The mentoring of livestock areas in East Nusa Tenggara

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Abstract. The aims of mentoring program are (1) farmer who want to apply new technology; (2) extension workers for field area; (3) the agricultural officer; and (4) other parties who involved in technology innovation and decision making to recommend and utilize the new technology. This study uses a farmer group-based adaptive research approach with descriptive methods and survey techniques implemented in Kupang District, North Central Timor, and Malacca in 2018. East Nusa Tenggara Assessment Institute has applied several mentoring formats for agricultural technologies, including (1) coordination, socialization, and also synchronization with local government; (2) becoming a resource person and giving the workshop; (3) the technology innovation demonstration through demonstration plot as the example of technology dissemination; (4) Becoming the initiator and facilitator for discussion; (5) the provider of dissemination material. Site-specific technological interventions are used in animal technology assistance to support beef self-sufficiency programs in East Nusa Tenggara. The result of this program makes the differences indicated by the increase in each stage of assistance. The indication of the program is a better cattle production performance compared to existing farmers. The Mentoring on livestock area in East Nusa Tenggara had been reaching eight districts, 11 sub-districts, 16 villages, and 22 farmer groups.

1. Introduction

One of the biggest challenges that is still faced by various research institutions in Indonesia is how to accelerate the innovations so that it quickly reaches the community, effective, and efficient to overcome existing problems. The type of technology that will be implemented at the farm level should be based on needs rather than wants. Thus, the biggest challenge is how to accelerate the innovation produced so that the technology transfer process can also run fast. Technology assistance, supporting the development of animal husbandry areas in East Nusa Tenggara, aims to create a model of community farms based on technological innovation in a sustainable and specific location in East Nusa Tenggara. It can be expected that the mentoring will benefit farmers, business partners, and local governments as policymakers in overcoming problems in the livestock subsector. Also, the expected impact is the development of cattle breeding technology innovation in the area of development of community farms in a sustainable and location-specific manner.

The mentoring pattern directly influences the application of technology significantly in raising cattle, which is in turn effects on improving the performance and ability of farmer group members in raising
livestock. The real effect occurs because farmer groups are a forum for farmers both for social activities and agricultural activities.

Through mentoring activities and innovations, the technologies that are taught can be spread and adopted, especially in the area of community farm development. The results of the application of innovation will ultimately have an impact on improving cattle business in the area of development of community farms. In the long term, mentoring will have an impact on increasing livestock production in community centers based on technological innovation and leading to increased regional income [1].

There are two aspects of livestock business improvement: (1) producing good quality livestock; and (2) able to meet market needs on an ongoing basis. The first aspect will be realized through male and parent selection and continuous feed availability throughout the year. The second aspect will be realized if it can produce high-quality livestock for fattening and high-fertility breeds. There are 10 to 13 beef cattle development areas, and three buffalo, which are three of them are in East Nusa Tenggara. Meanwhile, there are 230 livestock rescue groups and rewarded pregnant cows as much as 158 groups (Animal husbandry Department of East Nusa Tenggara).

Based on some of the results of studies that have been carried out on Timor Island [2-7], the improvement of rearing system from extensive to semi-intensive using farmer group’s approach will give a positive effect when a consistent act and application happens. Focusing on Timor Island studies, there were some farmer groups which had a significant result in the period of 2004 to 2009, i.e.: (1) The growth of fattening business owned by the farmer groups gave better revenue for its member according to the cooperation, caring, and positive competition of its members; (2) farmer’s bargaining position became stronger because of group of sales; (3) Higher probability of potential business partners to capitalize group activities, so farmers’ income will be better because their livestock can be sold without going through intermediary traders; and (4) livestock manure became more valuable by being used for alternative energy sources and food crops or horticulture that could increase the farmers’ income.

2. Materials and methods

This study uses a farmer group-based adaptive research approach with descriptive methods and survey/monitoring techniques implemented in Kupang District, North Central Timor, and Malacca in 2018. The aims of mentoring program are (1) farmers, as well as farmer groups, who want to apply new technology to their businesses; (2) extension workers for field area; (3) the agricultural officer; and (4) other parties who involved in technology innovation and decision making for new recommended and utilized technology. Innovation-technology interventions are applied in the form of assistance for technology through participatory farmer institutions, involving farmer groups that implement development assistant programs.

Primary data were collected from mentoring activity such as breeding technology, feedlot technology tarramba introduction and livestock management. Primary data and information gathered through multiple visiting during the program implemented. Secondary data gathered from Statistical Bureau and interview with farmer group and other relevant/related sources. Data were analyzed descriptively.

3. Results and discussion

3.1. Livestock population’s growth in five years period

Livestock population provides positive development, although not yet optimal for all types of livestock. The development becomes inefficient due to the still high mortality as a result of non-intensive farming on community farms. Health problems occur in locations where conditions are quite prominent related to the pattern of raising livestock by the community, while the age of large livestock businesses requires approximately five years so that it requires responsible mid-term management. Livestock population growth in East Nusa Tenggara in the last five years can be seen in table 1[8].
Table 1. Livestock Growth in East Nusa Tenggara.

| No | Livestock Commodity | Year (head) |
|----|---------------------|-------------|
|    |                     | 2014        | 2015        | 2016        | 2017        | 2018        |
| 1  | Cow                 | 865,731     | 899,577     | 984,508     | 1,007,608   | 1,027,256   |
| 2  | Buffalo             | 134,567     | 141,075     | 156,927     | 162,658     | 165,551     |
| 3  | Equine              | 112,948     | 111,047     | 112,557     | 112,589     | 114,514     |
| 4  | Goat/Sheep          | 674,012     | 691,852     | 704,853     | 741,806     | 761,965     |
| 5  | Pig                 | 1,755,058   | 1,812,449   | 1,845,408   | 2,073,466   | 2,141,246   |
| 6  | Amount              | 3,542,316   | 3,656,000   | 3,804,253   | 4,098,127   | 4,210,532   |

Source: East Nusa Tenggara Statistic, 2019.

Based on table 1, the population tends to increase every year, especially in cattle, buffalo, horses, goats/sheep, and pigs. The increase occurred because there were technological changes at the institutional level of farmer groups and community farms, which is indicated by the increasing population of livestock each year.

Since 2015, assistance activities for technology in the animal husbandry area in East Nusa Tenggara has begun with coordination of the relevant Dinas of each district. Subsequently, the activity continued with the selection of prospective farmers for the destined location. Also, there are discussions and decisions for choosing the proper form of mentoring, which met to the real situation. Because of the innovation mentoring is based on farmer’s needs, then the dissemination media varies from leaflet, brochure, and poster. The mentoring varies, i.e., technical workshop, technical assistantship, and demonstration plot [9 - 11].

Strategic plans for beef cattle development in East Nusa Tenggara are needed to enable in accelerating the achievement of development goals and objectives according to national and regional strategic policies. Technology assistance in supporting the development of animal husbandry areas in East Nusa Tenggara is expected to benefit farmers raising livestock for breeders, cattle farmers, business partners, and local governments. In this case, the local government has a role as a policymaker in overcoming problems in the livestock subsector.

3.2. Animal husbandry technology innovation

Animal husbandry technology innovations were introduced in three different districts, depending on the needs of farmers. Some types of the introduced technological innovations are:

3.2.1. Breeding technology innovation. Technological innovation focuses on raising female cows by improving the pattern of breeding using communal cages. Female cages are made for ten females, and a single cage will be used for pregnancy examination. The cage includes a feed bank and fence. The intention of building this is to give space to the cows and its calf. The length of the cage is 10 m, and the width of 2 m with a length of 2 m per partition will be sealed into individual barriers to accommodate one female. While the staple cage for pregnancy inspection has a width of 2 m and a length of 5 m and can also function for weighing livestock.

3.2.2. Fattening technology innovation. Fattening technology innovation using group cages has a capacity of 10 fattening bulls. The feedlot is 10 m long, 2.5 m wide, and 3.5 m high for the capacity of 10 bulls. Cage group is divided into ten parts. Each part is 1 meter long and 2.5 m wide. Group cages are used throughout the fattening period of about 4 to 7 months. During fattening, cattle are kept in cages throughout the day, and feeding is given in cut and carry from 2 to 3 times per day. The group cage is equipped with a feed
container, a cement floor, and the roof was made from dried cogon grass. The group cage unit is also equipped with a pinch cage for weighing and landfill measuring with the size of 3 x 2 x 1.5 m. Fattening technology innovation is beneficial including (1) increasing productivity through improving the maintenance system through the group cage approach will have a positive impact, because the development of dryland farming increasingly requires the division of agricultural land and livestock; (2) improving management of feed for fattening cattle using a combination of natural grass, legume and local concentrates is available on site. Provision of legumes and concentrates as additional feed, especially in the dry season so that livestock do not lose weight; (3) the potential of cow manure collected in group cages can be used as biogas (biogas) material because generally, farmers allow cow manure to mount around the cage, although some farmers use it as fertilizer for food crops, still much left and not utilized.

3.2.3. Technology innovation on the improvement of feed quality

The innovations are through the introduction of herbaceous legumes and tree legumes (Lamtoro tarramba). Herbaceous legumes can be planted as a conservation plant on the contour path and on the flat land (between plants on the contour path). Herbaceous legume plants will be pruned more often to the speed of plant growth (30 to 40 days, by rotating pruning so that there is always something that can be pruned every day to ensure the availability of feed). Tree legumes (lamtoro tarramba) were firstly planted in plastic containers because of the nature of this plant that is difficult to compete in the early growth. After the plants in kokeran reach 50 to 100 cm high, then it is planted at a distance of 2 m between plants, pruning will be carried out on lamtoro plants after the second year of planting. Rotational pruning will also be carried out under the speed of regrowth.

3.3. The performance of animal husbandry technology assistance in Kupang Regency, North Central Timor and Malaka

Implementation of livestock assistance is carried out in three districts involving several groups of farmers in 2018. The form of mentoring depends on the needs of the farmer groups. The program dynamically adapts to the conditions and abilities of farmers.

3.3.1. Kupang Regency

The location of technology assistance in Kupang Regency covers all hamlets in Raknamo Village, Amabi Oefeto District, namely: (1) Kiukasen Hamlet; (2) Tapasan Hamlet; (3) Oeendak Hamlet; (4) Oepoi Hamlet; and (5) Oebatuinak Hamlet.

The form of technology assistance carried out in the Fajar Pagi farmer group in Raknamo Village, Kupang Regency is presented in table 2 [10].

| Table 2. Forms of technology assistance in the Fajar Pagi farm group in Raknamo Village. |
|---------------------------------|---------------------------------|
| Technology of innovation | Activity |
| Fattening Technology | • Introduction of communal cages  |
|                      | • Introduction of cow headlock with cage |
|                      | • Cattle healthcare |
| Feed Technology | • Management of existing feed plants as cattle feed |
|                  | • Introduction of lamtoro tarramba |

Source: Processed primary data, 2018.

Table 2 shows the types of livestock accompaniment activities carried out in the "Fajar Pagi" farmer groups in three communal enclosure locations spread over two hamlets, which are monitored every month.
at the end of each month, by weighing livestock to determine body weight before being given vitamins and antibiotics. During eight months of mentoring, cattle fattening has been carried out for two times, namely the April-July period and the August-November period. There are approximately 80 to 90 animals for two periods of fattening with an average selling price of 7 million rupiahs with a range of body weight between 268 to 280 kg, with a maximum body weight reaching 300 kg. Until this report was written the third period of fattening is underway. To support fattening activities in the "Fajar Pagi" farmer group, an introduction of lamtoro tarramba has been carried out covering approximately 2 hectares in each cage location so that the total area of the Animal Feed Forage farms in the "Fajar Pagi" farmer group is 10 to 20 ha (because it includes Animal Forage land which belongs to a member of a farmer group).

3.3.2. North Central Timor Regency

Table 3. Mentoring locations and farmer groups participants in North Central Timor District 2016-2018

| Sub-district   | Farmer groups / Total members | Technology innovation                                                                 | Mentoring year |
|----------------|--------------------------------|---------------------------------------------------------------------------------------|----------------|
|                | Kiuola Village / Farmer Group  | • Breeding workshop of tarramba inside kokeran                                        | 2015, 2016     |
|                | Malilimepu, Pua Mes, Pasan, and Tuakum/80 members | • Demonstration plot for tarramba garden seluas 0.22 hectare                           |                |
|                |                                 | • Utilization of cattle manure for vegetable crop                                      |                |
|                |                                 | • Poster                                                                               |                |
| Noemuti        | Kiuola Village / Nekto toapala/25 members | • Introduction of Lamtoro tarramba for two hectares land                               | 2016, 2017, 2018 |
|                |                                 | • Poster                                                                               |                |
| Insana         | Oenbit Village / Farmer Group   | • Introduction of Lamtoro tarramba for 0.5 hectares                                      | 2015, 2016     |
|                | Tuinbatan/25 members            | • Communal cage for breeding                                                           |                |
|                |                                 | • Utilization of cattle manure for vegetable crop                                      |                |
|                |                                 | • Feed bank model according to the research center                                     |                |
|                |                                 | • Introduction of concentrate (rice bran) to bull                                      |                |
|                |                                 | • Periodic livestock healthcare (every 1 or two months)                                |                |
|                |                                 | • Poster                                                                               |                |
| Insana Tengah  | Lanaus Village / Farmer Group   | • Introduction of lamtoro tarramba to 1-hectare land                                   | 2017, 2018     |
|                | telobolmeo/25 members           | • Poster                                                                               |                |
| Miomafo Timur  | Taekas Village / Farmer Group   | • Introduction of lamtoro tarramba                                                    | 2016           |
|                | Selera, Yovita, and Oematalis/60 members | • Poster                                                                               |                |

Source: Processed primary data, 2018.

The location of assistance activities in the North Central Timor Regency is in Noemuti District. The form of mentoring provided is technology training and demonstration. The mentoring was the monitoring of
tarramba plants in 2018. Taramba plants were planted on an area of 2 ha in the place of the Nektonoaapala farmer group, Noemuti District, at the end of December 2017. The forage planting program is a collaboration program with the Office of Animal Husbandry of North Central Timor Regency. In this program, the Nektonoaapala farmer group received assistance in September 2018, in the form of a water pump with 2 dm diameter and a water pump housing. Also, the farmer group received a water tank with dimensions of length vs. width vs. height 4 vs. 4 vs. 1.5 meters and two small water-holding units of size 1.5 vs. 2 vs. 1.5 m, respectively. The tanks are installed in different places, one unit is inside the garden, and the other is outside the fence of the Animal Forage Land. "Nekto Noapala" farming group has a water source called lolok pvo besides being a source of water for drinking livestock. The community also uses this water source for daily needs by flowing through pipes to the residential villages. With the available support, the farmer group "Nekto Noapala” can expand the planting area of forage. The implementation of mentoring in the North Central Timor Regency had been conducted from 2016 to 2018. The activity was carried out about assisting farmer groups and subsequently spread to several farmer groups in Noemuti, Insana, and Central Insana Districts (Table 3) [12].

3.3.3. Malaka Regency. Mentoring was conducted at the "Intan Permai" farmer group in Malacca District until 2018. Mentoring included the cultivation of lamtoro tarramba development and livestock health care by administering vitamins and antibiotics (table 4) [13].

| Technology Innovation | Activity |
|-----------------------|----------|
| Breeding Technology   | • Introduction of a communal cage  |
|                       | • Feed bank model according to the research center |
| Feeding Technology    | • Introduction of lamtoro tarramba, herbaceous legume, and good quality grass |
| Livestock Healthcare  | • Applying careful observations of livestock health and immediately report to local livestock officers if there are signs of health problems that cannot be handled alone |
| Dissemination and transfer technology | • Dissemination through information media (posters, leaflets, brochures) |

Source: Processed primary data, 2018.

Table 4 shows that the implementation of animal assistance activities in the "Intan Permai" farmer group in Malacca District was more focused on raising cattle and developing Lamtoro tarramba. The total area of tarramba plantations owned by the "Intan Permai" farmer group up to 2018 is 11 ha. It is spread over five locations in the "Intan Permai" farmer group, each garden location has an area of around 2 to 3 ha. Tarramba plants produce seeds and have been sold for 50 thousand rupiahs kg⁻¹. The seeds sold were 500 kg. The farmer group needs technical assistance especially on livestock management, veterinary, and providing feed protein such as lamtoro tarramba. This can be fulfilled if the mentoring still continued and synergized with the extension worker. The primary challenge in NTT mentoring is climate because it has short rainfall (3 to 4 months) that will impact the feed availability. The second challenge is the group of farmer condition for receiving new technology adoption. The third challenge is the remote area condition.
4. Conclusions
Mentoring in the form of technology assistance of animal husbandry development had reached eight districts in East Nusa Tenggara until 2018. Technology innovations were included communal enclosure technology, feed banks, the introduction of Lamtoro tarramba in group gardens, technical training (making bokashi and silage), health care, and dissemination through leaflets, brochures, and posters.

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