Sustainability status of pasture for cattle development area in Pinrang Regency, South Sulawesi

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Abstract. This study aimed to analyze the index and sustainability status of pasture as beef cattle development area. By knowing the status of sustainability based on ecological, economic, social and technological dimensions will help in making improvements to sensitive attributes that affect the sustainability status of the pasture as beef cattle development area. The study was carried out in the pasture area of Suppa and Mattirobulu Districts, Pinrang Regency. The data in the present study consisted of primary and secondary data. Determination of farmers as respondents was performed randomly. In this study, the experts were also involved as respondents. The selection of experts was prioritized on experts/practitioners who had the expertise, reputation and or experience in the aspects that related to this study. The method of analyzing the sustainability of pasture as for beef cattle development area was carried out using the Multi-Dimensional Scaling (MDS) approach, using a modified Rap-Fish program technique. The results of this study showed that the multidimensional sustainability status resulted in the sustainability index of pasture for beef cattle development area producing an index value of 46.12 (less sustainable). In order to improve the sustainability status, improvements must be made to the sensitive attributes of each dimension. Ecological dimension attributes: a) high level of stocking rate; b) high level of weeds. Attributes that need improvement for the economic dimension: a) cost efficiency of pasture management; b) increased farmers income. The social dimension: a) regulation for establishment of pasture areas; b) strengthening farmers group institution, and technological dimensions: a) introduction of high quality of grass and legumes; b). increased the quality of pasture.

1. Introduction
The natural grazing land in Indonesia is largely not processed properly so the consumption needs for livestock in Indonesia are very minimal which causes low livestock production. There are several factors that cause low livestock production, namely: 1) the low quality of natural pasture 2) the number of livestock kept in natural grazing is not in accordance with the capacity and 3) income from the land in pasture grazing [1]. Pasture management has been known to farmers in Indonesia for a long time, but its management has not been done well. Good management of pasture is very important to improve the quality and advantages of cattle farming business [2].

Sustainable pasture-based livestock enterprises can be defined as having the following three general traits: 1) profitable over the long term; 2) provide good stewardship of natural resources; and 3) maintain a high quality of life for farmers, ranchers, and their communities. Intensively managed grazing system can reduce the risk of soil erosion, nutrient runoff, and pathogen loading in streams.
relative to continuously stocked pastures [3]. Grazing management, combining animal, plant, soil and other environmental components. The sustainable grazing management includes a proper stocking rate, livestock type and recovery time for grass re-growth after grazing. It is important to consider the effect of grazing management on pasture growth, tiller density, pasture quantity and quality and soil properties [4]. This study aimed to analyze the index and sustainability status of pasture as beef cattle development area.

2. Research methods
The study was carried out in the pasture area of Suppa and Mattirobulu Districts, Pinrang Regency, South Sulawesi, Indonesia. The data in the present study consisted of primary and secondary data. Determination of farmers as respondents was performed randomly. In this study, the experts were also involved as respondents. The selection of experts was prioritized on experts/practitioners who had the expertise, reputation and or experience in the aspects that related to this study. The method of analyzing the sustainability of pastures as a cattle development area was carried out using the Multi-Dimensional Scaling (MDS) approach, using the RAP-FISH (Rapid Assessment Techniques for Fisheries) program developed by Fisheries Centre, University of British Columbia [5]. Based on RAP-FISH, modifications were made to this technique which was adapted to this study. MDS is a method of computer-based statistical analysis techniques using SPSS software, the transformation of every dimension and sustainable of pasture as cattle development area. Analyses of data with MDS include the pasture of sustainability aspects of from different dimensions of ecology, economics, technology, and social.

Stage of the sustainability status analysis of pasture status as beef cattle development area were a) reviewing and determining the attributes in each dimension of sustainability. These were the ecological, economic, technological, and socio-cultural dimensions. Determination of attributes and definitions related to the results of the previous phase of research (existing condition); b) assessment and scoring on each attribute of each ordinal scale dimension, whereas each dimension of sustainability criteria were based on the existing condition of research and expert opinion. Range of scores ranging from 0-3 was interpreted from bad to good or vice versa, according to the condition of each attribute; c) based on the scoring of each attribute, and then analyzed using the MDS, to determine the position of the integration of sustainability status of beef cattle and paddy on each dimension of sustainability and multidimensional indices represented by the status of sustainability [6].

3. Results and discussion
The results of the analysis sustainability in multidimensional revealed that the pasture as cattle development area was less sustainable with the sustainability index of 46.12 (fig. 1). This value was calculated based on an assessment of the 15 attributes that were included into the four dimensions of ecological dimensions (4 attributes), the economy (4 attributes), social (3 attributes), and technology (4 attributes), as shown in table 1.

The sustainability index value for the ecological dimension was 47.86. This was categorized as less sustainable. Indicators that are estimated to have an influence on the ecological dimension of the sustainability of pastures are grazing pressure levels and high weed pressure. To improve the sustainability of pastures, an increase in carrying capacity and availability of grazing in pastures is needed by introducing superior grasses or legumes. Besides that, management of the pasture with a rotation system must be carried out.

Based on the results of the leverage analysis there are two indicators that are sensitive to the sustainability value of the economic dimension index, namely a) cost efficiency of pasture management; b) increased farmers income. The sustainability index value for the economic dimension was 39.91 with a less sustainable category. Management of pasture is an important matter, especially for grazing livestock (ruminants) that are using for grazing land, with a foundation according to
carrying capacity adapted to the forage vegetation that grows in the pasture. Thus, the cost efficiency of pasture management occurs, which in turn increases the income of farmers.

**Table 1. Dimensions and attributes of sustainability of pasture as cattle development area**

| No. | Dimension   | Attribute                                                      |
|-----|-------------|----------------------------------------------------------------|
| 1   | Ecological  | 1. Botanical composition of pasture                            |
|     |             | 2. Carrying capacity of pasture                                 |
|     |             | 3. High level of weeds                                          |
|     |             | 4. High level of stocking rate                                   |
| 2   | Economic    | 1. Increased cattle population                                   |
|     |             | 2. Increased farmers income                                     |
|     |             | 3. Level of ownership of cattle by farmers                       |
|     |             | 4. Cost efficiency of pasture management                        |
| 3   | Social      | 1. Regulation for establishment of pasture areas                |
|     |             | 2. Strengthening farmers group institution                      |
|     |             | 3. Knowledge and skills of farmers                              |
| 4   | Technology  | 1. Introduction of high quality of grass and legumes            |
|     |             | 2. Increased the soil fertility of pasture                      |
|     |             | 3. Weed handling technology                                     |
|     |             | 4. Animal reproduction technology                                |

**Figure 1. Leverage of attributes on sustainability score and index of sustainability**

The social dimension that is the determining factor for the sustainability of pasture is the establishment of pasture areas, and the strengthening farmers’ group institution. The development of pasture fields requires government policy support in establishing pasture areas so that there is no change in the function of pasture lands into plantation, housing and other lands. The sustainability index value for the social dimension was 40.97; this was categorized as less sustainable.

In view of technological dimensions, the introduction of high quality of grasses and legumes, and the increased quality of pasture are determinants of increasing the sustainability status of pastures. Excessive grazing causes damage to vegetation due to high amount of livestock grazing with high duration of time long and exceeding the capacity of pasture (penganganan). Over grazing and under
grazing must be avoided, because both will be detrimental effect on pasture itself. Thus, introduction of superior grass and legumes must be carried out to improve the quality of pastures production.

The results of the Rap-Fish analysis showed that all indicators reviewed on the technological status of integration between cattle and paddy rice had provided good and accountable results of the analysis. This can be seen from the stress values ranging between 13 and 15% with an R value of 0.97. This is in accordance with the opinion [5] which stated that the results of the analysis are sufficient if the stress value is smaller than 0.25 (25%) and the value of R approaches the value of 1.0. These two parameters indicate that all indicators used in the sustainability analysis of pastures are relatively good. The smaller the stress value obtained means the better the quality of the analysis performed. In contrast to the coefficient of determination R, the quality of the analysis results will be better if the coefficient of determination gets bigger (close to 1).

4. Conclusions

Index sustainability in multidimensional of pasture for cattle development area with the value of 46.12, it means that the status was less sustainable. To improve the sustainability status, each sensitive attribute in each dimension must be considered. Attributes that must be improved in each dimension is the dimension of ecology: a) high level of stocking rate; b) high level of weeds. Attributes that need improvement for the economic dimension: a) cost efficiency of pasture management; b) increased farmers income. The social dimension: a) regulation for establishment of pasture areas; b) strengthening farmers group institution, and technological dimensions: a) introduction of high quality of grass and legumes; b). increased the quality of pasture.

References

[1] Siba FG, Suarna IW, Suryani NN 2017 Majalah Ilmiah Peternakan 20 (1) 1
[2] Dilago Z 2007 Jurnal Agroforestri 2 (3) 194
[3] Hancock DW 2012 Journal of Extension 50 (5) https://www.joe.org/joe/2012october/iw5.php
[4] Sevov A, Yancheva C, and Y Kazakova 2018 Sustainable Pasture Management New Perspectives in Forage Crops ed R L Edvan (London : IntechOpen) Chapter 10 pp 187-201
[5] Fauzi AA, Susana 2002 Jurnal Pesisir dan Lautan 4 (3)43
[6] Syamsu JA, Ali HM, Ridwan M, Asja M A 2013 Environ. and Natur. Res. J. 11(2)1