Analysis factors affecting the success of Brahman Cross female cattle production improvement program from Australia in South Tapanuli District

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Abstract. The objectives of this research were: (1) Knowing the effect maintenance system, marriage system, breeders' resources, development of related institutions and feeding patterns of livestock body condition scores on Production Improvement Program from Australia in Southern Tapanuli; (2) Knowing the prospects for program development and formulating appropriate strategies to be implemented to support the Brahman Cross Female Production. The determination of samples was done by purposive sampling method as many as 74 respondents. Data were analysed using multiple linear regression and SWOT analysis. The results showed simultaneously, maintenance system, marriage systems, human resources, fostering relevant institutions, feeding patterns, and the farmer knowledge of the animal's body condition score were influenced the success of livestock production variables, while partially, the variables that were influenced. The success of livestock production and having a positive coefficient value are the maintenance system, the marriage system, breeders' human resources, and feeding patterns. The results of the SWOT analysis indicate that influence of internal factors is 1.56 and external factors are 1.59 so that an appropriate strategy for the development of Australian Brahman Cross Female Cattle Production Improvement Program in Southern Tapanuli is Opportunity strategy that is used the power to take advantage of opportunities

1. Introduction
The supply of meat to fulfilling society food security must be increased continuously to stabilize the increasing animal protein needs. The South Tapanuli Region (Tabagsel) is an area in the Province of North Sumatra that has complete natural resources from the coast to the mountains. Natural resources are still the strongest superior in supporting local revenue, so the focus in regional development in South Tapanuli Regency, which is placed on the primary sector, especially the livestock sector. Therefore, in the 2016 fiscal year, the Directorate General of Animal Husbandry and Animal Health through the Directorate of Animal Breeding and Production of the Ministry of Agriculture allocated assistance to increase livestock production through the addition of imported Australian beef cattle with the number of Brahman Cross (BX) broodstock, which is distributed to farmer groups/livestock as many as 44 groups where each group receives as many as 25 cattle. BC cattle were chosen because this type of cattle is easy to adapt to the environment, growth is
much faster, resistant to disease, relatively easy cultivation and high meat production and can develop well in the Tabagsel region because of the agro-climate of livestock origin that is not so much different. The procedure for the development of Australian Imported beef cattle, which is government assistance as an effort to improve food security, has not been implemented optimally. In the course of the implementation of this activity. There are several problems at the farmer level and technical officers in the field. Good and correct management of beef cattle has not yet been adopted perfectly by breeders, so there is still a need to provide guidance especially for recording marriages, treatments given, deaths, etc. because the recording is essential as a tool to improve genetic quality, productivity, business efficiency, and livestock prices. The office which handles the function of animal husbandry in the Tabagsel region (Tapanuli Selatan Districts, Padang Lawas, and Padang Lawas Utara) strives always to be able to provide guidance and motivation.

2. Materials and methods
This research was conducted in the Tabagsel area, which consisted of 3 districts, namely South Tapanuli Districts, Padang Lawas Districts, and Padang Lawas Utara Districts. The selection of this area is made deliberately. The primary data were field data obtained by pressing observation, and direct interviews with farmer/livestock groups and secondary data were supporting data. The sampling method was carried out intentionally (purposive sampling). The respondent units were the Livestock Farmers group that received the assistance of the Australian female cattle import program (Brahman Cross / BX), which were consisting of 12 livestock farmer groups spread across 3 districts, namely Tapanuli Selatan Districts, Padang Lawas Districts, and Padang Lawas Utara Districts with 286 members. The selection of respondents was carried out by simple random sampling by taking each of the livestock farmer groups in each district. The used method for determining the number of samples in this study was using the Slovin formula [1], so the number of samples was 74 farmers. Analysing the relationship between variables in this study was using the method of multiple regression analysis, coefficient of determination, t-test, and F test, preventing reducing errors manually data in this analysis using the Statistical Product and Service Solution (SPSS) tool.

2.1 Multiple linear regression analysis
Multiple linear regression analysis is the development of a simple linear regression analysis used to see a number of independent variables X1, X2, ... Xk on the dependent variable Y based on the value of the independent variables X1, X2, ... Xk.

2.2 Test statistics

2.2.1 Test F. F test is a way to test the null hypothesis involving more than one coefficient, the way it works is to determine whether the fit (the overall fit) of a regression equation is significantly reduced by limiting the equation to adjust to the null hypothesis.

2.2.2 Test T. According to Syakhiruddin [3] the test of the significance of individual parameters (T-test) was carried out to see the significance of the influence of the independent variables (X1 and X2) to the dependent variable Y individually.

2.2.3 Determinant coefficients. The coefficient of determination notated by R2 is an essential measure in the regression because it can inform whether or not the estimated regression; in other words, the number can measure how close the range of estimation is to the actual data. The value of the determination coefficient reflects how much the variation of the dependent variable can be explained by the independent variable [2].
2.2.4 Analysis of development strategy for the productive australian female cattle import (Brahman cross). The collected primary and secondary data, which are qualitative, were described descriptively, then the data is tested using the SWOT matrix. The SWOT matrix is a method used to arrange strategic factors. This SWOT matrix clearly illustrates how external opportunities and threats faced by farmers are resolved by their strengths and weaknesses [4]. The SWOT matrix was used to compile the strategic factors of the livestock business. This SWOT matrix clearly illustrates how their strengths and weaknesses can resolve external opportunities and threats.

3. Results and discussion
The results of the research were conducted by testing classical assumptions. The conclusions showed that the model could be used to test multiple regression analysis, then tested the hypothesis simultaneously with the F test and partial hypothesis testing with the T-test. Hypothesis testing can be formulated as shown in Table 1.

Table 1. Test F on the factors that influence the success of the program to increase the production of BX female cattle from Australia in Tabagsel

| Model         | Sum of Squares | Df | Mean Square | F     | Sig  |
|---------------|----------------|----|-------------|-------|------|
| Regression    | 1170.085       | 6  | 195.014     | 3.108 | .017b|
| Residual      | 313.707        | 5  | 62.741      |       |      |
| Total         | 1483.792       | 11 |             |       |      |

a. Dependent Variable: Success of the Animal Production Improvement Program
b. Predictors: (Constant), Farmer Knowledge Level about Animal Body Condition Scores, Rearing System, Mating System, Role of Related Institution Development, Feed Granting Pattern, Human Resources

Based on the analysis that has been done, the linear equation model is obtained as follows:

\[ Y = 68,508 + 0.513 X_1 + 18,625 X_2 + 5,996X_3 -102.901 X_4 + 84,705 X_5 - 10,723 X_6 \]  

(1)

Information:
Y = The success of the production improvement program
A = Constant
\( \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6 \) = Regression coefficient
\( X_1 \) = Maintenance system
\( X_2 \) = Marriage system
\( X_3 \) = Human resources
\( X_4 \) = Coaching related institutions
\( X_5 \) = Feeding pattern
\( X_6 \) = Farmer's knowledge level of livestock body condition scores
Table 2. T test results

| Model | Unstandardized Coefficients | Standardize Coefficients | t | Sig. | Correlations | Collinearity Statistics |
|-------|-----------------------------|--------------------------|---|------|--------------|------------------------|
|       | B                           | Std. Error               | Beta | .374 | .041         |                        |
| 1     | (Constant)                  | 68.508                   | 183.414 | .502 | 1.138 | .001 | .218 | .454 | .398 | .629 | .539 | 1.590 |
|       | Maintenance system          | .513                     | .451 | .502 | 1.138 | .001 | .218 | .454 | .398 | .629 | .539 | 1.590 |
|       | Marriage system             | 18.625                   | 12.530 | .622 | 1.486 | .000 | .423 | .554 | .520 | .698 | .433 | 1.433 |
|       | Human resources             | 5.996                    | 17.996 | .224 | 1.333 | .015 | .064 | .147 | .117 | .270 | .379 | 1.433 |
|       | Coaching related institutions | -102.901            | 114.318 | -2.840 | -.900 | .049 | .128 | -.373 | -.315 | .012 | .813 | 6.365 |
|       | Feeding pattern             | 84.705                   | 93.272 | 2.518 | 1.908 | .044 | .129 | .376 | .318 | .016 | .628 | 7.097 |
|       | Farmer's level of knowledge about livestock body condition scores | -10.723                  | 27.977 | -.160 | -.383 | .717 | -.242 | -.169 | -.134 | .698 | 1.432 |

Based on Table 2, it can be explained that the coefficient of determination with an Adjusted R Square value of 0.788. This means that the independent variable can explain the variation of the dependent variable (variables of the maintenance system, mating system, human resources, coaching related institutions, feeding patterns, level of knowledge of farmers, about the score of body condition livestock), 80% in explaining the effect on the success of the program to increase the production of BX female cattle from Australia in Tabagsel, namely South Tapanuli Regency, Padang Lawas, Padang Lawas Utara. It can also be explained that the influence of each variable of the maintenance system, mating system, human resources, the role of coaching related institutions, feeding patterns, and the level of knowledge of breeders about the score of livestock body conditions on the success of the program to increase production of BX female cattle in Tabagsel with the following explanation:

Table 3. Results of multiple linear regression coefficient analysis of the factors that influence the success of the BX female cattle production improvement program in Tabagsel

| Model Summaryb |
|----------------|-----------------|-----------------|-----------------|-----------------|
| Model          | R               | R Square        | Adjusted R Square | Std. The error of the Estimate |
| 1              | .788a           | 0.789           | 0.535            | 7.92095         |

a: Predictors: (Constant), Maintenance Systems, Marriage Systems, Human Resources, Coaching Related Agencies, Feeding Patterns, Farmers' Knowledge Levels on Animal Body Condition Scores; b: Dependent Variable: Success of the Animal Production Improvement Program
3.1 Variables of the maintenance system, marriage system, human resources, role of institutional development related, feeding patterns and farmer knowledge level of animal body condition scores for the success of the Australian BX female cattle production improvement program in Tabagsel

Table 2 of the results of the T-test above can be seen that simultaneously, the maintenance system variables, mating system, human resources, coaching related agencies, feeding patterns, and livestock body conditions affect. The success variables of livestock production, while partially the variables that influence the success of production livestock and have a positive coefficient value are the maintenance system, mating system, human resources, feeding patterns. While the variables that do not affect the success of livestock production and have a negative coefficient value are the coaching of related agencies and the farmer’s knowledge level about the score of the livestock body condition (BCS).

The estimation results show that the value of the regression coefficient of the maintenance system variable is positive at 0.513 (Table 1). This states that for every 1% increase/improvement in the maintenance system, there will be an increase in the success rate of Brahman cross female cattle origin from Australia by 0.5%, which further proves that proper management of the maintenance system can affect the success of the Production Increase program. Herwono said [5] that one of the efforts to increase population and accelerate the spread of large livestock by breeders is by raising these animals; good livestock rising significantly affects breeding and ensuring animal health. Farmers in raising their livestock must be based on the principles of raising and breeding tropical animals, namely: environmental control, supervision of management systems, and quality control of livestock.

The estimation results show that the value of the regression coefficient is positive at 18,625 on the marriage system variable. This states that if there is an increase in the management of the marriage system by 1%, there will be an increase in the success rate of Brahman cross female cattle origin from Australia by 18.625%. F test results (Table 1) explain the value of P-Value (sig) 0.017 smaller than 0.05, then (Ho is rejected), meaning that the independent variable, the marriage system, simultaneously influences the dependent variable success of livestock production at a significant level α = 5%. This proves that the marriage system influences the success of the Australian BX Female Cattle Production Improvement Program in Tabagsel with the proper pattern of marriage system application, which will significantly affect livestock productivity, [6]. In this study the most common marriages system is a marriage system through Artificial Insemination (IB) can be seen from as many as 12 groups as same as with the results of research conducted by the Director-General of Animal Husbandry team and researchers from the Faculty of Animal Husbandry of UB [7], who conducted a study on the evaluation of the success of the imported BX cattle breeding. The results show that only about 30% of all imported BX cows distributed are able to get pregnant again, which is very far from the original expectations of the program's objectives.

Table 2 T-test results explain the human resource variable of 0.015, the value of P-Value (sig) is smaller than 0.05 in the absolute value at a significant level α = 5% partially effect on the success of the program in Tabagsel (Ho rejected). The estimation results show that the regression coefficient value is positive at 5,996. This states that if there is an increase in the quality of Human Resources of ranchers by 1%, there will be an increase in the success rate of Australian Brahman cross female cattle by 5.996%. Table 1 F test explains the value of P-Value (sig) 0.017 less than 0.05, then (Ho is rejected), meaning that all human resource variables simultaneously influence the dependent variable success of livestock production at a significant level α = 5%. This proves that the role of the livestock business actors will determine the sustainability of the business being run. According to data obtained from respondents, components of human resource characteristics of members of livestock groups. That affects the success of raising livestock is the level of education, continuity of training, the experience of breeding and tribal races of farmers [8].

The test result of the Coaching variables of related agencies has a simultaneous effect. This variable has no partial effect because it has a value of a variable far greater than 0.05 in absolute values at a significant level of α = 5% ie, Development of Related Institutions of 0.409, has no partial effect on the success of this
program (Ho is accepted). The estimation results show that the regression coefficient value is negative; this proves that the factor of coaching related institutions does not affect the success of this program in Tabagsel; in other words, whether the role of relevant agencies does not affect the success of the program [9].

F test results (Table 1) explain the value of P-Value (sig) 0.017 smaller than 0.05, then (Ho is rejected), meaning that all independent variables simultaneously influence the dependent variable success of livestock production at a significant level α = 5%. Table 2 explains the independent variables that have a P-value (sig) smaller than 0.05 in absolute values at a significant level α = 5%, namely the feeding pattern of 0.044, partially influencing the success of the program in Tabagsel (Ho rejected). Estimation results show that the value of the regression coefficient is positive at 84.705, this states that if there is an increase in the management of feeding patterns by 1%, there will be an increase in the success rate of BX female cattle production by 84.705%. Increased beef cattle productivity is influenced by feeding because the feed has the most excellent effect (60%). Maximum weight gain can be achieved if the feed provided is sufficient both in quality and quantity [10]. The success of the livestock business can be achieved through proper maintenance management [11]. Maintenance management includes feed management, housing, reproduction, and health. In addition, one of the factors of weight gain can be influenced by the level of feed consumption, so cows that experience a shortage of feed consumption, weight gain will be hampered.

The independent variable that has a P-Value (sig) greater than 0.05 in the absolute value at a significant level α = 5%, namely farmer’s knowledge level about livestock body condition score of 0.717 has no partial effect on the success of the Program in Tabagsel (Ho is accepted). Estimation results show that the regression coefficient is Negative meaning this factor does not affect the success of increasing the production of Australian BX female cattle in Tabagsel but has a simultaneous effect with a P-value (sig) 0.017 less than 0.05, then (Ho is rejected), this means that all independent variables simultaneously influence the dependent variable on the success of livestock production at a significant level α = 5%. This is not the same as Santoso research [12] which states that livestock body condition scores need to be known for people's beef cattle breeding in increasing the number of livestock populations, especially in the Gondang District, Nganjuk Districts, because this is often ruled out in the management of maintenance and reproduction and selecting the excellent broodstock cattle.

3.2 Development strategy of Australian BX female cattle production enhancement program in Tabagsel

Based on the calculation results of internal factor analysis which is divided into strengths and weaknesses as well as an analysis of external factors divided into opportunities and threats, it can be seen that the coordinates of the strategy used for the development of the Australian BX Female Cattle Production Improvement Program in Tabagsel, the results can be summarized as follows: total strength score = 1.92; total weakness score = 1.20; total opportunity score = 1.83 and total threat score = 1.34. An overview of the overall SWOT results is presented in Figure 1. The results of the analysis of internal factors show a score of 1.56 and the results of external factors show a score of 1.59 and the position shows in quadrant I am an aggressive strategy, this situation according to Rangkuti (2008) is a strategy using Strength to take advantage of current opportunities. The SWOT analysis provides a detailed Strategy on the development of the Australian Brahman Cross Female Cattle Production Improvement Program in Southern Tapanuli.

To find the coordinates of the SWOT strategy, look for the following methods: internal analysis coordinates with: (Total Strength Score - Total Weakness Score)/2 = (1.92 - 1.20)/2 = 1.56 and external analysis coordinates with: (Total Opportunity Score - Total Threat Score)/2 = (1.83 - 1.34)/2 = 1.59. So the coordinates are at (1.56; 1.59). Next, the results of these coordinates are presented in the SWOT matrix diagram to determine the position of the development strategy:
3.2.1 Improving the management of the maintenance of BX female cattle through the synergy between the Government and the livestock farmer groups in meeting the high demand for meat. This strategy can be applied in the form of a program as follows: Human Resource Training (capacity building); Increasing the role of the livestock service through intensive technical staff to routinely; Creating livestock health service centers such as Poskeswan, Artificial Insemination Unit (IB), IB facilities, byproducts of the agricultural industry as raw material for concentrate feed and institutional farmers (farmer groups), slaughterhouses (RPH) and officers.

3.2.2 Utilization of land area as well as the potential availability of forage and suitability of the environmental climate for the application of patterns of integration of livestock-estate crops, this strategy can be implemented in the form of programs as follows: Build synergy between Farmers with plantation entrepreneurs; Development of forage and concentrate technology with local raw materials; and collaboration with other agencies in developing feed by utilizing existing land. Perform technical guidance in the application of feed technology.

3.2.3 Optimization Empowering the availability of affordable workforce (the role of Farmer Group Members) by utilizing the availability of access to information to meet the daily demand of consumers at traditional feast activities and religious holidays, this strategy can be implemented in the form of programs: increased participation and motivation of farmers / Poktan in the application and adoption of applicable technology through access to affordable information such as Internet access and through training and internships to advanced livestock groups or livestock companies.
4. Conclusions
Through the results of the study it can be concluded as follows: simultaneously variables of the maintenance system, mating system, human resources, coaching related agencies, feeding patterns and livestock body conditions affect the success variables of livestock production, while partially the variables that affect the success of livestock production and has a positive coefficient value is the maintenance system, mating system, human resources, feeding patterns, while the variables that do not affect the success of livestock production and have a negative coefficient value are the coaching of related institutions and the level of knowledge of farmers about the score of livestock body condition (BCS). The strategy that must be implemented in the framework of developing the Australian Brahman Cross Female Cattle Production Improvement Program in South Tapanuli based on the results of the SWOT analysis is that it tends to be a strength-opportunity (SO) strategy.

References
[1] Amirin T 2011 Populasi dan sampel penelitian 4: Ukuran sampel rumus slovin [Research population and samples 4: slovin formula sample size] (Jakarta: Erlangga)
[2] GhozaliI 2005 Aplikasi Analisis multivariate dengan program SPSS [Multivariate analysis application with SPSS program] (Semarang: Universitas Diponegoro)
[3] Syakhiruddin 2008 Statistika ekonomi [Economic statistics] (Universitas Banda Aceh: Syiah Kuala Press)
[4] Rangkuti F2008 Analisis SWOT: teknik membedah kasus bisnis SWOT analysis: Techniques for dissecting business cases (Jakarta: Gramedia)
[5] Herwono B 2006 Prospek pengembangan usaha peternakan sapi potong di Kecamatan Surade Kabupaten Suka bumi [Prospects for beef cattle business development in Surade Subdistrict, Suka Bumi Regency] (Bogor: Fakultas Peternakan)
[6] Toelihire M R 1993 Fisiologi reproduksi ternak [animal physiology and reproduction] (Bandung: Angkasa)
[7] Susilawati 2016 Industri sapi potong [Beef cattle industry] (Malang: Universitas Brawijaya Press)
[8] Suryana 2003 Kewirausahaan [Entrepreneurship] (Jakarta: Salemba Empat)
[9] Basril B 2018 Kebijakan penyuluhuan pertanian Sub Sektor peternakan sebagai alat pemacu pencapaian swasembada daging sapi yang berkelanjutan di Sumatera Barat (Policy on the agricultural extension of animal husbandry sub sector as a booster to achieve sustainable beef sufficiency in West Sumatra ) Doctoral Theses Pasca Unand Padang
[10] Supratman and Iwan 2001 Manajemen pakan sapi potong pelatihan wirabisnis feedlot sapi Potong [Beef cattle feed management wirabisnis feedlot beef cattle training] (Bandung: Universitas Padjajaran)
[11] Nurwahid 2011 Pemberian enzim dengan dosis yang berbeda pada pakan komersial terhadap kandungan bahan kering protein kasar dan lemak kasar (Enzymes with different doses in commercial feeds of dry content of crude protein and rough fat) Thesis Fakultas Perikanan dan Kelautan Surabaya: Universitas Airlangga
[12] Santoso U 2008 Mengelola peternakan sapi secara professional [Manage cattle farms professionally] (Jakarta : Penebar Swadaya)