

Country Report: Mozambique

A.P. Mavale¹

IN MOZAMBIQUE, priority has been given to ruminant production based on availability of pastoral resources. However, village poultry production is an important component of rural development. Poultry constitute almost the only source of animal protein and an important source of income for the majority of rural families.

The potential for village poultry production in Mozambique is enormous. According to the 1997 census, the human population of Mozambique is around 16 million. The majority of these people (71%) live in rural areas and have a tradition of poultry keeping, especially chickens and to some extent ducks. On average, each family is composed of 5 members. In 1970, it was estimated that there were 1.4 rural chickens per head of population (Macamo pers. comm.). Estimates have shown that in 1995 rural chickens were kept in small flocks ranging between 5 and 10 chickens with an average size of 7 per household (Wethli 1995; A. Mattick pers. comm.). Taking these figures into account, the number of village chickens can be estimated at about 16 million.

In spite of all these facts, village poultry are still a neglected resource and there are numerous constraints to their development. These include poor management, scarcity of feed, lack of housing, predation and diseases. Newcastle disease (ND) is considered to be the most important constraint, causing heavy losses every year in village flocks throughout the country.

Village Poultry Production Systems

Village poultry production is a subsistence system in which the majority of chickens in the country are kept. It is generally practised by people living in rural areas.

The main chicken (*Gallus domesticus*) breeds used are of indigenous type and are generally multi-coloured and of small size. The average body weight of a hen is about 1 kg and of a cock about 2 kg. These breeds are believed to be more resistant to the harsh environmental conditions and prevalent diseases (Wethli 1985) than those used in intensive systems. Flocks contain birds of different ages with a predominance of females. Males are frequently sold or consumed before adult age and thus there are usually only 1 to 2 adult males per family flock. These local breeds are also preferred by the rural and urban population due to their taste though they are slightly tougher than commercial chickens.

Village chickens obtain food predominantly by scavenging in the surrounding environment. Their food consists of worms, insects and greenery that are abundant during the rainy season and scarce during the dry season. Apart from scavenging, they sometimes receive scraps of human food and crop wastes.

Housing is not always provided (Wethli 1985). When it does exist, it is constructed of local material and is intended to prevent predation during the night. In some families, chickens are accommodated in the owner's house, particularly during the brooding period. Where there is no provision of housing, chickens roost in trees and they make their nests in the bush, which increases the possibility of losses due to predation.

Most hens lay and hatch eggs during the rainy season and very few chicks are seen during the dry season. This may be linked to the availability of feed, which may influence fertility, and the incidence of disease. Hens lay two to three clutches of about 8 to 12 eggs each per year. Fertility and hatchability are satisfactory but each hen may raise only 2 to 4 chicks to maturity. Hens generally start laying eggs at about 6–8 months of age (Wethli 1995; A. Mattick pers. comm.).

The overall standard of husbandry is usually poor and is almost exclusively carried out by women and children as men are either frequently away from home or this activity is not considered to be their

¹ National Directorate of Livestock, Ministry of Agriculture and Rural Development, PO Box 1406, Maputo, Mozambique

duty. Since crop production activities and housework occupy most of the women's time, there is very little time available for poultry management. Children also spend most of their time either at school or looking after other animals such as cattle, goats and pigs. This is an important constraint that should always be taken into account when planning any intervention at this level (Mavale 1995).

Apart from chickens, ducks are also commonly kept in extensive systems and are more resistant to many poultry diseases than chickens. However, possibly due to some traditional beliefs or cultural factors, duck meat is not much appreciated. The scarcity of water in some regions of the country also makes many areas unsuitable for duck rearing. Other species such as geese, pigeons and turkeys are seldom seen in rural areas.

Rural poultry are kept for economic and social reasons. Chickens play an important role, as not only a major part of the rural population diet, but also because they provide a source of cash income or they are used for in-kind exchange. Chickens are also used for celebrations held in a village or elsewhere in the country.

Constraints to the Production of Village Chickens

There are a considerable number of constraints to village poultry production in Mozambique. Among these are nutritional deficiencies, predation, climatic extremes, poor management and diseases.

Feed resources

Generally, rural poultry farmers are poor and they cannot afford to purchase commercial feeds for their birds. They normally produce subsistence crops that in some cases are not even sufficient for their own needs. For these reasons, apart from occasional household refuse and crop by-products, no other feed is provided to the poultry. Thus, almost all the feed for these birds comes from the local environment (A. Mattick pers. comm.). The amount of feed that the environment and the farmers can provide is one of the most important determinants of the maximum size of flocks and their productivity (James 1991).

The feed supply is relatively stable when the environment is able to provide an abundance of food and water during the rainy season. However, this situation deteriorates with the advent of the dry season. During this period, neither scavenged food nor household refuse and crop by-products are sufficient to maintain a satisfactory level of productivity. The birds generally become debilitated and are therefore predisposed to other factors such as

diseases and predation. As a result, higher mortality is generally observed during these dry periods (Mavale 1995).

Predation

Predators are another serious constraint for rural poultry (A. Mattick pers. comm.). Predators can be classified into two main groups. One group consists of birds of prey, which tend to take young chickens. The other group is mammals such as cats, dogs and wild animals that attack both adult and young birds.

Housing

The general lack of housing for rural poultry is an important factor that favours losses of birds through predation. During the laying and incubation period in the bush, hens are more likely to be caught by wild animals. The lack of shelter for chicks during the first weeks of life also accounts for considerable losses, for they are easily caught by predators.

Other management factors

The lack of a housing system has meant that at times of climatic extremes such as heavy rains, cyclones and low temperatures, many birds, especially the younger ones, are often lost. One reason why most of the rural farmers do not provide shelter for their birds to roost in is the fear of theft. Generally, there is lack of provision of nests, protection for young chicks, early removal of chicks from the hens and culling of old and unproductive birds. The market can also sometimes act as a limiting factor because some villages are so remote that it is difficult for farmers to market their chickens and eggs.

Poultry diseases

The most frequently diagnosed or reported poultry diseases in Mozambique are infectious bursal disease (Gumboro disease), avian salmonellosis and pasteurellosis, parasitosis and Newcastle disease (ND) (National Directorate of Livestock 1998).

ND is endemic in the country, occurring every year mainly in the rural poultry sector. The number of reported outbreaks in rural poultry does not reflect the true extent of the disease. The real number is believed to be far greater than that reported (National Directorate of Livestock 1998). ND is considered the most devastating disease for village poultry (Fringe and Dias 1991). The ravages of ND, which occurs regularly once or twice a year, are by far the greatest constraint to the development of rural poultry in Mozambique (Wethli 1995).

Control of Poultry Diseases

In Mozambique, the control of ND is essentially based on zoo-sanitary measures and vaccination. Hygienic measures are practicable only in intensively managed chickens, while vaccination is provided for the control of ND in both commercial and rural chickens. Apart from vaccination carried out in the areas surrounding urban zones and commercial poultry units, little has been done to reduce the impact of this disease in village chickens. The selection of indigenous chickens for resistance to ND has also been advocated as one of the possibilities for the control of this disease that needs to be studied further.

In recent years, there have been developments toward controlling ND in village chickens. Experimental vaccinations have been carried out using heat-resistant vaccines such as ITA-NEW, NDV4-HR and I-2, with promising results.

Vaccination programs

Vaccination of large numbers of village chickens using heat-resistant vaccines is a new experience in Mozambique. Until the present, vaccination campaigns of village chickens have been carried out once a year and are generally free of charge. However, a requirement for payment is being introduced gradually. Table 1 shows numbers of village chickens vaccinated in the past five years.

The percentage coverage is smaller than that shown in Table 1 as the real number of chickens is believed to be far greater than that shown.

The majority of village chickens are not vaccinated, and a number of factors prevent the implementation of vaccination programs in this important sector of the national flock.

Until recently, vaccines used in Mozambique required an effective cold chain and cold storage facilities because these vaccines were thermolabile. For village vaccination campaigns, there is a severe shortage of refrigeration equipment. Cold storage is not guaranteed even at the provincial level, as there are frequent power supply failures.

In village chickens, the large number of doses per commercial vial leads to wastage of large quantities

of vaccine. The large number of doses per vial was primarily conceived for commercial units with several thousand birds in each unit. The vaccinator can manage to catch only a few village chickens a day for individual application of vaccine. The remaining doses cannot be used on the following day, for these vaccines rapidly lose their viability after reconstitution. The existence of several age groups in village flocks makes this even more difficult and costly, as the vaccinator has to use more than one type of commercial vaccine in the same flock.

A significant number of village chickens have no housing and therefore roost in the trees. Even those housed at least during the night, are released early in the morning before any vaccination team can arrive. In this situation, it is extremely difficult to catch chickens for vaccination. Moreover, there is also a need to take into account the timetable of the farmers, as their first priority is usually crop production.

Village chicken vaccination programs using conventional vaccines require the involvement of highly trained people, efficient transport facilities, and many other resources that are scarce and very costly. Most rural areas are not easily accessible due to lack of efficient communication infrastructure. This can make vaccination programs impracticable as they take up large amounts of already limited financial resources.

Epidemiology of Newcastle Disease

A number of factors may favour the maintenance of the ND virus (NDV) in village chickens. Chickens, other species of poultry, wild birds, non-avian species, man, environmental reservoirs and the characteristics of NDV, play a considerable role in the persistence of ND in village poultry.

Village chickens act as reservoirs of NDV in different ways (Bell and Mouloudi 1998). Birds that have recovered from the disease may shed the virus for a period after recovery (Awan et al. 1994). Latently infected chickens may also act as reservoirs of infection. This situation is more likely to occur

Table 1. Numbers and percentage coverage of vaccinations of chickens in Mozambique, 1995–1999.

	1995	1996	1997	1998	1999
No. of chickens	2 569 103	1 244 386	1 899 314	2 161 728	N/A
No. vaccinated	1 486 971	733 390	691 651	1 570 873	2 353 992
Coverage (%)	57.9%	58.9%	36.4%	72.7%	—

when chickens are infected by mesogenic or avirulent strains of the virus or when chickens are partially immune. In vaccinated flocks, mild or hidden infection with virulent strains of the virus may develop and these birds may then become a source of NDV to fully susceptible birds. Clinically diseased birds may constitute one of the most important sources of infection.

Mozambican rural poultry flocks usually consist of a number of species, including ducks as well as chickens. The resistance of ducks to ND is widely recognised. They can be infected with virulent strains of NDV without showing clinical signs although sometimes they may develop clinical disease. Thus, ducks can become a source of infection and contribute to maintaining and transmitting the virus to susceptible chickens in the village. Due to their small number and distribution in the country, other species of poultry are of limited importance in the epidemiology of ND in a typical rural flock. However, the role of these birds as reservoirs of NDV needs to be determined.

Mozambique has a wide range of species of wild birds that are normally in contact with village poultry. Some of these wild birds may be more important as a source of NDV infection for domestic birds than others, due to their varying susceptibility to ND and to the difference in the frequency of contact with domestic birds.

Another source of NDV infection for village poultry can be wild and domestic mammals such as dogs, cats, jackals and rodents. Some of these animals are usually in close contact with village domestic birds.

Transmission of Newcastle disease virus

The most common route of transmission in village chickens is probably the oral route through the ingestion of contaminated feeds, water and faeces from infected animals. Village chickens normally eat anything they find in the environment, including viscera from other animals (Mavale 1995).

Since the birds are allowed to roam over a wide area, the probability of transmission of NDV by respiratory route is minimal. However, where shelter is provided for roosting, this route of transmission becomes important as birds in a limited space can release an infectious aerosol that may be inhaled by other birds in the shelter. Therefore, this route of transmission is clearly important in intensively managed birds.

The spread of NDV both within and between village flocks is slower than that found in intensive or semi-intensive systems, and the disease can take weeks to pass through the flock and months to pass

through the village (Awan et al. 1994). It appears that factors such as the low density of poultry and the consequent low contact rate as well as the immune status of rural poultry may play an important role in this slow spread of the disease in the village environment.

Another important reason for the movement of live birds is due to marketing. During the dry season, food is generally scarce for rural families. To deal with this situation as well as for other household needs, chickens are sometimes sold at distant markets. These chickens may already be infected with NDV and therefore can act as a vehicle for the disease to spread to distant susceptible flocks. The dry season is also the period in which most outbreaks of ND occur in Mozambique. When an outbreak occurs, chickens may be sold in a desperate attempt to minimise losses due to high mortality. Some of these chickens may have already been infected with NDV and thus the spread of the virus in this way is possible.

Outbreaks of Newcastle disease in rural poultry

There are many factors that influence outbreaks of ND in rural poultry. These include host characteristics, the presence of other infections and environmental factors.

The characteristics of the host may include the age structure of the flock, the immune status and nutritional status of the birds and breed susceptibility.

The Mozambican village flock usually comprises chickens of different ages whose proportion usually varies during the year. The recurrent changes in numbers of young chickens may influence the occurrence of epidemics of ND.

Immune status of flocks

The immunity of flocks can influence the occurrence and course of ND. Protection can be achieved either by exposure to natural infection with different strains of NDV that are present in the environment, application of vaccines or by passively acquired maternal antibodies.

Nutritional status of flocks

Food found through scavenging is generally scarce and of poor quality, particularly during the dry seasons. In this situation, chickens are generally weak, sometimes with metabolic disorders that may result in the reduction of their immune response to vaccines or natural infections with milder strains of NDV and increased susceptibility to more virulent viruses.

Seasonality of Newcastle disease

In Mozambique, outbreaks of ND occur throughout the year, but the peak incidence and severity tend to be at certain periods of the year. According to the National Directorate for Livestock (1980) and Fringe and Dias (1991), most outbreaks of the disease occur from January to March and from July to September. However, Wethli (1995) states that the incidence of this disease peaked twice a year during April to May and from September to October, while it has been reported that in the southern province of Inhambane, ND was generally more serious in the wet season between November and March (A. Mattick pers. comm.). There is therefore a need for further studies as this can influence control programs against this disease. There is some evidence suggesting that ND outbreaks might not occur simultaneously in the different regions of the country. Some factors that contribute to the seasonal occurrence of ND epidemics in rural poultry may be the seasonal changes in age composition of village flocks, scarcity of feed at certain periods of the year, climatic stress, incidence of other infections and village chicken market activity.

Diagnosis and Reporting of Newcastle Disease

Diagnosis is carried out in the field and at the laboratory for confirmation. There is some capacity in the country to carry out clinical diagnosis in the field, but many outbreaks of ND in remote areas are undiagnosed. Sometimes the lack of action from veterinary services discourages village chicken producers from reporting ND outbreaks. Even those outbreaks that reach veterinary services are not all confirmed at the laboratory for various reasons.

Reporting on ND outbreaks in intensively managed chickens is frequent, as most of these units are located in suburban areas. But many outbreaks of ND that occur in rural areas are not reported.

Role of Extension Services in Village Chicken Production

Successful ND control and improvement in village poultry husbandry would not be possible without adequate education and involvement of rural farmers (Fringe and Dias 1991; V. Macamo, pers. comm.). Extension services are involved in educating rural farmers in matters related to improving village chicken production such as nutrition, housing and disease prevention and control. Extension workers are particularly involved in all phases of campaigns for vaccinating village chickens against ND.

Resources Available to Village Chicken Producers

Livestock services and extension services that assist village chicken producers operate at the central, provincial and district levels. Their personnel work together, as the personnel from livestock services are technically capable and those from extension services are knowledgeable on methodology of agrarian extension.

In livestock production, there are two parallel extension services. These extension services are now in the process of unification and will therefore improve extension efficacy and coverage:

- Pure livestock extension, under livestock services, that gives priority to ruminant production, covering only those poultry farmers that also own ruminants. These farmers represent only a small proportion of rural poultry producers.
- Extension services that cover all poultry producers, including those who do not own other livestock species in areas where they operate. However, these services do not cover all districts of the country.

Marketing Opportunities for Village Poultry Production

The marketing of chickens from this system is more active during the dry season. This may be due to the relatively larger flocks at this time of the year and also an attempt by the farmers to avoid the high mortality that occurs towards the end of the dry season. The other reason for the seasonal trend of sales is that there is a need for cash at this time in order to purchase food as the availability of crop products declines.

Village producers market their poultry locally, mainly by barter, by sale at the main roads or by taking them long distances to urban zones. Rural chickens are highly appreciated by both rural and urban populations.

Research and Development Priorities

The health of village poultry is now a priority in Mozambique because their production involves the majority of the Mozambican population, provides an important source of animal protein and contributes to improving food security of rural people.

Strategies for village poultry development include the reduction of poultry mortality through improving effectiveness of vaccination against the main poultry diseases, and improving standards of rural poultry husbandry. Development priorities are to reduce the ravages of ND through vaccination of village

chickens and improving their productivity through better nutrition, housing and general management.

According to these development strategies and priorities, there are numerous areas for research into the village chicken production system, but priority should be given to the following:

- The accurate establishment of the period of the highest incidence of ND in the different regions of the country would help in planning the timing of vaccination campaigns. Research in this area should be given priority. Another useful study would be directed to a better understanding of the factors that are involved in the seasonal occurrence of this disease in the country.
- Heat-resistant vaccines seem to be appropriate for use in village chickens in Mozambique, and these vaccines have been developed. Some research into the most effective ways of delivery of these vaccines has been done with promising results. However, methods of delivery that could be easier and more economical should be sought.
- Scavenged feeds and household refuse are not sufficient to maintain a satisfactory nutritional level in poultry, particularly during the dry season. To address this situation, the availability of alternative feeds for these birds in the village environment should be investigated.
- The productive potential of indigenous chickens under an improved nutritional regime and disease free situation is unknown. Therefore, it would be of value to carry out studies to establish this productive potential of local breeds, as they are also believed to be more resistant to diseases than improved breeds.

References

- Awan, M.A., Otte, M.J. and James, A.D. 1994. The epidemiology of Newcastle disease in rural poultry: a review. *Avian Pathology*, 23: 405–423.
- Bell, J.G. and Mouloudi, S. 1988. A reservoir of virulent Newcastle disease virus in village flocks. *Preventive Veterinary Medicine*, 6: 37–42.
- Fringe, R. and Dias, P.T. 1991. Newcastle disease in Mozambique. In: Rweyemamu, M.M., Palya, V., Win, T. and Sylla, D. ed. *Newcastle Disease Vaccines for Rural Africa*. Proceedings of a Workshop held at Pan African Veterinary Vaccine Centre (PANVAC), Debre Zeit, Addis Ababa, Ethiopia, 22–26 April 1991, 73–74.
- James, A.D. 1991. A framework for the economic evaluation of vaccinating village poultry in Africa and Asia against Newcastle disease. In: Demey, F. and Pandey, V.S. ed. *Newcastle Disease Vaccination in Village Poultry in Africa and Asia*. Proceedings of the seminar held in the Institute of Tropical Medicine, Belgium, 13–14 February 1991, 30–36.
- Mavale, A.P. 1995. Epidemiology and control of Newcastle disease in rural poultry in Mozambique. M.Sc. thesis, Veterinary Epidemiology and Economics Research Unit (VEERU), University of Reading, Reading, England.
- National Directorate for Livestock 1980. Programa de luta contra a doenca de Newcastle. Maputo, Mozambique.
- National Directorate of Livestock 1998. Relatório Anual. Maputo, Mozambique.
- Wethli, E. 1985. Poultry production potential in the family sector in Mozambique. Proceedings of the Seminar on Animal Production held in Maputo, December 1985, 122–126.
- Wethli, E. 1995. Final Report on the Poultry Development Study for the Family Farming Livestock Rehabilitation Programme, Austral Consultoria e Projectos, Lda, Maputo, February.