The 3rd ISTAP, Faculty of Animal Science, Gadjah Mada University, 2002 ISBN: 979 – 97243 – 1 - 7

LIVESTOCK BREEDING AND REPRODUCTION IN INDONESIA: PAST AND FUTURE[1]

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Abstract

This paper presents the documented information of livestock breeding and reproduction at two different time periods, during the Dutch occupation and after the independence. The objective of the breeding program during the Dutch occupation especially was to overcome the need of draft cattle. They imported Ongole cattle from India, which then became the Sumba Ongole cattle. This cattle was crossed with the Java native cattle to produce Ongole Grade cattle, which then became the most popular cattle in the country. Some of these cattle were crossed with imported Friesian Holstein dairy cattle to increase the total number of dairy cattle. After the independence especially since the use of frozen semen in artificial insemination (AI) was popular, the Indonesian government imported different breeds of beef cattle to cross with the local cattle. Several breeding stations and AI centers were established to improve the genetic make up of livestock. The results achieved, the problems met and the failures will be discussed. Further future breeding strategies and reproduction technologies for livestock improvement are proposed.

Introduction

Most of Indonesian livestock are native breeds and local breeds. The local breeds were developed during the Dutch occupation in the early nineteen hundred by crossing and grading up the native breeds with imported breeds. The objectives were to meet the requirement of draft cattle, meat, and milk. The local breeds have the adaptation characteristic like the native breeds. The significant results of this past livestock breeding were the development of Sumba Ongole cattle, Ongole grade cattle and Madura cattle. The Ongole grade cattle are the largest cattle population and widely distributed in Indonesia. They serve the national needs for meat production.

Among the native cattle, Bali cattle are well known because of their good fertility, conception rate and birth rate was 90.1% and 82 % respectively (Simanjuntak, 1993). To conserve the genetic resource of Bali cattle this cattle are bred pure in Bali Island.

Crossbreeding was also implemented to other livestock species like goat, sheep

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[1] *Paper presented at the 3 rd International Seminar on Tropical Animal Production. Held at Yogyakarta. Indonesia. September 15-16, 2002.*

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and after the independence most of the government programs for livestock improvement are crossbreeding, but no record about the success of this program is reported. The programs were directly implemented in the field, they faced many problems and ended with failures because the specific goal of the program was not clearly fixed. Besides that important factors others than genetic were ignored.

Some improvement in dairy cattle production by grading up has been made but not as it was expected. The development of artificial insemination and use of frozen semen contributed significantly to this improvement.

Learning the failures of the livestock breeding in the past, the future strategies of the breeding plans should considered all factors that support the implementation of the program not only considering the genetic factors. Improvement can only be achieved if the genetic has the opportunity to express fully.

Livestock Breeding and Reproduction
Beef cattle

Genetic improvement through crossbreeding and grading up by importation of Ongole cattle from India during the Dutch occupation had been successful to develop Sumba Ongole cattle, and Ongole Grade cattle. The Ongole cattle were first imported to Sumba island. Sumba island was used as quarantine place. Then from these imported cattle Sumba Ongole was developed early in the nineteenth century. The Ongole grade cattle were the result of grading up the Jawa cattle with Sumba Ongole. The success of the breeding program were made possible by strict breeding program that only Sumba Ongole males may be used in the mating and Jawa cattle males must be castrated. Besides that the availability of feed resources, and water resources contributed to this success. Almost all of the Jawa cattle were crossed and the wide distribution of this crossbred animal was supported by the Sumba contract. The impact was very significant as now the Jawa cattle population could only be found in isolated location or where the people refused the grading up program like Karimun Jawa, and Tengger.

After the independence effort to improve livestock productions by the government was carried out mostly by crossbreeding in the field with the temperate breed, no selection was practiced. The exception is the breeding of Bali cattle, where selection within population was practiced. Thirteen breeds of beef cattle were imported and used in crossing with the local cattle. When the artificial insemination with frozen semen was made possible the government also imported semen. The result of the crossbreeding programs implemented turned out not as it was expected. Among the crossbred the Brahman, Limousine, and Simmental crossbred showed better than the others. The goal of the crossbreeding program about what kind of crossbred animal would be produced was not clear. The program only produced the F1 and the terminal cross that go to the market. Selection was not practiced and how to continue the program after the first cross still not known .The implementation of the program in the different region encountered with the different problems. There

were many problems in the field and the problem was specific to its region, and this must be put into consideration when constructing the program. The breeding program could not only be viewed in the genetic aspect, but should not ignore the other aspects which are important. Implementation of the program needs to consider the ecosystem, the climate, the farmer resources, the social economic and culture, and the infrastructure. Many of the failures were because of the lack of knowledge about characters and attitudes of farmers that differ from one location to other location. The lack of understanding that genetic expression needs the environment that gives the opportunity to express. Lack and scarcity of forages and water resources, lack of health care and disease resistant will hinder the genetic expression.

The breeding of Bali cattle is the only one example that is considered success. Selection was practiced within the population in the Open Nucleus Breeding Scheme at the Bali Cattle Breeding and Improvement Project (P3Bali). The program showed activities of good breeding program consist of genetic analysis, genetic synthesis, and genetic evaluation. All of this was made possible because of the recording system. This is also the first program noted for the genetic conservation of native cattle. The genetic improvement achieved in the first generation was 1.65% for weaning weight, and 2.35% for yearling weight (Pane, 1990). The government showed an intention to make the model of Bali Cattle Breeding and Improvement Project as the national model for native cattle breeding.

In Indonesia 90% of the beef cattle population are kept by the traditional farmers, and this seem continue for one or more decade. The future breeding program should anticipate this condition. Practice of crossbreeding program in the field should be based on sound justification. Many countries have applied crossbreeding in beef cattle, most of them use crossbreeding to produce the F1, and others use to develop a new breed. It seems that the application of crossbreeding is easy and the results in F1 are promising, but actually there are many problems encountered. Crossbreeding might become a threat to the genetic resource of native cattle if it is not under control. Crossbreeding will produce individuals with new characteristics that need different input, management and technology than the local cattle. These problems are not realized by the farmers.

The goal of the crossbreeding program and how to achieve it should be explained clearly. How to implement the program, how to record the data, how to evaluate, and where to go next should be given a careful thought.

The programs should be tested first in the breeding station, then it will be tested in the station location or village breeding center before further application in the field. Although there are no exact data in Indonesia but like in other countries the use of Brahman, Limousine, and Simmental cattle in crossing showed a good result. But there are problems to be thought. The questions about how much proportion of temperate blood will give the best production, and how much proportion of temperate blood will suit the specific environment, should be met. Other problem is the continuous importation either animal or semen of the temperate breeds used in

the program. The development of synthetic breed in the future breeding will give advantage of not depending on importation. A specific synthetic breed should be developed for specific region. At present a bit of information about performance of F1 from crossing with a certain temperate breed could be collected from the field. The synthetic breed could be developed by producing F2 then doing a continuous selection and no more crossing.

The future breeding for native cattle (Bali and Madura cattle) by selection within the population is the best choice in order to improve the production and to conserve the genetic resources. The improvement program should include the government or private breeding center that would be responsible for sire selection and semen production for artificial insemination (AI). The Bali Cattle Breeding and Improvement model with Open Nucleus Breeding Scheme could be considered as the appropriate model for village condition. In this model Village Breeding Center should be established by farmer organization where they practice recording and select the best dams to be used in the Nucleus Breeding Center run by the regional government. Then the best 30 % of the selected bulls based on performance test in the Nucleus Breeding Center will be used in the Village Breeding Center, and the best 5% will enter the AI center for progeny test. Ten percent of dams with low performance at the Village Breeding Center will be culled and the best 10 % will enter the Nucleus Breeding Center.

Not like in dairy cattle where all of the cows are mated by AI, in beef cattle natural mating is common. The use of AI is still limited because of the extensive raising system.

Dairy cattle

There are two kinds of dairy cattle the Friesian Holstein grade cattle and the Friesian Holstein cattle. The Friesian Holstein grade cattle i.e. Grati cattle, and Boyolali cattle was originated during the Dutch occupation by crossing the Jawa cattle or Madura cattle with the imported dairy cattle in the year 1891-1893 which was mostly the Friesian Holstein cattle (Sudono, 1982). In 1900 the first dairy enterprise with pure Friesian Holstein cattle was established in Lembang, where the males cattle were used to grade up the local dairy cattle. In 1939 the government imported Friesian Holstein cattle again to grade up the Grati cattle. Not much genetic improvement was achieved as there was no selection practiced. The development of dairy cattle was very slow.

In 1980 the total dairy cattle population is only 52 thousand , the significant increase begin in 1980 when the Indonesian government start to import thousands of dairy cattle from Australia, New Zealand, European, and some from USA. The population was 300 thousands in 1991. The dairy cattle breeding was practiced by grading up the existed population through artificial insemination using imported semen from elite bull.

Two artificial insemination center in Lembang and Singosari were established, they imported elite bull and produced frozen semen. A step forward was noted

when they start to conduct progeny test of the bull in 1987 (Hardjosubroto, 1994). The Baturraden breeding center was established to produce elite cows and elite bull. Further the possibility of using MOET in dairy cattle was studied and for this purpose the government established the embryo transfer station at Cipelang.

Much effort has been done for genetic improvement of dairy cattle and there must be some imported genetic material in the population. However the milk production is still low. The problem is that the required environment for the genetic of milk production to express is not met, further no selection for milk production was practiced. The problem is that selection needs records of animal performance, but complete and accurate record is not available. The characteristic of traditional dairy farmers with few cattle per farmer and spread in a wide area, and the lack of husbandry knowledge contribute to the difficulty of milk recording. In this situation selection is not possible, unless the dairy farmers make an organization or cooperation and this organization will be responsible for recording as one of its activities. A Dairy Herd Improvement Organization should be established at the National level, Regional level and Rural level.

Selection should be practiced in the dairy enterprise with good record keeping or in the Breeding Center run by the government or private company. This will become the center of genetic improvement, they release the best cows and sires for genetic improvement in the dairy population. Artificial insemination is the only technology that will be used along with the breeding strategy to improve the production. Though there are still many problems like lack of AI service at several locations, and the high service per conception. To increase the reproduction efficiency, pregnancy diagnosis and control of infertility are practiced in several areas. Embryo transfer technology is not yet needed. This technology is expensive and the success in the field is very low. Other new technology in reproduction is still far from the expectation of application.

The first step for future dairy cattle breeding is not the improvement of the genetic per se but how to manage the genetic material that already in the population. This thing has been neglected so far. Production should be recorded. Selection within the population should be practiced based on the production record. Importation of the Friesian Holstein cattle, either animal or frozen semen is justifiable, as this breed already proved their adaptability. The issue about importation of Jersey cattle or other temperate dairy breed should be put aside. Problem of low milk production is not only the responsibility of genetic but also other factors that support the genetic expression. Worried about inbreeding depression but not supported by data is over emphasize and not justifiable. Opinion should be changed by putting more attention on factors that support the genetic expression.

The use of functional traits like Linear Type Traits and Somatic Cell Count (SCC) as an aid to selection can be practiced where the milk production record not available or even when milk record is available (Anonymous, 2002). The direct relation between somatic cell count and milk production has been known, and the increase of somatic cell count would decrease the milk production. The correlation

between somatic cell score and mastitis is 0.65, this indicate that indirect selection using Somatic Cell Score (SCS) could reduce the incidence of mastitis that decrease milk production (Pryce et al. 1998). The development of Biotechnology offers another chance of using DNA marker as an aid to selection. Nevertheless breeding for improving milk production will stick on selection using milk records and the other methods will be used along as an aid to milk selection.

Buffalo

The swamp type buffalo in Indonesia is the native buffalo. The main purpose of raising buffaloes is for worked animal and then for producing meat. In West Sumatra the buffaloes are milked for making a traditional food called dadih not much has been done in buffalo breeding. Selection was not practiced, however crossbreeding with Murrah buffalo in the North part of Central Java was reported. The crossbred grew faster, but no report on reproduction traits. The Indonesian government has ever imported buffaloes from Australia and was distributed in Sumatra to improve buffalo performance but this was failing (Hardjosubroto, 1994). In the future genetic improvement should be done by selection within the population, there is no reason for crossbreeding. The Bali Cattle Breeding and Improvement model can be adopted. Though the genetic of reproduction performance is low, but the only thing than can be done is to improve the management of reproduction as selection to improve it is difficult. No AI is practiced in buffalo breeding. Further a spotted buffalo population called Tedong Bonga at Toraja need attention, as these buffaloes can not be found at other places. This valuable genetic resource should be managed and conserved.

Goat

In Indonesia there are not many goat breeds, the well known is the Kacang goat and the Etawah Grade goat. Kacang goat is the native goat, where the Etawah Grade goat is the result of breed development from crossing the Kacang goat and the Etawah goat imported from India during the Dutch occupation. Besides the two goat breeds there are several local breeds like Gembrong goat, Kosta goat, and Marica goat.

There is no exact program for goat breeding, but population of Kacang goat is decreasing due to unplanned crossbreeding with the Etawah Grade goat. The breeding program for the future should include conservation of genetic resource. This will be achieved by doing selection within the population. The model of Bali Cattle Breeding and Improvement Project is applicable. The crossing of Kacang goat and Etawah Grade goat should be well planned and accompanied by selection to develop a new goat breed for meat production. Right now there is an unintentional crossing between this two goat breeds with varieties of results.

Several breeding stations have been established for Etawah Grade goat where they conduct milk recording, like the one at Singosari, East Java. Selection should be practiced in the Etawah Grade goat breeding with the objective to improve

the dairy quality for milk production and not for meat production. Selection for producing dual purpose goat is difficult in practice. Goats are bred with natural mating, no artificial insemination is practiced.

Sheep

Three sheep breeds are known in Indonesia, the Short Tail sheep, Fat Tail sheep, and the Garut sheep. Most of the sheep population in West Java and Central Java is Short Tail sheep and this is the native sheep. The Fat Tail sheep can be found mostly in East Java and Madura. This breed was developed from the Fat Tail Sheep imported from Persia. The Garut sheep is developed from the crossing between the native sheep with the imported Merino sheep and Cape sheep around the year 1864 (Hardjosubroto, 1994).

After independence the Government imported several goat breeds like Merino, Suffolk, and Dormer, and were distributed to farmers for crossing with local sheep. There was no report about the results.

A sheep breeding station is known at Garahan, East Java, and at Sei Putih, Medan there is a breeding station for small ruminant.

The sheep breeding program conducted by the Research Institute of Animal Production has been successful to develop a prolific sheep with the litter size two or more. This is still facing with the actual situation of higher mortality and low weaning weight of twin birth or triplet than single.

A recording system should be practiced and selection within the existed population of sheep should be practiced. The objective of selection for single or twin birth should be specified for different location. The within population selection using the model of Bali Cattle Breeding and Improvement Project could be applied. Like in goat artificial insemination is not used in sheep breeding.

Conclusion

Crossbreeding in cattle was practiced during the Dutch occupation, and some new breeds were developed that are Sumba Ongole, and Ongole Grade cattle. Since then no development of new breed though there are applications of crossbreeding program with different temperate breeds. Future crossbreeding programs should well plan, be specific to each region. A fixed goal is stated of what kind of new breed to be produced, without ignoring other factors like the ecosystem, the climate, the farmer resources, the social economic and the infrastructure.

The conservation of genetic resources in native cattle breeding is important. A purebred breeding strategy with selection within the population by using the model of Bali Cattle Breeding Improvement Project is proposed.

The use of Friesian Holstein cattle should be the choice in dairy cattle breeding, and the idea of using other dairy breed is not justifiable. The non satisfaction of low milk production observed in the field is not caused solely by the genetic, but it must

be realized that environmental factors play a significant role. These factors become the first priority to be considered in the breeding strategy. Selection without performance record is impossible, so there must be organization that will help in the recording system. Problems and obstacles in the application of AI and management reproduction should be worked out.

Like in cattle breeding, the buffalo, goat and sheep breeding should used the model of Bali Cattle Breeding and Improvement Project as this model seems appropriate for native livestock breeding.

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