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## **Village breeding programme for local breeds of duck in Indonesia**

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Duck farming, mainly for egg production, has been part of rural life in many regions of the Indonesian Archipelago, as a component of an integrated traditional farming system. It provides significant additional income to the farmer household, especially during the dry season when the food crop farming activities are low. In the past, duck farming was generally considered only as a side activity, but in recent years it has played a more important role in the overall farming system as the major source of income to the farmers' family, in many rural areas. However, the farming practices are still mostly traditional and extensive, based on a herding or scavenging system except in a few cases.

The definition of duck breed/strain in Indonesia is basically based on geographical locations. As a result of geographical isolation for centuries and preference for various traits in different areas, some breed/strain differentiation may have taken place. Duck population often assumes local names and distinguishing characteristics may or may not reflect genetic differences in production traits. Hetzel (1986) has reviewed various Indonesian breeds/strains of ducks. The Muscovy breed is distributed throughout Indonesia and is primarily used as a natural incubator. The Alabio breed is native to South Kalimantan and is phenotypically different from other breeds and very uniform in appearance. In Java, there are two major breeds with large distribution, Tegal and Mojosari breeds, however, are very similar in appearances except for the colour tone of their feathers, Mojosari being darker brown than Tegal ducks. An analysis of protein polymorphisms was conducted on selected duck populations in Indonesia and Japan (Tanabe *et. al.*, 1984), as cited by Hetzel (1986), and the results showed that the Indonesian local ducks have medium distance from one another.

In his paper, Hetzel (1986) stated that in Asia, particularly in Indonesia, duck occupies a unique ecological niche in that it is traditionally closely integrated with other forms of plant and animal production. There is, therefore, a need for caution when so called improvement programmes are undertaken since the implications of any change in the production

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### **Introduction**

system may be far reaching. However, the pressure is on to improve the efficiency of duck production where possible. There are two alternatives available for the genetic improvement programme, under closed and intensive management or under open and traditional extensive systems. Although the intensive management system has started to gain popularity in recent years, the majority of the duck population is still under extensive system and the so-called "Village Breeding Programme" should be conducted in this environment.

Following the definition by Solkner, Nakimbugwe and Valle Zaratté (1998), village breeding programmes are carried out by communities of smallholder farmers (villagers), often at subsistence level. The availability of feed for the animals is far from optimal with large seasonal variations and variations between years. The pressures from diseases may be high. The level of organization is low, hierarchical structures with good flow of information between levels of hierarchy can not always be assumed to work. Data recording in the sense used by animal breeders in the developed countries will often be missing. We shall see that the situation with our programme of duck breeding in Indonesia does not quite fit the above description, the organizational structure is very clear and this helps significantly in data recording.

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## **Duck production system in Indonesia**

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The duck population in Indonesia has steadily increased over the years, with a current population of more than 30 million. Generally, there are three basic types of production systems. The herding system was, in the past, the most commonly used practice in which ducks were herded from one place to another following the period of rice harvest in the area. However, this system is gradually disappearing, particularly in Java, due to the intensification programme of rice cultivation which does not give a chance for the ducks to be herded into the rice fields. The scavenging system represents the majority of the production system in rural areas. In this semi-intensive system, the ducks are kept roaming freely around the house or village to feed themselves during the day and then return home in the evening and receive additional feed in confinement. The fully confined system is the third type of production system being practised more and more by larger farmers. In this intensive system, feed is fully provided by the owner from the locally available feed ingredients.

In order to accelerate the development of the duck industry in Indonesia, the Government has promoted a production scheme in which duck farmers are encouraged to form a cooperative group or to develop a partnership with a large company serving as the nucleus farm in a Nucleus-Plasma Scheme. Under this scheme, the cooperative unit or the nucleus company provides all the production inputs and collects all the products for marketing, while the farmer members serve as the production units in coordination of the group. Within this production system, all farming

practices by farmer members can be accommodated, the efficiency of production can be increased from being a larger operation and production risks are distributed among all members. The major implication of the implementation of this scheme is the large opportunity for the development of a breeding flock following a proper breeding programme especially designed for the group and other farmers as well. Under this partnership system, a village breeding programme should have greater success for the benefit of small farmers who are allowed to continue to participate in the development of the industry.

Before the programme was commenced, there was virtually no genetic improvement programme for local breeds of duck in Indonesia. The production of ducklings was and is still being handled by hatchery units in villages which rely mainly on collecting the hatching eggs from farmers in the area. Therefore, it is very difficult to implement any breeding programme aiming at genetic improvement. However, the demand for better quality final stocks in enough quantity is always increasing, due to the popularity of duck farming and duck products as an alternative to improved breeds of chicken which are imported from other countries and getting more and more expensive. In response to this situation, the coordination of the production system under group management or the Nucleus-Plasma Scheme were enthusiastically accepted by many duck farmers.

## Breeding programme

Among the three major local breeds, Alabio, Tegal and Mojosari ducks, the programme is using Tegal breed as the most popular breed and with the largest population (about 8 million) in Java. At the experimental station, the production level of this breed is on average about 65 percent egg production within a one-year period, i.e. 235 eggs annually. This level is actually quite satisfactory in terms of economical feasibility for a small to medium size farm. However, the main problem in the productivity of this breed and of other local breeds as well, is a rather low consistency of egg production. The local breeds of Indonesian ducks still retain their "moult" characteristics, during which they shed part of their feathers and stop laying eggs. This moult behaviour may happen after nine to 12 months of production but it may also happen much earlier, four to five months of production which is during their production peaks.

The breeding goal was to improve the consistency of production, at 60-65 percent egg production and between 4 to 4.5 Feed Conversion Ratio. The selection criteria are 65 percent or more of three-month egg production and without moult before nine months production and the ducks are fed 165 g/head/day of dry feed. In setting the breeding goal there was no economic values assigned to these objectives, and the selection was based on independent culling levels. Five hundred female ducks were kept in individual cages and mating was conducted through artificial insemination. This programme is being implemented in the nucleus farm.

The results of selection from each generation are distributed to the plasma farmers directly in the form of day-old-ducks and each farmer receives between 200 to 400 female ducklings to be raised as layers or 400 male ducklings to be raised and sold at four-months old as meat. These stocks are provided to farmers as final stocks while the breeding programme continues to improve the parent stocks

The foundation stock had an average of 67.3 three-month egg production and the selected group had an average of 81.3 eggs with a selection differential of about 14 eggs. The selection intensity was 30 percent and the selected parents were mated to produce 500 offspring for the next selection. The egg production of the first generation still continues to be recorded. It would have been more desirable if the selection differential were larger in order to expect a larger response to selection. Also, the variability is very large and this is mainly due to the small flock size. For a village breeding programme in which many environmental factors are not fully under control, the initial population should have been larger.

Initially, the programme was supported financially by the Government through the Research Institute for Animal Production. The plan and design were set up together between research scientists and the staff of the nucleus farm. Meanwhile, the development of the Nucleus-Plasma Scheme is supported and supervised by the Indonesia Agribusiness Foundation which is a semi-Government organization, as a pilot project in the development of duck farming as a business activity.

Despite the difficulties and problems in the breeding programme aimed at genetic improvement, the production process keeps running from the production of day-old-ducks by its own hatchery unit, raising growers and distributing layers to plasma farmers. The number of plasma farmers is still small and keeps building up. When the number is large enough and the activity covers a larger area the breeding programme will not only be conducted in the nucleus farm but also involve plasma farmers in an open-nucleus breeding system. This way, the dissemination of breeding results will be faster and the nucleus farm will be released from some of its weight in carrying out the breeding programme.

The combination between a Nucleus-Plasma Scheme in the production system and the open-nucleus breeding scheme is the most significant feature of this programme. It promises success in carrying out genetic improvement to local breeds underlying village conditions, in which farmers are directly involved at the low to medium input levels.

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## **Future directions**

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Research results showed that heterosis by environment interaction exists in some domestic animals (Sheridan, 1981). This phenomenon should be utilised in a breeding programme in a sub-optimal environment such as in Indonesia, because a stressful environment may increase the degree of

heterosis in a cross-breeding programme (Prasetyo and Eisen, 1989). The utilisation of heterosis by environment interaction in a breeding programme involving two or more genotypes may be used as a tool in genetic improvement as well as in conservation of genetic resources particularly for those involved in the programme (Prasetyo, 1996). This concept is very appropriate to be applied in the village breeding programme such as for the local ducks in Indonesia, in which the production system is under sub-optimal environment. The combination of within breed selection and cross-breeding between breeds/strains in producing final stocks will be developed in the future.

In terms of within breed selection, the breeding population size will be increased in order to increase the selection intensity and thus we can expect a larger selection response. This can only be achieved when the size of the group is getting larger and the production capacity has increased. Funding from national or international donor agencies would be greatly appreciated in order to guarantee the success of the programme.

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