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Research article
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The Development of Corporate-Based Beef Cattle Breeding Areas

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Abstract: Livestock is an integral part of agriculture that significantly contributes to economic and socioeconomic development. The research determines the potential of East Kalimantan Province as a development area for corporate-based beef cattle breeding. This research used the literature study method and the data obtained was analyzed through a qualitative descriptive method. The research results show that the East Kalimantan Province has the opportunity to become a beef cattle development area based on its natural and human resource potential. The development of corporate-based beef cattle farming areas is a strategic approach to business-oriented and industrial-shaped beef cattle farming, given the increasingly dynamic and complex environment. The concept of a breeder corporation will create new strengths in human resources, capital, and banking to expand the potential for the success and growth of the business. The development of a corporate-based beef cattle breeding area 1) improves the competitiveness and added value of the region and beef cattle commodities to support national sustainable food security; 2) reinforces the livestock business system in one area management holistically; and 3) strengthens breeders institutions in accessing information, technology, public facilities and infrastructure, capital, processing, and marketing to be applied in East Kalimantan Province.
Keywords: development; area; livestock; beef cattle; corporation

肉牛养殖企业化发展

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摘要:

畜牧业是农业的重要组成部分，对经济和社会经济发展做出了重大贡献。该研究确定了东加里曼丹省作为企业肉牛养殖发展地区的潜力。本研究采用文献研究方法，通过定性描述方法对获得的数据进行分析。研究结果表明，东加里曼丹省凭借其自然和人力资源潜力，有机会成为肉牛发展区。发展肉牛企业化养殖区是肉牛养殖企业化、产业化的战略举措，也是面对日益活跃、复杂的环境。培育公司的概念将在人力资源、资本和银行业务方面创造新的优势，以扩大企业成功和增长的潜力。企业型肉牛养殖区的发展1）提高区域和肉牛商品的竞争力和附加值，支持国家可持续粮食安全；2）加强畜牧业系统的区域管理；3)

加强育种机构在获取信息、技术、公共设施和基础设施、资本、加工和营销方面的能力，以应用于东加里曼丹省。

关键词：发展; 区域; 家畜; 肉用牛; 公司

1 Introduction

Gaps and equity guarantees in regional development and food security are issues in national development. Hence, the policies should be acceleration-oriented based on developing natural and human resources and integrated infrastructure. The development of agriculture is an effort conducted by the government to accelerate food self-sufficiency[1]. The government's attention to agriculture is closely related to the livestock sub-sector. Consequently, livestock development is always associated with the reorientation of agricultural policy[2]. Developing the agricultural area by improving the breeders' economic institution becomes the direction of sustainable agricultural development. The principle of sustainable development is managing and using the agricultural ecosystem by preserving the natural diversity, productivity, regeneration capacity, vitality, and function to fulfill present and future ecological, economic, and social functions[3].

Livestock is an integral part of agriculture that significantly contributes to the economy and socio-economic development[4,5]. The revitalization should emphasize efforts to achieve self-sufficiency, food security, welfare, and business sustainability[6]. The livestock sub-sector is a commercial activity with fairly high capital investment. It is an important source of livelihood for small farmers in developing countries[4]. Livestock has a crucial and relevant role from the health aspect (fulfillment for animal protein), the economic aspect (contributor to the gross domestic product; investment), and the social aspect (livelihood and employment)[7]. Food availability, accessibility, and safety of animal protein sources are essential in supporting the health and welfare of the community and are prerequisites for security[8]. Livestock gross domestic product (GDP) at constant prices in 2021 amounted to IDR167.6 trillion or an increase of 0.34% compared to 2020, meanwhile livestock GDP at the current is IDR 268.2 trilion[9]. The realization of the domestic direct investment value of livestock in 2020 is IDR 2.3 trillion, but in 2021 it decreased by 6.34% to IDR 2.1 trillion[9]. The realization of the foreign direct investment value of livestock in 2020 is US$ 44.4 million, but in 2021, it decreased by 37.75% to US$ 28.6 million[9].

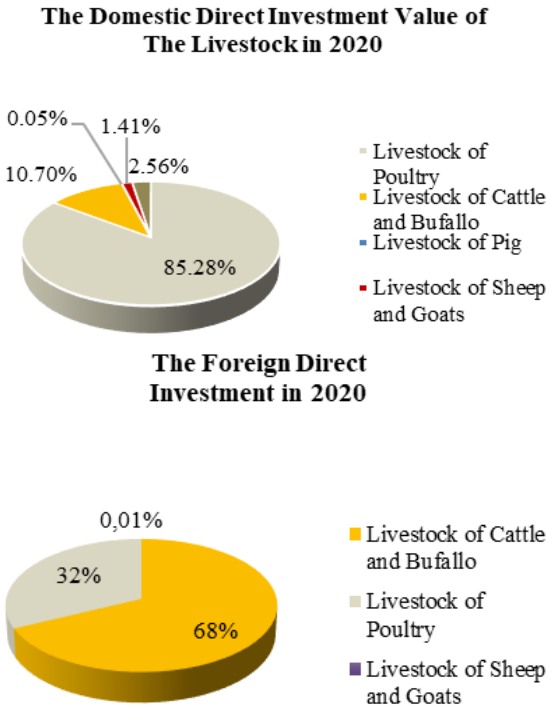

Fig. 1 The domestic direct investment value of livestock and foreign direct investment in 2020 [9]

The labor absorption of livestock in 2021

increased by 8.24% compared to 2020, with the number of workers (age range 25–59) in 2021 reaching 3.14 million people[9]. This increasing trend indicates the importance of the livestock sub-sector in the social aspect[10]. The illustration below shows the meat consumption of the Indonesian population from 2017 to 2020.

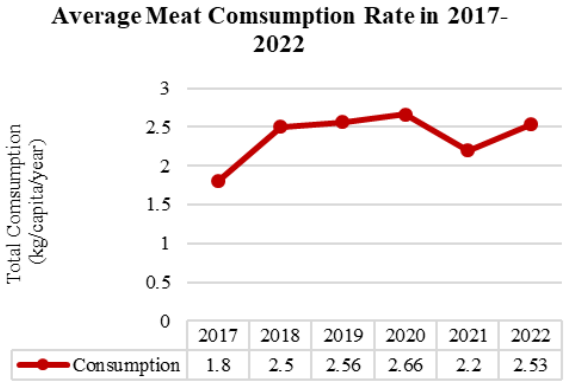

Fig. 2 Average meat comsumption rate in 2017-2022 (The data are processed from [11,12])

The average level of meat consumption in Indonesia (Fig. 2) is lower than in developed countries, reaching 6.4 kg[11]. This is caused by many factors, including the lack of beef cattle population, high meat prices, lack of business-oriented systems with low productivity, and production centers that have not been well distributed to consumer areas. Hence, efforts to increase the population and improve product quality and business systems still need to be carried out[11].

The development of the livestock sub-sector increases the population and production of products[13] with a good agribusiness system. However, the industrialization development of livestock, especially beef cattle, is difficult to implement because of the current condition of beef cattle breeding scattered in various regions and is not business-oriented[14]. Other problems that smallholder breeders often experience are the difficulty of obtaining additional capital, marketing, and the weakness of the institutional system. The breeders' businesses remain stagnant, and their profits decline. Therefore, comprehensive, systematic, integrated, competitive, sustainable, and decentralized strategies and policies under these conditions should be implemented[15], including a business approach toward a corporation. A corporate-based livestock area is developed with a strategy of empowering and cooperating with farmers. The corporate approach can connect breeders with livestock enterprises or develop their businesses. Discussion and study of the corporate livestock area are worthwhile because it offers a potential solution to problems associated with the growth of livestock businesses. The research determines the potential of East Kalimantan Province as a development area for corporate-based beef cattle breeding.

2 Research Methodology

This research applies a literature study approach to obtain data related to livestock population, production, and development policies in East Kalimantan Province. The secondary data used were obtained from Statistics Indonesia, the Livestock Service Office of East Kalimantan Province, and the Directorate General of Livestock and Animal Health, Ministry of Agriculture. The data obtained were analyzed through a qualitative descriptive method. Research related to the development of a corporate-based beef cattle breeding area was carried out through the following stages (Fig. 3).

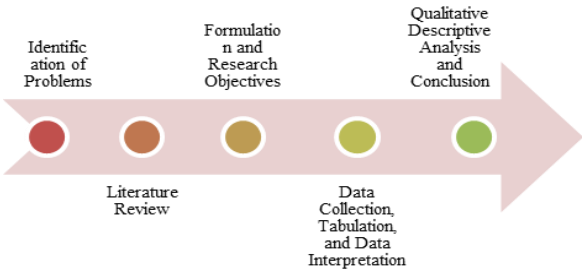

Fig. 3 Research stages

3 Results and Discussion

3.1 Beef Cattle Livestock

The need and demand for cattle meat continue to increase[16] along with the awareness of the importance of fulfilling nutrition (animal protein), increasing income per capita, urbanization, spending on the consumption of livestock products[8,17,18] as the population and wealth grows[19]. Such conditions require the livestock sub-sector, especially large ruminants, to increase productivity while still paying attention to the efficient uses of feed resources, environmental sustainability[7,17], and opening up great business opportunities for livestock producers[20]. There is a need for beef cattle development because they are the most popular large ruminant meat producer[4]. However, the current condition of beef cattle breeding in Indonesia is dominated by smallholder farmers contributing 90% of cattle production with a very low scale of ownership. It averages 2-3 heads, spreading throughout the region, making it difficult to develop toward industrialization[9,21]. The population of beef cattle in Indonesia in 2022 will reach 18,610 thousand heads with meat production reaching 498.92 thousand tons[9]. Beef

cattle production centers in Indonesia in 2022 will be concentrated in three provinces on the island of East Java with an average meat production of 808,072.80 tons, West Java of 920,692.76 tons, and Central Java of 867,665.21 tons, while in East Kalimantan Province only around 102,649.41 tons[9]. Such conditions can stimulate other regions to develop beef cattle breeding businesses. East Kalimantan Province can become a center of beef cattle development considering the land availability and human resources[22,23].

The population and quality of cattle influence the dynamic of meat availability[24]. Cattle quality is reflected in the final body weight and carcass percentage[25]. According to the genetic potential, high body weight can be achieved through a good maintenance system and balanced nutritional needs[24]. The beef cattle rearing system is divided into extensive, semi-intensive, and intensive[26] to increase business (feedlot)[27].

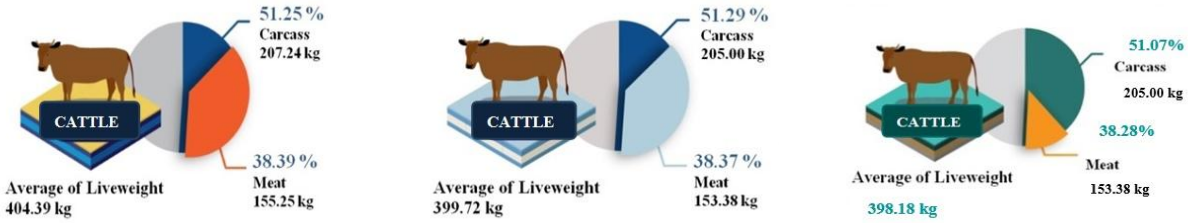

Fig. 4 Average body weight, carcass production, and meat of beef cattle[13,28,29]

Tab. 1 Beef cattle population and meat and carcass production in East Kalimantan Province (2018–2021) [30]

Year	Population (heads)	Carcass production		Meat production (tons)
		Production (tons)	Value (millions)	
2018	117.504	3.196,82	316.540,71	88.017,14
2019	119.485	3.048,69	252.883,51	61.771,56
2020	119.974	3.074,08	317.203,4	73.509,04
2021	121.290	2.800,98	290.163,54	77.965,06

Tab. 2 Beef cattle carcass production in East Kalimantan Province on a quarterly basis (2018-2020) [13,29,31]

Quarter	Year					
	2019		2020		2021	
	Production (tons)	Value (millions)	Production (tons)	Value (millions)	Production (tons)	Value (millions)
I (Januari-March)	667.68	42,687.01	695.67	72,900.12	623.68	64.462,94
II (April-June)	945.88	63,990.61	826.65	86,535.62	867.30	90.130,86
III (Juli-September)	709.92	72,085.83	723.17	73,038.71	634.53	65.510,93
IV (October-December)	725.22	74,120.07	828.59	84,728.94	675.47	70.058,81

3.2 Livestock Area

The increasing demand for animal food should be fulfilled with adequate management practices considering the environmental conditions[32]. The livestock industry development is closely related to the availability of natural resources such as land[33–35]. The availability of adequate natural resources for reared livestock commodities and the condition of the area support an efficient and sustainable livestock development policy[6]. Land, feed, calf, and labor are the main pillars that affect the productivity and sustainability of the livestock business[17]. Therefore, land resources play a core role in the livestock sub-sector[35], and the areas' determination shall guarantee land availability without competing with other sectors. The establishment of livestock areas will facilitate management because the commodities will be homogeneous and concentrated. As a result, resource utilization will be more efficient and optimal (holistic, commodity integration), commodities will receive more attention, budgets will be used more efficiently (management scale effect), and impacts will be more visible (wide-scale)[37].

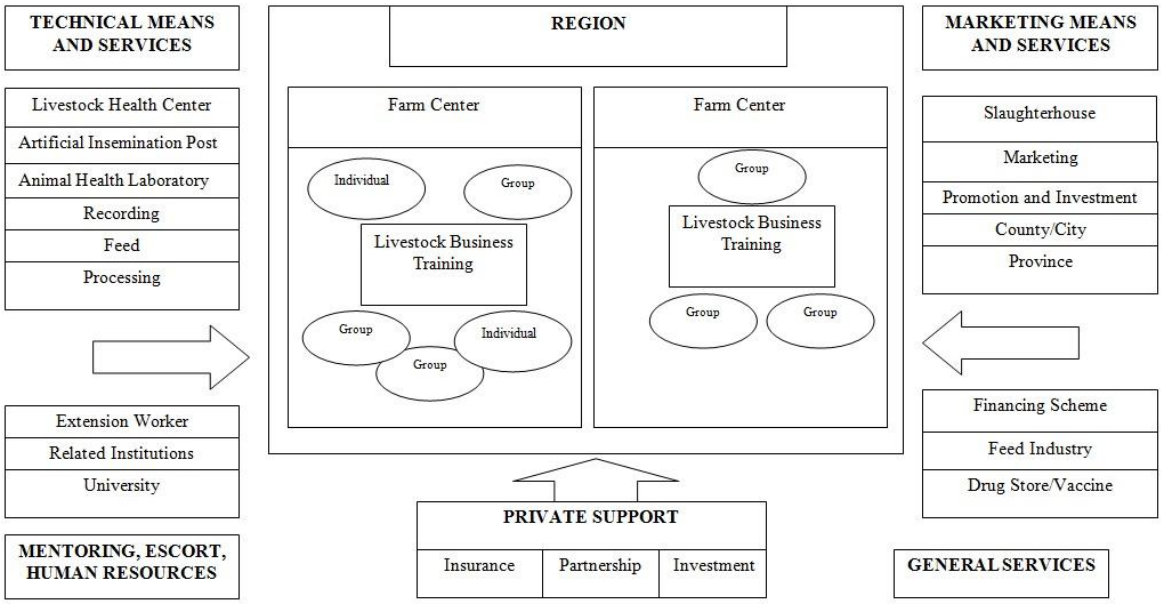

Fig. 5 Scheme of a livestock area based on the Regulation of the Minister of Agriculture of Indonesia Number 18/PERMENTAN/RC.040/4/2018 [37]

Based on its land resources, East Kalimantan Province has potential for livestock development areas, especially beef cattle, but not all districts have opportunities for development areas. The area of East Kalimantan Province reaches 127,346,92 km^2, and the uncultivated land for livestock development is 815,249 hectares[38]. The development of priority commodity areas is conducted based on the Decision of the Minister of Agriculture Number:

472/Kpts/RC.040/6/2018 on the Location of National Agricultural Areas, which has determined the area in each region. The livestock development area guarantees livestock productivity, and it is economically feasible to establish a livestock development center[6]. The development of the beef cattle commodities area as part of the livestock development designated area is an effort to leverage the contribution of beef cattle to regional development through the increment of population, production, and productivity[39]. These promote economic development in the region while maintaining the carrying capacity of available resources. Hence, a regional approach is needed to integrate regional potential and beef cattle commodities. The availability of a specific area for developing a commodity is expected to increase the efficiency of the commodity's production and distribution system. Principally, the regional approach is an effort to maximize the comparative advantag[39]. The criteria for developing beef cattle area set by the Directorate General of Livestock and Animal Health, Ministry of Agriculture, are as follows:

1. The development area covers a unitary district/municipality administrative area under the regional spatial planning (RSP) stipulated by the regional regulation at the regency/city level;
2. The territorial unit refers to the spreading of potential natural resources that support the development of beef cattle agribusiness, and effective control of livestock farmers is not limited by administrative boundaries of villages or sub-district government;
3. The regional agroecosystem promotes the development of beef cattle business, such as the availability of local natural and water resources, which is not an endemic area for infectious diseases.

The designated beef cattle breeding area should meet the following requirements:

1. There is a group of breeders actively engaged in beef cattle breeding;
2. The population should at least contain 1,000 adult cattle to achieve efficiency and economic scale;
3. Sources of forage and other additional feeds should be available. According to [6], livestock areas should be supported by the abundant availability of forage, plantation biomass, and agroindustrial waste that can promote feed availability;
4. Facilities and infrastructure for beef cattle health services, artificial insemination, and marketing should be available;
5. Primary infrastructure facilities such as electricity, clean water, fuel, and road access should be available.

Accuracy in determining the area for breeding is an important strategy to synergize the potential genetic advantages of livestock with existing regional resources, especially the availability of

adequate local feed[6], considering that the geography of an area affects health and feed management practices[40]. Therefore, the availability of abundant feed materials is the priority aspect in deciding the livestock rearing area. Silage of corn, rice straw, and grass can be the main feed source for fattening beef cattle[32].

3.3 Farmers' Corporation

The livestock business in East Kalimantan Province is dominated by smallholder breeders (mostly breeders' households) with small-scale businesses. Smallholder livestock is identical to business locations spread out in remote villages. It experiences reduced technical services, market connectivity, production, and income. In this situation, livestock businesses have no contribution to the economy. Smallholder livestock has lower business performance with a daily weight gain of 0.3 to 0.8 kg/head/day than industrial-based commercial-scale cattle fattening business performance with 1 to 1.4 kg/head/day[24]. The government has taken optimization efforts, including strengthening beef cattle farming financing[11].

A significant effort is being made to institutionalize change in the livestock industry. However, at the breeder and coordinating levels, institutions serve as obstacles to developing livestock businesses, apart from capital[41]. Many breeder institutional conditions still do not meet expectations. This is due to 1) lack of productive-oriented businesses; 2) reduced access to financing/banking sources and market networks; 3) failure to connect with sources of information, technology, and market-leading to less competition with other business actors; and 4) failure to serve the needs of agribusiness development for the members[42]. This is caused by the lack of socialization and readiness for institutional patterns. Thus, strengthening aspects of business in terms of technology and institutions to support business development is necessary[39]. The strengthening of breeder institutions is also expected to stimulate breeders to be more independent and competitive[43]. The breeder institution is developed by and for breeders to strengthen cooperation in struggling with their interests in the form of groups[42].

Assistance and empowerment of breeders in developing innovation and technology, supporting facilities and infrastructure (machines), processing animal feed and manure, and determining production targets related to the marketing of products can be carried out to strengthen breeder institutions. These measures can be put in place through a corporate framework to create an agricultural business focused on raising livestock, which will benefit breeders' negotiating power and the products[4,6]. In addition, breeders' savings and insurance in institutional programs can strengthen businesses[43]. The concept of a breeder corporation will provide new strengths such as human resources, capital, and banking that are included in business development to open more opportunities for success and progress. Important strategies that can improve the added value and competitiveness of livestock include improving the human resource capacity, breeder institutions (cooperatives), development of complementary sectors (agro-industry, provision of credit, application of appropriate technology), improvement of the logistic system, provision of information, development of innovation and technology, and market network expansion[14].

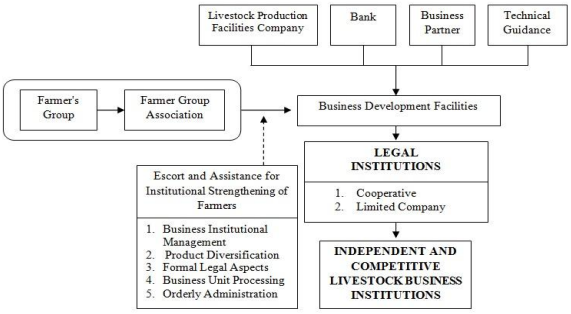

Fig. 6 Breeder institutional strengthening scheme [42]

3.4 Corporate Beef Cattle Development Area

The beef cattle agribusiness area is the development of the entire agribusiness subsystem integrated upstream to downstream[14]. The strengthening of breeder institutions is carried out through coordination and assistance to develop partnerships and corporate-based livestock areas in 2020[44]. The development is an approach to achieving business and industrial beef cattle breeding. This approach is in synergy with the vision of the Directorate General of Livestock and Animal Health: "The realization of competitive and sustainable Indonesian livestock in realizing advanced, independent and modern Indonesian agriculture"[44]. The development pattern of corporate-based beef cattle breeding areas is under Law Number: 19 of the Year 2013 concerning the Protection and Empowerment of Farmers and based on Regulation of the Minister of Agriculture Number 48 of 2018 Concerning Guidelines for the Development of Corporation-Based Agricultural Areas[14]. Designated areas for breeding cattle in Indonesia include 1) beef cattle area in Tuban, East Java, 2) beef cattle area in Subang, West Java, 3) beef cattle area in East Lombok, NTB, 4) beef cattle area in South Lampung, 5) beef cattle area in North Bengkulu,

Bengkulu, 6) Ngada Regency, 7) Gowa Regency, 8) Central Lombok Regency, and 9) Probolinggo Regency[44].

Livestock business development should be carried out collectively and holistically because livestock is an interconnected value chain from production inputs (upstream subsystem), production process (on-farm), post-harvest handling/downstream (off-farm) to consumers (marketing)[45], and the subsystem of supporting services such as government policies, financial institutions, insurance, extension and information services, transportation, research and development[24]. Upstream agribusiness subsystems (production of calf, feed, livestock production facilities) and on-farm beef cattle breeding are located in rural areas. Downstream agribusiness subsystems are located in urban areas and are interconnected. Therefore, animal husbandry needs to be developed on an efficient business scale in one corporate area. The factor components can be conducted efficiently, effectively, and integrated simultaneously to produce various products that improve added value and competitiveness[14]. The development of corporate-based beef cattle breeding areas is integrated and sustainable from the upstream to downstream subsystems in a livestock business system while still paying attention to economic, socio-cultural, technical, ecological, and environmental aspects. Beef cattle breeding areas should be supported by the availability of pasture land with an integration pattern between plantation crops, beef cattle, and horticulture[15,45]. The development of a corporate-based beef cattle breeding area aims to: 1) increase the competitiveness and added value of the region and beef cattle commodities to support national sustainable food security; 2) holistically strengthen the livestock business system, and 3) strengthen breeder institutions in accessing information, technology, public facilities, capital, processing, and marketing. The targets for developing a corporate-based beef cattle breeding area are:

1. Increasing the production, productivity, added value, and competitiveness of beef cattle;
2. Optimal availability of animal husbandry facilities and infrastructure support in beef cattle breeding areas;
3. Application of innovative technology in line with the specific location in the breeding development area;
4. Improving breeders' knowledge, skill, and entrepreneurship abilities in managing economic institutions; and
5. The functioning of an integrated, effective, efficient, and sustainable business system.

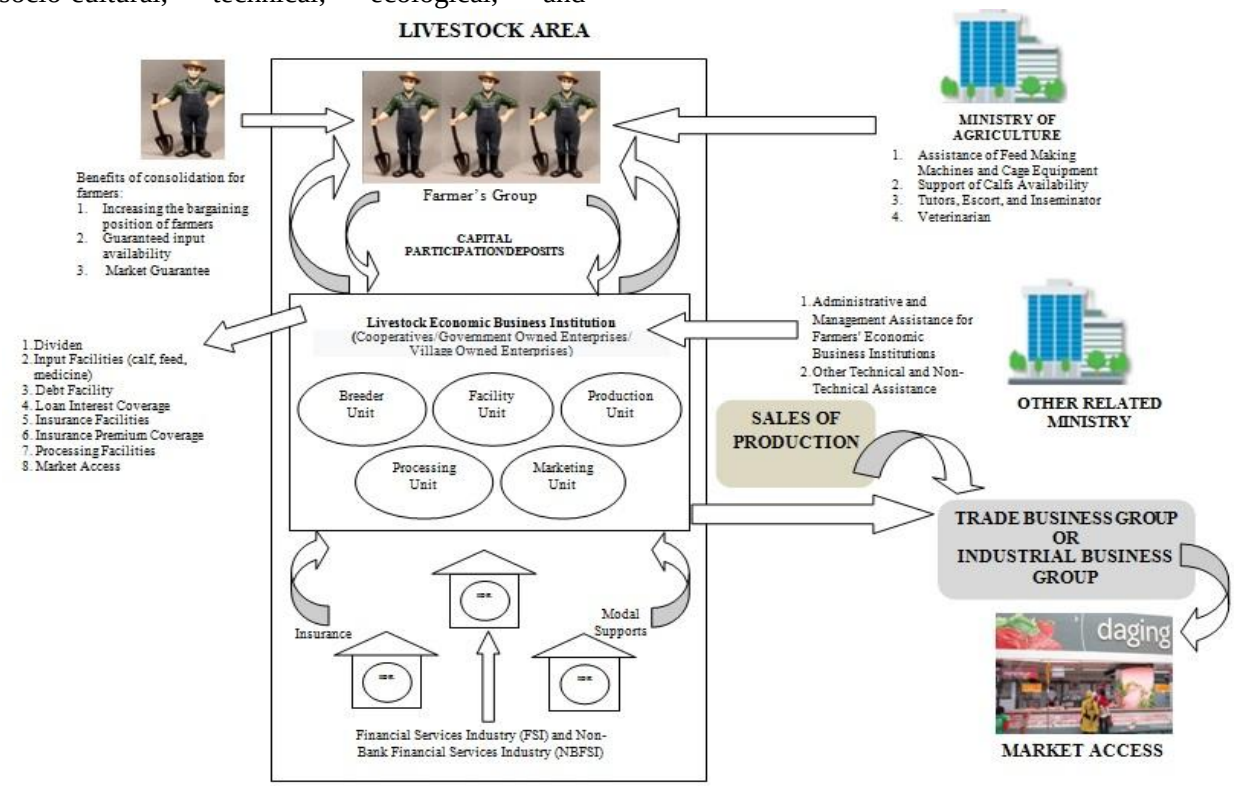

Fig. 7 Corporate-based livestock

The development of a corporate-based livestock area focuses on increasing beef cattle production, productivity, and quality. It involves many important aspects such as human resources

(HR), the government's involvement, private sectors, academics, banks, and cooperatives. The capacity, quality, and integrity of human resources as actors in the livestock business will determine the performance of livestock development[24]. Groups of breeders, traders, and small and medium entrepreneurs are the main actors in implementing beef cattle breeding areas[14]. Therefore, it is expected to stimulate the combination of strategic activities at an adequate economic level, both on and off farms, toward the industrial level integrated with an agribusiness system. However, breeders often experience limited access to inputs, information, and services; hence, there is a need to be fully empowered[21].

The human resources capacity of breeders can be improved by training, counseling, and field assistance through empowerment programs. The empowerment of breeder groups is a process, method, program, institution, and movement involving the community as a basis for being educated and trained. Strengthening the economic institutions of beef cattle breeders into business institutions can empower breeders[14]. A sense of ownership, participation, and creative development should be encouraged as an effective approach to understanding and using the corporate-based beef cattle breeding area program. Empowerment programs can be a means of interaction between breeders and other main actors. Therefore, it impacts the sense of mutual need, complementing, strengthening, and enhancing each other. This attitude is expected to improve knowledge and ability to professionally manage the beef cattle system and businesses[14]. Strengthening livestock institutions is very strategic in improving the performance and competitiveness of livestock businesses. Additionally, through breeder groups, collective actions can be taken to realize the synergy and achieve a more viable business scale[24].

Corporations will facilitate collaboration between breeders, large companies, small and medium enterprises, home industries, and other supporting institutions in the production, processing, trade, and integration with the wider market[14]. The breeder group is the human resource that can determine the success of the development of a corporate-based beef cattle farming area, in addition to the number of cattle and other infrastructure[14]. The activities of breeders in the on-farm subsystem have a great opportunity to be optimized and be more efficient in terms of productivity and waste management. The adoption of appropriate technology in livestock business is highly recommended for its efficiency but should be balanced with good markets and institutions[45]. Furthermore, optimization and efficiency can be conducted by using agricultural by-products as feed ingredients[15,46]. Adult cattle can produce 25.5–30 kg of feces per day; hence, utilization is necessary. Cattle feces can be processed into fertilizer and renewable energy such as biogas and biochar[47]. The use of organic fertilizers based on urine and livestock feces can fertilize the soil[48] and reduce the use of pesticides, especially in agriculture. Processing feces into fertilizer, biogas, and biochar at sustainable livestock breeding also benefit breeders by increasing efficiency.

The government plays a core role in developing and making policy instruments and regulations to determine the ability of sustainable economic competitiveness[24,49,50]. Thus, regulations should encourage the growth of a competitive livestock business[24]. The government also promotes a more conducive business climate to attract the private sector to develop livestock businesses[6]. This results in certain policies and regulations to protect breeders from intermediaries to increase the growth of the beef cattle industry[21]. In addition, government policies and regulations that cover activities from upstream to downstream are needed to encourage the establishment of production input subsystems and process efficiency in production, post-harvest, processing, and marketing[21,24]. The ministries involved in the livestock corporation are the Ministry of Economy and the Ministry of Agriculture and Cooperatives.

The development of corporate-based livestock needs to be supported by the government and private sector. The private sector involvement is very important, and one of its forms are partnerships[41]. This cooperation should be encouraged to build synergies between nucleus-plasma companies in corporate-based beef cattle agribusiness, including procurement of production facilities, breeding, post-harvest, quality improvement, and marketing[24]. Partnerships with millennial breeders in the era of modern livestock and technological advances are highly expected to be performed on corporate-based beef cattle breeding because technology and information support the success of livestock businesses. Advanced digitalization technology can optimize the contribution of livestock to the economy and ease the work of breeders. In addition, it is expected to be a solution to the problems that are often experienced in the marketing aspect[36].

Intensification of livestock business is carried out in terms of financing and production[45]. Financing for the livestock business is a strategic aspect that has become a priority in development and is currently a big problem often faced by farmers[24]. The support of financing/capital sources is needed in realizing a corporate-based beef cattle breeding area as a source of economic growth. Sources of financing/capital include:

1. Government funds through the state budget are designated to provide technical infrastructure needed in the development of corporate-based beef cattle breeding areas, while regional government state budgets (provincial/district/city level) are used to complete basic public infrastructures, human resource capacity, and institutional development to promote beef cattle business in the region;
2. Capital from financial institutions such as microcredit can access the corporate area of beef cattle breeding; and
3. Financing that the private sector provides through corporate social responsibility (CSR) in the form of business partnership and capital participation accessed after the business performance of the breeder groups is perspective[14].

Capital support is designed to directly link banks and the area management unit (AMU) as the micro-entrepreneur and loan group, regional development banks (RDB), and rural banks. The role of extension from the supervisory board, government, company, non-government organization (NGO), and higher education is important to encourage and assist breeders in the development area through UMK. This can fulfill the banks' credit requirement criteria for direct distribution[14]. Active participation from financial institutions can be carried out by developing a credit scheme for livestock business activities. This scheme should have interest subsidies, simple administration procedures, and a short processing time. The subsidy scheme is expected to subsidize the bank interest, and financing is needed to make special credit insurance for livestock[24]. In 2020, the Ministry of Agriculture set the target of microcredit distribution to be IDR9.01 trillion. The realization was IDR10.57 trillion, which achieved 117.30% of the target. Meanwhile, financing the Environmental Development Partnership Program (EDPP) of state-owned companies was IDR5.96 billion. From 2016 to 2020, insurance assistance for cattle reached 120.000 heads per year, and the fee was 2% of the value. The insured value was 2% x IDR10,000,000 = IDR200,000/head/year. The government gives insurance fee donations from APBN by 80% or IDR160.000, and 20% or IDR40,000 is paid by breeders[44].

4 Conclusions

Beef cattle agribusiness is integrated upstream to downstream as a business institution. The development of corporate-based beef cattle farming areas is a strategic approach to business-oriented and industrial-shaped beef cattle farming, given the increasingly dynamic and complex environment. The concept of a breeder corporation will create new strengths in human resources, capital, and banking to open opportunities for the success and growth of the breeders' business. Furthermore, it improves competitiveness and adds value and beef cattle commodities to support sustainable national food security. It holistically strengthens the livestock business system in one management area and enables institutions to access information, technology, public facilities, capital, processing, and marketing. Therefore, the concept is expected to solve the problems that breeders often face. The corporate concept described in the discussion has implications for the mindset of breeders in running their business to become industry-oriented so that they are expected to form independent, precise, integrated, and profit-oriented corporations. Crucial aspects that are the focuses for livestock corporations and determining the success of corporation-based livestock businesses include 1) business assistance in empowering groups of breeders related to optimizing livestock production and access to financing and partnership programs or credit schemes that are affordable for farmers and 2) stakeholder support including academia (researcher institutions, universities), the business sector (livestock industry), government (central, regional), and the livestock community. Wider and in-depth studies related to the readiness of human resources for breeders as well as increased research related to formulas and systematic feed development are recommended based on the research results.

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References

参 考 文 献

[1] LEIMONA B, AMARUZAMAN S, ARIFIN B, et al. Indonesia's 'green agriculture' strategies and policies: closing the gap between aspirations and application. The World Agroforestry Centre, Nairobi, 2015.
[2] ELLY F H, SALENDU A H S, KAUNANG C L, et al. Forage introduction to support development of cattle in Sangkub District. International Journal of Environment, Agriculture and Biotechnology, 2018, 3(5), 1718–1720.
[3] CAMMARATA M, TIMPANARO G, SCUDERI A. Assessing sustainability of organic livestock farming in Sicily: a case study using the FAO SAFA framework. Agriculture, 2021, 11(3), 274.
[4] HEGDE N G. Livestock development for sustainable livelihood of small farmers. Asian Journal of Research in Animal and Veterinary Sciences, 2019, 3(2), 1–17.
[5] KAUFMANN L, MAYER A, MATEJ S, et al. Regional self-sufficiency: a multi-dimensional analysis relating agricultural production and consumption in the European Union. Sustainable Production and Consumption, 2022, 34, 12–25.
[6] MAYULU H, DARU T P. Region based of animal husbandry development policy: a case study in East Kalimantan. Journal of Tropical AgriFood, 2019, 1(2), 49–60.
[7] CONGIO G F S C, BANNINK A, MOGOLL'ON O L M, et al. Enteric methane mitigation strategies for ruminant livestock systems in the Latin America and Caribbean region: a meta-analysis. Journal of Cleaner Production, 2021, 312, 127693.
[8] TRAORÉ S G, FOKOU G, NDOUR A P N, et al. Assessing knowledge, beliefs and practices related to the consumption of sheep and goat meat in Senegal. Global Food Security, 2018, 19, 64–70.
[9] NASRULLAH. Book of livestock and animal health statistics for 2022. Directorate General of Livestock and Animal Health, Ministry of Agriculture, 2022. https://ditjenpkh.pertanian.go.id/berita/1609-buku-statistik-peternakan-dan-kesehatan-hewan-tahun-2022
[10] NATIONAL BANK FOR AGRICULTURE AND RURAL DEVELOPMENT. Sectoral paper on animal husbandry. Farm Sector Policy Department, NABARD Head Office, Mumbai, 2018. https://www.nabard.org/auth/writereaddata/file/AH%20Final.pdf
[11] MINISTRY OF AGRICULTURE. *Beef cattle outlook*, 2020. http://epublikasi.setjen.pertanian.go.id/
[12] MINISTRY OF AGRICULTURE. *Beef cattle outlook*, 2022. https://satudata.pertanian.go.id/assets/docs/publikasi/Outlook_Daging_Sapi_2022.pdf
[13] STATISTICS INDONESIA. *Statistics of livestock slaughtered*, 2021. https://www.bps.go.id/publication/2021/05/04/5446d9b3d09a12d6a6d0d9dc/statistik-pemotongan-ternak-2020.htm
[14] DIRECTORATE GENERAL OF LIVESTOCK AND ANIMAL HEALTH. Operational instruction on the development of corporate beef cattle area. Ministry of Agriculture, 2018.
[15] MAYULU H, SUNARSO, SUTRISNO C I, et al. Beef cattle development policy in Indonesia. Jurnal Penelitian dan Pengembangan Pertanian, 2010, 29(1), 34–41.
[16] NG E L, HONEYSETT J, SCORGIE Y. Regionalised greenhouse gas emissions from food production in South-Eastern Australia. Sustainable Production and Consumption, 2023, 35, 116–128.
[17] BEKELE M, MENGISTU A, TAMIR B. Livestock and feed water productivity in the mixed crop-livestock system. Animal, 2017, 11(10), 1852–1860.
[18] JI-BIN Z, JIA Z, JIA-HUI L, et al. Black soldier fly: a new vista for livestock and poultry manure management. Journal of Integrative Agriculture, 2021, 20(5), 1167–1179.
[19] MORAES C C, CLARO B P, RODRIGUES V P. Why can't the alternative become mainstream? Unpacking the barriers and enablers of sustainable protein innovation in Brazil. Sustainable Production and Consumption, 2023, 35, 313–324.
[20] YANG H. Livestock development in China: animal production, consumption and genetic resources. Journal of Animal Breeding and Genetics, 2013, 130(4), 249–251.
[21] AGUS A, WIDI T S M. Current situation and prospect of beef cattle production in Indonesia - a review. Asian-Australasian Journal of Animal Sciences, 2018, 31(7), 976–983.
[22] DARU T P, SARI M, MAYULU H. Coix lacryma-jobi L. nutritional value concerning nitrogen fertilizer doses. American Journal of Animal and Veterinary Sciences, 2022, 18(2), 117–124.
[23] ABDUNNUR, MAYULU H. The policy on the development of integrated coastal and livestock area

based on geospatial in East Kalimantan. Technium BioChemMed, 2021, 2(3), 35–41.
[24] ISMONO R H, ERWANTO, LESTARI D A H, et al. Thematic analysis of ST2013 in the beef cattle household agribusiness sub-sector and self-sufficiency target. Statistics Indonesia, Jakarta, 2015. https://media.neliti.com/media/publications/48498-ID-agribisnis-usaha-rumah-tangga-budidaya-sapi-dan-target-swasembada.pdf
[25] MAYULU H, MAISYAROH S, RAHMATULLAH S N, et al. Influences of conventional feeding regimen on the productivity of Bali cattle in Samarinda. American Journal of Animal and Veterinary Sciences, 2022, 17(4), 274–280.
[26] MAYULU H. Beef cattle and its business management. Raja Grafindo Persada, Depok, 2021.
[27] MAYULU H. Feed and fattening efficiency of beef cattle. UNNES Pres, Semarang, 2015.
[28] STATISTICS INDONESIA. *Statistics of livestock slaughtered 2019,* 2020. https://www.bps.go.id/publication/2020/04/27/ac88aa064e54d3ca8292b4f3/statistik-pemotongan-ternak-2019.html
[29] STATISTICS INDONESIA. *Statistics of livestock slaughtered 2021,* 2022. https://www.bps.go.id/publication/2022/05/13/c8baff30fdff082c6648556d/statistik-pemotongan-ternak-2021.html
[30] DIRECTORATE GENERAL OF LIVESTOCK AND ANIMAL HEALTH, INDONESIAN MINISTRY OF AGRICULTURE. *Livestock and animal health statistics 2021.* https://pusvetma.ditjenpkh.pertanian.go.id/upload/statistik/1644549920.Buku_Statistik_2021.pdf
[31] STATISTICS INDONESIA. *Statistics of livestock slaughtered 2018,* 2019. https://www.bps.go.id/publication/2019/04/26/525464447f69b27576c906ea/statistik-pemotongan-ternak-2018.html
[32] CONGIO G F S, CHIAVEGATO M B, BATALHA C D A, et al. Strategic grazing management and nitrous oxide fluxes from pasture soils in tropical dairy systems. Science of the Total Environment, 2019, 672, 493–500.
[33] LAL R. Integrating animal husbandry with crops and trees. Frontiers in Sustainable Food Systems, 2020, 4, 113.
[34] DARU T P, MAYULU H. Optimization of land resources through forages development. European Journal of Molecular & Clinical Medicine, 2020, 7(7), 5000–5013.
[35] YI J, LEENES P W G, LUNA P G. Water, land and carbon footprints of Chinese dairy in the past and future. Sustainable Production and Consumption, 2023, 38, 186–198.
[36] NEETHIRAJAN S, KEMP B. Digital livestock farming. Sensing and Bio-Sensing Research, 2021, 32, 100408.
[37] SECRETARIATE GENERAL OF THE MINISTRY OF AGRICULTURE. Policy on the development of agricultural area. In: Proceedings of the Socializatin of Map and Master Plan and Action Plan Workshop in Grand Mega Resort and Spa, 13–15 February 2018; Bali, 2018.
[38] STATISTICS INDONESIA. *Kalimantan Timur Province in Figures 2018,* 2018. https://kaltim.bps.go.id/publication/2018/08/16/9341dae4a1306ccfee98a393/provinsi-kalimantan-timur-dalam-angka-2018.html
[39] SUSANTI Y, PRIYARSONO D S, MULATSIH S. Pengembangan Peternakan Sapi Potong untuk Peningkatan Perekonomian Provinsi Jawa Tengah: Suatu Pendekatan Perencanaan Wilayah. Journal of Indonesian Agribusiness, 2017, 2(2), 177–190.
[40] KIHORO E M, SCHONEVELD G C, CRANE T A. Pathways toward inclusive low-emission dairy development in Tanzania: producer heterogeneity and implications for intervention design. Agricultural Systems, 2021, 190, 103073.
[41] INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE. Option for the livestock sector in developing and emerging economies to 2030 and beyond. World Economic Forum, Geneva, 2019. http://www3.weforum.org/docs/White_Paper_Livestock_Emerging%20Economies.pdf
[42] DIRECTORATE GENERAL OF LIVESTOCK AND ANIMAL HEALTH. Guidelines on the implementation of breeders' institutional strengthening. Ministry of Agriculture, 2015. http://cybex.pertanian.go.id/artikel/54448/penguatan--kelembagaan-petani-peternak/
[43] CAMARA Y, MOULA N, SOW F, et al. Analysing innovations among cattle smallholders to evaluate the adequacy of breeding programs. Animal, 2019, 13(2), 417–426.
[44] DIRECTORATE GENERAL OF LIVESTOCK AND ANIMAL HEALTH. Work report 2020. Ministry of Agriculture, 2020. https://ditjennak-ppid.pertanian.go.id/doc/17/LAKIN/Lakin%202020.pdf
[45] OOSTING S J, UDO H M J, VIETS T C. Development of livestock production in the tropics: farm

and farmers' perspectives. Animal, 2014, 8(8), 1238–1248.
[46] LEINONEN I. Achieving environmentally sustainable livestock production. Sustainability, 2019, 11(1), 246.
[47] ITOH T, IWABUCHI K, MAEMOKU N, et al. A new torrefaction system employing spontaneous self-heating of livestock manure under pressure. Waste Management, 2019, 85, 66–72.
[48] WANG Y, SUN Y, CHANG S, et al. Restoration practices affect alpine meadow ecosystem coupling and functions. Rangeland Ecology & Management, 2020, 73(3), 441–451.
[49] JENSEN S F, KRISTENSEN J H, ADAMSEN S, et al. Digital product passports for a circular economy: data needs for product life cycle decision-making. Sustainable Production and Consumption, 2023, 37, 242–255.
[50] MAYULU H, SAWITRI E, TRICAHYADINATA I. The distribution of livestock commodities during the COVID-19 pandemic. Transactions of the Chinese Society of Agricultural Machinery, 2023, 54(4), 221–229.

[1] LEIMONA B、AMARUZAMAN S、ARIFIN B 等人。印度尼西亚的"绿色农业"战略和政策：缩小愿望与应用之间的差距。世界农林业中心，内罗毕，2015年。
[2] ELLY F H、SALENDU A H S、KAUNANG C L 等。引进饲料以支持桑库布地区牛的发展。国际环境、农业和生物技术杂志，2018，3(5)，1718-1720。
[3] CAMMARATA M、TIMPANARO G、SCUDERI A。评估西西里岛有机畜牧业的可持续性：使用粮农组织南非航空协会框架的案例研究。农业，2021，11（3），274。
[4] HEGDE NG. 畜牧业发展促进小农可持续生计。亚洲动物和兽医科学研究杂志，2019，3(2)，1-17。
[5] KAUFMANN L、MAYER A、MATEJ S 等人。区域自给自足：欧盟农业生产和消费的多维度分析可持续生产和消费，2022年，34，12-25。
[6] MAYULU H, DARU T P. 基于畜牧业发展政策的地区：东加里曼丹的案例研究。热带农业食品杂志，2019，1(2)，49–60。
[7] CONGIO G F S C, BANNINK A, MOGOLL'ON O L M, 等。拉丁美洲和加勒比地区反刍牲畜系统的肠道甲烷减排策略：荟萃分析。清洁生产学报, 2021, 312, 127693.
[8] TRAORÉ S G、FOKOU G、NDOUR A P N 等人。评估与塞内加尔绵羊和山羊肉消费相关的知识、信仰和做法。全球粮食安全，2018年，19，64-70。
[9]纳斯鲁拉。2022年牲畜和动物健康统计手册。农业部畜牧和动物卫生总局，2022年。https://ditjenpkh.pertanian.go.id/berita/1609-buku-statistik-peternakan-dan-kesehatan- 赫万塔洪-2022
[10]国家农业农村发展银行。关于畜牧业的部门文件。农业部门政策部，纳巴尔德总部，孟买，2018年。https://www.nabard.org/auth/writereaddata/file/AH%20Final.pdf
[11] 农业部。2020年肉牛展望。http://epublikasi.setjen.pertanian.go.id/
[12]农业部。2022年肉牛展望。https://satudata.pertanian.go.id/assets/docs/publikasi/Outlook_Daging_Sapi_2022.pdf
[13]印度尼西亚统计数据。2021年屠宰牲畜统计数据。https://www.bps.go.id/publication/2021/05/04/5446d9b3d09a12d6a6d0d9dc/statistik-pemotongan-ternak-2020.htm
[14] 畜牧和动物卫生总局。企业肉牛养殖区发展操作指导 农业部，2018。
[15] MAYULU H、SUNARSO、SUTRISNO C I 等人。印度尼西亚肉牛发展政策。《彭内邦安·佩塔尼安和佩尼利特人杂志》，2010年，29(1)，34–41。
[16] NG E L, HONEYSETT J, SCORGIE Y。澳大利亚东南部食品生产的区域化温室气体排放。可持续生产和消费，2023年，35，116-

128。
[17] BEKELE M，MENGISTU A，TAMIR B。混合作物-牲畜系统中的牲畜和给水生产力。动物，2017，11(10)，1852–1860。
[18] 吉斌 Z，贾 Z，贾慧 L，等。黑水虻：畜禽粪便管理的新前景。综合农业杂志，2021，20（5），1167–1179。
[19] MORAES C C, CLARO B P, RODRIGUES V P. 为什么替代方案不能成为主流？解开巴西可持续蛋白质创新的障碍和推动因素。可持续生产和消费，2023年，35，313-324。
[20] 杨华. 中国畜牧业发展：动物生产、消费和遗传资源。动物育种与遗传学杂志，2013，130（4），249-251。
[21] AGUS A，WIDI T S M. 印度尼西亚肉牛生产现状与前景——回顾。亚洲-澳大利亚动物科学杂志，2018，31（7），976–983。
[22] DARU T P, SARI M, MAYULU H. 薏苡仁与氮肥剂量有关的营养价值。美国动物和兽医科学杂志，2022年，18(2)，117–124。
[23] ABDUNNUR，MAYULU H. 东加里曼丹基于地理空间的沿海和畜牧区综合发展政策。技术元素生物化学医学，2021，2(3)，35–41。
[24] ISMONO R H、ERWANTO、LESTARI D A H 等人。肉牛家庭农业综合企业英石2013主题分析及自给自足目标。印度尼西亚统计局，雅加达，2015年。https://media.neliti.com/media/publications/48498-ID-agribisnis-usaha-rumah-tangga-budidaya-sapi-dan-target-swasembada.pdf
[25] MAYULU H、MAISYAROH S、RAHMATULLAH S N 等人。传统饲养方案对三马林达巴厘牛生产力的影响。美国动物和兽医科学杂志，2022年，17(4)，274–280。
[26] MAYULU H. 肉牛及其企业管理。拉贾·格拉芬多·佩萨达，德波，2021年。
[27] MAYULU H. 肉牛的饲料和育肥效率。联合国内科斯出版社，三宝垄，2015年。
[28]印度尼西亚统计数据。2019年、2020年屠宰牲畜统计。https://www.bps.go.id/publication/2020/04/27/ac88aa064e54d3ca8292b4f3/statistik-pemotongan-ternak-2019.html
[29]印度尼西亚统计数据。2021年、2022年屠宰牲畜统计数据。https://www.bps.go.id/publication/2022/05/13/c8baff30fdff082c6648556d/statistik-pemotongan-ternak-2021.html
[30]印度尼西亚农业部畜牧和动物卫生总局。2021年牲畜和动物健康统计数据。https://pusvetma.ditjenpkh.pertanian.go.id/upload/statistik/1644549920.Buku_Statistik_2021.pdf
[31]印度尼西亚统计数据。2018年、2019年屠宰牲畜统计。https://www.bps.go.id/publication/2019/04/26/525464447f69b27576c906ea/statistik-pemotongan-ternak-2018.html
[32] CONGIO G F S、CHIAVEGATO MB、BATALHA CD A 等人。战略性放牧管理和热带乳制品系统牧场土壤中的一氧化二氮通量。整体环境科学，2019，672，493–500。
[33] LAL R. 将畜牧业与农作物和树木结合起来。可持续粮食系统前沿，2020年，4，113。
[34] DARU T P，MAYULU H。通过饲料开发优化土地资源。欧洲分子与临床医学杂志，2020，7(7)，5000–5013。
[35] YI J，LEENES P W G，LUNA P G. 中国乳制品过去和未来的水、土地和碳足迹。可持续生产和消费，2023年，38，186-198。
[36] NEETHIRAJAN S, KEMP B. 数字畜牧业。传感与生物传感研究，2021，32，100408。
[37]农业部秘书长。农业领域发展政策。见：2018年2月13日至15日，大米加度假村及水疗中心地图和总体规划社会化及行动计划研讨会论文集；巴厘岛，2018年。
[38]印度尼西亚统计数据。东加里曼丹省2018年数据，2018年。https://kaltim.bps.go.id/publication/2018/08/16/9341dae4a1306ccfee98a393/provinsi-kalimantan-timur-dalam-angka-2018.html
[39] SUSANTI Y、PRIYARSONO D S、MULATSIH S. 发展肉牛养殖场以改善中爪哇省的经济：区域规划方法。印度尼西亚农业综合企业杂志，2017

年，2(2)，177–190。
[40] KIHORO E M、SCHONEVELD G C、CRANE T A。坦桑尼亚包容性低排放乳制品发展之路：生产者异质性和对干预设计的影响。农业系统，2021, 190, 103073。
[41]国际畜牧研究所。发展中经济体和新兴经济体畜牧业到2030年及以后的选择。世界经济论坛，日内瓦，2019年。http://www3.weforum.org/docs/White_Paper_Livestock_Emerging%20Economies.pdf
[42]畜牧和动物卫生总局。关于加强育种者制度建设的实施指南。农业部，2015年。http://cybex.pertanian.go.id/artikel/54448/penguatan--kelembagaan-petani-peternak/
[43] CAMARA Y、MOULA N、SOW F 等。分析养牛小农的创新，以评估育种计划的充分性。动物，2019，13(2)，417–426。
[44] 畜牧和动物卫生总局。2020年工作报告。农业部，2020年。https://ditjennak-ppid.pertanian.go.id/doc/17/LAKIN/Lakin%202020.pdf
[45] OOSTING S J，UDO H M J，VIETS T C。热带畜牧业生产的发展：农场和农民的观点。动物，2014，8(8)，1238–1248。
[46] LEINONI. 实现环境可持续的畜牧生产。可持续发展，2019，11（1），246。
[47] ITOH T，IWABUCHI K，MAEMOKU N，等。一种新的烘焙系统，利用牲畜粪便在压力下的自发自加热。废物管理，2019，85，66-72。
[48]王Y，孙Y，常S，等。恢复实践影响高寒草甸生态系统的耦合和功能。牧场生态与管理，2020，73（3），441–451。
[49] JENSEN S F、KRISTENSEN J H、ADAMSEN S 等人。循环经济的数字产品护照：产品生命周期决策的数据需求。可持续生产和消费，2023年，37，242–255。
[50] MAYULU H、SAWITRI E、TRICAHYADINATA I。新冠肺炎大流行期间牲畜商品的分配。中国农业机械学报，2023，54（4），221-229。