

RINGKASAN

Kawasan Teluk Tomini terdiri atas 17 Kabupaten/Kota yang tersebar pada 3 Provinsi yakni Provinsi Gorontalo sebanyak 5 daerah, Provinsi Sulawesi Tengah sebanyak 6 daerah dan Provinsi Sulawesi Utara sebanyak 6 daerah. Potensi sumber daya alam yang melimpah, termasuk lahan yang subur dan beragam jenis pakan ternak, menjadikan kawasan Teluk Tomini sebagai salah satu daerah yang strategis untuk pengembangan sektor peternakan untuk meningkatkan pendapatan perkapita masyarakat petani peternak. Meskipun demikian, tingkat pendapatan perkapita di sebagian besar kabupaten/kota di kawasan Teluk Tomini masih relatif rendah. Sehingga melalui kajian ini menjadi sebuah referensi bagi Pemerintah di daerah Kawasan Teluk Tomini untuk merancang sebuah kebijakan strategis untuk komoditi sektor peternakan yang unggul dan berdaya saing bagi kemajuan daerah dan kesejahteraan masyarakat.

Penelitian bertujuan untuk (1) menganalisis keunggulan komoditi sub sektor peternakan di Kabupaten/Kota kawasan Teluk Tomini, (2) menganalisis sejauh mana pengaruh keunggulan komoditi sub sektor peternakan di Kabupaten/Kota kawasan Teluk Tomini terhadap pendapatan perkapita masyarakat dan (3) menganalisis strategi pengembangan kawasan ketahanan pakan di Kabupaten/Kota kawasan Teluk Tomini. Penelitian ini merupakan penelitian kuantitatif dengan menggunakan data Time Series, Cross Sectional & data panel. Sumber data dalam penelitian ini adalah data sekunder berupa data BPS dan kementerian pertanian dan data primer melalui penyebaran angket. Teknik analisis data yang digunakan adalah analisis Localization Index (LI), Specialization Index (SI), dan Location Quotient (LQ) untuk menganalisis keunggulan dan pemetaan potensi komoditi sektor peternakan, analisis regresi berganda data panel untuk menganalisis pengaruh keunggulan komoditi bagi pendapatan perkapita masyarakat dan analisis SWOT untuk merumuskan strategi pengembangan kawasan ketahanan pakan.

Kata Kunci: Peternakan; Pendapatan; Pakan; Teluk_Tomini; UNG



THE ADVANTAGES OF LIVESTOCK COMMODITIES IN INCREASING PER CAPITA INCOME IN THE TOMINI BAY REGION'S REGENCY/CITIES AND THEIR RELATION TO FEED SECURITY AREA DEVELOPMENT STRATEGIES

Livestock comodities in the Tomini Bay Region

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6 **THE ADVANTAGES OF LIVESTOCK COMMODITIES IN INCREASING PER CAPITA**
7 **INCOME IN THE TOMINI BAY REGION'S REGENCY/CITIES AND THEIR RELATION**
8 **TO FEED SECURITY AREA DEVELOPMENT STRATEGIES**

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16

17 **ABSTRACT**

18 This research aims to analyze the advantages of livestock sub-sector commodities in the districts/cities
19 of the Tomini Bay area, the impact of these commodity advantages on the per capita income of the
20 community, and to design strategies for developing feed security in the region. This research is a
21 quantitative study. The data sources in this research are secondary data from the Central Statistics

22 Agency (BPS) and the Ministry of Agriculture, as well as primary data obtained through observations,
23 interviews, and questionnaires. The secondary data sample consists of 85 data points, namely 17
24 districts/cities and data from 5 years, while the primary data includes 85 individuals consisting of
25 farmers and related stakeholders. The data analysis techniques used are Localization Index (LI) analysis,
26 Specialization Index (SI), Location Quotient (LQ), Multiple Regression of Panel Data, and SWOT
27 Analysis. The results of this study indicate that (1) livestock tends to be widespread and none are
28 considered special, while the analysis shows that beef cattle serve as the basis in an average of 11
29 districts/cities, horses in an average of 4 districts/cities, goats in an average of 10 districts/cities, and
30 pigs in an average of 7 districts/cities. For poultry, only local chickens fall into the special and
31 widespread category, while the others are not special and widespread, with local chickens excelling in
32 13 districts/cities, layer chickens excelling in 7 districts/cities, broiler chickens excelling in 5
33 districts/cities, and ducks excelling in 6 districts/cities. (2) Beef cattle, local chickens, broiler chickens,
34 and ducks have a positive and significant impact on per capita income in the districts/cities of the Tomini
35 Bay area, or can increase per capita income, while goats, pigs, and layer chickens have a positive but
36 insignificant impact on per capita income, or are in the sufficient category, whereas horses have a
37 negative and insignificant impact, meaning that horses tend to reduce income due to high maintenance
38 costs. (3) The strategy for developing feed security areas in the districts/cities of the Tomini Bay region
39 is positioned in quadrant 3, which is the Turn Around strategy. This is operationalized through strategic
40 steps such as utilizing natural resources and agricultural waste as feed through the Smart Integrated
41 Farming System (SIFS), enhancing human resource capacity through training in modern technology in
42 feed production and feed security management, strengthening government support through
43 infrastructure, management, and agribusiness downstreaming of farming and livestock enterprises, as
44 well as collaboration among districts/cities in the Tomini Bay region related to feed security.

45 **Keywords:** Feed; income; livestock; strategy; Tomini Bay

INTRODUCTION

47 . The livestock development program outlined in various activities is the government's facilitation
48 aimed at empowering and increasing community participation, as well as developing regions,
49 community groups, and the economy. (Hererro, 2012; Adams, 2021; Famona, 2022). In general, the
50 livestock sector experiences fluctuating developments each year, both in terms of livestock population
51 and the production of meat, milk, and eggs (Yulia, 2015). The increase in community income is a highly
52 desired goal for every country. However, to achieve a higher income level, appropriate strategies are
53 needed, especially in the context of strengthening the livestock sector. One of the advantages of
54 livestock commodities in increasing per capita income for the community is due to the large market
55 potential. The livestock sector involves various types of jobs, ranging from farmers, livestock keepers,
56 animal slaughtering personnel, to sales and marketing staff for livestock products. Thus, the
57 development of the livestock sector can help reduce unemployment rates and improve the economic
58 welfare of the community through job creation. (Ali, 2023).

59 One of the main challenges is the availability of adequate and sustainable animal feed. The Tomini
60 Bay area, although fertile, still faces challenges regarding the availability of adequate livestock feed
61 throughout the year, especially during the dry season. (Mukhtar Syamsul Bahri, 2023). Feed resilience is
62 very important because feed is one of the main factors that affects livestock productivity. (Matitaputy,
63 2010). This can hinder the growth and production of livestock, as well as increase production costs for
64 farmers. Therefore, the development of regional feed security strategies becomes very important in
65 supporting the growth and sustainability of the livestock sector in the Tomini Bay area. This strategy
66 must encompass various approaches, ranging from the development of local feed agriculture to the
67 application of appropriate technology in natural resource management. One of the strategies for
68 developing food resilience areas that can be implemented is the diversification of feed sources
69 (Mansyur, 2012; Mukhtar, 2021).

70 The development of livestock farming, especially the advancement of animal husbandry, needs to be
71 carried out through a sustainable, modern, and professional business approach by utilizing technological
72 innovations to enhance operational efficiency. In addition, the development of livestock farming should
73 be supported by the feed industry by optimizing the use of location-specific feed materials through an
74 integrated pattern. (Rusdiana & Praharani, 2018; Bayu, 2022; Lessman, 2024). The Department of
75 Animal Husbandry plays a role as an insulator and regulator in the development of livestock farming in
76 its region, due to its contribution to the development of sectoral policies. The development of this
77 livestock farming can progress very rapidly if it is carried out collaboratively among business actors
78 (private sector), financing institutions, farmers, and the government. Furthermore, the government also
79 plays a crucial role as a link between farmers and livestock business actors with banks or financing
80 institutions. Bank Indonesia and banking institutions are making efforts to support the people's economy
81 and implement the Feed security Commodity Development Program as an opportunity to develop
82 productive, quality, and competitive businesses in a programmed manner (Sodiq and Yuwono 2016).
83 The Feed security Commodity Development Program is carried out, among other things, through the
84 development of livestock SMEs. Financing through the role of the government is directed towards the
85 enhancement of business scale oriented towards agribusiness (Pawlak & Kołodziejczak, 2020).

86 Livestock farming in the districts/cities of the Tomini Bay area needs to be developed because these
87 regions have good livestock potential for increasing income, especially when considering various local
88 government programs for the development of the livestock sector. Data from the central statistics agency
89 for each district/city in the Tomini Bay area shows a trend of increasing populations of livestock and
90 poultry. This increase must, of course, be accompanied by the availability of effective and efficient feed
91 to enhance farmers' income and support feed security in the Tomini Bay region. The issue at hand that
92 forms the basis of this research is that the livestock commodities prioritized in the districts/cities of the
93 Tomini Bay area are quite diverse, yet there is no mapping of priority potential that can be pursued by
94 each government. In fact, the districts/cities in the Tomini Bay area could certainly become suppliers of

95 animal food needs in the region of the new national capital if they could maximize their efforts in the
96 livestock sector.

97 This research is a development of the study on beef cattle development in Gorontalo (Mukhtar et al.
98 2023), but with various expansions, particularly in development based on value excellence and more
99 targeted strategic steps. Then, the approaches of agroecology and permaculture have also become new
100 trends in the sustainable management of natural resources. The integration of these principles into the
101 feed security development strategy can help create a more environmentally friendly and economically
102 efficient agricultural system that will make a significant contribution in facing new challenges and
103 seizing current opportunities in the development of the livestock sector in the Tomini Bay area.
104 Furthermore, the potential of superior livestock commodities in the Tomini Bay area, along with the
105 formulation of a comprehensive and sustainable feed security development strategy, will certainly
106 encourage the availability of animal feed and various downstream businesses that can enhance the
107 macroeconomic conditions of a region and its community, one of which is the increase in community
108 income. Thus, the livestock sector in this region can become one of the main pillars in improving the
109 economic welfare of the community and supporting feed security in both the Sulawesi region and
110 nationally, even serving as a food buffer, especially in livestock for the National Capital region in
111 Kalimantan.

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MATERIALS AND METHODS

115 This research was conducted in 17 districts/cities in the Tomini Bay area using data from 5 years,
116 namely 2019-2024. The districts/cities in question are South Bolaang Mongondow Regency, East
117 Bolaang Mongondow Regency, Southeast Minahasa Regency, Minahasa Regency, North Minahasa
118 Regency, Bitung City, Banggai Laut Regency, Banggai Islands Regency, Banggai Regency, Tojo Una-

119 Una Regency, Poso Regency, Parigi Moutong Regency, Pohuwato Regency, Boalemo Regency,
120 Gorontalo Regency, Bone Bolango Regency, and Gorontalo City. This research is a quantitative study.
121 The data sources in this research are secondary and primary data, where the secondary data consists of
122 data from the Central Bureau of Statistics (BPS) and the Ministry of Agriculture, while the primary data
123 is obtained through observations, interviews, and the distribution of questionnaires to respondents
124 relevant to the study. The population for the primary data in this study consists of 85 individuals,
125 comprising 51 farmers and 34 related stakeholders. The sampling method used is saturated sampling,
126 meaning the entire population is included as the research sample.

127 The data analysis techniques used are Localization Index (LI), Specialization Index (SI), and
128 Location Quotient (LQ). (Rahardiansyah et al., 2022; Gustia et al., 2024).

129 a. Localization Index (LI) Analysis

130 This analysis is used to measure the distribution or relative concentration of commodities. The
131 formula used for localization analysis is:

$$132 \alpha = (v_i/V_i) - (v_t/V_t)$$

133 with the following definitions:

134 v_i = population of the commodity in the district

135 V_i = population of the commodity in the province

136 v_t = total population of the commodity in the district

137 V_t = total population of the commodity in the province

138 α = localization coefficient

139 The localization coefficient is obtained by summing $(v_i/V_i) - (v_t/V_t)$ that are positive, with the
140 stipulations:

141 $\alpha \geq 1$: the commodity is concentrated in one area, and

142 $\alpha < 1$: the commodity is spread across several areas.

143 b. Specialization Index (SI) Analysis

144 This analysis is used to observe specialization in commodities using the following formula:

145 $\beta = (v_i/v_t) - (V_i/V_t)$

146 with the following definitions:

147 v_i = commodity population of the district

148 V_i = commodity population of the province

149 v_t = total commodity population of the district

150 V_t = total commodity population of the province

151 β = specialization coefficient

152 The specialization coefficient is obtained by summing $(v_i/v_t) - (V_i/V_t)$ that are positive, with the
153 stipulation:

154 $\beta \geq 1$: a region specializes in the commodity

155 $\beta < 1$: not specialized

156 c. Location Quotient (LQ) Analysis

157 This analysis is used to identify commodities produced in a district, classifying them into basic and
158 non-basic sectors using the following formula:

159 $LQ = (v_i/v_t) / (V_i/V_t)$

160 with the following definitions:

161 v_i = commodity population of the district

162 V_i = commodity population of the province

163 v_t = total commodity population of the district

164 V_t = total commodity population of the province

165 LQ = location quotient coefficient

166 A commodity in a region is considered a basic sector if the LQ coefficient ≥ 1 , whereas if $LQ < 1$,
167 then the commodity is not part of the sector.

168 The next data analysis is multiple regression analysis of panel data, which is used because the data
169 structure consists of cross-section and time series data (Supianti, 2023). The data in this study consists
170 of 85 data points, namely 17 cross-section data and 5 time series data. The multiple regression equation
171 for panel data is as follows:

$$172 \quad Y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} + \beta_8 X_{8it} + \varepsilon_{it}$$

173 Where:

174 Y_{it} = Per capita income

175 α = Constant, the value of Y when X = 0

176 $\beta_1 - \beta_8$ = Regression coefficients indicating the change in Y when there is a change in X

177 $X_1 - X_8$ = beef cattle, horses, goats, pigs, village chickens, laying hens, broilers & ducks

178 ε_{it} = Error term, representing the level of estimation error in the research

179 Furthermore, to analyze the development strategy for feed security areas in the districts/cities of the
180 Tomini Bay area, a SWOT analysis will be used. SWOT analysis (Strengths, Weaknesses,
181 Opportunities, Threats) is a strategic planning method used to evaluate internal and external factors that
182 influence the success of a project, business, organization, or initiative. (Rangkuti, 2016).

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RESULTS

186 The development of livestock farming is not only aimed at enhancing the government's prestige
187 through increasing livestock populations, but more importantly, it is for the welfare of livestock
188 entrepreneurs so that they can make a meaningful contribution to the economy of a region. Henuk (2016)
189 reveals that livestock production is increasingly directed towards commercial goals and business
190 orientation. Farmers are more experienced and usually have a global network where efficiency and
191 productivity are the main aspects that are highly prioritized. The livestock sector has various potential

192 advantages that must be mapped out so that the government can identify livestock businesses that are
193 suitable to become the hallmark of a region, along with various supporting activities for livestock, such
194 as the industrialization of animal feed. (Fitratunnisa et al., 2022). This is also intended so that the
195 livestock sector can provide benefits in increasing the per capita income of a community in a certain
196 area. An explanation regarding the mapping of the advantages of the livestock sub-sector commodities,
197 their impacts and influences, as well as the potential for feed industrialization is outlined as follows:

198 **A. Analysis of the Advantages of Livestock Sub-Sector Commodities**

199 The livestock and veterinary development program outlined in various activities is a government
200 facilitation aimed at empowering and increasing community participation, as well as regional
201 development, specifically in the districts/cities in the Tomini Bay area. The farms that are the focus in
202 this case are beef cattle, horses, goats, pigs, village chickens, laying hens, broiler chickens, and ducks.

203

204 **1. Beef Cattle**

205 Table 1 shows that beef cattle from 2019 to 2023 are a commodity that falls into the category of
206 being widespread throughout the districts/cities in the Tomini Bay area (based on localization index
207 analysis) and tends to be non-specialized. This is because all districts/cities in the Tomini Bay area have
208 various programs aimed at developing the beef cattle population and improving the welfare of farmers,
209 so each region has a good opportunity for developing beef cattle as a sub-sector focused on welfare and
210 per capita income of the community. The analysis results indicate that beef cattle tend to be the main or
211 superior basis in 11-12 districts, namely South Bolaang Mongondow, East Bolaang Mongondow,
212 Southeast Minahasa, Banggai Islands, Banggai, Tojo Una-Una, Poso, Pohuwato, Boalemo, Gorontalo,
213 and Bone Bolango. This indicates that these regions are capable of making beef cattle a priority in the
214 economic development of the community, so the focus on beef cattle development yields the best results
215 and must be maintained.

216 **2. Horses**

217 Table 2 shows that horses from 2019 to 2023 are a commodity that falls into the category of being
218 widespread throughout the districts/cities in the Tomini Bay area (based on localization index analysis)
219 and tends to be non-specialized. This means that horses tend to be distributed across all districts/cities
220 in the Tomini Bay area, but in relatively small numbers, as evidenced by the basis analysis (advantage)
221 indicating that horses are only a basis in 4 districts/cities, namely Minahasa Regency, Banggai Laut
222 Regency, Banggai Islands Regency, and Gorontalo City. Horses have become increasingly rare over the
223 past few years, and the economic activities related to horse maintenance are limited to services such as
224 horse-drawn carriage rides, tourism, or other freight transport. However, the businesses that operate in
225 this field are certainly less intensive.

226 **3. Goats**

227 Table 3 shows that goats from 2019 to 2023 are a commodity that falls into the category of being
228 widespread throughout the districts/cities in the Tomini Bay area (based on localization index analysis)
229 and tend to be non-special. Goats serve as the basis in 9-11 districts/cities, namely South Bolaang
230 Mongondow Regency, East Bolaang Mongondow Regency, Southeast Minahasa Regency, Banggai
231 Islands Regency, Banggai Regency, Tojo Una-Una Regency, Parigi Moutong Regency, Pohuwato
232 Regency, Boalemo Regency, and Gorontalo City. Goats are quite popular among farmers because they
233 tend to breed quickly and are spread throughout the districts/cities in the Tomini Bay area. Even in
234 urban areas, goats can serve as a foundation due to the potential of the Aqiqah goat selling business,
235 which is quite challenging for urban regions.

236 **4. Pigs**

237 Table 4 shows that pigs from 2019 to 2023 are a commodity that falls into the category of being
238 widespread throughout the districts/cities in the Tomini Bay area (based on localization index analysis)
239 and tends to be non-special. In the districts/cities of the Tomini Bay area, only a few regions raise pigs,
240 so they are primarily found in just 6-9 areas, namely East Bolaang Mongondow Regency, Southeast

241 Minahasa Regency, Minahasa Regency, Bitung City, Banggai Laut Regency, Banggai Islands Regency,
242 and Poso Regency.

243 **5. Local Chicken**

244 Table 5 shows that local chicken from 2019 to 2023 is a commodity that falls into the categories of
245 widespread and specialty. This indicates that the districts/cities in the Tomini Bay area have various
246 potentials for local chicken farming to enhance the economy, with 13 out of 17 regions serving as the
247 basis. Local chickens are easy to care for, which makes this commodity highly sought after and
248 cultivated by the community. The regions with potential for the development of local chickens are South
249 Bolaang Mongondow Regency, East Bolaang Mongondow Regency, Southeast Minahasa Regency,
250 Bitung City, Banggai Laut Regency, Banggai Islands Regency, Banggai Regency, Tojo Una-Una
251 Regency, Poso Regency, Parigi Moutong Regency, Pohuwato Regency, Boalemo Regency, and
252 Gorontalo Regency.

253 **6. Layer Chickens**

254 Table 6 shows that layer chickens from 2019 to 2023 are a commodity that falls into the category of
255 being spread throughout the districts/cities in the Tomini Bay area (based on localization index analysis)
256 and tends to be non-specialized. Layer chickens serve as a base in 5-8 districts, with 6 districts being
257 more potential, namely East Bolaang Mongondow, Minahasa, Bitung City, Tojo Una-Una, Boalemo,
258 and Bone Bolango. This shows that layer chickens are quite beneficial in improving the economy and
259 per capita income, but not all districts/cities are able to maximize the potential of these layer chickens.

260 **7. Broiler Chicken**

261 Table 7 shows that broiler chicken from 2019 to 2023 is a commodity that falls into the category of
262 being widespread throughout the districts/cities in the Tomini Bay area (based on localization index
263 analysis) and tends to be non-specialized, with 5 districts/cities serving as the main bases, namely
264 Minahasa Regency, North Minahasa Regency, Gorontalo Regency, Bone Bolango Regency, and

265 Gorontalo City. Broiler chickens are cultivated by all districts, but only a small portion maximizes
266 economic development through this broiler chicken commodity.

267 **8. Ducks**

268 Table 8 shows that ducks from 2019 to 2023 are a commodity that falls into the category of being
269 widespread throughout the districts/cities in the Tomini Bay area (based on localization index analysis)
270 and tends to be non-specialized. Ducks serve as a basis in 4-8 districts/cities, but in 2021, they were
271 only present in 4 districts/cities, namely Southeast Minahasa Regency, Banggai Islands Regency,
272 Banggai Regency, and Parigi Moutong Regency. Ducks have many benefits, but the progress of duck
273 farming is not as good as that of chicken, which is more favored by consumers. As a result, many
274 farmers choose to raise chickens instead of ducks.

275

276 **B. Increasing Per Capita Income of the Community Through the Livestock Subsector**

277 Efforts in the livestock sector are certainly expected to provide economic benefits for entrepreneurs
278 and farming communities. With the livestock subsector as a commodity supported by various
279 government programs, it will have an impact on increasing the per capita income of the community.
280 Table 9, which is the result of the E-Views version 9 analysis, shows that the significance of the F-
281 statistic is 0.000, which is smaller than the alpha value. This indicates that the livestock subsector, which
282 includes beef cattle, horses, goats, pigs, village chickens, laying hens, broilers, and ducks, has a positive
283 and significant impact on per capita income in the Tomini Bay region's districts/cities, with an influence
284 value of 29.76%. This suggests that the development of the livestock sector through government
285 programs and support from livestock farmers will enhance per capita income in the Tomini Bay region's
286 districts/cities. Meanwhile, the results for each variable of livestock commodities are presented as
287 follows:

288 **1. Beef Cattle**

289 The significance value of the t-statistic for cattle is 0.0478, which is smaller than the alpha value,
290 indicating that the cattle commodity has a positive and significant effect on per capita income in the
291 Tomini Bay Region. The positive and significant result means that the greater the number of cattle or
292 the interest of the community in cattle farming, the higher the per capita income in the Tomini Bay
293 Region, as cattle farming shows continuous economic progress, especially in the months leading up to
294 Eid al-Adha.

295 **2. Horses**

296 The significance value of the t-statistic for horses is 0.7604, which is greater than the alpha value,
297 indicating that the horse commodity has a negative and insignificant effect on per capita income in the
298 Tomini Bay Region's districts/cities. This negative result means that horses are not a commodity capable
299 of enhancing the economy of the communities in the Tomini Bay Region, as their economic added value
300 is low, compounded by the relatively challenging maintenance, particularly in terms of upkeep costs.

301 **3. Goats**

302 The calculated t-value for goats is 0.8559, which is greater than the alpha value, indicating that goat
303 commodities have a positive but not significant effect on per capita income in the Tomini Bay
304 District/City area. This positive result suggests that goats can provide economic benefits to the
305 community in the Tomini Bay District/City area; however, the value of these benefits is still relatively
306 small, particularly in terms of increasing community income.

307 **4. Pigs**

308 The significance value of the t-statistic for pigs is 0.5534, which is greater than the alpha value,
309 indicating that the pig commodity has a positive but insignificant effect on per capita income in the
310 Tomini Bay Region Districts/Cities. This positive result means that pigs can provide economic benefits
311 to the community in the Tomini Bay Region Districts/Cities; however, not all Districts/Cities consider
312 pigs as a livestock business.

313 **5. Local Chicken**

314 The significance value of the t-test for local chicken is 0.000, which is smaller than the alpha value,
315 indicating that the local chicken commodity has a positive and significant impact on per capita income
316 in the Tomini Bay Region District/City. The positive and significant result means that the larger the
317 number of local chickens, the higher the per capita income in the Tomini Bay Region District/City, due
318 to the relatively easy maintenance of local chickens and their popularity among the community for
319 culinary ventures.

320 **6. Layer Chickens**

321 The significance value of the t-count for layer chickens is 0.1529, which is greater than the alpha
322 value, indicating that the layer chicken commodity has a positive but insignificant effect on per capita
323 income in the Tomini Bay District/City area. This positive result suggests that the community in the
324 Tomini Bay District/City area has not engaged significantly in layer chicken farming due to the
325 considerable capital required, thus this livestock commodity has not been able to enhance the economic
326 value and income of the community.

327 **7. Broiler Chickens**

328 The significance value of the t-test for broiler chickens is 0.0001, which is smaller than the alpha
329 value, indicating that broiler chicken commodities have a positive and significant effect on per capita
330 income in the districts/cities of the Tomini Bay area. The positive and significant results mean that the
331 larger the number of broiler chickens, the higher the per capita income in the districts/cities of the
332 Tomini Bay area, where these chickens are widely cultivated for culinary needs. Thus, the demand for
333 broiler chickens can serve as an economic stimulus and increase community income.

334 **8. Ducks**

335 The significance value of the t-count for ducks is 0.0248, which is smaller than the alpha value,
336 indicating that duck commodities have a positive and significant impact on per capita income in the
337 Tomini Bay Region's District/City. The positive and significant result means that as the number of ducks

338 increases, the per capita income in the Tomini Bay Region's District/City will rise, as many people are
339 starting to favor ducks as a food preparation that offers numerous benefits.

340 Thus, the livestock sub-sector provides significant benefits to per capita income in the Tomini Bay
341 region's districts/cities, where the results above show that there are 8 districts/cities that heavily rely on
342 their community's income from the livestock sub-sector, both in the form of raw food and ready-to-eat
343 (culinary) products, namely South Bolaang Mongondow, East Bolaang Mongondow, Southeast
344 Minahasa, Minahasa, North Minahasa, Bitung City, Banggai Regency, and Gorontalo City. This means
345 that these districts/cities will experience a decline in per capita income if there is a decrease in the
346 commodities of the livestock sub-sector.

347

348 **C. SWOT Analysis (Feed security Area Development Strategy)**

349 The analysis of the feed security area development strategy in the Tomini Bay region's districts/cities
350 can be described as follows:

351 **1. IFAS (Internal Strategic Factors Analysis Summary) Analysis**

352 For internal factors, the strength score is 1.349, while the weakness score is 1.403. Thus, the
353 difference between internal and external factors is a negative value of -0.054, indicating that the strength
354 score is lower than the weakness score. This means that the development of the feed security area in the
355 Tomini Bay region's districts/cities still needs to be continuously optimized internally.

356

357

358 **2. EFAS (External Strategic Factors Analysis Summary) Analysis**

359 The value of the opportunity factor possessed by the food resilience development strategy in the
360 districts/cities of the Tomini Bay area is 1.439, while the threat factor is 1.299. Thus, when compared,
361 the opportunity factor is greater than the score of the threats. This shows that there are good

362 opportunities in the development of food resilience areas in the districts/cities of the Tomini Bay region,
363 and this opportunity must be maximized to turn weaknesses into strengths and to overcome threats.

364 **3. SWOT Analysis Diagram**

365 Based on the IFAS and EFAS tables, the SWOT results indicate that the strategic position for the
366 development of feed security areas in the districts/cities of the Tomini Bay region is in quadrant 3,
367 which is the Turn Around strategy. This strategy emphasizes that efforts to develop feed security areas
368 in the districts/cities of the Tomini Bay region can be focused on optimizing opportunities to reduce
369 weaknesses in the development of feed security areas. The strategic steps that need to be taken are (1)
370 the utilization of natural resources and agricultural waste as feed through the Smart Integrated Farming
371 System (SIFS), (2) the enhancement of human resource capacity through training in modern technology
372 in the fields of feed production and feed security management, (3) strengthening government support
373 through infrastructure, management, and the downstreaming of agribusiness in farming and livestock
374 enterprises, and (4) collaboration among districts/cities in the Tomini Bay area regarding feed security.
375 (production-distribution-consumption of feed)

376

377 **DISCUSSION**

378 The Tomini Bay area holds great potential in the livestock sector. The diversity of natural resources
379 and geographical conditions that support livestock growth serve as the main capital in increasing
380 community income. (Siebrecht, 2020). However, several challenges such as limited access to quality
381 feed, suboptimal technology, and market price fluctuations pose obstacles that must be addressed. (Huy
382 et al., 2023). For this reason, the development of feed security areas becomes crucial to ensure the
383 availability of sufficient and quality feed for livestock. Thus, the livestock sector can become the
384 locomotive of the regional economy and improve the welfare of the community. The advantages of
385 livestock commodities must be analyzed in order to make decisions about which commodities are viable

386 for development or intervention by local governments, so that the outcomes can benefit the increase in
387 livestock populations and ultimately improve the welfare of the community.

388 The development of livestock in the Tomini Bay area shows a fairly even trend across various
389 regions. Cattle, for example, have become a flagship commodity with a fairly consistent population
390 development program. Cattle slaughter is considered one of the commodities that can enhance the
391 welfare of farmers and stimulate local economic growth. Horses, although scattered, have a relatively
392 small population and are more often utilized in service economic activities such as horse-drawn carriage
393 transportation or tourism. On the other hand, goats have become a popular choice among farmers due
394 to their rapid reproduction and potential in the sales business, especially for traditional purposes such
395 as aqiqah. Meanwhile, pigs have become a more limited commodity with a small population, although
396 in some areas they still remain part of farming activities and economic development. Livestock such as
397 cattle, goats, horses, and pigs have great potential to boost the economy and the income of the
398 community. Cattle and goats, for example, provide meat that is in high demand, as well as by-products
399 such as milk and organic fertilizer. A rapidly growing population makes livestock farming a sustainable
400 source of income for farmers. In addition, animals like horses can be used in the service sector, such as
401 transportation or tourism, which provides additional opportunities to enhance the well-being of the
402 community.

403 The development of poultry in the Tomini Bay area shows quite interesting variations. Local
404 chickens, as a highly sought-after commodity, are easy to care for and can thrive evenly across all
405 regions. Layer hens, although spread across many areas, have not yet been fully utilized to their
406 maximum potential by all regions. This commodity has great potential in increasing community income,
407 especially in egg production. Broiler chickens, on the other hand, are also widely cultivated, but only
408 certain areas have succeeded in optimizing their potential to enhance the local economy. Ducks, despite
409 having economic benefits, are not as popular compared to chickens, resulting in their farming efforts
410 not being as optimal as other poultry commodities.

411 The results of the multiple regression show that beef cattle, horses, goats, pigs, village chickens,
412 laying hens, broilers, and ducks have a positive and significant impact on per capita income in the
413 Tomini Bay region with a coefficient of determination of 29.76%. The partial results indicate that beef
414 cattle have a significant economic impact, especially leading up to occasions like Eid al-Adha, when
415 the demand for beef surges. This positions beef cattle as a strategic commodity capable of increasing
416 the per capita income of the community. Meanwhile, although goats also contribute to the economy, the
417 added value they generate is still relatively small compared to beef cattle. Pigs also show positive
418 economic potential, although not all regions utilize pigs as a primary source of income. In contrast,
419 horses do not provide significant economic contributions due to their high maintenance costs and low
420 profits, making them less optimal as a source of community income.

421 Poultry such as local chickens, laying hens, broilers, and ducks contribute positively to the economy
422 of the community. Local chickens and broiler chickens yield significant results due to high market
423 demand, especially for culinary needs. Local chickens have the advantage of simple maintenance, while
424 broiler chickens have a fast harvest cycle that increases per capita income. Although ducks are not as
425 popular as chickens, their presence as a food ingredient is becoming increasingly favored and is boosting
426 the income of the community. Layer chickens, although they yield positive results, are still less popular
427 because they require a significant initial investment, making their economic contribution not yet
428 optimal. Village chickens and laying hens are easy to raise and provide meat and eggs, which have high
429 market demand, thereby creating economic activities that can stimulate community income.

430 Then the SWOT analysis found that the strategy for developing feed security areas in the
431 districts/cities of the Tomini Bay region is in quadrant 3, namely the Turn Around strategy, which can
432 be implemented through four strategic steps, namely the utilization of natural resources and agricultural
433 waste as feed through the Smart Integrated Farming System (SIFS). The utilization of natural resources
434 and agricultural waste as feed through the Smart Integrated Farming System (SIFS) is a strategy to
435 integrate various agricultural and livestock sectors into one sustainable ecosystem. By utilizing

436 agricultural waste such as leaves, straw, and crop residues, this system can reduce dependence on more
437 expensive commercial feed. In addition, SIFS enables the use of smart technology to efficiently monitor
438 and manage feed production. Technologies such as soil sensors, automated feeding systems, and
439 monitoring of feed crop growth can enhance productivity and reduce production costs. (Sekaran et al.,
440 2021). SIFS also encourages the use of abundant local resources, reduces waste, and creates a more
441 environmentally friendly production cycle. With this approach, farmers in the Tomini Bay area can
442 enhance their feed resilience, reduce environmental impact, and strengthen their independence in
443 livestock feed supply.

444 The enhancement of human resource capacity through modern technology training in the fields of
445 feed production and feed security management is crucial to support the development of food resilience
446 in Tomini Bay. Through modern technology training, farmers and agribusiness actors can acquire new
447 knowledge and skills in feed production and more efficient management. This training covers various
448 aspects, ranging from the use of advanced technology in feed production such as automatic drying, feed
449 fermentation, to the utilization of local materials for alternative feed (Rasanjali et al., 2021; Liu et al.,
450 2022). By enhancing skills and knowledge, the local workforce can contribute more significantly to
451 increasing productivity in the feed sector, reducing dependence on imports, and strengthening local feed
452 security. In addition, this training will open up new job opportunities and improve the welfare of the
453 community in the Tomini Bay area.

454 Strengthening government support through infrastructure, management, and the downstream
455 processing of agribusiness in farming and livestock is essential for enhancing the effectiveness and
456 sustainability of the agribusiness sector in the Tomini Bay region, particularly in the development of
457 feed resilience. One important step is through the provision of adequate facilities and infrastructure,
458 such as road infrastructure, electrical networks, and feed storage facilities. Good infrastructure will
459 support more efficient feed distribution and reduce logistics costs. In addition, the government also
460 needs to strengthen agribusiness management through training and support for farmers and ranchers so

461 that they can manage their businesses more professionally. (Supendi, 2022). Agribusiness
462 downstreaming should also be a focus, by encouraging the processing of agricultural and livestock
463 products into value-added feed products that can be sold in both local and international markets. The
464 collaboration between the central government, local authorities, and the private sector in these programs
465 will accelerate the development of food resilience areas and improve the welfare of local communities.

466 Collaboration among districts/cities in the Tomini Bay area regarding feed security (production-
467 distribution-consumption of feed) is an important strategy to strengthen feed security through the
468 integration of the production, distribution, and consumption sectors of feed. Each region in Tomini Bay
469 has different advantages and potential natural resources, so this collaboration allows for the efficient
470 exchange of resources to meet the needs of livestock feed and fisheries. For example, regions with a
471 surplus of feed production can distribute it to other areas that are experiencing shortages. This
472 collaboration also enables the formulation of joint policies related to feed quality standards, the
473 establishment of competitive pricing, and the strengthening of distribution networks across regions.
474 (Aswad et al., 2021). With this synergy, the regions in Tomini Bay can more easily meet their local feed
475 needs, reduce dependence on imports, and enhance the competitiveness of their feed products in both
476 domestic and international markets. This collaboration also creates price stability and a supply of feed
477 that will provide long-term benefits for the livestock and fisheries sectors in the Tomini Bay region.

478 The advantages of the livestock sector in the Tomini Bay area play an important role in increasing
479 the per capita income of the community. With abundant natural resources and favorable geographical
480 conditions, livestock farming has become one of the economic sectors that can develop rapidly.
481 However, several challenges such as limited access to quality feed, market price fluctuations, and
482 suboptimal technology require more attention in their development. In an effort to address these
483 challenges, the strategy for developing feed security areas becomes crucial because adequate feed
484 promotes the optimal performance of livestock enterprises. (Santoso et al., 2024). One approach that
485 can be applied is the use of the Smart Integrated Farming System (SIFS), which integrates agricultural

486 waste as livestock feed and smart technology to enhance production efficiency. In addition, the
487 enhancement of human resource capacity through training in modern technology, as well as
488 strengthening government support in terms of facilities, infrastructure, and agribusiness management,
489 is essential. With the collaboration between regions in terms of production, distribution, and
490 consumption of feed, the livestock sector in this area has great potential to grow more sustainably,
491 enhance feed security, and significantly contribute to improving the welfare of the community.

492

493

494 **CONCLUSIONS**

495 The analysis results found that (1) livestock tends to be widespread and none are considered special,
496 while the analysis shows that beef cattle serve as the basis in an average of 11 districts/cities, horses in
497 an average of 4 districts/cities, goats in an average of 10 districts/cities, and pigs in an average of 7
498 districts/cities. For poultry, only local chickens fall into the special and widespread category, while the
499 others are not special and widespread, with local chickens excelling in 13 districts/cities, layer chickens
500 excelling in 7 districts/cities, broiler chickens excelling in 5 districts/cities, and ducks excelling in 6
501 districts/cities. (2) Beef cattle, local chickens, broiler chickens, and ducks have a positive and significant
502 impact on per capita income in the districts/cities of the Tomini Bay area, or are able to increase per
503 capita income, while goats, pigs, and layer chickens have a positive but insignificant impact on per
504 capita income, or fall into the category of being somewhat capable, whereas horses have a negative and
505 insignificant impact, meaning that horses tend to reduce income due to high maintenance costs. The
506 SWOT results are in quadrant 3, which indicates a Turn Around strategy operationalized through
507 strategic steps such as utilizing natural resources and agricultural waste as feed through the Smart
508 Integrated Farming System (SIFS), enhancing human resource capacity through training in modern
509 technology in feed production and feed security management, strengthening government support

510 through infrastructure, management, and agribusiness downstreaming of farming and livestock
511 enterprises, as well as collaboration among districts/cities in the Tomini Bay area concerning feed
512 security. (produksi-distribusi-konsumsi pakan). These results indicate that the livestock sub-sector
513 needs to become a program for the districts/cities in the Tomini Bay area, where government policy
514 programs should be tailored to the livestock potentials in terms of livestock population and the
515 availability of adequate and cost-effective feed to enhance community income.

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519 study.

520

521

522 **CONFLICT OF INTEREST**

523 No potential conflicts of interest relevant to this article are reported.

524

525 **NOVELTY STATEMENT**

526 The novelty of this research lies in the scope of the study covering all livestock commodities in
527 the Tomini Bay area, utilizing commodity competitiveness analysis. The innovation of using SWOT
528 analysis encompasses all stakeholders across 17 districts/cities in the Tomini Bay area. The main
529 novelty in this research is that the data processed in the panel data regression equation is the Location
530 Quotient (LQ) data, rather than the population data of the livestock sector commodities. This results in
531 a more credible and relevant evaluation of the benefits of each livestock commodity in increasing
532 farmers' income.

533

534 **AUTHOR'S CONTRIBUTION**

535 MM & MHB: Conceptualization, methodology, data curation, writing original draft, writing – review
536 and editing. MZH & AWT: data curation, supervision. writing original draft, writing – review and
537 editing.

538

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610 Table 1. Advantages of Beef Cattle in the Tomini Bay Region District/City

Year	Localization		Specialization		Base	
	Mark	Category	Mark	Category	Area	%
2019	0.2704	Spread	0.3540	Not special	12	70.59
2020	0.2768	Spread	0.3837	Not special	11	64.71
2021	0.2924	Spread	0.3782	Not special	12	70.59
2022	0.2612	Spread	0.2702	Not special	11	64.71
2023	0.2945	Spread	0.2920	Not special	11	64.71
Rata-Rata	0.2791	Spread	0.3356	Not special	11	67.06

611 *Source: Processed data, 2024*

612

613 Table 2. Advantages of Horses in the Tomini Bay Region District/City

Year	Localization		Specialization		Base	
	Mark	Category	Mark	Category	Area	%
2019	0.5517	Spread	0.0046	Not special	4	23.53
2020	0.5634	Spread	0.0042	Not special	4	23.53
2021	0.5668	Spread	0.0038	Not special	4	23.53
2022	0.6091	Spread	0.0031	Not special	3	17.65
2023	0.6302	Spread	0.0032	Not special	4	23.53
Rata-Rata	0.5842	Spread	0.0038	Not special	4	22.35

614 *Source: Processed data, 2024*

615

616 Table 3. Advantages of Goats in the Tomini Bay Region District/City

Year	Localization		Specialization		Base	
	Mark	Category	Mark	Category	Area	%
2019	0.4042	Spread	0.2771	Not special	9	52.94
2020	0.4617	Spread	0.3110	Not special	9	52.94
2021	0.4691	Spread	0.2854	Not special	9	52.94
2022	0.4504	Spread	0.2838	Not special	11	64.71

2023	0.4619	Spread	0.3002	Not special	10	58.82
Rata-Rata	0.4495	Spread	0.2915	Not special	10	56.47

617 *Source: Processed data, 2024*

618

619 Table 4. Advantages of Pigs in the Tomini Bay Region District/City

Year	Localization		Specialization		Base	
	Mark	Category	Mark	Category	Area	%
2019	0.5069	Spread	0.3848	Not special	8	47.06
2020	0.4802	Spread	0.3981	Not special	9	52.94
2021	0.4764	Spread	0.3905	Not special	7	41.18
2022	0.4918	Spread	0.4430	Not special	6	35.29
2023	0.4825	Spread	0.4117	Not special	7	41.18
Rata-Rata	0.4876	Spread	0.4056	Not special	7	43.53

620 *Source: Processed data, 2024*

621

622 Table 5. Advantages of Local Chickens in the Tomini Bay Region District/City

Year	Localization		Specialization		Base	
	Mark	Category	Mark	Category	Area	%
2019	0.2962	Spread	3.4675	Special	13	76.47
2020	0.3456	Spread	3.8228	Special	13	76.47
2021	0.3471	Spread	3.7227	Special	13	76.47
2022	0.2822	Spread	3.5852	Special	13	76.47
2023	0.2883	Spread	3.8085	Special	13	76.47
Rata-Rata	0.3119	Spread	3.6813	Spesial	13	76.47

623 *Source: Processed data, 2024*

624

625 Table 6. Advantages of Layer Chickens in the Tomini Bay Region District/City

Year	Localization		Specialization		Base	
	Mark	Category	Mark	Category	Area	%
2019	0.2528	Spread	0.4869	Not special	8	47.06

2020	0.2419	Spread	0.4094	Not special	8	47.06
2021	0.2899	Spread	0.3972	Not special	7	41.18
2022	0.2159	Spread	0.2652	Not special	5	29.41
2023	0.2107	Spread	0.2755	Not special	6	35.29
Rata-Rata	0.2422	Spread	0.3668	Not special	7	40.00

Source: Processed data, 2024

Table 7. Advantages of Broiler Chickens in the Tomini Bay Region District/City

Year	Localization		Specialization		Base	
	Mark	Category	Mark	Category	Area	%
2019	0.1601	Spread	0.5872	Not special	5	29.41
2020	0.2075	Spread	0.7115	Not special	6	35.29
2021	0.2221	Spread	0.7782	Not special	6	35.29
2022	0.2249	Spread	0.8058	Not special	5	29.41
2023	0.2204	Spread	0.7428	Not special	5	29.41
Rata-Rata	0.2070	Spread	0.7251	Not special	5	31.76

Source: Processed data, 2024

Table 8. Advantages of Ducks in the Tomini Bay Region District/City

Year	Localization		Specialization		Base	
	Mark	Category	Mark	Category	Area	%
2019	0.4944	Spread	0.3381	Not special	8	47.06
2020	0.5511	Spread	0.2567	Not special	5	29.41
2021	0.5205	Spread	0.2530	Not special	6	35.29
2022	0.5523	Spread	0.3565	Not special	7	41.18
2023	0.5763	Spread	0.2701	Not special	4	23.53
Rata-Rata	0.5389	Spread	0.2949	Not special	6	35.29

Source: Processed data, 2024

Table 9: Analysis Results of Per Capita Income Increase in the Community Through the Livestock Subsector

Dependent Variable: PEND_PERKAPITA?

Method: Pooled EGLS (Cross-section random effects)

Date: 12/29/22 Time: 08:29

Sample: 1 5

Included observations: 5

Cross-sections included: 17

Total pool (balanced) observations: 85

Swamy and Arora estimator of component variances

Variable	Coefficie nt	Std. Error	t-Statistic	Prob.
	-			
C	4.911868	3.923806	-1.251812	0.2145
BEEF CATTLE	0.599890	0.298150	2.012041	0.0478
	-			
HORSE?	0.104229	0.340486	-0.306118	0.7604
GOAT?	0.103025	0.565289	0.182253	0.8559
PIG?	0.147523	0.247822	0.595279	0.5534
LOCAL CHICKEN?	5.501455	1.176777	4.675021	0.0000
LAYER CHICKEN?	0.578373	0.400591	1.443801	0.1529
BROILER?	9.796355	2.322663	4.217726	0.0001
DUCK?	0.963673	0.420765	2.290289	0.0248
Random Effects				

(Cross)

	-
_BOLSEL--C	1.414251
	-
_BOLTIM--C	7.064234
	-
_MITENG--C	0.411075

	-		
_MINAHASA--C	3.999371		
	-		
_MINUT--C	4.868125		
	-		
_BITUNG--C	4.962606		
_BANGLA--C	2.077141		
_BANGKEP--C	3.532897		
	-		
_BANGGAI--C	5.710949		
_TOUNA--C	4.484584		
_POSO--C	3.007765		
_PARIMO--C	3.149963		
_POHUWATO--C	3.737688		
_BOALEMO--C	4.703745		
_KABGOR--C	6.112800		
_BONBOL--C	4.196655		
	-		
_KOTAGOR--C	6.572627		
			1.77954
R-squared	0.297636	Mean dependent var	0
			1.49400
Adjusted R-squared	0.223703	S.D. dependent var	6
			131.688
S.E. of regression	1.316335	Sum squared resid	0
			0.97510
F-statistic	4.025743	Durbin-Watson stat	3
Prob(F-statistic)	0.000500		

635

Source: Processed Data E-Views version 9, 2024

636

638 Table 10: Internal Rating Factors (Strengths and Weaknesses)

No.	Description	Actual Points	Points Weight	Rating	Score
1	Teluk Tomini has diverse and abundant natural resources, including marine and agricultural products that can support feed security.	79.53%	0.070	3.000	0.211
2	The high biodiversity allows for the development of various types of sustainable alternative feeds.	83.29%	0.074	4.000	0.294
3	There are government programs and policies that support feed security in the Teluk Tomini region.	81.65%	0.072	4.000	0.288
4	Basic infrastructure such as roads, ports, and adequate storage facilities for feed distribution.	77.41%	0.068	2.000	0.137
5	A large number of local workers are ready to be involved in the feed production and distribution sector.	76.94%	0.068	2.000	0.136
6	Collaboration with universities and research institutions that can support the development of feed technology and innovation.	81.65%	0.072	3.000	0.216
7	A large local market potential for livestock and aquaculture feed.	76.47%	0.068	1.000	0.068
Total Strengths			0.492		1.349
1	Limited modern and advanced technology for feed production and processing.	83.53%	0.074	4.000	0.295
2	Human resource capacity in terms of knowledge and skills still needs improvement.	78.82%	0.070	2.000	0.139
3	Limited access to capital and investment for feed business development.	93.18%	0.082	4.000	0.329
4	Limited diversification of feed products, leading to dependency on certain types of feed.	78.35%	0.069	1.000	0.069
5	Resource management and utilization that have not been optimized.	80.47%	0.071	3.000	0.213
6	Uneven distribution of infrastructure across the Teluk Tomini region.	82.12%	0.072	3.000	0.217
7	Education and outreach to the public about the importance of feed security still need to be enhanced.	79.29%	0.070	2.000	0.140
Total Weaknesses			0.508		1.403
Total IFAS		11.33	1.000		
Score IFAS					-0.054

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640 Source: Processed data, 2024

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643 Table 11: External Rating Factors (Opportunities and Threats)

No.	Description	Actual Points	Points Weight	Rating	Score
1	Increasing demand for feed along with the growth of the fisheries and livestock sectors.	85.65%	0.078	4.000	0.311
2	Opportunities to adopt new technologies in feed production and processing.	84.00%	0.076	3.000	0.229
3	Availability of funding programs and assistance from the government and international organizations.	84.71%	0.077	4.000	0.307
4	Potential to export feed products to international markets (at least demand around the IKN area).	83.06%	0.075	3.000	0.226
5	Development of innovative feed products based on local and environmentally friendly materials.	80.71%	0.073	1.000	0.073
6	Potential for Natural Increase of livestock and poultry, and expansion of crop areas integrated with complete feed production.	80.71%	0.073	2.000	0.146
7	Opportunities to establish partnerships with the private sector in feed industry development.	80.94%	0.073	2.000	0.147
Total Opportunities			0.526		1.439
1	Climate change that may affect the production of feed raw materials.	74.35%	0.067	2.000	0.135
2	Price instability of raw materials and overhead costs that may impact production costs.	76.00%	0.069	3.000	0.207
3	Competition with feed producers from other regions and abroad.	76.94%	0.070	4.000	0.279
4	Dependency on imported technology and raw materials that may hinder self-sufficiency.	73.18%	0.066	2.000	0.133
5	Risk of environmental degradation that could affect natural resources.	75.53%	0.069	3.000	0.206
6	Economic crises and inflation that may reduce public purchasing power and investment.	70.59%	0.064	1.000	0.064
7	Strict regulations related to feed production and distribution that may pose operational challenges.	76.00%	0.069	4.000	0.276
Total Threats			0.474		1.299
Total EFAS		11.02	1.000		
Score EFAS					0.140

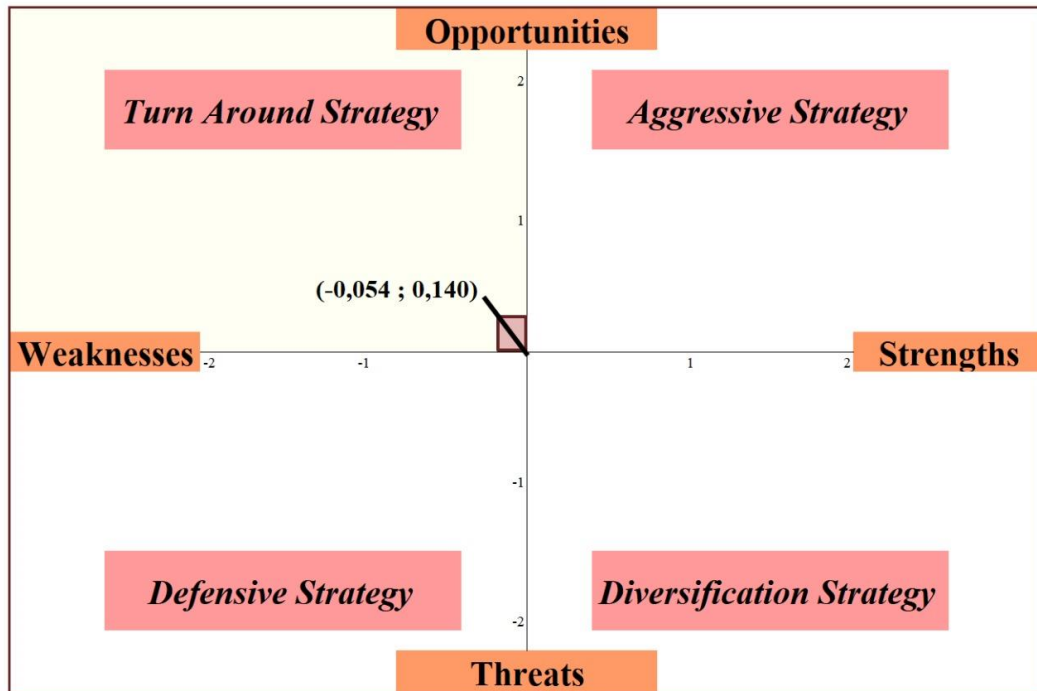
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645 *Source: Processed data, 2024*

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648 Figure 1. SWOT Analysis Diagram



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650 *Source: Processed data, 2024*

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