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# Beef Cattle Development Models in the Selected Transmigration Areas

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**ABSTRACT**: One of the government efforts to optimize available human and natural resources in the dry zone of transmigration areas is using beef cattle development. Several advantages of beef cattle are: increase of family income, provide animal power, improve the quality of natural resources, fulfil the need for food of high quality and increase job opportunity. Beef cattle model for transmigration has not been developed, therefore, this study was conducted. The aims of the study was to design beef cattle model in accordance with agro-ecosystem profile in the study areas. The study was conducted in the four provinces consisting of 10 transmigration resettlements i.e. 3 sites in South Sulawesi and in South East Sulawesi and 2 sites in West Nusatenggara and East Nusatenggara provinces. Rapid Rural Appraisal method was employed. Primary data were collected by direct interview to transmigrans, farmer groups, institutions, and related officers in various levels. Of the 10 locations all have different conditions in term of topographical, geographical and socio-economic. They had low livestock population and far below its carrying capacity. Cattle seems to have a greatest potential for increasing income both in short and long term. Three basic model for cattle development were identified: cattle for fattening, breeding and combination of the two. These models can be approached through the nucleus estate concept which increase farmer's resource use for more productive activities.

Key Words: Beef Cattle Model, Transmigration Areas

## Introduction

Income received by transmigrants from agricultural sector is generally low, since the available natural resources has not been fully utilized. One of the government efforts to optimize available resources is by using livestock. There are several advantages of developing livestock model in transmigration areas, for instance, to increase family income, provide animal power, improve the quality of natural resources, fulfil the need for food and increase job opportunity. Although livestock usually part of subsidies from the government its role is still limited. In the early establishment for instance, the role of cattle as source of animal power was not understood seriously.

So far, there are some transmigration models which have been introduced, namely model for food crop, estate crop, fishery, industrial forestry. Livestock model for transmigration areas has not been developed, therefore this study was carried out to participate in forming livestock model in accordance with agro-ecosystem profile in the study areas and recommend the suitable livestock species for development.

## Methods

The study was conducted in four provinces consisting 10 transmigration resettlement units (TRU) in October 1993. Three sites located in South Sulawesi and in South East Sulawesi, two sites in West Nusatenggara and in East Nusatenggara provinces.

The study team identified the integration of livestock development plan in relation to the existing potentials of feed resources. Information on strategies of area development from local government and related institutions was also reviewed. The team also investigated the availability and suitability of natural resources, infrastructures, potential feed resources, existing livestock and food crop management and other available facilities required for livestock development. Primary data was collected through a direct interview using prepared questionnaires either to transmigrans, farmer groups, institutions available at the locations and related officers. Secondary data were obtained

from literature study, TRU monography, survey results. Direct field observation was also conducted especially in relation with livestock management such as housing, feed, forage availability and other resources.

## Result and Discussion

*Livestock population*

In general livestock population in the study area was low and almost all livestock were from the government' subsidy. At the time of study transmigrants almost had no ability to purchase livestock. An exception occurs, however, in Labangka IV where farmer successfuly harvest their chili and cattle was the choice of investment. Cattle in Tobadak IV originated from the Departement of Transmigration with the average ownwership of 0.16 per household. From the origin number of 8 bulls and 78 cows, at the time of study the number decreased to 7 bulls and 70 cows. Mortality mainly occured during transportation. Livestock population in Mautenda was much higher than anywhere else because most livestock were brought from the neighbouring villages. Table 1 shows that village chicken is the most favored stock kept by farmer. This tendency expressed capital shortage in these locations and village chicken is the cheapest to start with. This condition showed that investment in livestock development should be dependent on external capital resource.

According to the International Fund for Agricultural Development (IFAD) study (DPA, 1990) high livestock extraction was occured in South Sulawesi, West Nusatenggara and East Nusatenggara provinces. Regarding to this, measures should be taken by the government to slow down the process or even to stop further extraction in the near future. Generally, livestock were kept traditionally as one of income generating activities. Farmers from Java and Bali, however, always keep their large ruminant in pen, contrast to the local transmigrants, which are grazed during the day and tethered at night. This later practice of course has a negatif impact on food crops since animal will devastate the crops. Muscovy duck was the main duck raised by transmigrants in South Sulawesi

Table 1. Livestock population in the study areas

| Location | Cattle | Buffalo | Goat | Sheep | Pig | Chicken | Duck | Horse |
|---|---|---|---|---|---|---|---|---|
| South Sulawesi: | | | | | | | | |
| Tobadak IV | 77 | - | - | - | - | 3806 | 323 | - |
| Topoyo III | - | - | 9 | - | 6 | 2180 | 557 | - |
| Pedanda II | - | - | 8 | - | 10 | 926 | 65 | - |
| South East Sulawesi: | | | | | | | | |
| Sabulakoa I | 32 | - | 195 | - | 2 | 1150 | 5 | - |
| Lambale SP1 | - | - | 22 | - | - | 755 | 15 | - |
| Lambale Sp4 | - | - | 75 | - | - | 1423 | - | - |
| West Nusa Tenggara: | | | | | | | | |
| Labangka III Sp2 | 7 | - | 18 | - | - | 2350 | 25 | 4 |
| Labangka IV Sp3 | 11 | - | 104 | - | - | 2000 | 12 | 10 |
| East Nusa Tenggara: | | | | | | | | |
| Mautenda I | 74 | 57 | 200 | 200 | 650 | 1200 | - | 24 |
| Mautenda II | 35 | 13 | 10 | 10 | 200 | 300 | - | 18 |

because of its disease resistance and relatively easier to raised. Pig only raised by transmigrants from Bali and in Mautenda where the majority of farmers are Christians.

*Agricultural by-products and carrying capacity*

Based on the available data on cropping patterns estimation of agricultural by-product was made. By considering cropping pattern, different agriculteral by-products supply can be estimated. Table 2 shows available potential of food crops and annual crops by-products. In all locations - except Mautenda - availability of agricultural by-products varied considerably. Sabulakoa and Labangka III were the most potential. From feed availability, therefore, these two locations should be placed in the first priority if livestock development will be implemented. In contrast, Mautenda shows different condition due to long dry season.

Table 2 also indicates the role of each type of crops in contributing to the feed resource. Annual crops were dominant in three locations, mainly Tobadak III, Sabulakoa I and Labangka III. In other locations, food crops are the most important contributors.

Bamualim and Saleh (1992) obtained that production of native grass in the grazing lands varies according to the season. In Sumbawa island, where Labangka is located, October is the lowest while March is the highest of grass production. Based on this finding, strategies in raising livestock can be planned to match feed supply.

Based on feed potential shown in Table 2, livestock population still can be increased. However, other factors such as parasites and diseases, capital, extension services and motivation in livestock rearing also need to be looked at. For instance, if 250 kg of cattle (1 Livestock Unit) required 7.5 kg dry matter, therefore, 2.74 ton per year is required per head.

Table 2. Estimated food and annual crops by-products in the four provinces

| Location | By-product | | Total |
|---|---|---|---|
| | Food crops | Annual crops | |
| | ------- ton dry matter/year --------- | | |
| South Sulawesi: | | | |
| Tobadak IV | 122,2 | 165,1 | 287,3 |
| Topoyo III | 137,8 | 49,7 | 187,5 |
| Pedanda II | 61,6 | 46,2 | 107,8 |
| South East Sulawesi: | | | |
| Sabulakoa I | 117,8 | 198,9 | 316,7 |
| Lambale Sp1 | 198,3 | 12,3 | 210,6 |
| Lambale Sp4 | 117,6 | 94,9 | 212,5 |
| West Nusatenggara: | | | |
| Labangka III Sp2 | 181,0 | 177,9 | 358,9 |
| Labangka IV Sp3 | 181,0 | 6,0 | 187,0 |
| East Nusatenggara: | | | |
| Mautenda I | 18,6 | 11,6 | 30,2 |
| Mautenda II | 4,7 | 1,6 | 6,3 |

Table 3. Carrying capacity based on the available agricultural by-products and the existing ruminant in the four provinces

| Location | Potensial (LU) | Current population (LU)[a] |
|---|---|---|
| South Sulawesi: | | |
| Tobadak IV | 105 | 58 |
| Topoyo III | 68 | 1 |
| Pedanda II | 39 | 1 |
| South East Sulawesi: | | |
| Sabulakoa I | 116 | 47 |
| Lambale Sp1 | 77 | 3 |
| Lambale Sp4 | 78 | 9 |
| West Nusa Tenggara: | | |
| Labangka III Sp2 | 131 | 7 |
| Labangka IV Sp3 | 68 | 20 |
| East Nusa Tenggara: | | |
| Mautenda I | 11 | 131[b] |
| Mautenda II | 2 | 40[b] |

[a]Livestock Unit (LU) for cattle 0.758; buffalo 0.908; goat 0.115; sheep 0.126; pig 0.200; horse 0.687; chicken 0.020; duck 0.030 (Anonimous, 1989).
[b]Raised outside location.

Table 3 indicates the number of animal unit that potentially can be raised in each location. It should be noted, because livestock are raised extensively rather than confined, therefore, the actual carrying capacity can be increased further. Research showed that energy requirement of grazed animal is 1.5 higher than if animal kept in pen (White, 1993). In addition, if available native grass as source of feed also appraised then more livestock can be added to these locations. In most cases native grass contributes between 60 to 100 per cent of feed required.

*Beef cattle models*

Available resources will make possible for livestock development planning. Considering data concerning with available feed supply and its carrying capacity as the focus of development, livestock models based on beef cattle as a main occupation will be proposed. These models propably can be tried first in certain areas i.e. Sabulakoa I in South East Sulawesi and Labangka III in West Nusatenggara. There were three basic models i.e. cattle for fattening, breeding and combination of fattening and breeding. Bali cattle will be used, since imported breeds for reason of management, nutrition, stress and the inability to adapt to the local conditions have not been recommended yet. The proposed models will subsidise farmer with 10 steers for fattening while for breeding followed by fattening will require 1 male and 10 cows. Model for combination requires 1 male, 5 cows for breeding and 5 steers for fattening. All cooperators will prepare at least 0.5 ha for intensive forage planting for fattening and 1 ha for the two others.

It was assumed if annual income from agricutural sector range between Rp. 1.000.000 to Rp. 1.500.000 per household, therefore, livestock sub-sector should contribute the difference to achieve the income target of Rp. 3.600.000 per household. In another word livestock should contribute between Rp. 2.100.000 to Rp. 2.600.000. This amount can be generated from livestock (cattle) as a major income source plus livestock (village chicken and goat) as subsistence activity. The role of chicken and goat rearing is to increase income from

livestock sub-sector which range between 10 to 30 per cent of total income. Additional activity is another criteria in which the income proportion ranges between 30 to 70 per cent from total income. The number of chicken and goat raised in these two activities depend to the planned income of farmer. If income is planned to increase, chicken and goat can be increased accordingly with farmer need. Table 4 shows the scale of each model.

**Fattening.** Fattening starts with 10 steers of 130 kg body weight each. With assumption of 0.4 kg daily weight gain, in 10 months period farmer will be able to sell 10 older steers of 250 kg each. Feeds can be obtained from two sources, first improved pasture and legumes from 0.5 ha of land and second, from agricultural by-products, native grass and limited grazing. This particular model also aims to conserve land and to increase soil fertility.

Credits for pen, fence, operational costs and pasture improvement which amount of Rp. 600,000 can be justified in 5 years with 12 per cent interest rate, while credit for animal (Rp. 2,500,000) only for one year with the same interest rate. Therefore, installment per year is Rp. 2,992,000.

Applying the above model for fattening, farmers will receive Rp. 2,002,000 per annum before deducted for farmer'labour (Table 5).

**Breeding.** In contrast with fattening, breeding is a long term activity. It starts with 10 cows and 1 bull. It was assumed to have 60 per cent calving rate and 17 per cent mortality, particularly during pre weaning period. In the second year, 1 cow was culled to be replaced with one selected heifer calf. All other calves are raised up to 2-3 years for sale either for breeding or for meat.

As breeding is relatively longer activity, farmers require seven year credit for all components with 12 per cent interest rate. With total credit of Rp. 7,320,000, therefore, per year installment is Rp. 1,924,100 which start in the second year.

Return in term of cash to farmers from breeding model is much less than fattening (Rp. 676,000/annum), but installment also less. But at the end (year seven), farmers will have 16 cows of their own (Table 5).

**Combination (fattening and breeding).** Combination model starts with 1 bull, 5 cows and 5 steers. Cattle for fattening is reared for 10 months and sold every year, while for breeding selling can be conducted at the end of year two or in early year 3.

Credit for fattening (Rp. 1,250,000) is planned only for one year, while credit for breeding, pen, fence, pasture and operational cost (Rp. 4,320,000) for seven years. With 12 per cent interest rate farmer will have to repay Rp. 1,400,000 per year for fattening. For breeding, installment which starts in the second year is Rp. 1,135,500 per year. Therefore, start in the second year farmers have to repay Rp. 2,536,000 per year and at the end year seven farmers will have 8 cows.

Combination model will give return to farmers higher that breeding model but less than fattening model. In the first year they will receive Rp. 1,100,000; in the second year Rp. 1,574,000 will be received because it involves selling of a 2- 3 years cow. Without selling, in the third year farmer receive less i.e Rp. 1,074,000. This pattern of return starts from year two and will be repeated in the duration of rearing (Table 5).

The difference among these 3 models, that at the end of the estimated project period, breeding and combination models retained 16 and 8 breeding cows respectively. These animals are used in further cattle production activity.

Table 4. Livestock raised per household in the three models

| Livestock | Fattening | Breeding | Combination |
|---|---|---|---|
| Cattle | | | |
| Adult | - | 11 | 6 |
| Young | 10 | 11 | 5 |
| Village chicken | 25 | 50 | 25 |
| Goat | 5 | 10 | 5 |

Table 5. Financial analysis of beef cattle models (Rp. 000)

| | Year | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Fattening: | | | | | | |
| Investment | 2,930 | 2,530 | 2,530 | 2,530 | 2,530 | |
| Operational cost | 170 | 150 | 150 | 150 | 150 | |
| Selling | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | |
| Installment | 2,998 | 2,998 | 2,998 | 2,998 | 2,998 | |
| Total return to farmer | 2,002 | 2,002 | 2,002 | 2,002 | 2,002 | |
| Breeding: | | | | | | |
| Investment | 7,150 | 0 | 0 | 0 | 0 | 0 |
| Operational cost | 170 | 150 | 150 | 150 | 150 | 150 |
| Selling | - | 2,600 | 2,600 | 2,600 | 2,600 | 2,600 |
| Installment | 1,924 | 1,924 | 1,924 | 1,924 | 1,924 | 1,924 |
| Total return to farmer | - | 676 | 676 | 676 | 676 | 676 |
| Combination: | | | | | | |
| Investment | 5,400 | 1,250 | 1,250 | 1.250 | 1,250 | |
| Operational cost | 170 | 150 | 150 | 150 | 150 | |
| Selling | 2,500 | 4,600 | 3,600 | 4,100 | 3,600 | |
| Installment | 1,400 | 2,526 | 2,526 | 2,526 | 2,526 | |
| Total return to farmer | 1,400 | 2,526 | 2,526 | 2,526 | 2,526 | |

## Recommendation

Considering resource availability in all locations, it seems that Sabulakoa I and Labangka III much more suitable than others to try the models. Income from livestock as main activity will help to achieve the targetted income of Rp. 3,600,000/year per household. Other livestock, chicken and goat will also give contribution but its scale will depend on the economic status of rearers.

Agricultural by-product availability in the future will make possible to add more livestock than proposed here, as more food and annual crops will be cultivated. Appropriate facilities to support such activities requires collaborative work from different institutions, such as bank, marketing network, traders, cooperative and many more.

The three models presented here is conceptual frammework, while description in more detail will be made available in its implementation. For instance, without land specially allocated to produce improved pasture, the model is not workable. Fattening model is more suitable in the short run while breeding is more for the long run.

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