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The Analysis of Region Potential for Ruminant Development in Polewali Mandar District, West Sulawesi Province, Indonesia

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ABSTRACT. *This study aims to identify the potential of Polewali Mandar Regency as a ruminant development area based on the analysis of regional potential and forage availability. Identify the condition of the Polewali Mandar Regency area regarding the availability of forage and analyze the feasibility of the area for the development of ruminant farming. The method used to carry out the analysis was the analysis of livestock density and LQ, and the analysis of the carrying capacity of forage and agricultural waste to develop ruminants in the Polewali Mandar Regency. The data used in the analysis is secondary data from the Agriculture and Livestock Service Office of Polewali Mandar Regency and the Central Bureau of Statistics of Polewali Mandar Regency. The data analysis method used is descriptive-analytical. Recommendations for livestock types to be developed based on the LQ analysis results are cattle-based in Tubbi Taramanu, Wonomulyo, Mapilli, Bulo and Matangnga sub-districts, buffalo-based in Tinambung and Campalagian sub-districts, and goat base in Balanipa, Limboro, Alu, Campalagian, Luyo, Tapango, Matakali, Polewali, Binuang, and Anreapi sub-districts. CCI analysis shows that only the Tapango, Wonomulyo, and Binuang sub-districts are in a safe status. The RDP analysis shows that most sub-districts in Polewali Mandar can increase their livestock population, with the Tapango sub-district having the highest population increase capacity. The recommendation results are a preliminary analysis of ruminant development, so further studies are needed.*

Keywords: CCI, livestock density, LQ, RDP, ruminant.

INTRODUCTION

The Polewali Mandar Regency is one of the regencies in West Sulawesi Province, Indonesia. In the livestock sector, Polewali Mandar also has great potential, including a population of 34,369 beef cattle, 1,335 buffaloes, and 93,881 goats spread across several sub-districts. The livestock sector, which is directly integrated with agriculture in general, plays a key role in improving the quality of Human Resources and the economy of the autonomous region of Polewali Mandar Regency (Rahasia et al., 2021). Ruminant is a potential livestock commodity in fulfilling animal protein needs because the need for meat continues to increase yearly, along with the increasing population (Ibrahim et al., 2021).

Feed is the most important factor to consider in livestock development (Rauf & Thaha, 2018), which includes the fulfillment of feed needs is considered in quantity, quality, and availability throughout the year (Boti et al., 2018). However, problems related to forage supply range from limited seasonal land to the quality of forage feed, while the provision of forage for Buffalo livestock is strongly influenced by land availability. The solution is to utilize sub-optimal land for natural pastures and potential forage cultivation land (Imanudin et al., 2020). Efforts to support the increase in ruminant livestock production are by utilizing the potential in their respective regions, especially in fulfilling forage needs, to fulfill feed independence and support increased ruminant livestock production (Norau et al., 2023).

Ruminant feed is mostly from forage consisting of grass, legumes, leaves, and by-products of agricultural products (Edi, 2020).

Furthermore, to support the productivity of ruminants and see the projected development of ruminants in the area following the availability of forage feed, it is necessary to analyze the potential of feed and the index of feed carrying capacity for the proper development of the livestock sub-sector (Edi, 2020). Forage consists of natural grasses and by-products of agricultural potential. Natural grasses are forage that can be consumed by ruminants that grow on the left and right sides of roads, garden/field areas, agricultural areas, and natural grassland areas, while by-products of agriculture are the remains of crops after harvesting or taking the main part, such as rice and corn straw. Efforts that can be made to facilitate sustainable livestock development are to identify the potential of the region based on the size of the resources used in the livestock sector, using livestock density analysis and Location Quotient (LQ) analysis (Habsari & Irwani, 2021). The proper development of ruminant areas needs to be supported by analyzing the livestock base of each region.

In addition, livestock density analysis is one of the studies that can be used to project appropriate and efficient livestock development by harmonizing local potential and the development of livestock bases in each region (Edi, 2020). Therefore, this study was conducted to identify the potential of Polewali Mandar Regency as a ruminant development area based on the analysis of regional potential and the availability of forage.

MATERIALS AND METHODS

This study was conducted in the Polewali Mandar District, consisting of 13 sub-districts. The research location was determined by purposive sampling based on the highest total ruminant population in West Sulawesi Province. The method used in this study is qualitative descriptive analysis. This research was conducted using the judgment sampling method, namely sampling from relevant information available from certain sources and seeking information from the Extension Implementation Agency of Polewali Mandar Regency, the Agriculture and Livestock Service Office of Polewali Mandar District, and the Central Bureau of Statistics of Polewali Mandar District, for the Years 2023 and 2024 (BPS, 2023; BPS, 2024). Data were analyzed using descriptive statistics.

Livestock Density Analysis

Analysis and assessment of livestock density consisting of (Ashari et al., 1995):

$$Economic\ density = \frac{Ruminant\ Population\ (AU)}{People\ population} \times 1000$$

$$Farming\ density = \frac{Ruminant\ population\ (AU)}{The\ area\ of\ arable\ land\ (ha)}$$

$$Regional\ density = \frac{Ruminant\ population\ (AU)}{Territory\ area\ (km^2)}$$

The results of livestock density analysis in Table 1 will be combined with population density analysis consisting of 6 categories, namely Economic Density × Livestock Density (EU), Economic Density × Regional Density (EW), Economic Density × Population Density (EP), Livestock Density × Regional Density (UW) Livestock Density × Population Density (UP), and Regional Density × Population Density (WP). Ruminant population by animal unit (AU). The score for the combination of livestock density and population density follows Sumanto & Juarini (2024) presented in Table 2, where the accumulation will determine the order of priority areas for livestock development.

Analysis of Regional Development Potential

Analysis of regional development potential is conducted by first weighting the criteria based on livestock density and the population density analysis formula (Table 1). Then, the criteria for livestock development

areas are determined based on the combination of livestock density and population density (Table 2).

Location Quotient

Location Quotient (LQ) is used to determine the distribution of ruminants in a sub-district with the same sector capability at the district level. The formula for calculating LQ is (Vikaliana, 2018):

$$LQ^i = \frac{X^i/X^t}{Y^i/Y^t}$$

Description:
Xi = Ruminant population i in the sub-district (AU); Xt = Total ruminant population in the sub-district (AU); Yi = Ruminant population i in the district (AU); Yt = Total ruminant population in the district (AU); i = Ruminant commodity (cattle, buffalo, goat).

If LQ > 1 means that the livestock commodity is a basic sector. The potential of the livestock can not only be developed for the needs of the region itself, but also can fulfill the surrounding areas. If LQ = 1 means the livestock commodity is a non-base sector. Its potential can only be fulfilled in its area without fulfilling the surrounding area. If LQ<1 means the livestock commodity is a non-base sector. This area is not a good potential for livestock development.

Table 1. Criteria of livestock density and people density analysis formula.

Criteria	Economic density	Farming density	Regional density	People density
Rarely	<50	<0.25	<10	<1,249
Middle	50-100	0.25-1	10-20	2,500-3,999
Normal	100-300	1-2	20-50	4,000-7,400
Very	>300	>2	>50	>7.500

Table 2. The criteria for livestock development areas with a combination of livestock density and population density.

	Rarely	Middle	Normal	Very
Rarely	WPP	WPP	WP	WM
Middle	WPP	WP	WM	WM
Normal	WP	WP	WK	WK
Very	WP	WM	WK	WK

Note: WPP (spreading and development area) = value 4. WP (development area) = value 3. WM (stabilization area) = value 2. WK (consumer area) = value 1. Source: Sumanto and Juarini (2004).

Forage Production

Measurement of the potential supply of forage, consisting of forage components whose production is measured, includes natural grasses and by-products of agriculture (Nell & Rollinson, 1974) were calculated with:

Natural forage (ton DM per year) = (pasture land area (ha) × 15) + (paddy land area (ha) × 0.1 × 0.2) + (paddy low land area (ha) × 0.03) + (forest land area (ha) × 0.02) + (moor land area (ha) × 0.1) + (plantation land area (ha) × 0.05).

By-products of agriculture (ton DM per year) = (low land paddy field harvested area (ha) × 3.86 × 0.925) + (dry land paddy field harvested area (ha) x 2.76 × 0.925) + (corn field harvested area (ha) × 10 × 0.803) + (peanuts field harvested area (ha) × 4 × 0.9) + (mung beans field harvested area (ha) × 3 × 0.889) + (soybean field harvested area (ha) × 3 × 0.889) + (sweet potato field harvested area (ha) × 15 × 0.2) + (cassava field harvested area (ha) × 5 × 0.26).

Carrying Capacity (CC)

CC of forage is the ability of available forage to support livestock in the area. Each

livestock is measured by AU, where each 1 AU is equivalent to livestock consuming 6.25 kg of dry matter per day multiplied by 365 days in a year to get the feed requirement (Nell & Rollinson, 1974; NRC, 2000), which can be determined through:

$$CC\ (AU) = \frac{Feed\ Potential\ (ton\ DM\ per\ year)}{Feed\ requirement\ (1\ AU\ per\ year)}$$

Ruminant Development Potential (RDP)

Livestock Development is the ability of an area to accommodate ruminants based on the ability to provide forage. To determine the Ruminant Development Potential (RDP) of an area, the following formula is used (Nell & Rollinson, 1974):

RDP = Carrying Capacity (AU) – Ruminant Population (AU)

Carrying Capacity Index (CCI) Forage

The CCI of forage plays a role in assessing an area in terms of providing sufficient forage. CCI explains the level of security of forage in an area (Kusumaningrum, 2013; Santoso et al., 2019). The equation used to derive the CCI is:

$$CCI = \frac{Carrying\ Capacity\ (AU)}{Ruminant\ Population\ (AU)}$$

If CCI ≤ 1, it is stated that the forage in the area is very critical, CCI >1-1.5 is critical, CCI > 1.5-2 is vulnerable, and CCI > 2 is safe.

RESULT AND DISCUSSION

Livestock Density Analysis

The results of livestock density analysis in Table 3 consist of economic density criteria, farming density, regional density, and population density in Polewali Mandar Regency.

Economic density in Table 3 shows that the economic density in Polewali Mandar Regency is categorized as medium when compared to the total population of 495371 thousand people with a value of 99.15 AU/1000 people. The value of economic density is also different in each sub-district, namely the Normal category 50%, the Middle category, 37.5%, and the Rarely category, only 12.5%. This indicates that economic density can still be increased.

The regional density in Polewali Mandar Regency has Normal criteria with a value of 23.67 AU/km2, with 5 sub-districts in the Very category, 4 sub-districts in the Normal category, 4 sub-districts in the Middle category, and 3 sub-districts in the Rarely category. Tubbi Taramanu, Bulo, and Matangnga sub-districts are sub-districts with the Middle category, which are mountainous areas that should be a potential area to be developed. This difference can be caused by variations in geographical conditions, feed availability, and farming patterns applied in each sub-district (Winarso, 2017).

The farming density in the Polewali Mandar District in Table 3 shows the Middle criteria with a value of 0.10 AU/ha. This also indicates that farming in the Polewali Mandar District still has a great opportunity to be developed due to the large area of arable land that is still not utilized for livestock cultivation. The amount of arable land available is still sufficient to accommodate livestock that will be developed (Edi, 2020).

The population density in Polewali Mandar Regency is 239 inhabitants/km2 with the Rare category. Similarly, all sub-districts in Polewali Mandar District are included in the Rarely criteria. Based on the results of the combination analysis between livestock density and population density displayed in Table 4, it shows that the top priority recommendation for ruminant development is in Binuang sub-district, followed by Bulo, Anreapi, and Matangnga sub-districts and the third priority is in Campalagian, and Matakali sub-districts. The economic density, farm size, and region combination showed that the sub-district was the priority for livestock development (Osak et al., 2019).

Table 3. Analysis of livestock density in Polewali Mandar Regency

No	Sub-district	Economic density (AU/1000 people)		Regional Density (AU/km²)		Farming density (AU/ha)		Population density (inhabitants/ km²)	
		Value	Criteria	Value	Criteria	Value	Criteria	Value	Criteria
1	Tinambung	139.87	Normal	162.96	Very	2.30	Very	1138	Rarely
2	Balanipa	90.38	Middle	82.55	Very	1.19	Normal	913	Rarely
3	Limboro	142.90	Normal	43.27	Normal	1.42	Normal	303	Rarely
4	Tubbi Taramanu	168.79	Normal	9.43	Rarely	1.38	Normal	56	Rarely
5	Alu	185.92	Normal	16.34	Middle	0.19	Very	88	Rarely
6	Campalagian	88.04	Middle	50.38	Very	0.82	Middle	572	Rarely
7	Luyo	107.72	Normal	29.66	Normal	0.35	Middle	275	Rarely
8	Wonomulyo	75.52	Middle	52.33	Very	1.07	Normal	691	Rarely
9	Mapilli	268.79	Normal	90.99	Very	1.49	Normal	340	Rarely
10	Tapango	71.92	Middle	14.96	Middle	0.31	Middle	208	Rarely
11	Matakali	71.00	Middle	28.01	Normal	0.46	Middle	399	Rarely
12	Bulo	128.39	Normal	6.09	Rarely	0.66	Middle	47	Rarely
13	Polewali	16.85	Rarely	37.71	Normal	0.75	Normal	2238	Rarely
14	Binuang	35.98	Rarely	10.23	Middle	0.00	Rarely	284	Rarely
15	Anreapi	82.41	Middle	10.47	Middle	0.25	Middle	127	Rarely
16	Matangnga	228.28	Normal	5.76	Rarely	0.18	Rarely	25	Rarely
	Polewali Mandar	99.15	Middle	23.67	Normal	0.10	Middle	239	Rarely

Table 4. Criteria of livestock development areas in Polewali Mandar Regency.

No	Sub-district	Combination						Value	Priority
		EU	EW	EP	UW	UP	WP		
1	Tinambung	WK	WK	WP	WK	WP	WP	12	7
2	Balanipa	WM	WM	WPP	WK	WP	WP	15	6
3	Limboro	WK	WK	WP	WK	WP	WP	12	7
4	Tubbi Taramanu	WK	WP	WP	WP	WP	WPP	17	4
5	Alu	WK	WP	WP	WM	WP	WPP	16	5
6	Campalagian	WP	WM	WPP	WM	WPP	WP	18	3
7	Luyo	WP	WK	WP	WM	WPP	WP	16	5
8	Wonomulyo	WM	WM	WPP	WK	WP	WP	15	6
9	Mapilli	WK	WK	WP	WK	WP	WP	12	7
10	Tapango	WP	WP	WPP	WP	WPP	WPP	21	2
11	Matakali	WP	WM	WPP	WM	WPP	WP	18	3
12	Bulo	WP	WP	WP	WPP	WPP	WPP	21	2
13	Polewali	WP	WP	WPP	WK	WP	WP	17	4
14	Binuang	WPP	WPP	WPP	WPP	WPP	WPP	24	1
15	Anreapi	WP	WP	WPP	WP	WPP	WPP	21	2
16	Matangnga	WP	WP	WP	WPP	WPP	WPP	21	2
	Polewali Mandar	WP	WM	WPP	WM	WPP	WP		

Note: WPP = spreading and development area. WP = development area. WM = stabilization area. WK = consumer area.

The livestock development pattern consists of groups, namely WPP (distribution and development area), which is an area that is given priority for livestock distribution and development, WP (development area), which is an area that will become a growth area for intensive development and agribusiness, WM (stabilization area), which is an area where

livestock development cannot be increased or can only be maintained in existing conditions, and WK (consumer/ livestock service area), which is an area for marketing production results or providing production facilities/ infrastructure that are less suitable for livestock cultivation or development purposes (Budiharsono, 2001).

Ruminant Population and LQ

The ruminant population in the Polewali Mandar District in 2023 can be seen in Table 5. The buffalo population in the district is still small compared to the population of other ruminants such as cattle and goats. In addition, the buffalo population is not well distributed in each sub-district in the Polewali Mandar district. The sub-district with the largest buffalo population is Tinambung sub-district with 919 AU, while the sub-district with the smallest population is Tubbi Taramanu sub-district and Alu sub-district with 1 AU. This condition is caused by buffaloes that like humid areas such as swamps, to wallow, so the buffalo population will be found in coastal areas. The wallowing behavior of buffalo is caused by very few sweat glands or pores. In addition, wallowing behavior is a grooming activity to restore body temperature to normal quickly (Nuraida & Susanti, 2024).

Unlike buffalo, both cattle and goats in the Polewali Mandar District are spread across each sub-district. Campalagian sub-district is the sub-district with the highest population of cattle and goats. Information on the place of business of goats and cattle is needed by the community, both entrepreneurs, the general public, and the relevant livestock services to see which areas have the potential for cattle, goats, and sheep production in a particular area (Anara et al., 2021)

The LQ method analyzes whether an area is a base or non-base sector (Surachman et al., 2022). The results of the LQ analysis in Table 5 show that each sub-district has its livestock base of excellence with data obtained that there are 5 cattle base areas, 2 buffalo base areas, and 10 goat base areas. Therefore, the data shows that the leading commodity in Polewali Mandar Regency is goats, followed by cattle, and lastly is buffalo. The high LQ coefficient in a region is due to the number of sheep populations in that region being able to balance the number of other ruminant livestock populations and vice versa (Surachman et al., 2022). Based on the data in Table 5, several sub-districts are livestock development bases, including cattle development base, including cattle development base, namely Mapilli sub-district (1.27), Wonomulyo sub-district (1.21), Bulo sub-district (1.09), Tubbi Taramanu sub-district (1.18), Matangnga sub-district (1.13); The development bases for buffalo are Tinambung sub-district (9.42) and Campalagian sub-district (2.15); while the development bases for goats are Balanipa sub-district (2.16), Limboro sub-district (1.96), Tapango sub-district (1.42), Polewali sub-district (1.24), Matakali sub-district (1.20), Alu sub-district (1.19), Luyo sub-district (1.17), Campalagian sub-district (1.11). The LQ coefficient for each ruminant commodity can be described as cattle with the highest coefficient in the Mapillli sub-district (1.27), buffalo with the highest coefficient in the Tinambung sub-district (9.42), and goats with the highest coefficient in the Balanipa sub-district (2.16). This data informs us that the potential livestock base to be developed is cattle in the Mapilli sub-district, buffalo in the Tinambung sub-district, and goats in the Balanipa sub-district.

The livestock population that produces LQ>1 is the normative standard to be designated as a superior commodity or population in a region (Kardin & Koesmara, 2023). LQ can be used to assess how an industry sector affects the economy of an area and to determine local government policy (Asiz et al., 2021). Analysis of ruminant livestock development areas using analytical tools such as LQ can provide clearer insights into development priorities, resource allocation, and appropriate development strategies, as well as enable the identification of specific needs and opportunities to improve

production efficiency and strengthen the competitiveness of the ruminant livestock sector in the region (Dalle et al., 2023). The region can not only be developed for the needs of the area itself, but also can meet the needs of the surrounding areas ((Azis et al., 2024). The availability of animal feed must support the increase in the population and development of livestock areas (Hidayat et al., 2020). An important aspect in determining the development of ruminants in an area is the availability of forage because most of the costs required to maintain livestock come from feed (Daru et al., 2024).

Table 5. Population and LQ.

No	Sub-district	Population (AU)				LQ		
		Cattle	Buffalo	Goat	Ruminant	Cattle	Buffalo	Goat
1	Tinambung	1764.00	919.00	905.43	3588.43	0.70	9.42	0.92
2	Balanipa	1121.00	0.00	1605.57	2726.57	0.59	0.00	2.16
3	Limboro	1311.00	0.00	1504.14	2815.14	0.67	0.00	1.96
4	Tubbi Taramanu	3351.00	1.00	708.71	4060.71	1.18	0.01	0.64
5	Alu	1918.00	1.00	918.86	2837.86	0.97	0.01	1.19
6	Campalagian	3738.00	342.00	1765.14	5845.14	0.91	2.15	1.11
7	Luyo	2476.00	18.00	1174.86	3668.86	0.96	0.18	1.17
8	Wonomulyo	3341.00	0.00	613.00	3954.00	1.21	0.00	0.57
9	Mapilli	8299.00	14.00	1016.00	9329.00	1.27	0.06	0.40
10	Tapango	1166.00	3.00	738.57	1907.57	0.87	0.06	1.42
11	Matakali	1356.00	16.00	664.57	2036.57	0.95	0.29	1.20
12	Bulo	1065.00	0.00	325.57	1390.57	1.09	0.00	0.86
13	Polewali	757.00	0.00	387.86	1144.86	0.94	0.00	1.24
14	Binuang	1020.00	19.00	453.43	1492.43	0.98	0.47	1.11
15	Anreapi	609.00	0.00	344.43	953.43	0.91	0.00	1.32
16	Matangnga	1077.00	2.00	285.43	1364.43	1.13	0.05	0.77
	Polewali Mandar	34369.00	1335.00	13411.57	49115.57			

Capacity and Potential for Ruminant Development

Based on the analysis of feed potential, Tapango Sub-district has the largest potential for forage at 31175.22 tons per year, followed by Mapilli and Wonomulyo Sub-districts at 27,813.56 and 23,900.90 tons per year, respectively. The level of forage availability in an area is one of the most important factors that influence population dynamics in the success of livestock development (Prabawati et al., 2020). In addition, it is also necessary to consider other factors such as the availability of water, labor, and supporting infrastructure despite the abundant availability of forage (Nugraha et al., 2013).

Based on CC, Tapango, Mapilli, and Wonomulyo sub-districts stand out with a capacity that reaches tens of thousands of heads compared to other sub-districts in Polewali Mandar District. However, sub-districts that have a safe category CCI value are Tapango, Wonomulyo, and Binuang sub-districts, respectively. This difference can be caused by the livestock population in those sub-districts used as a comparison in the CCI. Carrying capacity and carrying capacity index can be used to evaluate the forage-livestock balance in an area (Yanan et al., 2020). Carrying capacity describes the maximum number of livestock a pasture can support without compromising available resources such as crops and soil (Hae et al., 2020).

Table 6. Capacity and potential for ruminant development in Polewali Mandar Regency.

No	Sub-district	Natural Forage (ton DM/ year)	The by-product of agriculture (ton DM/ year)	Forage (ton DM/ year)	CC (AU)	CCI	RDP (AU)
1	Tinambung	972.26	651.53	1623.79	711.80	0.20	-2876.63
2	Balanipa	34.47	2281.42	2315.89	1015.18	0.37	-1711.39
3	Limboro	418.27	6334.11	6752.38	2959.95	1.05	144.80
4	Tubbi Taramanu	6879.91	131.60	7011.51	3073.54	0.76	-987.18
5	Alu	503.41	296.93	800.34	350.83	0.12	-2487.02
6	Campalagian	22350.45	361.23	22711.68	9955.80	1.70	4110.66
7	Luyo	7637.50	8231.07	15868.56	6956.08	1.90	3287.23
8	Wonomulyo	23628.62	272.28	23900.90	10477.11	2.65	6523.11
9	Mapilli	27402.81	410.75	27813.56	12192.25	1.31	2863.25
10	Tapango	21112.15	10063.07	31175.22	13665.85	7.16	11758.28
11	Matakali	6.50	5347.45	5353.95	2346.94	1.15	310.37
12	Bulo	6085.18	130.66	6215.83	2724.75	1.96	1334.18
13	Polewali	3698.52	76.77	3775.29	1654.92	1.45	510.06
14	Binuang	734.02	7870.18	8604.21	3771.71	2.53	2279.28
15	Anreapi	3595.96	203.31	3799.27	1665.43	1.75	712.01
16	Matangnga	4660.10	708.87	5368.96	2353.52	1.72	989.09
	Polewali Mandar	129720.14	43371.20	173091.34	75875.66	1.54	26760.09

CCI is the basis for assessing the level of food security in the region that supports livestock farming in the region (Prayitno & Mirnawati, 2023). In addition, a very high CCI can also indicate suboptimal utilization of forage resources (Siregar et al., 2024). The holding capacity of pastures or grasslands is closely related to the type of livestock, forage production, season, and area of pastures or grasslands, where each research location has different physical growth and soil climate (Nugraha et al., 2022). Implementation time is also closely related to the rainy or dry season, affecting water availability in supporting the physiological processes of available forage.

The RDP in Polewali Mandar District will show the priority ranking in developing each type of ruminant in each different sub-districts. Some sub-districts in the Polewali Mandar District can develop ruminants because they have a positive RDP value, although with different increases in livestock population. Although some sub-districts have negative RDP values, Polewali Mandar District generally has a positive RDP value. RDP with a positive value indicates that the area, based on the carrying capacity of the land, is still possible to increase the cattle population because the level of land carrying capacity exceeds the population, resulting in under grazing (excess feed) (Abadi et al., 2021).

CONCLUSION

The research concludes that the combination analysis of livestock density which includes analysis of economic density, farming density, regional density, and population density shows that the Binuang sub-district gets the priority for ruminant development, the second priority is Anreapi, Matangnga, and Tapango sub-districts, while Campalagian and Matakali sub-districts are in the third priority. Recommendations for livestock types to be developed based on the LQ analysis results are cattle-based in Tubbi Taramanu, Wonomulyo,

Mapilli, and Matangnga sub-districts, buffalo-based in Tinambung and Campalagian sub-districts, and goat base in Balanipa, Limboro, Alu, Campalagian, Luyo, Tapango, Matakali, Polewali, Binuang, and Anreapi sub-districts. CCI analysis shows that only Tapango, Wonomulyo, and Binuang sub-districts are in a safe status. The RDP analysis indicates that most sub-districts in Polewali Mandar can increase their livestock population, with the Tapango sub-district having the highest capacity for population growth. The recommendation results are a preliminary analysis of ruminant development, so further studies are needed.

CONFLICT OF INTEREST

We certify that there is no conflict of interest with any financial, personal, or other relationships with other people or organizations related to the material discussed in the manuscript. Conflicts of Interest should be stated in the manuscript.

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