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DYNAMICS OF THE ACCELERATION PROGRAM FOR INCREASING THE CATTLE POPULATION IN JAMBI PROVINCE FOR THE PERIOD OF 2011-2022

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ABSTRACT
This research aims to analyze the comparison of the acceleration of increasing the cattle population between programs to increase the cattle population (PSDS, GBIB, Upsus Siwab, and Sikomandan) in Jambi Province as well as the direct and indirect influence of the factors determining the acceleration of increasing the cattle population. This research uses secondary data from Jambi Province Statistics for 2011-2022. A multivariable comparative analysis uses ANOVA (Analysis of variances). Further testing can be done with Tukey's Honestly Significant Difference (HSD). Path analysis was used to analyze the direct and indirect influence of the factors determining the accelerated increase in cattle population in Jambi Province. Differences occur in the income and output of livestock for the PSDS and Sikomandan programs, while population growth accelerates between PSDS and GBIB. Factors influencing the program to increase the cattle population in Jambi Province are the birth factor of cattle, the death factor of livestock, and the number of AI doses used. The factor that has the most significant influence on increasing the cattle population is the birth factor of cattle.

KEY WORDS
Consumption, production, PSDS, GBIB, UPSUS SIWAB, SIKOMANDAN.

Enhancement in beef consumption is caused by improved economic growth, population growth, and education levels, which are not in line with increases in meat production. This results in a shortage of beef supplies and triggers quite large imports. Domestic meat production can only meet 65% of the demand, so the remainder is met by imports of beef, 20%, and feeder cattle, 15% (Ilham et al., 2015).

To increase the availability of food from livestock, the government has started a program to achieve beef self-sufficiency since 2000, continuing in 2005 with a target of achieving it in 2010, but this has not yet been realized (Haddi et al., 2011), so that some groups question whether it is possible to achieve meat self-sufficiency (Atmakusuma et al. 2011). Ashari et al. (2012) stated that the Ministry of Agriculture's 2010-2014 strategic plans show four main targets to be achieved or maintained: achieving meat self-sufficiency. Still, in the context of food independence, the government is continuing with the 2014 Beef Self-Sufficiency Program (PSDS 2014). Continuing with the lust bluffing and artificial insemination (GBIB) program, which is carried out by injecting hormones to synchronize lust so that it is hoped that pregnancy and births will increase, it is hoped that Indonesia will be able to increase the domestic beef cattle population as a national meat supply. Furthermore, the government launched a new program to increase the cattle population, Special Efforts for Compulsory Pregnant Mother Cows (Ministry of Agriculture, 2017). It is hoped that the UPSUS SIWAB program can boost the domestic cattle population so that it develops well (Sulaiman et al., 2017). In 2020, the government expanded the scope of output activities, increasing population and providing domestic beef production through the SIKOMANDAN program as stated in Minister of Agriculture Regulation Number 17 of 2020 (Trisman et al. 2021).

Likewise, Jambi Province is involved in carrying out all population increase programs. However, in Jambi Province, there has been no comparative analysis of these programs, so the regional government does not yet have the appropriate direction to continue the program to increase the cattle population if this program is returned to the respective regional

governments. So, it is necessary to carry out an analysis and compare programs to increase the cattle population that have been implemented in Jambi Province. Based on the data collected, a comparative analysis is carried out between programs based on the level of success achieved and an analysis of factors that are considered to influence the increase in livestock population, either directly or indirectly.

METHODS OF RESEARCH

This research was conducted using primary data and secondary data sourced from statistical data from the Jambi Province Department of Horticulture Food Crops and Livestock and livestock statistics data from Jambi Province. The statistical test used is ANOVA (Analysis of Variance). To be able to use ANOVA, you must first test assumptions, including normality, heteroscedasticity, and random sampling (Ghozali, 2009). The hypothesis is H0 , end subscript: mu sub 1 equals , mu sub 2 equals dot dot dot equals , mu sub k meaning that all population means are the same, there is no variability in standards within groups. H_1: not all $\mu_i$the same. i = 1,2,3,…k means there is at least one population mean that is different, there is a treatment effect, and not all population means are different Post hoc analysis was performed if H_0 rejected—analysis after ANOVA is to find out which groups are different. Further testing can be done with Tukey's HSD. The process is as follows:

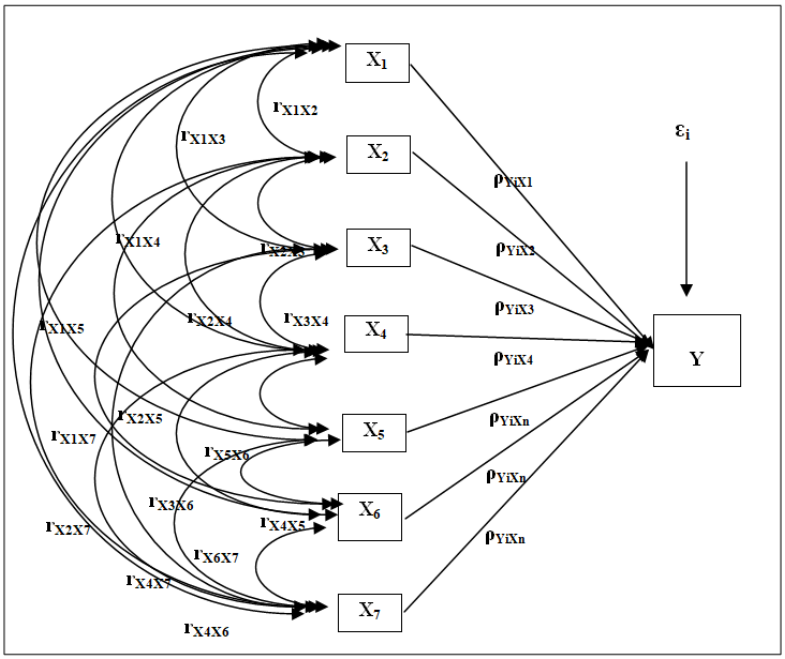
$$HSD = \sqrt[q]{\frac{RKd}{n}}$$

Where: n = number of samples per group; q = the student size range statistic; k = number of groups; df = n – k.

Next, look for the average difference between groups and compare the average with the HSD value. If the average difference is greater than the HSD value, it means there is a significant difference, but if the value is smaller than the HSD, then there is no significant difference. Statistical data analysis in this research will be carried out using the SPSS program.Path analysis is used to test the magnitude of the direct and indirect influence of factors influencing population increase. It can also find clear reciprocal relationships between results and various components as research variables (Khan et al., 2009).

The path analysis of this research can be written as follows:

$$Y_i = \rho_{YiX1} X_1 + \rho_{YiX2} X_2 + \rho_{YiX3}\rho\rho\rho X_6 + \rho_{YiX7} X_7 + \varepsilon_i$$



Where: Y = Livestock Population; X_1 = Birth of livestock; X_2 = Death of livestock; X_3 = Livestock slaughter; X_4 = Livestock import; X_5 = Livestock expenditure; X_6 = Number of AI acceptors; X_7 = Number of AI doses; ρ_{YiX1-n} = Path Coefficient; E = Residual variable.

RESULTS AND DISCUSSION

This research found that the significance value of cattle birth from the PSDS, GBIB, Upsus Siwab, and Sikomandan programs was 0.907. The consequence shows no difference in the number of births from each population increase program. These results are based on research by Nursholeh et al. (2021), which states that there are no differences in cattle birth rates between districts/cities in Jambi Province. The birth rate is also influenced by the number of female cattle that are AI acceptors each period, which has the same average so that the birth rate has the same results (DTHPP, 2020).

Table 1 – Comparative Results of Livestock Birth Rates between Livestock Population Increase Programs

Program	Normality		Homogeneity		One-Way ANOVA Test		
	Stat	Sig	Information	Sig.	Information	F	Sig.
PSDS	0.949	0.634	Based on Mean	0.937	Between Groups	0.18	0.907
GBIB	0.937	0.487	Based on Median	0.975			
Upsus Siwab	0.932	0.428	Based on Med.Adj. df	0.975			
Sikomandan	0.920	0.319	Based on trim. mean	0.943			

The results obtained from statistical tests on livestock imports obtained a significance value of 0.014 when comparing the Sikomandan program with PSDS. These results show a significant difference in the amount of livestock income between the Sikomandan and PSDS programs, while there is no difference between the other programs. This research indicates that the PSDS program causes more cattle imports than other programs because there are more massive cattle seed procurement activities (Regulation of the Minister of Agriculture of the Republic of Indonesia Number 19 of 2010).

Table 2 – Comparative Results of Livestock Income Levels between Livestock Population Increase Programs

Program	Normality		Kruskal Wallis Test		Pairwise Comparison	
	Stat.	Sig.	Information	Stat.	Program	Adj. Sig
PSDS	0.817	0.016	Kruskal Wallis	10.19		
GBIB	0.670	0,000	Df	3	SIKOMANDAN- PSDS	0.014
Upsus Siwab	0.688	0,000	Asymp.Sig	0.017		
Sikomandan	0.893	0.151				

The statistical test for the number of livestock expenditures obtained a significance value of 0.027 when comparing the Sikomandan and PSDS programs. These findings indicate a difference in the amount of livestock production between the Sikomandan and PSDS programs, while there is no difference between other programs. The results of this research illustrate that the PSDS program causes more cattle to be lost than other programs. In the PSDS program, activities prohibit the slaughter of productive female cattle and delay the slaughter of local cattle to achieve maximum slaughter weight (Regulation of the Minister of Agriculture of the Republic of Indonesia Number 19 of 2010). In this way, the slaughter of cattle for consumption needs is reduced so that more cattle income results in more cattle expenditure.

The analysis of the variance test obtained for the number of livestock slaughtered obtained a significance value of 0.999. This value shows no difference between programs in the level of cattle slaughter. The consequence of the findings of this research is that the program to increase the cattle population (PSDS, GBIB, Upsus Siwab, and Sikomandan) in Jambi Province for 2011-2022 did not show significant differences in livestock slaughter. This condition is due to the per capita consumption level of beef among the people of Jambi Province during that period showing a considerable increase. In contrast to the conditions in

Indonesia, demand for meat continues to increase, so being forced to slaughter more domestic cattle, whose slow growth will cause the population to decline drastically and could even lead to shortages (Ilham, 2009).

Table 3 – Comparative Results of Livestock Expenditure Levels between Livestock Population Increase Programs

Program	Normality		Kruskal Wallis Test		Pairwise Comparison	
	Stat.	Sig.	Information	Stat.	Program	Adj. Sig.
PSDS	0.644	0,000	Kruskal Wallis	10.46		
GBIB	0.592	0,000	Df	3	SIKOMANDAN- PSDS	0.027
Upsus Siwab	0.765	0.003	Asymp.Sig	0.015		
Sikomandan	0.757	0.003				

Table 4 – Comparative Results of Livestock Slaughter Levels between Livestock Population Increase Programs

Program	Normality		Homogeneity		One-Way ANOVA Test		
	stat	Sig	Information	sig	Information	F	Sig.
PSDS	0.960	0.775	Based on Mean	0.926	Between Groups	0.008	0.999
GBIB	0.935	0.468	Based on Median	0.957			
Upsus Siwab	0.913	0.266	Based on Med.Adj. df	0.957			
Sikomandan	0.950	0.642	Based on trim. mean	0.930			

The death rate of cattle in Jambi Province for the period 2011-2022 after carrying out the Analysis of Variance statistical test results obtained a significance value of 0.710 or this result shows that there is no difference in the number of cattle deaths between population increase programs implemented in Jambi Province. Various programs to increase the cattle population (PSDS, GBIB, Upsus Siwab, and Sikomandan) in Jambi Province for 2011-2022 did not reveal any outbreaks of cattle diseases categorized as extraordinary events. Hence, cattle deaths were relatively the same in each program period. The results of this research are in line with the research results that there is no difference between gross population growth and net population, and there is no influence of birth factors, income factors, expenditure factors, and death factors on the dynamics of net growth of the cattle population in Jambi Province (Nursholeh et al., 2021).

Table 5 – Comparative Results of Livestock Slaughter Levels between Livestock Population Increase Programs

Program	Normality		Kruskal Wallis Test	
	Stat.	Sig.	Information	Stat.
PSDS	0.919	0.306	Kruskal Wallis	1,381
GBIB	0.831	0.024	Df	3
Upsus Siwab	0.856	0.050	Asymp.Sig	0.710
Sikomandan	0.919	0.312		

Table 6 – Comparative Results of Livestock Populations between Livestock Population Improvement Programs

Program	Normality		Homogeneity		One-Way ANOVA Test		
	Stat	Sig	Information	Sig	Information	F	Sig.
PSDS	0.957	0.728	Based on Mean	0.775	Between Groups	0.252	0.860
GBIB	0.953	0.680	Based on Median	0.860			
Upsus Siwab	0.927	0.384	Based on Med.Adj. df	0.860			
Sikomandan	0.885	0.121	Based on trim. mean	0.801			

For the cattle population, the results obtained had a significance value greater than 0.05, so it could be concluded that there were no differences between the programs implemented. The insignificant condition of the population can be caused by the birth, slaughter, and death rates of cattle in Jambi Province, which are relatively the same between programs. The average cattle slaughter rate is 29,000 head per year (DTPHP, 2020). Yusdja et al. (2011) reported that the causes of low cattle population growth include (1) the proportion of productive males and females, (2) the productivity of productive females, (3) the number of sales and slaughter of productive females, and (4) cases of death due to animal disease.

The statistical test results for the acceleration of population increase obtained a significance value of 0.019, which shows a difference in the acceleration of the rise in the cattle population between the PSDS and GBIB programs. At the same time, there is no difference between the other programs. The acceleration of increasing the cattle population among the cattle population increase programs (PSDS, GBIB, Upsus Siwab, and Sikomandan) in Jambi Province during the 2011-2022 period is the largest in the GBIB program. In this GBIB program, there are specific activities in the form of optimizing reproduction by injecting the hormone PGF2α so that there is synchronization of estrus and increased pregnancy in cattle.

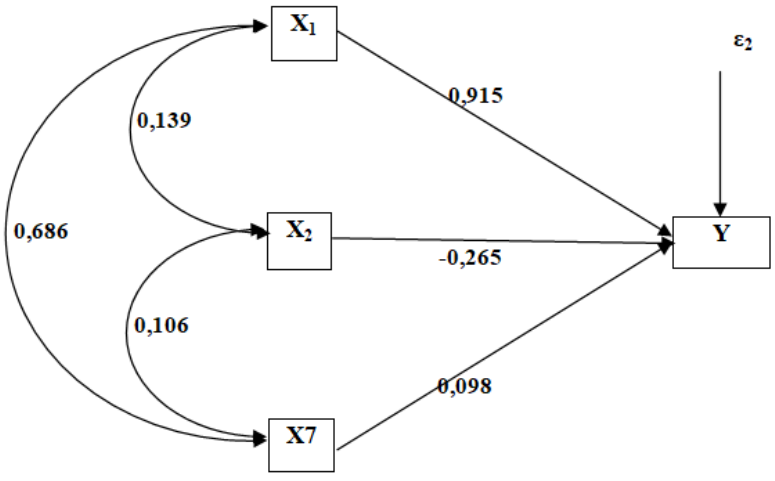
Table 7 – Comparative Results of Livestock Population Increase between Livestock Population Increase Programs

Program	Normality		Kruskal Wallis Test		Pairwise Comparison	
	Stat.	Sig.	Information	Stat.	Program	Adj. Sig
PSDS	0.779	0.005	Kruskal Wallis	10.43		
GBIB	0.940	0.518	Df	3	PSDS – GBIB	0.019
Upsus Siwab	0.831	0.024	Asymp.Sig	0.015		
Sikomandan	0.944	0.563				

Statistical tests are used to determine the influence of livestock birth factors (X_1), livestock death factors (X_2), livestock slaughter factors (X_3), livestock entry factors (X_4), livestock output factors (X_5), AI acceptor factors (X_6) and the AI dose factor (X_7) simultaneously on increasing the cattle population in Jambi Province is the F test. The results of the F test analysis obtained a calculated F value = 176.474 with significance = 0.000, which means the null hypothesis is rejected and the alternative hypothesis is accepted, meaning that there is at least one path coefficient value that is meaningful (significant). These results indicate that the livestock birth factor (X_1), livestock death factor (X_2), livestock slaughter factor (X_3), livestock entry factor (X_4), livestock output factor (X_5), AI acceptor factor (X_6), and the AI dose factor (X_7) simultaneously influence the increase in livestock population in Jambi Province.

The results obtained from the t-test for the seven existing paths (X_3), livestock entry factor (X_4), livestock output factor (X_5), and AI acceptor factor (X_6), while the other three paths are the path coefficient of livestock birth factor (X_1), livestock death factor (X_2) and the AI dose factor (X_7) was significant. An insignificant path coefficient indicates that the path coefficient is not meaningful. So, the insignificant path coefficient must be removed.

The results obtained show that the livestock birth factor (X_1), livestock death factor (X_2), and AI dose factor (X_7) simultaneously influence the increase in the cattle population of Jambi Province. The t-test results for Y (livestock population) showed that PYX1, PYX2, PYX6, and PYX7 were significant. This means that the livestock birth factor (X1), livestock death factor (X2), and AI dose factor (X7) influence the increase in the livestock population:



From the results obtained, population increase is influenced by factors such as births, deaths, and the AI dose used. Birth factors have the most significant influence, namely 86.5%, so efforts need to be made to increase births. Asana F (2018) states that the birth rate is the most effective benchmark for determining the productivity and fertility of livestock in a region. The birth factor supported by the AI dosage factor will increase the population by 6.2%, so artificial insemination with the proper treatment and time is needed (Ramli, 2016).

Table 8 – Path Analysis Test Results

Variable	Coefficient Beta	Influence Direct	Indirect Influence			Total Influence Indirect	Total Influence
			X_1	X_2	X_7		
X_1	0.915	0.837	0,000	-0.034	0.062	0.028	0.865
X_2	-0.265	0.070	-0.034	0,000	-0.003	-0.036	0.034
X_7	0.098	0.010	0.062	-0.003	0,000	0.059	0.068

Note: X_1 = Factor Number of Births; X_2 = Number of Deaths Factor; X_7 = Factor for the number of AI doses.

Haile A. (2011) states that regularly monitoring breeding programs can increase livestock and meat production. Meanwhile, the death factor has a negative sign, reducing the population. Asana F (2018) stated that the death of Bali cattle is basically due to traditional maintenance and breeders lacking skills, so it is necessary to increase breeders' ability to reduce the cattle death rate. Kusriatmi et al. (2014) revealed that technological improvements in AI through increasing dose application can accelerate the achievement of meat self-sufficiency.

CONCLUSION

Comparison between population increase programs, namely PSDS, GBIB, Upsus Siwab, and Sikomandan, shows significant differences in livestock income and output variables in the PSDS and Sikomandan programs. Meanwhile, there is a fundamental difference between the PSDS and GBIB programs regarding the acceleration of the population growth variable. For the variables of number of births, number of slaughters, number of deaths, and livestock population, the results were not significantly different. The program to increase the cattle population in Jambi Province is influenced by the birth factor, the death factor, and the number of AI doses used. The birth factor has the greatest influence on increasing the cattle population. The population increase program in the Jambi area can be carried out with activities such as the GBIB program, namely by bullying female cows so that there will be a lot of cattle pregnancies.

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