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RESEARCH ARTICLE

BEEF CATTLE PRODUCTIVITY DEVELOPMENT STRATEGY AT PASTURE KONETUEF

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ABSTRACT

Research on the productivity display of the Konetuef pasture of Timor Tengah Utara Regency, East Nusa Tenggara Province, Indonesia was carried out using a qualitative descriptive method with primary and secondary data. The results of the study explain that Konetuef pasture is a beef cattle breeding area with a grassland base belonging to Timor Tengah Utara Regency Government, East Nusa Tenggara Province Indonesia with limited quantity feed and poor maintenance management. To increase the universal base of livestock productivity, it is necessary to integrate mixed farming. The limiting factors at this ranch are climate, land, plants, livestock production and reproduction, livestock marketing, including ecology and policy.

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INTRODUCTION

Climate-plant-livestock interaction is a system characteristic that determines the productivity of ruminants livestock. Each subsystem covered by various elements, both individually and together with elements in the subsystem and/or in other subsystems directly or indirectly influences the appearance of livestock (Habaora 2015; Kleden *et al.,* 2015; Karti *et al.,* 2015; Habaora 2017; Riwukore 2019).Climate is a limiting factor for other subsystems so management is needed as a counterweight to produce optimum livestock productivity and the sustainability of livestock business (Tamba *et al.,* 2014; Jermias *et al.,* 2016; Sanger *et al.,* 2016). The Konetuef is one of the territory that is under the auspices of the Timor Tengah Utara Regency Animal Husbandry Office to become an integrated model of livestock-based dryland development. Research needs to be carried out to obtain information and data about models of interactions between climate and plants on livestock productivity.

MATERIALS AND METHODS

The method used in this study is descriptive qualitative, namely the method used to understand a phenomenon in a natural context by prioritizing the process of in-depth communication between researchers and the phenomenon under study. The type of data used is primary data from the results of interviews with the Head UPTD Konetuef of Timor Tengah Utara Regency and the Assistant Konetuef Pasture Manager. In addition, technical measurements of grass production were carried out in the Konetuef pasture using the technique of quadrant. The quadrant technique is carried out by throwing quadrants, the type of feed vegetation in the quadrant frame is cut ± 5 cm from the ground. The vegetation is then weighed to determine its weight (Habaora 2015). Then also obtained secondary data in the form of the annual report of the Meteorology and Geophysics Agency for North Central Timor Regency. The results of the data analysis were used as the basis for the development of beef cattle productivity in the Konetuef pasture area by identifying internal and external factors which were then explained in qualitative descriptive.

RESULTS AND DISCUSSION

Konetuef Pasture Profile: The Konetuef pasture is located in Timor Tengah Utara Regency, East Nusa Tenggara Province, Indonesia. The area of Konetuef reaches ± 40 ha, and is used as a center for fattening and breed Bali cattle**,** and animal feed sources. In 2010, there were 140 cattle in this region. Then it was reduced by 97 cows because this region is an endemic area of Brucellosis. In addition, this region is an area of invasion of chromolena weeds and reeds so that many feed plants in pasture cannot grow properly. The impact is a decrease in cattle body weight due to a decrease in the quality and quantity of feed.

The Konetuef pasture has 2 (two) embungs, namely buildings such as ponds / basins which function to hold back the flow of water and other water sources to support agricultural activities. However, the two embung were damaged, because the construction of the building was allegedly bad. In addition, other water sources such as rivers in this region have not been used for livestock activities. The classic reason, because of limited infrastructure such as water suction machines, and drainage.

The pattern of rainfall in the Konetuef pasture with high intensity occurs in December (271 mm), and in February (260 mm). Where as in other months it has a low intensity (<100 mm), so this region is identified as dryland. The climate in the Konetuef pasture tends to dry for 7 months (May-November), with an average air temperature of $26,05^0$C, where the maximum temperature is around 29^0C and the minimum temperature is around $22,20^0$C. The soil texture in this region is more identified with mild soil texture, the meaning low clay texture, and high sand texture with other large particles.

The soil type of the Konetuef pasture is litosol with a shallow soil solum, and is sensitive to erosion, so that perennials and grasses are more dominant. As a result, land is invaded by weeds such as Chromolena. Tamba *et al.* (2014), Siba *et al.* (2017) and Putritamara *et al.* (2018) states that soil texture affects water resistance and infiltration rate of water. The coarse soil texture often infiltrates fast water localization so that there is no surface run-off, even after heavy rain. Rough soil texture is not able to maintain large amounts of water. On the contrary, clay is so fine texture that a little water penetrates the lower levels, especially after the clay surface gets wet and expands. Low rainfall, mild soil texture, and dry climate have an impact on the feed available in the region, having low quality and quantity. Damage to the dam cannot be repaired because of the weak political will system in the government. Sources of animal feed that are only pasture-based further worsen the condition of livestock. This has an effect on the livestock production system in the Konetuef pasture which is very low. Thus, Konetuef is a classification zone of the ecological type A11, which is an area with a flat undulating topography, has low rainfall, and low soil fertility. The main limiting factors are water, nutrients and drainage.

Profile of livestock in the konetuef: The grazing management system is rotational (divided into 5 paddocks),with the dominant vegetation is Chromolaena weeds, and reeds. Weed invasion is the biggest obstacle because it dominates 60-70% of the location. The grazing system carried out in the Konetuef Region is semi intensive, that is, livestock are grazed in the morning until the afternoon, and before night is put back into the cage.At certain time, livestock are fed at night but in an unbalanced portion (Interview with UPTD Head Melky Nggelu and Adi Assistant Manager). The cow cage system is an individual cage. But over capacity occurred. The ability to accommodate cages is only 23 tails, while the number of cows in the Konetuef region is 43 tails, so a total of 20 tails are tied to trees around the cage. The reproductive system of livestock in the Konetuef has low productivity.

The ability to produce low calfs. The number of calf produced by 20 mothers cow is 6 calfs. Likewise Konetuef pasture location managers do not have accurate data on patterns of livestock birth, livestock mortality rates, and breeding patterns. Inseminator skills have not been supported by quality infrastructure, and human resources. The livestock marketing system in the Konetuef region is not yet good because it is limited by complicated bureaucracy through the Timor Tengah Utara Regent's Circular Letter which prohibits the flow of seed livestock out of regency. The Konetuef pasture has a Slaughterhouse but it never operates. Nonetheless, the Konetuef pasture in accordance with the master plan is a cattle fattening center in the Regency.

Carrying capacity: The quality of the forage is determined by the ratio of cell content (nutrient composition) and cell wall (crude fiber and silica) from the forage. The cell wall is a low digestibility component, and the proportion increases with the age of the plant. Tropical grass generally has high crude fiber and silica compared to temperate grass species. Silica and lignin are complex compound carbohydrates which are chemically forming plant cell walls which are relatively difficult to digest by carbohydrate-breaking enzymes. The higher the proportion of lignin and silica in the forage, the lower the proportion of cell contents so that the nutrient content decreases, and the quality of the forage decreases. Availability and forage needs for a cattle are very dependent on carrying capacity, namely the ability of the region or location to accommodate a number of livestock to meet forage needs within 1 year as fodder is available and sufficient.

Table 1. Sampling of paddock grass with tile techniques

Envelope	Condition after grazing		Conditions before being grazed	
	Weight of grass (gr)	Tall of grass (cm)	Weight of grass (gr)	Tall of grass (cm)
1	100	27	1025	100
2	100	49	425	76
3	150	33	375	93
4	252	33		
5	100	36		
Average	140,4	35,6	608,3	89,7

Based on data from Table 1 above, biomass production can be calculated using the following mathematically.

$$\text{Production(tons/ha)} = \frac{\text{Weight of sample(gr)} \times 40.000}{1.000.000}$$

$$\text{Production(tons/ha)} = \frac{140,4 \times 40.000}{1.000.000} = 5,6 \text{ tons condition after grazing}$$

$$\text{Production(tons/ha)} = \frac{608,3 \times 40.000}{1.000.000} = 24,3 \text{ tons conditions before being grazed}$$

If data converted to carrying capacity based on pasture conditions has not been pastured by considering the proper use factor of 45% (medium), the amount of forage available per hectare is 45% x 24.3 tons = 10.94 tons, or 10.935 kg per year. Given the long dry season, the rest period is 70 days (10 weeks) after grazing for 30 days (1 month). The average weight of cattle in the Konetuef pasture is 250 kg so a cow needs 10% fresh forage of body weight, which is 25 kg per day. This means that in 30 days, the forage needed by a cow is 750 kg / month or 0.75 tons / month. Therefore the fresh forage that the Konetuef region must provide for one livestock per hectare per month is 0.75 / 10.94 = 0.07 ha / month. To calculate the need for land area per year, it is calculated according to Voisin formula (1995), namely: (y-1) s = r, y is the ratio of land area needed by a cow to the month, s is the grazing period, and r is rest.

(y-1)30 = 70
y = 70/30 + 1
y = 2,3 + 1
y = 3, 3, so the land area per year is:

3,3 x 0,07 ha / livestock / month = 0,231 ha / livestock / year or 1 ha of land can hold 0.361 cattle. The Konetuef Region has 43 cattle in an area of 40 ha, then 40 ha x 0,231 tails = 9, 24 cows. This means that the capacity of land in the provision of feed is not able to accommodate as many as 43 livestock because of over capacity of 33, 76 livestock.

Identification of Internal Factors (Strengths and Weaknesses) and External Factors (Opportunities and Threats)

Internal Factors

Strengths: Konetuef pasture is a zone managed by the Regional Technical Management Unit under Animal Husbandry Office, Timor Tengah Utara Regency so that it has capable staff in data management, and study. In addition, the Konetuef pasture also has a partnership of experts with academics from the Faculty of Animal Husbandry, University of Nusa Cendana Kupang.

- The Konetuef pasture has very wide paddocks, and is filled with vegetation of trees that can be used as cattle feed.
- The Konetuef pasture has a reservoir that can be used as a water source through drainage and has 1 spring. This zone is also adjacent to a river that has a water flow that never dries during the dry season. Having waste treatment facilities (biogas and compost) that are environmentally friendly, and can improve the economy. The Konetuef Zone also has a Slaughterhouse facility that guarantees the availability of hygienic meat and fulfills the principles of Safe, Healthy, Whole, and Halal.
- The Konetuef pasture has area ± 40 ha of land which is the main base for livestock resources.
- The availability of inseminators in the Konetuef pasture becomes effective in increasing the reproductive productivity of cattle.

Weaknesses

- The implementation of the livestock program policy by the Government has not been maximized and oriented dominant to the bureaucracy. In addition, the capacity of staff resources in the Konetuef pasture is still low in managerial of livestock.
- Utilization of reservoirs as a source of livestock water, and forage is not effective since the reservoir collapsed in 2009, and has not been repaired to date due to government budget constraints. In addition, the use of springs and rivers is not effective because of limited supporting facilities. Likewise, the waste treatment facilities are not well cared for so that they become damaged and neglected. Slaughterhouses which were originally used as providers of halal and hygiene meat became damaged because they were not properly looked after.
- 60-70% of area in the Konetuef pasture is an invasion of chromolena weeds and reeds so that the productivity of cattle in the areas is low due to dependence on feed, only on that areas.
- Less-optimal land management causes over grazing of 33,76 cattle. Likewise the type of soil in the area is litosol with a shallow soil solum that is very sensitive to erosion causing a high weed invasion.
- The implementation of the artificial insemination program in the Konetuef pasture was not optimal due to budget constraints and tools. In addition, a low increase in livestock population was caused by high calf mortality in the Konetuef pasture.

External Factors

Opportunities: The productivity of land and livestock can be increased because the Konetuef pasture received support for multiyears funds of Rp.129,500,000 for the development of forage crops. In addition, the implementation of the livestock sector in the Konetuef pasture can be carried out well because it is in line with the vision and mission of the East Nusa Tenggara provincial government that makes Timor Island the center of beef cattle production.

- Distribution of cattle assistance from the Timor Tengah Utara Regency Government totaling 100 cows since the 2012 budget year has become a potential increase in beef cattle production in the areas.
- Partnerships with experts (academics) can be enhanced managerially related to utilizing the potential of feed in the Konetuef pasture.

Threats

- Climate classification in the Konetuef zone is the A11 strata, which has low rainfall, and a long dry season, which is a threat to the availability of feed which is limited in quality and quantity. The invasion of fertile weeds is also resistant to land burning.
- The implementation of budget policies in multiyear programs is very loaded with political interests which can be delayed due to the absence of good politics.
- Konetuef pasture is an endemic area of brucelosis which can cause the death of high cattle. In addition, the distribution and marketing system of livestock will be low due to the issuance of Regional Regulations and the Bupati's Decree which prohibits cattle traffic from coming out of Timor Tengah Utara Regency.

Beef cattle productivity development strategy at Konetuef pasture: Increasing the productivity of beef cattle in the Konetuef pasture, Timor Tengah Utara Regency can be done through the following policies, targets, strategies and master plans.

- Policies related to climatic conditions in the Konetuef pasture with the aim of rainfall intensity, rainfall patterns, rainy months, dry months, temperature, humidity, recording systems and climate data use, are carried out with a strategy: (1) establishment of task forces for utilization of grazing areas based on climate recording to achieve feed resistance; (2) develop areas for grazing development based on the proportion of rainy months, and rainfall patterns; (3) optimizing funds for developing forage as investment.The master plans

that can be owned are: (1) development of climate-based grazing areas, and technology; (2) development of models, regions and forage management; (3) development and improvement of reservoirs, drainage and several water points as a form of water resources management; and (4) enhancing human resources in managing climate-based Konetuef zone facilities.

- Policies related to land targeting land area, soil type, soil texture, soil chemical composition, and topography can be carried out by strategies: (1) optimization of soil conservation in pasture and forage fodder; (2) utilization of grazing areas based on weed invasions, becomes contradictory to feed sources; (3) utilization of environmentally friendly biotechnology in the utilization of weeds as animal feed; and (4) utilization of funds for developing animal feed for the region. The master plan needs to be owned, namely: (1) enhancing soil conservation in pasture and fodder based on soil type, chemical composition and topography; (2) development of grazing areas to be a source of animal feed based on rotation grazing; (3) optimizing the use of weeds (chromolena and reeds) as potential sources of animal feed with environmentally friendly biotechnology; and (4) improving human resources in managing land-based area facilities.
- Policies related to forage with a target forage type, forage composition, forage production, carryng capacity, grazzing pressure, stocking rate, pasture management system, are carried out with a strategy (1) optimizing the use of natural food sources; and (2) building a feed industry in cultivation centers. The master plan needs to be owned, namely: (1) development of potential natural sources of forage; (2) improving the technology of natural resource utilization; (3) inventory of forage sources; (4) training in cultivation technology, supply systems and feed management; (5) determining the strategic location for the feed industry; (6) design arrangement of the feed industry; (7) preparation of the management system of each region's feed industry; and (8) implementation of the development of the feed industry.

- Policies related to livestock production with the target system of maintenance, and cage facilities are carried out with livestock raising management strategies, and management of livestock cages. The master plan needs to be owned, namely: (1) increasing human resources in maximizing the physiological status of livestock; (2) increasing intensification of livestock maintenance in the provision of pens; (3) improving the quality of animal feed for reducing grazing pressure; (4) development and utilization in intensification of livestock waste.

- Policies related to reproduction and breeding with the target of the marriage system, birth patterns, and mortality rates are carried out by the reproductive system and breeding strategies. The master plan needs to be owned, namely: (1) development of livestock area models; (2) management development in maintaining the safety of the quality and quantity of livestock breeds; (3) inventory of potential locations for livestock breeding areas; (4) development of regional facilities; (5) fostering human resources and assistance; (6) formulation of seedling area management systems; and (7) procurement of seedling and production facilities.

- Policies related to marketing with the objectives of planning activities and marketing are carried out with a strategy to improve the marketing system and the development of livestock transportation routes. The master plans that need to be owned are: (1) development of an inter-regency livestock marketing system model; and (2) providing livestock health-based facilities.

Conclusions and Recommendation

The Konetuef zone is a range of beef cattle with a pasture base belonging to the Timor Tengah Utara District, East Nusa Tenggara. To increase the universal base of livestock productivity, it is necessary to have integrated farming (mix farming) management because the limiting factors in this range are climate, soil, plants, livestock production, livestock reproduction and marketing, including ecology and policy.

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