 28 | 31 | 0,02 | 0,74 |
| N | 20 | 32 | 0,01 | 0,43 |
| O | 26 | 31 | 0,02 | 0,66 |
| P | 21 | 39 | 0,01 | 0,41 |
| Q | 31 | 61 | 0,02 | 0,58 |
| R | 40 | 48 | 0,03 | 1,02 |

Based on an assessment of 18 sensitive attributes in the prospective analysis and the calculation of the total global strength score, six key factors were identified to have a strong effect on the system. These six key factors have a relatively low level of dependence but have a major effect on the dairy business. The six key factors: 1) variable A (Air temperature and humidity) total global strength score of 1.86; 2) variable B (distance between cage and settlement) total global strength score of 1.72; 3) variable C (forage feed availability) global total strength score of 2.31; 4) variable D (average lactation cow ownership) total global strength score of 2.98; 5) variable E (amount of subsidy) global total strength score of 2.44;

and 6) variable R (marketing information system) global total strength score of 1.02. These sensitive attributes, after being assessed, resulted in a grouping of attributes in four quadrant groups based on the degree of dependence and influence of attributes on the dairy cattle business in the lowlands of Malang Regency.
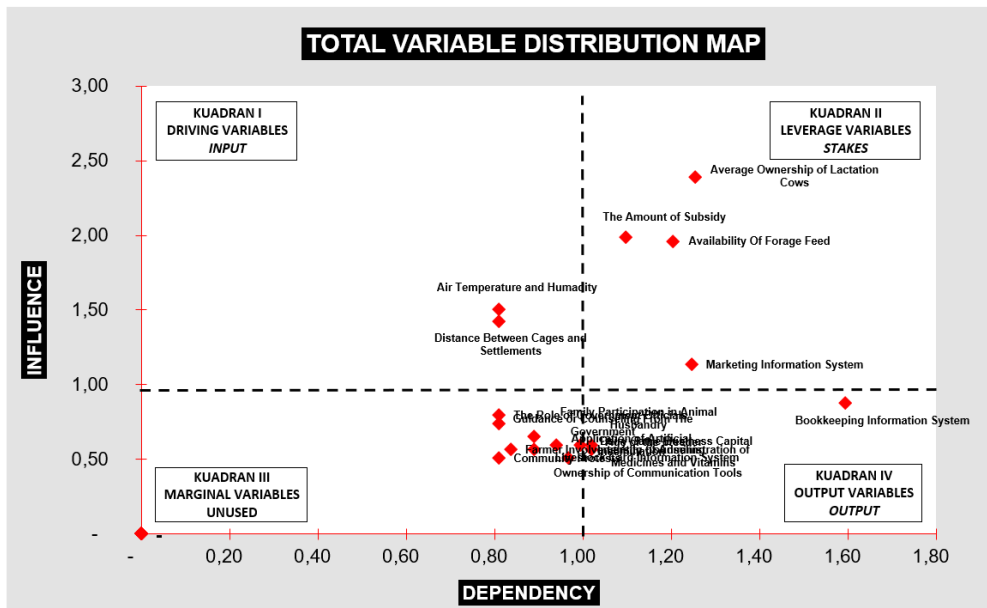


Figure 2 – Total Variable Force Distribution Map

Based on the total variable strength distribution map, the grouping of identified variables or sensitive attributes from the *leverage* results is as follows:

- The variable group of drives (*drivers*) is the variables (A) temperature and humidity and (B) the distance of the coop to the settlement;
- The control variable groups are variable C (availability of forage feed), variable D (average ownership of lactation cows), variable E (amount of subsidies), and variable R (marketing information system);
- The output variable groups are variable F (business capital of dairy cattle), variable G (family participation in animal husbandry), variable H (community protest), variable I (age of farmers), variable J (application of artificial insemination), variable K (ownership of communication tools), variable M (role of government officials), variable N (involvement of breeders in counseling), variable O (coaching or counseling from the government) and variable P (livestock card information system);
- The marginal variable groups are variable L (intensity of administration of drugs and vitamins) and variable Q (bookkeeping information system).

The policy direction for developing the dairy cattle business in the lowlands of Malang Regency can be formulated based on six key factors identified by prospective analysis. The six key factors in the driving variable quadrant and the control variable have *a multiplier effect* when intervened, either in the form of regulatory or corrective actions. Hence, the factors in this quadrant are priority factors that require improvement to achieve better dairy business performance

The average ownership of lactation cattle in the lowlands of Malang Regency, especially Kalipare, Bantur, and Gondanglegi Districts, amounts to 4-6 heads. The amount of ownership for the category of community livestock business is classified as profitable. The dairy cattle business is divided into large-scale, medium-scale, and small-scale. Large-scale with the ownership of lactation cows >7 heads, medium-scale with the ownership of lactation cows 4-6 heads, and small-scale with ownership of lactation cows of at least two heads. Farmers running a dairy cattle business expect profits, so many people take advantage of these business opportunities. The profit obtained from the dairy cattle business depends on

several factors such as investment costs, operational costs, receipt of milk sales results, sale of dairy cows, and other receipts from the sale of dairy cow dung. Receipts from the sale of milk are obtained daily on an ongoing basis until the dairy cow experiences a dry period. The more ownership of lactation cows owned by farmers, the greater the income received; according to the opinion of Ningsih, et al (2013) stated that a large number of livestock ownership affects revenue; the more livestock ownership, the higher the income.

In the future government policy direction, it is hoped that the government can import superior dairy breeds to be given to farmers or given to farmers with a profit-sharing system. The government can also provide seed assistance through cooperatives with a credit system with very low-interest rates. It aims to increase the number of dairy cattle raised by farmers. In addition, the promotion of low-cost artificial insemination programs must continue to be pursued so that dairy cows can produce superior breeds that have undergone genetic quality disputes. Artificial insemination can also prevent inbreeding.

The government has provided subsidies to farmers in the lowlands of Malang Regency, especially Kalipare, Bantur, and Gondanglegi Districts. Subsidies provided include animal feed (concentrates), business capital in the form of credit, seed assistance, subsidies for purchasing dairy livestock business equipment (*chopper, milkcan,* fan), and artificial insemination facilities. The government supports subsidy programs for livestock in order to realize food security. The provision of subsidies is important for the government to increase motivation in doing business and is a form of business stimulant in the livestock sub-sector. The government continues to provide subsidies to its breeders in developed countries, especially in developing countries such as Indonesia.

The government can increase subsidies for animal feed assistance, seeds, and business capital in the future. The important thing besides providing subsidies is the good dairy farming *practice*. The government is also obliged to make regulations to create a conducive dairy business climate whose ultimate goal is to improve the welfare of farmers.

Forage feed for dairy cattle businesses in lowland areas of Malang Regency, especially Kalipare, Bantur, and Gondanglegi Districts, is quite available. The types of forage feed used include elephant grass, odot grass, kolonjono, and field grass. The availability of forage feed is very necessary for dairy cows to produce optimally for growth and productivity because forage feed is a source of crude fiber energy, protein, and other nutrients needed to live the staple life and produce milk. The addition of concentrates should support the use of forage feed because the protein content of concentrates is higher than that of forage feed. Budiarti and Nyoman (2019) state that bringing feed crops is one of the supporters of increasing livestock productivity; therefore, its availability and quality must be maintained to meet livestock needs.

Farmers hope that future government policies can be directed at efforts to increase forage production by subsidizing seeds of superior grasses, fertilizers, and even land for planting grasses. The milk processing industry is also expected to contribute to farmers through seed assistance, fertilizers, and medicines for the cultivation of forage feed.

The air temperature and humidity in Kalipare, Gondanglegi, and Bantur districts tend to have high temperatures because these three districts are located in lowland areas at an altitude of $\leq$ 400 meters above sea level. The average air temperature in Kalipare District is 26.5 0 C with a humidity of 72.5%, the average air temperature in Gondanglegi District is 27.25 0 C with a humidity of 70%, and the average temperature in Bantur District is 27.75 0 C with a humidity of68.75%. The temperatures in these three sub-districts include air temperature and humidity that are less than optimal for the productivity of dairy cows because they can cause heat stress. The consequences that will be caused by heat stress are decreased productivity and will result in a decrease in feed consumption, and result in reduced milk production.

To overcome the high temperature and humidity, the government is expected to provide subsidies to farmers, namely fans, so that farmers can put the fan on the cow's drums. The government is also expected to often counsel farmers on how important it is to anticipate and prevent heat checks because heat checks can make farmers lose. This is by Qishton and Hartono (2019) stated that obstacles due to heat stress could be anticipated and

overcome so that it will have an impact on improving livestock productivity with several microclimate environment modification techniques to anticipate the negative impact of high air temperature in the drum can be made by the use of shading or roofing, watering water and the use of fans.

The distance between dairy cattle pens and settlements in dairy cattle businesses in the lowlands of Malang Regency, especially Kalipare, Bantur, and Gondanglegi Districts, is an average of 150-500 m. According to the Decree of the Director General of Animal Husbandry No. 776 of 1982 concerning Technical Requirements of Dairy Cattle Breeding Companies, the minimum distance between the pen and the settlement is 250 m. In Gondanglegi District, there are a pen 150 m away from the settlement, So there have been protests from the public. The protests carried out by the community were caused by air pollution derived from unpleasant odors caused by untreated dairy cow dung or the absence of WWTP.

The direction of the government's policy in the future is for a distance between the cage and the settlement of at least 250 m, according to the Ministry of Animal Husbandry. This distance is an ideal distance to prevent conflicts between farmers and the local community so that the dairy business can still be run. Efforts to manage dairy cow manure waste in the form of feces, urine, and feed residues properly need to be emphasized again to farmers so that they do not pollute the environment around the pen.

Farmers use mobile phones to contact cooperatives that house and buy milk in marketing the milk produced by their dairy cows. The use of such mobile phones is less in line with increasingly sophisticated mobile phone technology. Farmers should use the sophistication of cellular telephones to find information about the management of the dairy business, both regarding maintenance management, the latest technologies in terms of feeding, reproductive systems, milking systems, and milk handling information on the daily price of milk. The use of social media to exchange ideas with fellow breeders must also be continuously improved so that the latest information can quickly spread and be known by breeders.

The policy direction related to the marketing information system, the government, can take advantage of the existence of the WA Group owned by farmers to disseminate information related to the dairy business, including the daily price of milk so that farmers will be able to negotiate the purchase price of milk with the cooperative. Other important information, such as training information, and information on milk handling and processing technology, is also provided through social media. The government is also expected to provide internet quota subsidies to farmers.

## CONCLUSION

Based on the research that has been carried out, it can be concluded that the key factors that influence and support the sustainability of dairy cattle in the lowlands of Malang Regency are: 1) Variable A (air temperature and humidity) with a global strength score of 1.86; 2) Variable B (distance between cage and settlement) with a total global strength score of 1.72; 3) Variable C (forage availability) with a total global strength score of 2.31; 4) Variable D (average dairy cow ownership) with a total global strength score of 2.98; 5) Variable E (amount of subsidy) with a total global strength score of 2.44, and 6) Variable F (marketing information system) with a total global strength score of 1.02.

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