



## Sustainability Status of Alabio Duck Farming in Hulu Sungai Utara Regency, Indonesia

Aulia Rahayu Putri<sup>1</sup>, Siti Azizah<sup>2</sup>, Irfan Hadji Djunaidi<sup>3</sup>

<sup>1</sup> Student, Faculty of Animal Science, University Brawijaya, Jl. Veteran Malang 65145 East Java, Indonesia

<sup>2,3</sup> Lecturer, Faculty of Animal Science, University Brawijaya, Jl. Veteran Malang 65145 East Java, Indonesia

**ABSTRACT:** Alabio Duck (*Anas platyrhynchos Borneo*) is a germplasm originating from Hulu Sungai Utara Regency, South Kalimantan. Currently, the availability of pure Alabio Ducks is very limited in Hulu Sungai Utara Regency due to various factors that threaten the sustainability of Alabio duck farming. This paper aims to analyse the sustainability status of Alabio duck farming in Hulu Sungai Utara Regency. Multidimensional Scaling (MDS) is used to determine the sustainability status. The result showed that the sustainability status of Alabio duck farming in Hulu Sungai Utara Regency is classified as moderately sustainable. However, the ecological and technological dimensions are classified as less sustainable, the economic and institutional dimensions are classified as moderately sustainable, while only the social dimension is classified as sustainable. Improvements are needed in the conditions of Alabio duck farming to raise its sustainability status in Hulu Sungai Utara Regency.

**KEYWORDS:** Multidimensional scaling, index, development, ducks, germplasm

### INTRODUCTION

Ducks are a type of waterfowl known as a source of animal protein, providing both meat and eggs. Ducks are highly potential to be developed as a source of animal protein due to the open market for ducks both domestically and internationally [1]. One of the local duck breeds found in Indonesia is the Alabio Duck. Alabio Duck (*Anas platyrhynchos Borneo*) is a germplasm originating from South Kalimantan. According to the Minister of Agriculture Decree Number 2921/kpts/ot.140/6/2011, Alabio duck is designated as a distinct breed specific to South Kalimantan. Duck farming plays an important role in South Kalimantan because the society values duck eggs more than chicken eggs [2]; thus, the existence of duck farming is vital for the people of South Kalimantan. Over the past five years, the duck population in South Kalimantan has decreased. The duck population decreased from 4,264,995 ducks in 2018 to 3,359,856 ducks in 2022, representing a decline of approximately 21.20% [3].

The availability of Alabio Ducks is very limited in Hulu Sungai Utara Regency because farmers have shown decreasing interest in raising Alabio Ducks as their primary livestock. The decrease in farmer's interest of raising Alabio Ducks is due to market preference now being dominated by Mojosari Alabio (MA) ducks and Peking ducks [4]. As the variety of ducks farmed by the farmer's increases, the presence of purebred Alabio Ducks has been indirectly marginalized, making it imperative to protect and preserve purebred Alabio Ducks. The issues in Alabio duck farming pose a threat to the sustainability of Alabio duck farming in Hulu Sungai Utara Regency as a center of Alabio duck farming. Initially, the concept of sustainability focused more on environmental issues; however, over time, the sustainability concept has increasingly adopted a triple bottom line approach, encompassing ecology, economic, and social aspects [5]. Sustainable livestock farming refers to the concept of sustainable agriculture, wherein farming is considered sustainable if it is ecologically sound, economic viable, socially just, humane, and adaptable [6]. It is necessary to conduct an analysis of the sustainability of Alabio duck farming in Hulu Sungai Utara Regency as a central for Alabio duck farming to determine the sustainability status of the farming practices.

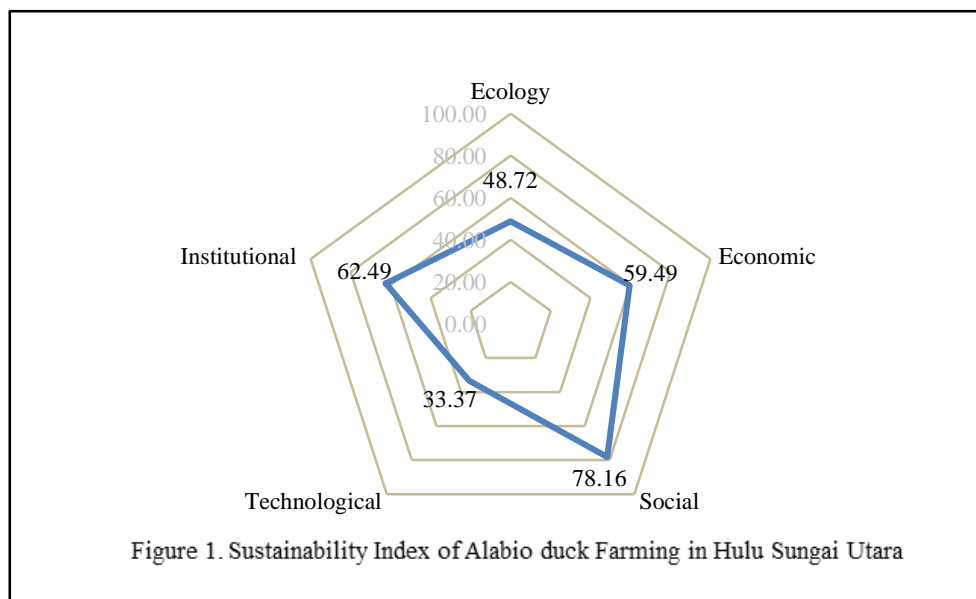
### METHODS

This study was conducted from February to April 2024 in Hulu Sungai Utara Regency. The research location was purposefully selected, considering its role as a center for Alabio duck farming. According to the Minister of Agriculture Decree Number 2921/kpts/ot.140/6/2011 in 2013, Hulu Sungai Utara Regency was designated as the Alabio Duck Breeding Source Area [7]. This study employed a quantitative method with a descriptive exploratory approach. Primary data consisted of attributes related to the five dimensions of Alabio duck farming sustainability: ecology, economic, social, technological, and institutional. Primary data

were obtained through interviews with Alabio duck farmers using questionnaires and direct observations. Secondary data were obtained from literature reviews and institutions related to this research. The sustainability status analysis used the Multidimensional Scaling (MDS) method. Data processing and sustainability status analysis based on the attributes of the ecology, economic, social, technological, and institutional dimensions employed the Rapfish (Rapid Assessment Technique for Fisheries) method developed by the Fisheries Center, University of British Columbia [8].

**RESULT AND DISCUSSIONS**

This study began with research observations and interviews with 60 farmers. The sustainability status of Alabio duck farming in Hulu Sungai Utara Regency was examined from five dimensions of sustainable development: ecology, economic, social, technological, and institutional. Each dimension consisted of 10 attributes, resulting in a total of 50 attributes. The sustainability index of Alabio duck farming in Hulu Sungai Utara Regency are presented in Figure 1 as a kite diagram. Based on the MDS analysis, the multidimensional index for Alabio duck farming in Hulu Sungai Utara Regency was 54,48 means the status is Moderately Sustainable. This results shows that the itik Alabio farming in Hulu Sungai Utara Regency is not too bad but requires improvements in several attributes within each dimension. The social dimension had the highest sustainability index at 78,16, while the lowest value was in the technological dimension at 33,37 (Figure 1). Alabio duck is a featured commodity in Hulu Sungai Utara Regency, it leads various stakeholders to put a lot of efforts for the sustainability of Alabio duck farming. Efforts to maintain the sustainability of Alabio duck farming include improving Alabio duck breeding system, providing grants for Day Old Ducks (DOD), feed, and housing, as well as offering extension services to Alabio duck farmers to ensure the sustainability of their farming practices.



The ecology and technological dimensions were classified as Less Sustainable, the economic and institutional dimensions were classified as Moderately Sustainable, while only the social dimension classified as Sustainable (Table 1). The MDS analysis results indicate that improvements are needed in each dimension of Alabio duck farming in Hulu Sungai Utara Regency to raise sustainability and ensure the farming practices are not threatened. To identify the sensitive attributes affecting the farming practices, a leverage analysis was conducted. Leverage analysis is used to determine the sensitive or influential attributes that impact the sustainability index in each dimension, focusing on the highest Root Mean Square (RMS) values [9]. From the 50 attributes analysed through leverage analysis, 15 were found to be the most sensitive from the ecology, economic, social, technological, and institutional dimensions. The sensitive attributes identified from the leverage analysis can be used as a reference for forming policies to improve Alabio duck farming practices in Hulu Sungai Utara Regency.



Table 1. MDS Analysis

No	Dimensions	MDS Analysis	Status
1	Ecology	48,72	Less Sustainable
2	Economic	59,49	Moderately Sustainable
3	Social	78,16	Sustainable
4	Technological	33,37	Less Sustainable
5	Institutional	52,67	Moderately Sustainable
	Multidimensional	54,48	Moderately Sustainable

The ecology and technological dimensions classified as Less Sustainable because they have index in the range of 25,00 – 49,99, while the economic and institutional dimensions are classified as Moderately Sustainable with index ranging from 50,00 – 74,99. The only dimension classified as Sustainable is the social dimension, which has an index in the range of 75,00 – 100,00 (Table 1). The ecological dimension is categorized as less sustainable due to several factors, one of the factors is the lack of waste management in Alabio duck farming in Hulu Sungai Utara Regency. This leads to environmental degradation, thereby it threatening the ecological sustainability of Alabio duck farming. In the technological dimension, the lack of technologies that can support sustainable farming, such as egg hatching technology and waste processing technology, contributes to its Less Sustainable status. These technologies are crucial for achieving sustainable farming practices. The economical and institutional dimensions are categorized as moderately sustainable, indicating that they are fairly sustainable but still require improvements in certain attributes. For example, in the economical dimension, the continuous decreases in the number of Alabio ducks owned each year poses a threat to the sustainability of Alabio duck farming in Hulu Sungai Utara Regency. The social dimension is categorized as sustainable, meaning that socially the attributes support the sustainability of Alabio duck farming in Hulu Sungai Utara Regency for example the presence of farmer groups helps farmers gain access to government assistance.

Table 2. Sustainability index and model feasibility in Alabio duck farming Hulu Sungai Utara

No	Dimensions	MDS Analysis	Monte Carlo Analysis	Difference	Stress Value	R <sup>2</sup>
1	Ecology	48,72	49,02	0,3	0,16	0,94
2	Economic	59,49	58,37	1,1	0,14	0,93
3	Social	78,16	75,82	2,3	0,13	0,94
4	Technological	33,37	34,70	1,3	0,14	0,93
5	Institutional	52,67	61,53	0,9	0,14	0,95
	Multidimensional	54,48	55,89	1,18	0,14	0,94

To evaluate errors in the sustainability analysis, Monte Carlo analysis was used. The Monte Carlo analysis evaluates the impact of random errors on the MDS ordination process in Rapfish. Errors may arise due to estimation errors from misunderstandings of attributes or imperfect research conditions, estimation differences from various researchers' opinions or studies, repetitive MDS analysis processes, data entry errors, and missing data [10]. The difference in sustainability index values between Monte Carlo analysis and MDS analysis at a 95% confidence interval ranges from 0,3 to 2,3, with a multidimensional difference of 1,18 (Table 2). The maximum difference between the Monte Carlo analysis values and the sustainability index is 5. If the difference between the two ordinations, namely sustainability ordination and Monte Carlo ordination, is > 5, then the model is considered inadequate for estimating the sustainability index/status. However, if the difference between the two ordinations is < 5, the model is considered adequate for estimating the sustainability index/status [11]. The stress value range is 0,14-0,16, with a multidimensional value of 0,14. The coefficient determination (R<sup>2</sup>) results range from 0,93 to 0,95, with a multidimensional value of 0,94 (Table 3). An acceptable stress value is <25%, and the coefficient of determination (R<sup>2</sup>) value should be close to 1 (Kavanagh, 2001). This indicates that each attribute is sufficiently accurate and reliable in depicting field conditions.



## CONCLUSION

From these results, it can be concluded that the multidimensional sustainability status of Alabio duck farming in Hulu Sungai Utara Regency shows moderate sustainable with an overall index of 54.48. The ecological dimension has an index of 48,72, indicating less sustainable; the economical dimension has an index of 59,49, indicating moderate sustainable; the social dimension has an index of 78,16, indicating sustainable; the technological dimension has an index of 33,37, indicating less sustainable; and the institutional dimension has an index of 52,67, indicating moderate sustainable. There are sensitive attributes that need improvement to enhance the sustainability status of Alabio duck farming in Hulu Sungai Utara Regency in the future. Sustainable strategies should be implemented by farmers and stakeholders to address these sensitive attributes effectively.

## REFERENCES

1. Hidayati, N.N., Yuniwati, E.Y.W. and Isdadiyanto, S., 2016. Comparison of meat quality of magelang duck, pengging duck and tegal duck. *Biom: Biology Scientific Periodical*, 18(2):56-63.
2. Sulaiman A and Ramatullah SN. 2011. Exterior characteristics, production and egg quality of Alabio ducks in South Kalimantan duck farming centers. *Bioscientiae (Journal of Biology Science)*, 8:46-61.
3. Data kalsel.2023. Poultry Population. South Kalimantan. Accessed October 9, 2023. <https://data.kalselprov.go.id/dataset/data/1496>
4. Fitriyanti, S. and Pradana, H., 2021. Marketing Strategy of Alabio Duck as a Regional Product of South Kalimantan. *Journal of Development Policy*, 16(2):165-179.
5. Ahi, P. and Searcy, C., 2013. A comparative literature analysis of definitions for green and sustainable supply chain management. *Journal of cleaner production*, 52:329-341.
6. Reijntjes, C., Havekort, B., and Bayer, A. W. 1999. *Agriculture of the Future, An Introduction to Sustainable Agriculture with Low External Inputs* (E. Fliert van de E, Hidayat B, Ed.). Yogyakarta: Kanisius.
7. Ministry of Agriculture Strategic Plan 2015 - 2019
8. Pitcher, T.J. and D. Preikshot. 2001. Rapfish: a rapid appraisal technique to evaluate the sustainability status of fisheries. *Fisheries Research* 49:255-270.
9. Fauzi, A. and Anna, S. 2002. Evaluation of the Sustainability Status of Fisheries Development, RAPFISH Application, Case Study of DKI Jakarta Coastal Waters. *Journal of Coastal and Ocean*. Vol 4 (3): 43-55.
10. Kavanagh, P., & T. Pitcher. 2004. Implementing Microsoft Excel Software for Rapfish: A Technique for the Rapid Appraisal of Fisheries Status. Fisheries Centre Research Report 12 (2). University of British Columbia, Canada.
11. Yusuf, M., Wijaya, M., Surya, R. A., & Taufik, I. (2021). *MDS-RAPS Sustainability Analysis Technique*. Gowa: Tohar Media
12. Decree of the Minister of Agriculture Number 2921/Kpts/ OT.140/6/2011 dated June 17, 2011 concerning "Determination of the Alabio Duck Breed".