Utilization of lutur in the traditional grazing system of buffalo production in Moa Island – Maluku, Indonesia

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Abstract. Buffalo and crop production systems in Moa Island are closely related to the availability of "lutur" fences, which area inside becomes an enclosure for food crops, buffalo shed and limiting grazing areas. The aim of this study was to observe the use of lutur and traditional grazing systems of buffalo production system in Moa Island. The study conducted in Moa Island, Indonesia, located in Southwest Maluku, on eastern side of Indonesia. A total 261 farmers were involved in this study. Focus group discussion, semi structured interview and direct observation performed. Data were analysed descriptively, for correlation and by one-way ANOVA. The results showed that Lutur ownership for crop were 3-5 units/family with a total area of 0.83±0.48 ha and used alternately between crops and buffalo shed. The family size were strongly related (P<0.05) with area of food crops. Lutur as buffalo shelters was used communally in an area of 0.7-1 ha, which placed by 250-600 buffalos. Communal groups were based on "soa" or "fam" (family relations), to avoiding conflicts among groups. As a conclusion, besides making buffalo management easier, lutur and communal grazing have been maintaining tradition in Moa Island for generations.

1. Introduction
Moa buffalo are populated in Moa Island, Southwest Maluku Regency, Maluku Province, one of indigenous buffaloes in Indonesia. Moa buffalo is mud buffalo, which is resistant to the dry agro-ecosystem environment in the island of Moa. In the last 5 years, Moa Island has classified as a dry climate type with an average rainfall of 155 mm per year, an average temperature of 28.09°C and humidity of 81.02%. The optimum temperature for buffalo ranges between 15 - 25°C with humidity of 60- 70% [1]. Moa buffalo still survive in dry climate conditions due to high ability of environmental adaptability and supported by wide natural grasslands (savannas) available in Moa Island (± 20,000 ha of pasture land) [2] or 20.84% of the total island area of Moa. Raising buffaloes has been traditionally conducted for generations. Buffalo is an important component in organic food crop farming by utilizing manure for fertilizer. Besides having an economic function, buffalo is also used in various traditional activities such as dowry, customary sanctions, payment and other traditional ceremonies. The social life of the people in Moa Island for generations shows that buffalo is a symbol of customs [3].

Buffalo maintained by smallholder farmers with limited capital, innovation, and simple technology. The people of Moa Island utilize local wisdom by integrating local knowledge and traditional and
cultural norms. In practice, the unique knowledge of the community and culture has evolved long ago in the process of raising buffalo. The pattern of maintenance by utilizing local resources such as the use of buffalo sheds and grazing communal grazing patterns provide positive value for the sustainable production system. One of local wisdoms is using fences made of limestone called lutur. Area inside lutur becomes an enclosure for food crops, buffalo shed and limiting grazing areas. Another local wisdom is communal grazing. This patterns are inseparable from the cultural roots of the local community and has a high social value, especially in maintaining family relationships and kinship among farmers. That pastoralism is not an only commercial practice, but also has deep social values and cultural roots [4]. The aim of this study was to observe the use of lutur and traditional grazing systems in buffalo production in Moa Island.

2. Material and methods

2.1. Material

This research carried out in 2018 in Moa Island, located around 583 km or 315 nautical miles from Ambon, the capital of Maluku Province and can be reached through sea and air. Two hundred and sixty-one (261) buffalo farmers from 6 villages from a total of 7 villages located Kaiwatu, Patti, Werwaru, Tounawan, Klis, and Moain, selected as respondents using purposive sampling with a minimum keeping experiences was 3 years.

2.2. Methods

Data collection techniques used an interview using semi-structured questionnaires, focus group discussions (FGD) and direct observation. Data were analysed descriptively. One way-ANOVA was use to compare between areas. To measure the relationship between the area of food crops and the number of family members we used partial correlation analysis. To determine the strength of the relationship between the area of family and number of family members the statistical technique used was Pearson Correlation Product Moment [5].

3. Result and discussion

3.1. Lutur

Lutur was a fence made of one metres height of limestone or wood, which functioned as a barrier for food crops, buffalo shed and pasture areas. In the East Moa, lutur were circular, made of stone and were square and generally made of woods in Middle and West Moa. There are 3 types of lutur, i.e. lutur for food crops, buffalo shed, and grazing areas. The average area of lutur for food crops per farmers family was $0.83 \pm 0.48$ ha, with the number of ownerships was 3 to 5 units and used in rotation. The number and size of lutur per farmer family depended on the size of the family members. The family size was significantly ($p<0.05$) correlated with the areas of food crops. Correlation value of 0.510 indicated that the greater the family size, the more food crops areas. Agricultural activities in Moa Island, were merely oriented to provide foods for family consumption (subsystem), so that greater of family size, the more planting activities and areas to meet the family's food needs. In East Moa, stone lutur used alternately between buffalo and food crops (corn, cassava, sweet potatoes, green beans, peanuts). Before the planting season, buffalo kept for $\pm 2$ to 3 months. The benefit was collecting buffalo dung as a natural fertilizer. During planting season, buffaloes were grazing in the pasture and lutur used for cropping activities. However, this system has been neglected in some villages due to limited labour availability.

Buffalo lutur was communally used as buffalos’ sheds A buffalo lutur area (about 0.7 to 1 ha), were able to accommodate 250 to 600 buffaloes belonging to 20 to 25 farmers. About 60% of farmers with average ownership of $26.81 \pm 13.96$ buffaloes did not place all of their buffaloes in communal lutur, and the rest of farmers who owned less buffaloes (18.68\pm12.34) can place all of their buffaloes in communal lutur. Lutur made the keeping management were easier, especially during the rainy
season, handling sick and pregnant animals, milking and identifying the buffaloes. Communal lutur also allowed the use of labour and land were more efficient. This is in line with in the most African regions that the establishment of communal enclosures has become an important strategy in overcoming declining grazing land and reduced patterns of livestock mobility due to an increase in human populations [6].

Lutur for pasture land was very wide (hundreds to thousands of hectares) and found in all villages. These lutur were made of stone and had been built for hundreds of years. An example of lutur area for grazing land in Klis village was $\pm 1200$ ha [3], as barrier of grazing area of one village and another. In the dry season, the buffalo were freely grazing. As buffalo can walk 3 to 5 km, this kind of lutur protected the buffaloes from joining with buffaloes from other villages.

Limited movement of the buffaloes due to lutur system and highly-market demand for male buffaloes, resulted a high inbreeding. This was indicated by a lot albino buffaloes and hanging horned buffaloes existed and the body size become smaller [7]. Economically, albino buffaloes had lower selling price. Quality decreasing of Moa buffalo has an impact on population decline and will ultimately reduce the number of ownership and income of farmers. Inbreeding has adverse effects on milk production performance and fertility [8].

3.2. Difference size of buffalo lutur per region

Area of buffalo lutur sheds in East Moa and Central Moa, East Moa and West Moa were significantly different (p <0.01), yet, lutur areas of Central Moa and West Moa were not different (p > 0.025) as presented in Table 1.

| Region               | Area (ha) |
|----------------------|-----------|
| East Moa – Center Moa| 8.872**   |
| East Moa – West Moa  | 7.780**   |
| Center Moa – West Moa| -1.019**  |

Information: ** = p<0.01, there is a difference at a significant level 1%; ns =p>0.025, not significant

The areas of East Moa were larger than those in Central and West Moa. Currently, as West Moa is a capital district, its lands were converted into residential and commercial uses. In a result, the reduce of grazing areas made the farmers also reduced the number of buffaloes they owned. The pastoral community faces many challenges in facing population growth and urbanization and changes in land use [9].

3.3. Buffalo grazing system.

The buffalo grazing system in Moa has been practiced communally with characteristics: 1) pastoral season was highly ranged, from 30 to 140 days per year with grazing time was 5 to 7 hours per day; 2) annual grazing frequency was 1 to 2 times; 3) each village consisted of 2 to 3 groups of grazing; 4) a group of farmers consisted of 20 to 25 farmers; 5) the groups arranged schedules for grazing in the communal grazing; 6) the communal grazing areas were unoccupied lands, belonged to a certain family.

Grazing groups were based on family relationships, locally named as "soa" (a small group of houses that had a certain “fam” (family relations) living in an area). This system only applied in East Moa, but in West Moa, it was based on the distance between houses and grazing areas. However, the ‘soa’ system seemed to reduce conflicts among grazing groups.

4. Conclusion

As a conclusion, besides making management of buffalo keeping easier, lutur and communal grazing has been maintaining tradition for generations in Moa Island.
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