
Practical experiences in Milk Recording in Indonesia

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1. Introduction

Indonesia is a tropical country that relies on Friesian Holstein dairy cows for its domestic milk production, and since 1979 intensive development efforts have been made to improve the productivity of animals so as to meet the increasing demand for milk. One of the most important policy measures which was taken, in cooperation with the milk processing industry, was to set up an integrated development programme aimed at guaranteeing the market for milk produced by smallholders. Smallholders are dependent on milk production and in the cooperative system, to obtain a legal permit to operate, the milk processing plants must accept locally produced milk. This policy resulted in a significant contribution to domestic milk production increase; however, it has created a problem by increasing inefficiency in farms and cooperative units (production resulting in low productivity of the dairy herds).

In order to improve the production and the productivity of dairy animals, it was considered important that accurate and continuous records of various productions and of biological factors should be obtained. It is apparent that such accurate and permanent record keeping is still very weak and does not enter into the daily activities of the farmer in comparison with other animal production farms where intensive extension and training means have been supplied..

In facing the free trade commitments that will be implemented in the year 2005, production efficiency and productivity should receive more serious attention in order to allow smallholder dairy farms to compete with milk producers in other countries. Record keeping becomes a priority for the farmers and cooperatives concerned in respect of improving management orientations . The records would serve as a source of information for the decision makers involved in improving production and productivity of the animals of farmers and of cooperatives. More important will be the improvement of breeding stock that will result in increased domestic milk production which, at present, has reached only 3 000 litres in a lactation.

This paper will present the progress of a recording program at farmers and milk plants levels and in the implementation of record keeping at institutional and national levels. Moreover, the progress of the breed improvement programme over the past two decades is reported both to provide a clear picture of the role and functions of record keeping as a source of information in the decision making process and to improve production through breeding in the Indonesian dairy industry.

The establishment of the dairy industry in Indonesia began during the Dutch colonial time (1891) with the importation of Friesian Holstein bulls from The Netherlands and of Shorthorn from Australia to Pasuruan in East Java. Its development started through crossbreeding with local Ongole and Ongole crosses. After the independence of Indonesia, the development of the dairy industry was rather slow. The national policy at that time was to keep dairy cattle and their crosses in Java. Only a few times were large numbers of dairy cattle imported into Indonesia. Once in 1962 Friesian Holstein cattle were imported from Denmark prior to the Asian Games Festival in Jakarta. Thereafter in 1964, to increase the production of milk, around 1 354 dairy cows were imported from The Netherlands as breeding stock. (Sudono, 1983).

Entering the new order, increased milk consumption was observed due to nutrition awareness of the community for milk that could be relatively easy to obtain in conjunction with the development of milk processing plants. However, all the milk which was being used by the dairy industry for processing was imported. The result was that the irregular supply of non-guaranteed quality local milk produced by the farmers under a cooperative scheme could not compete with milk products produced by highly technical processing plants.

Because of the unfavourable condition of the dairy industry and of the problem in facing the increasing dependency upon milk importation, since Pelita III (1979-1983) the Government has made serious commitments to improve milk production within the smallholder farming system as a means for the industry to increase farmers' incomes, employment opportunities in the villages and improve farmers' welfare. The dairy development program is an integrated agro-industrial systems (Soehadji, 1989) it includes a holistic programme comprising:

- Measures to guarantee the marketing of the milk produced by smallholders and large enterprises through the cooperative scheme (GKSI) and milk processing plants (IPS). This was enforced by means of a decree issued by the three competent ministries for milk policy.
- The importation of dairy cows to support the genetic improvement of the dairy herd by means of AI services, training and extension and animal health coverage.
- The assistance to smallholders in the form of credit packages for dairy production through DGLS and village cooperatives units (KUD).

- Maintaining and expanding fresh milk handling capacity by the village cooperative units with respect to potential supply to the existing milk processing industries.
- The strengthening of dairy cooperatives through an institutional approach with a view to developing cost effective and viable production systems over a period of time, and reducing imports of milk powder.
- The setting up of a National Dairy Development Coordinating Team, supported by a Technical Working Group at national policy making level.

The implementation of the above mentioned policies has positively affected the development of the dairy industry. It resulted in 1993 in an increase of 98 000 dairy farmers in 207 village cooperative units (V.C.U.) With a production capacity of 3 88 600 tons , compared to 2 174 dairy farmers in 11 V.C.U. who in 1978 could only produce 3 800 tons of milk.

With the implementation of the Presidential Instruction decree No. 2, 1985, that regulates the importation quota versus the domestic milk production and the absorption of domestic milk supply by processing plants, milk import decreased and domestic milk production increased. The milk ratio of domestic milk production to import which was 1:20 in 1979 came down to 1:2 in 1996. The lowest ratio of 1:0.7 was reported from 1987 till 1989.

Efforts to create and maintain a conducive environment for developing the dairy industry through providing a guaranteed milk market and stable milk price for those dairy farmers members of the cooperative, have induced other problems. Farmers were not motivated to expand their business and did not take into account efficiency aspects and animal productivity (GKSI, 1996). The dairy business is traditionally managed by most farmers; however production efficiency was neglected, including the importance of starting with a proven breeding stock, the implementation of an economically viable feeding system based on meeting the biological requirements of the animals, and the attitude consisting of managing the dairy business as a side business. The lack of professional human resources to cope with various technical problems at village cooperative units further induced the downward trend of production efficiency and to a larger extent, also, it has induced a weak program planning for developing the dairy industry at cooperative level and limited the supply of technical services to farmers i.e. animal health service, feeding management, and the availability of essential inputs.

Entering the free trade era that will be implemented in developing countries in the year 2005, the policy of milk ratio that has been implemented by the Government of Indonesia, to comply with the GATT/WTO commitments, should end and be replaced by a tariff policy. Hence, efficient production and improved productivity, become, among others, two decisive factors in allowing the smallholder dairy production systems to compete with exporting countries, and this should be taken into account (Diwyanto and Setiadi, 1995 and DGLS, 1996). Efficiency and productivity targets would initially be dependent upon a recording system of accurate production

factors, regularly and continuously monitored. This is important information in deciding the management policy at cooperatives and farmers levels and also on the policy to improve the genetic quality of animals in order to achieve development goals.

2. Dairy herd improvement policy

The Java island, which is only 6% of the Indonesian territory but is inhabited by almost half of the human population, is the centre of the dairy agribusiness. The three reasons which make the Java island the major dairy agribusiness centre are: (i) its high altitude areas with a climate that is close to that of the temperate dairy cattle habitat; (ii) the fact that the majority of potential milk consumers, and almost all dairy product processing plants are located in Java (Jakarta, Yogyakarta, Bandung etc.). The principle of the dairy herd improvement policy which is being implemented is based on a dairy herd breeding programme and on the utilization of a nucleus breeding center.

3. Dairy herd breeding program

The objectives of the dairy herd breeding program are to increase the genetic make-up of the local dairy herd towards higher grade Holstein crossbred animals through upgrading. A small part of *Taurindicus* that have Zebu (Sahiwal) and *Bos Taurus* dairy types will be maintained. Grading-up is applied through the importation of Friesien Holstein purebred cows, superior proven bulls, and frozen semen as gene sources. From 1972 till 1992, around 125 000 cows have been imported from New Zealand and Australia (Soehadji, 1993). In addition, millions of frozen semen doses of superior bulls have been imported from England, USA, Middle East and Japan. This was followed by the importation of young bulls and proven bulls. The artificial insemination technique has been widely used to increase the dairy population and the genetic quality of animals utilizing Friesian Holstein frozen semen produced at the AI centers in Lembang and Singosari. However, the local and imported bulls from which the frozen semen was produced, have not gone through progeny testing in Indonesia.

In line with the advancement in animal science and technology, Indonesia has also initiated the utilization of embryo transfer technology to increase good quality dairy cows. The first embryo transfer on dairy cows was carried out in West Java with 205 embryos. The results of this will be assessed when the offspring is in production.

4. Nucleus breeding center

To enhance consolidated genetic improvement rate of the dairy population, over Pelita VI (6th Five Year Development Phase), a breeding strategy has been implemented in a pyramidal selection within the dairy foundation stock. The plan was to involve 5% (16 thousand) of the dairy cows with highest milk production record from a total population of 320 000 heads. Ten percent of the best animals of the foundation stock (1 600 heads) are to be used as breeding stock, and 30% (4 800 heads) as multiplication stock,

whereas 60% (9 600 heads) are considered as commercial breeding stock. The establishment of the nucleus breeding herd is an effort aimed at collecting and utilizing the gene sources of proven dairy cows in the foundation stock, in particular, those in milk production centres. The development of foundation stock was carried out by applying the super-ovulation and embryo transfer techniques (Soehadji, 1995)

Genetic improvement was applied in an “open nucleus breeding scheme” with the establishment of a hierarchy in the population where the genetic quality of the bulls proceeds from the foundation stock to the breeding stock, from the breeding stock to the commercial stock and allow the reverse flow of genetics of proven dairy cows. This has been the focus of attention to produce locally tested dairy cows in order to reduce the dependency on importing dairy cows for replacement stock. The availability of locally proven dairy cows has the advantage of preventing the reduction of performance due to stress factors against climatic and hot, humid tropical environment as generally was experienced with imported dairy animals. From the total dairy population of 320 000 head and on the assumption that 57.9% are cows used for multiplication over a 3-8 years period, it was calculated that around 11.1% or 35 500 cows are needed as replacement stock annually. From this total number of replacement stock, at least 5 to 10 000 animals are expected to be certified proven animals produced through a selection process (Hardjosoebroto *et al.*, 1997).

In order to achieve the selection progress as expected, evaluation should focus on the genetic or the inherent superiority of the selected animal. Therefore, in the process of obtaining local Holstein breeding stock or Indonesian Holstein type to replace the unproductive ones a complete record of each animal is needed.

The following discussion will focus on the recording scheme that has been implemented at small-holder farmer level as well as at the dairy enterprise. The scheme covers the identification of limiting factors and the solutions to overcome the problems, especially those related to genetic improvement for increased production. The recording scheme needed in managing the whole system at farmer and cooperative levels is also discussed.

The dairy records at dairy farms includes identity records, pedigree, production, reproduction, nutrition and health condition of each individual animal, in general, this has not been done by farmers. Recording was only carried out by a few large dairy enterprises with various methods partially dictated by the importance of the records to the enterprise. Record keeping is often implemented for calculating production and income costs to decide what positive actions are needed to increase production efficiency. Most of the farms also use records of animals to decide on the best breeding program. It is unfortunate that guidance and extension service to farmers on the importance of performance records that has been introduced by the

5. Implementation of the recording program

institutions concerned, i.e. village cooperative units, professional organizations and also the universities, gained little success. In an in-depth study carried out over five years by the University Padjadjaran aimed at socializing the recording programme through extension and training of dairy farmers in West Java, indicated that the data could only be analyzed with regard to the production aspect, but was not sufficient for the selection and genetic evaluation purpose (Bandiati *et al.*, 1997). The problem in respect of genetic evaluation of dairy cattle, that is related to limited availability of data, was also observed in a study conducted by the Provincial Livestock Services of West Java in collaboration with the Research Institute for Animal Production, Ciawi-Bogor. The effort was to identify and select breeding cows as replacement stock for the dairy population in West Java. The study could only provide information on milk production based on one sampling of individual cows, without any data on pedigree, lactation period, length of lactation, age/period of production, and other important information to evaluate the dairy cattle. Obviously that the data available is still far from being sufficient to confidently select the genetic quality of cows being evaluated (Diwyanto *et al.*, 1996).

A recording scheme to support the breeding programme of dairy cattle in Indonesia was initiated in 1986/1987 as a joint effort between the Directorate General for Livestock Services and JICA (Japan International Cooperation Agency - ATA. 233) it was actually a progeny testing exercise. The programme was divided into two phases in three villages in West Java and nine villages in East Java. The first phase of the progeny test was implemented with three dairy bulls introduced from Japan and involves 1500 selected cows with an average production capacity of over 3 600 litres per lactation. The second phase was conducted with more cattle involving five bulls introduced from Japan and 3 500 cows.

In the attempt to evaluate milk production, recording was carried out twice a day in the morning and in the late afternoon. To predict the production potential of dairy cows a performance test was carried out using the Most Probable Producing Ability (MPPA) which include : identity of the animal and of the owner, animal pedigree, mating and calf birth, selected information production aspects (including lactation period, total milk production and milk production per lactation), animal growth, nutrition and health (Soehadji, 1989).

It is apparent that at the initial stage the collaboration efforts between Indonesia and JICA could only indicate the productivity and health of the bulls offspring, and no data is available for the contemporary local bulls. Therefore, the progeny tests could only be done on the Japanese bulls, but not to evaluate the superiority of the local dairy bull (Padmadinata, 1994). Further, the government policy to identify the proven bulls to be used for AI purposes could not be implemented either. This is due to the many problems encountered in implementing conventional selection at farmer level, since the identity of the animals was not known and no milk

production, reproduction, nutrition and health records were available. This condition imposes limitations on carrying out performance tests in village breeding centres and progeny testing at breeding and AI centres (Soehadji, 1989).

A progeny test is currently being conducted to evaluate the local dairy bulls and imported proven bulls, aimed at improving the genetic make-up through AI and provide a significant contribution towards increased milk production of local dairy cows. The Research Institute for Animal Production will evaluate, both on the dairy farms and at the BPT-HMT of Baturaden in central Java, the superiority of bulls which have been used for AI from among those which have a sufficient offspring for progeny testing. BPT-HMT Baturaden is a breeding unit under the DGLS that produce breeding stock. With the availability of well organized, regular and continuous records at BPT-HMT Baturaden and at dairy farms, it is hoped that progeny tests could be carried out so as to include various genetic parameters (heritability, repeatability, genetic correlation) of importance for selection. The availability of records at dairy farms would no doubt serve as a basis for further selection.

The development of correction factors is also considered necessary for a better assessment of milk production in relation to the physiological condition of local cattle population. The inadequacies of the correction factors of the Dairy Herd Improvement Association (DHIA), US, that has been developed in the 1960 and used so far as standard factors of milk production variation, has shown that the duration of lactation of dairy cows at the farms were not normally distributed over the 305 days lactation period but rather skewed (Anggraeni, 1995). Standardized milk production records using correction factors that are more suitable for local dairy cattle will in turn increase the accuracy of selection of dairy cows and bulls.

Assessment of the recording scheme being implemented at farmer level under the supervision of extension officers, village cooperative unit, association, researchers, and university personnel; and also at dairy farm enterprises indicate the existence of various limitation i.e. :

- The farmers limited experience and knowledge of the benefit of recording, hence their low awareness and participation in doing recording.
- Most of the dairy farms operate on a small scale.
- Lack of farmers understanding of the dairy herd improvement program.
- The high influence of trading activities on cattle evolution in the provinces.
- Insufficient facilities for data collection and analysis.
- Limited role of the associations in collection of data and in the coordination of recording scheme improvement schemes.
- Unclear organizational structure and responsibility in carrying out the implementation of breed improvement schemes.
- Limited number of recording personnel.
- No incentive for the farmers who implement milk recording.

6. Problems in the implementation of recording scheme

**7.
Development
of future
recording
systems**

The evaluation and identification of the various supporting factors and limitation of recording systems would apparently provide invaluable inputs to be considered in establishing the future of record keeping that involve the various parties and organizations concerned. The implementation of an informative and effective management structure involving all parties concerned in a national network is expected to result in a better and well planned operational recording scheme with the objective to support the goals and aims of a national breeding programme geared to increase the number and genetic quality of Indonesian dairy cows.

In order for them to play an active role in record keeping and as actors of the production process the dairy farmers require intensive guidance, extension service, a flow of information and training to keep the records and increase the awareness of the advantage of recording activities. Better attention being given by the government, by the association (PPSKI/AHI) and the cooperatives in various respects will further motivate the farmers to maintain records of their animals. This can be done through :

- providing an incentive to the farmers that are already keeping records;
- translating into economic merits the genetic improvement results of keeping good selected breeding stock, such as the increased income from additional sale of milk if farmers raise proven cows; and
- applying an attractive guaranteed price for the milk produced by good breeding cows, etc.

Recording personnel need to be prepared in sufficient number, with good knowledge and experience in doing the job. Establishing a bridge between farmers and the record organization to guarantee the accuracy and completeness of the data will be of advantage. It appears also that the coverage area should be optimal so as to enable the recording people to carry out their duties and responsibility. An attractive incentive might be paid to the recording personnel from the self-supporting fund of the cooperative, that does no burden to the farmers, to increase product processing by the cooperative.

Providing adequate facilities will stimulate the collection of comprehensive information on biological and technical aspects. This will enable ascertaining that all the essential data needed are being collected, including both biological data of the animals at farm level and technico-operational data at national level. The various facilities needed include a high-speed computer with a program to store and formulate available data on management and also breeding aspects. Various examples of available computer programs include the Dairy Champ program package, US-Holstein, LKV, Super Kuhe and others that could be implemented by the consultants or the managers toget advice towards optimal production efficiency (Bandiati *et al.*, 1997). Another problems with regard to the identification of individual animals at farm level with the high mutation rate of animals due to active market opportunities, could be minimized by using the International Identification

Program (IIP). With this package program, complete data input of each animal identity could be entered, for easy finding of the animal location, ownership, and movement to other locations.

For a uniform data entry by the recorders, that will ease the transfer of information results of laboratory analysis and interpretation of results, a guidebook needs to be prepared. Uniform data entry should not be worked out at regional level but well at the national level.

The organizations and government agencies which have the privilege of being part of the improvement process of the existing dairy herd but who are still facing limitations in carrying out their jobs or functions, should strengthen their role. Some of the organizations and agencies which are expected to have, in connection with animal recording, a significant contribution to genetic improvement are mentioned hereafter and their role is summarily described.

KBTN (Komisi Bibit Ternak Nasional – The National Livestock Breed Commission) using data as complete and accurate as possible, the organization makes recommendations as regards the certification of the breeds that have to pass a genetic quality test.

PIDT (Pusat Informasi Data Ternak – National Livestock Information Centre) could strengthen its role in the fields of data collection and analysis utilisation of information for decision making purposes, in providing information to those in need, as well as of brochures, guidelines and genetic information.

PIDTD (Pusat Informasi Data Ternak Daerah – Regional livestock Information Center) carries out various activities in relation to data collection at regional level which include : inventory, identification and registration of male and female animals, recording the production of cows, of their offspring and the selection steps ; data analysis providing information on the result of analysis/recording and recommends better feeding practices and management.

The establishment of a network of breeding expertise (universities, research institutes, a private companies and professionals) involved as collaborators of the government in organizing improved breeding. This organization would give neutral advice in its field of competence. For instance, by providing advice to the government on positive and negative impacts of the policies being enforced in the livestock breed improvement program. The Indonesian Holstein Association (AHI) that is under the PPSKI (Persatuan Peternak Sapi dan Kerbau Indonesia – The Indonesian Cattle and Buffalo Farmers Association), as dairy breeding organization in Indonesia, is expected to take a more active part in carrying out its function.

The dairy breeding program could be fully operational in respect of selection and mating of dairy animals, if all organizations/ government and non-government agencies that are competent collaborate and, in line with their special function, implement essential recording means including statistical data, population structure, dynamics, dairy herd technical coefficient apart from techno-operational data at farmer level, cooperative and national organizations.

8. Final remarks

In Indonesia dairy cattle recording is not properly implemented, because farmers and other parties concerned still do not realize its importance. Efforts to set up a recording scheme that is consistent and accurate could only be implemented under sustainable projects. Large scale farmers are applying recording systems that could be considered well organize; however, available data is not used in the best possible way. In contrast, small scale farmers that are more numerous, practically do not keep any records of their animals for better management nor for genetic improvement.

The rapid random mutation and replacement of animals are not based on their breeding value. The sale of animals does not take into account the whole situation, hence, animals for replacement do not carry any pedigree information and their origin is also unknown.

The GKSI (Gabungan Koperasi Susu Indonesia - Indonesian Milk Cooperative Alliance) and the Indonesian Holstein Association (IHA) makes continuous efforts to implement a recording scheme in Indonesia. Farmers are expected to participate actively in the scheme by collecting and providing data for subsequent analysis by the associations. The data is intended to be utilized to improve the genetic quality of dairy herds. The Livestock Service officers could in fact play a significant role motivator and, in particular, by supplying essential farm inputs.

In carrying out recording of dairy cattle that includes a production factors and biological aspects, the priority need is towards better and focused and/or rehabilitation and organization of a recording scheme. This is considered important, in order for the organization to fully operate in providing good and accurate information to improve the production efficiency and genetic make-up towards increasing dairy production through breeding. Many limitations exist which include the lack of human resources in the field of recording, limited budget, insufficient facilities, and the still inactive role of organizations/ government institutions that have the authority to carry out recording.

In planning a recording program for successful implementation in the future, there is a need to cover the limitations that exist at each organization, implementing unit or institution level through an informative and effective

communication network between the recording parties from at farmers level, as major source of data, to the level of the organizations/institutions concerned at national scale.

Entering the globalization era, information flow between countries has no border, and the establishment of a network across countries in the world would speed up breed improvement efforts, in particular, for those that are relatively new in the implementation of dairy cattle technology. Indonesia as a tropical country that started to actively adopt the importation of dairy Holstein cattle over the last two decades, supports the convening of an international meeting like this one in order to learn from experience and through the exchange of information on many positive results and on limitations in developing dairy production in respective countries, especially through recording systems or programmes. Countries that adopt current available technology, in general the developing countries, could learn and assess the various challenges and at the same token, opportunities that could be advantageous to enhance dairy industry development. In contrast, the countries of origin of the technology in question that are already developed are expected to provide the solutions to overcome the problems faced by the countries that adopt advanced technology.

The outcome of this workshop is expected to provide useful inputs and suggestions/recommendations to improve the recording program in each participating country. The results could be further implemented in a realistic form such as by establishing a worldwide network between countries for the development and management of dairy cattle and other livestock species.

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