The Analysis of Capacity Increase in Beef Cattle Population in The South Konawe Regency

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ABSTRACT

This research aimed to determine the maximum potential for increasing the population of beef cattle in the South Konawe Regency, Southeast Sulawesi Province based on natural resources and the ability of the head of the farmer family to raise cattle. This research was conducted from 5th October to 28th December 2019. Determination of research location was carried out purposively (purposive sampling), with the consideration that South Konawe Regency was a central area for Bali cattle breeding. The data analysis was carried out by analyzing the supporting capacity of forage from pasture land and non-pasture land (rice fields, plantations, forests and moor) as well as the production of agricultural food crop waste (rice, corn, peanuts, green beans, cassava, sweet potatoes and soybeans), using tabular data in the form of data on food crop production and land area. Potential analysis of beef cattle business development in South Konawe Regency using the calculation of the Capacity Increase of Ruminant Population (KPPTR). Based on the results of research in South Konawe Regency, the number can still be increased by 7,478 Animal Units. If the value is converted to adult female heifers with an age of >1 year, the population increase can be done as many as 7,478 cows. Meanwhile, if converted to female-male heifers with an age of 1-2 years, the population increase can be increased by 14,956 and if converted to female-male calves with an age of >1 year, the population increase can be done up to 28,912.

Keywords: Capacity increase, Cows, Feed, Population

Introduction

The development of the livestock sector is part of agricultural development in a broad sense. The development of livestock as an integral part of the development of the agricultural sector in the provision of animal protein, develops the potential of people's economy, especially in rural areas, employment and development the potential of an area (Zahara et al., 2016).

South Konawe Regency is the second largest beef cattle producing regency in Southeast Sulawesi Province. Based on data from the Central Statistics Agency in 2018, the number of cattle population in South Konawe Regency was 72,004 (BPS, 2019). To obtain good quality livestock, adequate feed availability is required. The quality and availability of feed in the form of adequate and sustainable forage and concentrate is very important in development of beef cattle (Wantasen, 2016). The availability of forage is a top priority to fulfill livestock needs. Production costs in fulfillment of the availability of feed are 60-70% of all production costs. Given the high costs, it is necessary to pay deep attention to the provision of good feed in terms of quantity and quality (Infitria and Khalil, 2014).

The development of beef cattle farms needs to be supported by the availability of forage for both quality and quantity (Abadi et al., 2019a). The low availability of feed in an area is a trigger factor for failure to increase productivity and livestock population in an area, this is due to the low feed supporting capacity that is not suitable for the available livestock population (Abadi et al., 2019b). The carrying capacity of beef cattle development is one of the important factors to support the increase in beef cattle productivity, to achieve optimal results, it is necessary to develop a livestock development strategy that has good carrying capacity, such as feed given to livestock must contain good nutritional value, large land, processing, waste, utilization of forage fodder (Saputra et al., 2016).

To determine the maximum potential of the population increase development of beef cattle in an area, it can be done by analyzing the supporting capacity of agricultural land (rice fields, plantations, forests and moor) and supporting capacity of food crop waste. This research aims to
determine the maximum potential of population increase of beef cattle in South Konawe Regency based on natural resources and ability of the head of farmer family to raise cattle. The results of this research are expected to provide important information to Animal Husbandry Service, community and breeders in the context of developing ruminants based on the potential supporting capacity of forage and the maximum ability of the head of farmer family in raising cattle.

Materials and Methods

This research was conducted in South Konawe Regency from 5th October to 28th December 2019. The location determination in this study was carried out purposely (purposive sampling), with the consideration that South Konawe Regency is the center of Bali cattle breeding area. The data used in this study are primary (main) data and secondary (supporting) data. Primary data is collected through surveys and observation of the general condition of research location and conducting interviews with respondents (farmers and beef cattle breeders) to determine the conditions at research location. Supporting data is the general condition of location, population and type of livestock, total population, land use and others. Secondary data is needed to obtain a broader and more comprehensive picture related to the focus/object of research in the field.

Data analysis was carried out by analyzing the supporting capacity of forage from pasture land and non-pasture land (rice fields, plantations, forests and moor) as well as the production of agricultural food crop waste (rice, corn, peanuts, green beans, cassava, sweet potatoes and soybeans), using tabular data in the form of data on food crop production and land area, sourced from Central Statistics Agency, Regency and Provincial Animal Husbandry Service and Agriculture Service.

To analyze the potential of the development of beef cattle business in South Konawe Regency, using the calculation of the Increase Capacity of Ruminant Livestock Population/ Kapasitas Peningkatan Populasi Ternak Ruminansia (KPPTR). This method refers to Fariani (2008) with the following steps:

a. Maximum Potential based on Natural Resources/PSML (Regional Supporting Capacity) is formulated:

\[ PSML = \text{Supporting capacity of Agricultural Land} \times \text{Supporting capacity of Food Crops} \]

Notes:
- Supporting capacity of Agricultural Land = Contribution of Agricultural Land \times 3.75.
- The supporting capacity of agricultural land is obtained from the contribution of pasture land and non-pasture land (rice fields, plantations, forests and moor).
- Contribution of Agricultural Land = Land Area \times \text{Land contribution coefficient.} 

b. Maximum Potential based on Farmer Family (PMKK) is formulated:

\[ PMKK = c \times KK \]

Notes:
- \( c \): The coefficient calculated based on the number of livestock units (ST) that can be cared for by a family is 2.33 ST/KK.
- \( KK \): Head of Farmer Family

c. KPPTR value is formulated:

1. KPPTR (SL) = PSML – Popril
2. KPPTR (KK) = PMKK – Popril

Notes:
- KPPTR (SL): the Increased Capacity of Ruminant Livestock Population (ST) based on natural resources. KPPTR (KK): The Increased Capacity of Ruminant Livestock Population (KPPTR) based on the head of farmer family.
- Popril: Real population (livestock population of research location)

d. Effective KPPTR: KPPTR (SL), if KPPTR (SL) < KPPTR (KK)

Effective KPPTR:

e. Effective KPPTR: KPPTR (KK), if KPPTR (KK) < KPPTR (SL)

Effective KPPTR:

Effectiveness is determined as the capacity of population increase of ruminants in the research area, namely KPPTR (SL) or KPPTR (KK) which has smaller value. KPPTR calculations, Nell and Rollinson (1974) provide conditions as shown in Table 1 and Table 2 below:

The number of livestock calculation uses livestock units (Soekardono, 2009), namely:
- 1 adult cow, age > 2 years = 1 ST
- 1 heifer, age 1-2 years = 0.5 ST
- 1 calf, age <1 year = 0.25 ST.

Results and Discussion

Beef cattle population

Livestock population is a general indicator that can be used as a measurement for the conditions of livestock development, because it can describe the suitability of livestock to the agroecological environment, the level of...
community acceptance of livestock, technical mastery of livestock, population dynamics and the success of reproductive system (Arifin and Risqina, 2016). The population rate of ruminants such as beef cattle is influenced by several supporting factors such as the number of births, availability of feed and disease attacks. Beef Cattle Population by South Konawe Regency can be seen in Table 3.

Based on Table 3, showed that the cattle population continues to increase, and it can be seen as a good progress of livestock. South Konawe Regency was determined as the center area for Balinese cattle breeding through Decree of the Ministry of Agriculture number 803/Kpts/PK.030/12/2016. Since its establishment, in the last 4 (four) years, the livestock sector in South Konawe Regency has received serious attention. Beef cattle development efforts have been carried out by the government through procurement and quality improvement of seedlings, improvement of maintenance systems, management of reproductive systems, artificial insemination (IB), supervision of slaughtering excellent males and productive females, periodic livestock health checks as prevention and control of disease, increasing the quality and quantity of feed, business counseling and coaching, improving the facilities and infrastructure for business development, so that the cattle growth rate continues to increase. The policy of developing livestock production centers in the form of establishing and expanding pastures and forage areas for animal feed, management, improving livestock cultivation (Abadi et al., 2018) must receive serious attention so that the increase in livestock population can be carried out optimally.

**Source land of forage for livestock**

Livestock development is closely related to the development of an area and the carrying

| Type of land       | Land contribution (%) |
|--------------------|-----------------------|
| Pasture            | 100% of land area     |
| Similar Forest     | 5% of land area       |
| Secondary forest   | 3% of land area       |
| Plantation         | 5% of land area       |
| Rice fields        | 2% of land area       |
| Galengan rice fields | 2.5% of land area   |
| Moor               | 1% of land area       |

Source: Nell and Rollinson (1974)

**Table 2. Forage production that could be produced from the harvested area**

| Waste products | Straw production (Tons BK/ha/Year) |
|----------------|-----------------------------------|
| Rice straw     | 0.23                              |
| Corn straw     | 0.10                              |
| Peanut straw   | 1.44                              |
| Soybean straw  | 0.07                              |
| Cassava straw  | 5.05                              |
| Sweet potato straw | 1.2                              |

Source: Nell and Rollinson (1974)

**Table 3. Beef cattle population according to the district in South Konawe Regency**

| Number | District   | Beef cattle population |
|--------|------------|------------------------|
| 1      | Andolo     | 1,919                  |
| 2      | Andolo Barat | 2,487                  |
| 3      | Angata     | 2,202                  |
| 4      | Balo       | 3,375                  |
| 5      | Basala     | 928                    |
| 6      | Benua      | 378                    |
| 7      | Buke       | 3,593                  |
| 8      | Kolono     | 1,534                  |
| 9      | East Kolono | 847                    |
| 10     | Konda      | 5,272                  |
| 11     | Lauya      | 3,671                  |
| 12     | Lainea     | 2,592                  |
| 13     | Lalembu    | 1,670                  |
| 14     | Lando     | 3,116                  |
| 15     | Laroni    | 616                    |
| 16     | Moramo     | 4,027                  |
| 17     | North Moramo | 980                   |
| 18     | Mowila     | 3,311                  |
| 19     | Palangga  | 5,765                  |
| 20     | South Palangga | 3098                  |
| 21     | West Ranomeeto | 2,598                |
| 22     | Ranomeeto  | 2,025                  |
| 23     | Sabulakoa | 1,071                  |
| 24     | Tinanggea | 4,273                  |
| 25     | Wolasi     | 1,277                  |
| Total  |            | 62,625                 |

Source: Department of Animal Husbandry and Animal Health (2019).
capacity of forage both in quality and quantity (Abadi et al., 2019b). The availability of forage is the main priority in fulfilling the needs of livestock. Land has an important role in providing forage such as grass and agricultural waste. Forage for livestock can be obtained on agricultural land, plantations, forests, moor and food crops by-products such as rice straw, corn, peanuts, cassava, sweet potatoes and soybeans. The land area for forage sources in South Konawe Regency can be seen in Table 4.

Based on Table 4, showed that the land area for forage sources from rice fields, moor, plantations, pasture and forests in South Konawe Regency is 349,482 ha. The largest land area is plantation, which is 194,555 ha, then forest is 70,835 ha, wetland is 41,442 ha, moor is 35,710 ha, the smallest land area is pasture, which is 6,941 ha. The largest source of forage land is Lalenmbu District with an area of 91,967 ha, while the smallest is Ranomeeto District, 826 ha.

Table 4 also showed that the harvested area for food crops consists of various types of commodities (rice, maize, peanuts, cassava, sweet potatoes and soybeans) reaching 50,687 ha, where the largest harvest area is rice, which is 39,030 ha, followed by maize of 7,267 ha, cassava 2,479 ha, soybean 1,357 ha, peanuts 164 ha, and sweet potatoes 393 ha. The largest

### Table 4a. Land area of forage sources area of food crops in South Konawe Regency

| District     | Land area (ha) | Total |
|--------------|----------------|-------|
|              | Rice Field | Moord | Plantation | Pasture | Forest |
| Andolo       | 3,774    | 2,510 | 5,792      | 86      | 0      | 12,162 |
| West Andolo  | 2,524.8  | 2,270 | 8          | 1,105   | 0      | 5,908  |
| Angata       | 1,970    | 0     | 0          | 0       | 0      | 1,970  |
| Baito        | 2,029.6  | 840   | 853        | 75      | 0      | 3,791  |
| Basala       | 2,421.5  | 295   | 6,236      | 0       | 70     | 9,023  |
| Benua        | 190      | 0     | 35,350     | 0       | 0      | 35,540 |
| Buku         | 2,209.2  | 0     | 1,578      | 0       | 0      | 3,787  |
| Kolono       | 349      | 7,517 | 5,276      | 0       | 11,528 | 21,773 |
| East Kolono  | 0        | 1,249 | 67         | 0       | 134.9  | 1,451  |
| Konda        | 2,344    | 790   | 986        | 320     | 863    | 5,303  |
| Laeya        | 2,345.26 | 0     | 18,345     | 0       | 0      | 20,690 |
| Lainea       | 536      | 2,642 | 2,720      | 700     | 4,430  | 11,028 |
| Lalenmbu     | 9,033.6  | 0     | 82,932     | 0       | 0      | 91,966 |
| Landono      | 461      | 3,222 | 642        | 154     | 783    | 5,262  |
| Laonti       | 13       | 3,490 | 5,669      | 1,408   | 450    | 11,030 |
| Moramo       | 1,020    | 2,495 | 13,424     | 200     | 17,472 | 34,611 |
| North Moramo | 120      | 2,039.55 | 1,409 | 679.58 | 0 | 4,248 |
| Mowila       | 2,526    | 0     | 1,932      | 0       | 0      | 4,458  |
| Palanga      | 2,498.5  | 457   | 2,231      | 524     | 683    | 6,394  |
| South Palanga | 196.92 | 158.83 | 1,365.84 | 26.03 | 9,492.72 | 11.240 |
| West Ranomeeto | 708  | 381   | 1,381      | 215     | 349    | 3,034  |
| Ranomeeto    | 289      | 0     | 537        | 0       | 0      | 826    |
| Sabulakoa    | 30       | 330.4 | 1,851.75   | 0       | 0      | 2,212  |
| Tinanggea    | 3,623.6  | 3,373 | 5,669      | 1,408   | 8,450  | 22,524 |
| Wolasi       | 230      | 1,850 | 1,300      | 40      | 16,029 | 19,249 |
| Total        | 41,442   | 35,710 | 194,555 | 6,941   | 70,835 | 349,482 |

### Table 4b. Land area of harvested area of food crops in South Konawe Regency

| District     | Harvested area of food crops (ha) | Total |
|--------------|-----------------------------------|-------|
|              | Rice     | Corn   | Peanuts | Ubi Kayu | Sweet Potato | Soybeans |       |
| Andolo       | 3,744    | 612    | 2       | 990      | 2           | 322      | 5,670  |
| West Andolo  | 2,524.8  | 450    | 0       | 3        | 0           | 15       | 2,993  |
| Angata       | 1,970    | 0      | 0       | 20       | 0           | 0        | 1,990  |
| Baito        | 1,746.3  | 394    | 2       | 0        | 0           | 0        | 2,142  |
| Basala       | 0        | 0      | 0       | 0        | 0           | 0        | 0      |
| Benua        | 190      | 350    | 0       | 0        | 0           | 0        | 540    |
| Buku         | 2,209.2  | 416    | 46      | 157      | 38          | 0        | 2,866  |
| Kolono       | 348      | 337    | 0       | 131      | 0           | 229      | 1,045  |
| East Kolono  | 0        | 48     | 0       | 15       | 0           | 0        | 63     |
| Konda        | 2,235    | 607    | 6       | 258      | 23          | 1        | 3,130  |
| Laeya        | 2,345.25 | 97     | 29      | 76       | 23          | 142.5    | 2,713  |
| Lainea       | 503.9    | 346.6  | 2       | 42       | 0           | 1        | 896    |
| Lalenmbu     | 8,989.2  | 1,365  | 0       | 5        | 0           | 10,359   |       |
| Landono      | 370      | 145    | 6       | 51       | 89          | 0        | 661    |
| Laonti       | 26       | 0      | 0       | 6        | 0           | 0        | 32     |
| Moramo       | 870      | 22     | 8       | 6        | 8           | 19       | 933    |
| North Moramo | 120      | 1      | 1.05    | 7.6      | 0           | 0        | 130    |
| Mowila       | 2,522    | 915    | 15      | 16       | 20          | 36       | 3,524  |
| Palanga      | 2,408.4  | 370    | 0       | 5.5      | 0           | 0        | 2,784  |
| South Palanga | 1,300   | 30     | 30      | 340      | 0           | 0        | 1,670  |
| West Ranomeeto | 516    | 25     | 0       | 85       | 55          | 27       | 706    |
| Ranomeeto    | 276      | 85     | 9       | 6.25     | 289         | 0        | 665    |
| Sabulakoa    | 30       | 111    | 3       | 241      | 125         | 239      | 749    |
| Tinanggea    | 3,555.6  | 418    | 5       | 18       | 12          | 36       | 4,045  |
| Wolasi       | 230      | 150    | 0       | 0        | 0           | 0        | 380    |
| Total        | 39,030   | 7,265  | 164.05  | 2,479    | 393         | 1,357    | 50,687 |
harvested area for food crops is Lalembu District with an area of 10,359 ha and the smallest is Laonti District, which is 32 ha.

Forage is the most basic requirement for the survival of ruminants, both large and small livestock. Every day, livestock need quite a lot of forage, because more than 60% of all the feed needs consumed are forage, both fresh and dry. Thus, forage is one of the ingredients for animal feed that is indispensable and has great benefits for the life and survival of the livestock population (Abadi, et al., 2019a; Abadi, et al., 2021b). Regarding the supply of forage to increase population, the availability of suitable land for forage growth is very important. If the aspect of land availability is not taken into account properly, increasing the livestock population will be very difficult to achieve (Delima, et al., 2015). The potential of the supporting area and the availability of feed raw materials and human resources allow the development of beef cattle based on local resources in the region. This is because the development of beef cattle is positively correlated with the availability of forage as a source of animal feed. Forage is the main feed ingredient that needs to be provided for ruminants (Sangadji and Rajab, 2018).

Supporting capacity of land

In developing beef cattle, one thing to pay attention to is supporting capacity of land. It is the ability of land to provide forage for livestock, which was estimated from the land area in the land use utilization. The calculated supporting capacity of land is all the land that has potential to produce forage. Land resources that can be used for ruminants are rice fields, grazing/pasture lands, plantations, forests and so on.

In addition to relying on grass that was intentionally planted on forage land, the farmers in South Konawe Regency also used natural grass that grows around staple crops or forage that grows in other lands such as forests and moor. Each type of land has a different ability to produce forage for livestock. The supporting capacity of land for forage sources in South Konawe Regency can be seen in Table 5. Based on Table 5, it showed that the land that has the largest contribution in providing feed for livestocks was plantations, 9,728 ha, while the smallest was moor of 357 ha. The area that had the largest contribution of land was Lalembu District, which was 4,327 ha and the smallest was East Kolono District of 23 ha. Table 5 also showed that the supporting capacity of agricultural land in South Konawe Regency reached 80,235 ST. The area that had the largest supporting capacity was Lalembu District at 16,227 ST and the smallest was Laonti District at 85 ST.

Land use must be carried out by applying the level of land suitability through in-depth and unpatterned studies of temporary interests (Sangadji and Rajab, 2018). To increase soil fertility, it is necessary to add soil organic matter with a higher nutrient content. Land preparation needs to be done to renovate existing vegetation (Jarmani and Haryanto, 2015).

Supporting capacity of food crops

The supporting capacity of food crop waste is the ability of an area to produce feed for livestocks in the form of food crop waste that can fulfill the needs of a number of ruminant livestock populations in fresh or dry form. Utilization of food crops by-products as feed for ruminants is widely known, this is due to the ability of beef cattle to convert feed ingredients containing crude fiber into products that are useful for their growth and reproduction.

| District          | Land contribution coefficient (ha) | Total |
|-------------------|-----------------------------------|-------|
|                   | Rice field | Moor | Pasture | Pasture | Forest |
| Andolo            | 75.48      | 25.10| 289.60  | 96.00   | 0      | 476   |
| West Andolo       | 50.50      | 22.70| 0.40    | 1105.00 | 0      | 1,179 |
| Ballo             | 40.59      | 8.40 | 42.65   | 75.00   | 0      | 167   |
| Basala            | 48.43      | 2.95 | 311.80  | 0       | 3.50   | 367   |
| Benua             | 3.80       | 0    | 1,767.50| 0       | 0      | 1,771 |
| Buke              | 44.18      | 0    | 78.90   | 0       | 0      | 123   |
| Kolono            | 6.96       | 75.18| 113.80  | 0       | 581.40 | 777   |
| East Kolono       | 0          | 12.49| 3.35    | 0       | 6.75   | 23    |
| Kendu             | 46.88      | 7.90 | 49.30   | 320     | 43.15  | 467   |
| Laayu             | 46.91      | 0    | 917.25  | 0       | 0      | 964   |
| Laina             | 10.72      | 26.42| 136.00  | 700     | 221.50 | 1,095 |
| Lalembu           | 180.67     | 0    | 4,146.80| 0       | 0      | 4,327 |
| Landono           | 9.22       | 32.22| 32.10   | 154.00  | 39.15  | 267   |
| Laonti            | 0.26       | 34.90| 283.45  | 1408.00 | 22.50  | 1,749 |
| Moramo            | 20.40      | 24.95| 671.20  | 200     | 873.60 | 1,790 |
| North Moramo      | 2.40       | 20.40| 70.45   | 679.58  | 0      | 773   |
| Mowila            | 50.52      | 0    | 96.60   | 0       | 0      | 147   |
| Palangga          | 49.97      | 4.57 | 111.55  | 524.00  | 34.15  | 724   |
| South Palangga    | 3.94       | 1.59 | 68.29   | 26.03   | 474.84 | 574   |
| West Ranomeeto    | 14.16      | 3.81 | 69.05   | 215.00  | 17.45  | 319   |
| Ranomeeto         | 5.78       | 0    | 26.85   | 0       | 0      | 33    |
| Sabulakoa         | 0.60       | 3.30 | 92.59   | 0       | 0      | 96    |
| Tamba             | 72.47      | 33.73| 283.45  | 1408.00 | 422.50 | 2,220 |
| Wolasi            | 4.60       | 16.50| 65.00   | 40      | 801.45 | 928   |
| Total             | 829        | 357  | 9,728   | 6,941   | 3,542  | 21,396|
The production of food crops by sweet potato leaves, and other agricultural waste. Separated from the development of agricultural products (straw) was obtained from Moramo District with 36 BK tons/year. The smallest was peanuts plants at 236 BK tons/year. Table 6, it showed that the largest production of food crop by-products (straw) was Lalembu District with 16,971 BK tons/year and the smallest was Laonti District with 36 BK tons/year. Table 6 also showed that the supporting capacity of food crops in South Konawe Regency reached 50,687 ST. The area that had the largest supporting capacity was Lalembu District at 16,227 ST and the smallest was Laonti District at 16 ST.

### Table 6b. Production of food crops by-products

| District       | Rice  | Corn  | Peanuts | Cassava | Sweet Potato | Soybean | Total    |
|----------------|-------|-------|---------|---------|--------------|---------|----------|
| Andolo         | 580.70| 4,905.00| 0       | 0       | 0            | 0       | 5,499.70 |
| West Andolo    | 453.10| 0      | 0       | 0       | 0            | 0       | 516.10   |
| Angata         | 401.65| 4,294.60| 2.88    | 0       | 0            | 0       | 4,696.25 |
| Baito          | 343.70| 3,815.00| 0       | 0       | 0            | 0       | 4,158.70 |
| Basa           | 508.12| 4,534.40| 66.24   | 792.85  | 0            | 0       | 5,939.35 |
| Konda          | 80.04 | 3,673.30| 0       | 661.55  | 0            | 0       | 4,663.25 |
| Moramo         | 715.05| 6,616.30| 8.64    | 1,302.90| 27.60        | 1.07    | 8,471.94 |
| Laeyla         | 539.41| 1,057.30| 41.76   | 383.80  | 27.60        | 152.48  | 2,202.87 |
| Lainea         | 115.90| 3,777.94| 2.88    | 212.10  | 0            | 1.57    | 4,110.64 |
| Lalembu        | 2,067.02| 4,878.50| 0       | 25.25   | 0            | 0       | 6,971.77 |
| Landleono      | 85.10 | 1,580.50| 8.64    | 257.55  | 106.80       | 0       | 2,039.30 |
| Moramo         | 5.98  | 0      | 0       | 30.30   | 0            | 0       | 36.28    |
| Baito          | 210.10| 239.80 | 11.52   | 30.30   | 9.60         | 20.33   | 312.85   |
| North Moramo   | 27.60 | 10.90  | 1.51    | 38.38   | 0            | 0       | 78.48    |
| Mowila         | 580.06| 9,973.50| 21.60   | 80.80   | 24.00        | 38.52   | 10,718.51|
| Palangga       | 553.92| 4,033.00| 0       | 27.78   | 0            | 0       | 4,061.78 |
| South Palangga | 299.00| 0      | 43.20   | 1,717.00| 0            | 0       | 2,059.20 |
| West           | 118.68| 272.50 | 0       | 429.25  | 66.00        | 28.89   | 915.22   |
| Ranomeeto      | 63.48 | 926.50 | 12.96   | 31.56   | 0            | 309.23  | 1,344.21 |
| Sabulako       | 6.90  | 1,209.90| 4.32    | 1,217.05| 150          | 255.73  | 2,844.72 |
| Tinanggea      | 817.79| 4,556.20| 7.20    | 90.90   | 14.40        | 38.52   | 5,525.80 |
| Wolasi         | 52.26 | 1,635.00| 0       | 0       | 0            | 0       | 1,687.26 |
| Total          | 8,977 | 79,184.00| 236     | 12,521  | 472          | 1,451   | 102,841  |
Livestock development needs to be supported by the availability of forage and feed ingredients sourced from adequate agricultural by-products throughout the year both in terms of quality and quantity, so that sources of forage feed ingredients and agricultural by-products need to know their potential in order to maximize their utilization (Abadi et al., 2021a). The production of food crop waste depends on the harvested area of food crops by increasing agricultural land for food crops, the production of waste by-products of food crops also increases (Zahara et al., 2016). However, the use of various types of agricultural by-product waste in the form of straw must first be treated physically, chemically, and biologically. The high content of crude fiber and the low nutritional content of straw feed are limiting factors for its use. One of the approaches which can be used is through fermentation technology (Darmawansya et al., 2021).

Increase capacity of ruminant livestock population

The development of beef cattle population is an increase in the population of beef cattle both in terms of the increase of body weight and number of livestock, namely the calves of the cow. Increasing the population of beef cattle needs to be supported by the ability of area to produce forage, both from various types of grass and legumes as well as food crop straw/waste products. The potential of forage and food crop waste is an alternative to fulfill the needs of beef cattle feed while creating a ruminant livestock business in the development of environmental-based agribusiness (Febrina and Liana, 2008).

The increase capacity calculation of the ruminants population was useful to see how much an area has potential to increase ruminants population based on the capability of the land supporting capacity and ruminants population that can be cared for by the head of family in South Konawe Regency. The coefficient value of increasing ruminant livestock population in South Konawe Regency can be seen in Table 7.

The KPPTK SL score in each district varies greatly. Based on the result of data and the calculation of increase capacity score of livestock populations from 25 (twenty-five) districts, there are 17 (seventeen) districts that are positive, namely Andolo District of 5,451.22 ST, West Andolo District of 4,485.89 ST, Basala District of 493.55 ST, Benua District of 7,849.07 ST, Kolono District of 3,645.56 ST, Konda District of 509.46 ST, Laeya District of 968.12 ST, Lainea District of 3,536.53 ST, Lalembu District of 22,128.08 ST, Laonti District of 5,976.44 ST, Moramo District of 3,413.52 ST, North Moramo District of 1,988.68 ST, Mowila District of 2,175.91 ST, South Palangga District of 403.62 ST, Sabulakoa District of 297.32 ST, Tinarggea District of 6,641.25 ST and Wolasi District of 2,983.81 ST. Then, 8 (eight) districts are negative, namely Angata District of -1,760.84 ST, Baito District of -458.79 ST, Buke District -242.69, East Kolono District of -465.39 ST, Landon District of -753.57 ST, Palangga District at -456.71 ST, West Ranomeeto District at -940.82 ST and Ranomeeto District at -1,103.41 ST. KPPTK SL which had a negative score because the livestock population exceeded the capability of the bearing capacity of land. Table 7 also showed that KPPTK KK score are positive in all districts. The positive score of KPPTK KK in all districts of South Konawe Regency indicated that the ruminant livestock population was smaller than the maximum potential that can be taken care by each head of farmer family. The varying KPPTK score were influenced by the agricultural land area, harvested area, real proportion of livestock population and the number of farmer households (Darsono et al., 2016).
The KPPT 1 in 18 (eighteen) districts was positive. This showed that the area based on capability of land supporting capacity was still possible to increase the number of cattle population because the level of land supporting capacity exceeds the population, so that caused under grazing (excess feed). Meanwhile, 7 (seven) other districts had negative scores. So it was not possible to increase the cattle population because the number of population had exceeded the capability of land supporting capacity. If the population continues to increase, there will be potential for excessive overgrazing (lack of feed) and can affect livestock productivity. This was in accordance with the statement of Ningsih et al., (2011) which stated that the positive (+) calculation results indicated the level of excess feed availability while negative (-) indicated a lack of feed.

The bearing capacity of an area based on the feed potential was then compared with bearing capacity based on the farmer household. The addition of an effective ruminant livestock population (PPTR) was the smallest score of the comparison between KPPT based on the potential of feed and KPPT based on farmer households in South Konawe Regency. The results of analysis using the effective KPPT calculation showed that the effective KPPT score of each district in South Konawe Regency varied. In general, the total effective KPPT score was 9,257 ST. This means that based on the maximum potential of natural resources and the head of farmer family in South Konawe Regency, it was still possible to increase the population. If the score was converted to adult female-male cows with an age of > 2 years, the population addition can be done as much as 7,478.

Meanwhile, if converted to female-male heifers with an age of 1-2 years, the population increase could be increased by 14,956 and if converted to female-male calves with an age of > 1 year, the population increase could be done up to 28,912. However, there were 8 (eight) districts where it was not possible to increase the cattle population, namely Angata District, Baito District, Buke District, East Kolono District, Lando District, Palangga District, West Ranomeeto District and Ranomeeto District.

Based on the available resources, both land availability and labor availability, Konawe South Regency had considerable potential for livestock development. Factors that supported the increase of livestock population in South Konawe Regency were forage from pasture and non-pasture land (rice fields, plantations, forests and moor) as well as production of agricultural food crop waste (rice, corn, peanuts, green beans, cassava, sweet potato and soybean), which was balanced by the number of farmer families.

Referring to the availability of forage resources and food crops waste used as feed for livestock as well as the real livestock population of South Konawe Regency, it could be seen that the capacity to increase the ruminants population (KPPT). Abdullah (2014) stated that in the ruminants development in Indonesia, forage was a very important factor with the largest composition, namely 70-80 percent of the total maintenance costs. The level of forage availability in an area was one very important factor and also influenced population dynamics in the successful development of livestock, especially herbivorous livestock.

The availability of land area for forage, the potential of agricultural waste, and the availability of livestock feed, was an important factor in developing livestock in Konawe South Regency.
of labor in South Konawe Regency were opportunities that could be utilized for the development of beef cattle business. The steps that can be taken are to intensify the existing land and utilize agricultural waste as a source of feed for livestock to increase the number of livestock that can be accommodated. As well as by increasing the ability of the head of farmer family as a labor to improve maintenance management so that the number of livestock being raised is more and is expected to be able to absorb optimal labor.

The development of livestock is aimed to increase the production of livestock products which at the same time to increase the income of breeders, to create jobs and to increase the population and genetic quality of livestock.

The role of government has a big influence in increasing the population of cattle, namely by optimizing supervision in the prohibition of slaughtering productive female cattle. This is important to maintain the continuity of population, because slaughtering productive females can reduce the number of beef cattle calves, thereby enlarging the possibilities that the population improvement program will not be realized.

Conclusions

Based on the availability of forage land resources and farmer labor, the increase in ruminant livestock population in the South Konawe Regency could still be increased by 7,478 ST. If the score is converted to adult female-male cows with an age of >2 years, the population addition can be done as much as 7,478. Meanwhile, if converted to female-male heifers with an age of 1-2 years, the population addition can be increased by 14,956 and if converted to female-male calves with an age of >1 year, the population addition can be done up to 28,912. However, there were 8 (eight) districts where it was not possible to increase the cattle population, namely Angata District, Baito District, Buko District, East Kolono District, Landono District, Palangga District, West Ranomeeto District and Ranomeeto District.

References

Abadi, M., L. O. Nafiui, and K. Jufr. 2019a. Mapping of Bali cattle forage potential resources, Tinanggea District, South Konawe Regency. Jurnal Ilmu dan Teknologi Tropis 6: 124-137.

Abadi, M., Surahmanto, A. Rizal F. Nasiu, and Fatmawati. 2019b. The carrying capacity of crop as cow and goat feed in Muna Barat Regency. Buletin of Animal Science. 43: 151-157.

Abadi, M., L. O. Nafiui, L. Yunus, dan Fatmawati. 2018. Strategy for structuring and developing livestock production centers in East Kolaka Regency. JITRO. Vol. 5 No.1; Pg. 21-25.

Abadi, M., L.O. Nafiui, F. Nasiiu, and W. Kurniawan. 2021a. Identification of local feed potential in Bali cattle breeding area in Konawe Selatan Regency. IJAAS. 3: 7-13.

Abadi, M., H. Hafid, A. S. Aku, and L. O. Munadi. 2021b. The potential of developing beef cattle cluster model based on food crops and plantation and grazing in Muna Barat District. IJAAS. Vol. 3 No. 2; Hal: 38-50

Abdullah, L. 2014. Realizing green concentrate in the new feed industry to encourage feed independence and national animal husbandry competitiveness. Orasi Ilmiah Guru Besar IPB. IPB Press, Bogor.

Arifin, M. Z. and Riszqina. 2016. Analysis of the beef cattle development potential through land and human resources approach in Galis District, Pamekasan Regency. Maduranch. 1: 1-12.

BPS. 2019. South Konawe Regency in Figures 2019. Badan Pusat Statistik, Konawe Selatan.

Darmawansa, M., F. Nasiu, and N. Sandiah. 2021. In vitro digestibility analysis of fermented rice straw using aspergillus niger and effective microorganisms. IJAAS. 3: 1-6.

Darsono, W., E. I. K, Putr and Nahrowi. 2016. Area priorities for ruminant livestock development in Tasikmalaya Regency. Jurnal Ilmu Produksi dan Teknologi Hasil Peternakan 4: 356-363.

Delima, M., A. Karim, & M. Yunus. 2015. Study of the forage production potential on existing land and the potential to increase the ruminant population in Aceh Besar District). Agripet 15: 33-40.

Farani, A. 2008. Ruminant livestock development based on forage land availability and labor in Musi Rawas Regency, South Sumatra. J. Indon. Trop. Agric. 33: 145-157.

Febrina, D. and M. Liana. 2008. Utilization of agricultural waste as ruminant feed for small-scale farmers in Rengat Barat District, Indragiri Hulu Regency. Jurnal Peternakan 5: 28-37.

Infitria and Khalil. 2014. Study of production and quality of forage in pasture land, technical service unit of livestock, Andalas University, Padang. Buletin Makanan Ternak 101: 25-33.

Jarmani, S. N. and B. Hayanto. 2015. Improving forage productivity for animal feed to support buffalo herding capacity in Kampar District, Riau. Pastor 4: 95 – 99.

Nell, J. A. and D. H. L. Rollinson. 1974. The Requirements and Availability of Livestock Feed in Indonesia. Jakarta.

Ningsih, S. Sulastri, and M. A. Setiana. 2011. The pattern of forage provision of small ruminants in Pantai Sidoharjo Village, Pacitan District, Pacitan Regency. Department of Nutrition Science and Feed Technology, Faculty of Animal Science.
Bogor Agricultural University (IPB) Jurnal Agromedia, 29: 1-6.
Sangadji, I. and R. Rajab. 2018. Regional potential and land carrying capacity in supporting availability of animal feed for beef cattle development (Case Study in Sakabu Village, Raja Ampat Regency). Journal of Small Islands Forest 2: 219-229.
Saputra, J. I., Liman, and Y. Widodo, 2016. Analysis of beef cattle farming potential development in Pesawaran Regency. Jurnal Ilmiah Peternakan Terpadu 4: 115-123.

Soekardono. 2009. Animal Husbandry Agribusiness Economics. Penerbit Akademika Pressindo, Jakarta.
Wantasen, E., S. Dalie and F. N. S. Oroh. 2016. Supporting capacity of forage and food crop waste of population development for beef cattle in Tompaso District, Minahasa Regency. Pastura 6: 4-11.
Zahara, D. A., Liman, and Muhtarudin. 2016. Capacity increase of ruminant livestock population based on the potential of food crop waste as animal feed in South Lampung Regency. Jurnal Ilmiah Peternakan Terpadu 4: 249-255.