

The Social Impact of Newcastle Disease Control

B. Bagnol¹

Abstract

Widespread social impact can be achieved with the use of thermostable, live Newcastle disease (ND) vaccine NDV4-HR and I-2, applied via eye drop. Based on the evaluation of five ND vaccination campaigns carried out in Mozambique over a period of just under two years, significant and immediate increases in the number of chickens raised by households were recorded and acknowledged by the poultry breeders. Chickens are the most popular and most widely available livestock species raised by the households and by different members of the households. Thus, increased numbers benefit all individuals, regardless of gender, age or class. However, the impact of ND vaccination is higher among the poorest and women because they rely on chickens to provide for their basic needs such as food, hygiene, clothing, medications and schooling. The increase in the number of chickens is translated immediately into an improved access to cash or goods through exchange, but it also represents the possibility of gaining access to a good meal of higher nutritional value, and improved food security.

MOZAMBIQUE is an agricultural country with 16 million inhabitants, 71.4 % of whom live in rural areas (Instituto Nacional de Estatística 1999). The majority of the rural population (52.1 %) is made up of women (Instituto Nacional de Estatística 1999). In 1996, after 15 years of war, Mozambique was considered by the World Bank to be the poorest country in the world, with an annual income of US\$80 per person and a life expectancy of 46 years. The child mortality is high and 16% of children suffer acute chronic malnutrition (Ministério da Saúde and Instituto Nacional de Estatística 1997). In spite of the Rehabilitation Program that improved the situation somewhat, two thirds of the population are still living in absolute poverty (Ministério do Plano e Finanças et al. 1998). For this reason poverty is one of the major issues facing the Mozambican government.

Before independence, the commercial sector around the towns was the focus for poultry activity. With nationalisation that occurred after Independence, the government focused on the cooperative sector where ND vaccination campaigns were carried out using imported La Sota ND vaccine. Village chicken-raising, both for food and ceremonial purposes, is traditional in rural areas and is generally the

responsibility of women (Dohmen and Fafine 1998). As in other African countries, ND is the most pathogenic of the annual epidemics in Mozambique and destroys up to 50 to 100% of chickens. There is a consensus that vaccination campaigns have a vital role to play in the improvement of household food security and family income (Harun and Massango 1996; Mavale 1995; Wethli 1995). Currently three types of vaccine are used in Mozambique: La Sota, ITA-NEW and I-2. The last vaccine is produced locally in Mozambique by the National Veterinary Research Institute (INIVE) in collaboration with the ACIAR Newcastle Disease Control Project.

The work presented in this paper is the result of an independent evaluation carried out in Mozambique for the Australian Centre for International Agricultural Research (ACIAR) Newcastle Disease (ND) Control Project during January 2000 (Bagnol 2000). This project, based at INIVE in Maputo, started the local production of thermostable, live ND vaccine I-2 in 1999. Mabalane and Massingir districts (Gaza province) were selected for evaluation as NDV4-HR and I-2 had been used there for over one year. VETAID (a British NGO with a livestock development project in Gaza Province) implemented and supervised the ND control activities in collaboration with the ACIAR ND project. The major aim of the evaluation was to identify the benefits and constraints related to ND vaccination programs in rural areas.

¹ Anthropologist and Independent Consultant, PO Box 3235, Maputo 2, Mozambique

Characteristics of the Districts

Unlike the coastal strip of southern Mozambique, which offers reasonable conditions for agricultural production, both in terms of climate and soil fertility, the arid interior zone is less favourable for agriculture. This is why emigration of the men to South Africa in search of work is a frequent phenomenon. In the majority of the districts, as in Massingir and Mabalane, it is possible to cultivate only along the river edges and lagoons, where the land is relatively more fertile and water from the river can be used for irrigation. Here the main food crops are maize, sorghum and millet, and the cash crops are cotton and tobacco (Ministério da Saúde and Ministério do Plano e Finanças 1998). The distances of the farming areas from the cities are long and the roads are in a dreadful condition, making commercial activity difficult. In Mabalane, livestock production in the family and private sectors comprises cattle (16 197 total herd), goats (7484 total herd) and sheep (2668 total herd), according to data from the livestock register for 1999. The situation is similar in Massingir, although smaller total numbers are registered. Data related to poultry flocks are not available. In addition to farming and livestock, the main sources of income for the poor families are the sale of traditional beverages, charcoal and firewood.

Data on food security and nutrition in Gaza province indicate a high incidence of chronic malnutrition. The feeding of infants is essentially done by breastfeeding. Weaning food is generally introduced between 18 and 24 months, but earlier in the event of a new pregnancy arising. The main foodstuff for children is pap made of maize, sorghum or millet meal, with salt or sugar. The majority of women state a lack of money as the main reason for not using other foodstuffs such as green vegetables, fruits and foods rich in animal proteins (Ministério da Saúde and Ministério do Plano e Finanças, 1998). In addition to poverty, which determines food availability, chronic malnutrition can be related to inadequate food practices in term of quantity, quality and period of introduction (USAID et al. 1997).

Newcastle Disease Vaccination Campaigns

Among other objectives, the VETAID project aimed to develop a proper poultry health control program that would contribute to increased production and reduced losses of chickens due to disease, particularly ND. The project proposed to organise vaccination campaigns in collaboration with the National Livestock Directorate (DINAP) and aimed to reach a total of 25 000 birds per province in the first year of the project and 50 000 in the second. In the field,

VETAID worked with men and women selected by their communities to work as community livestock workers (CLWs). They received specific training in the treatment and prevention of the main livestock diseases which are prevalent in the region, and were equipped with materials and drugs to meet the needs of livestock breeders (Pagani 1999). With the introduction of the ND vaccination campaigns, the CLWs were responsible for vaccinations at the community level.

The activity reports produced by VETAID (Pagani 1999), indicate that between 1998 and 1999, vaccination campaigns against ND took place in five districts in Gaza province, and two districts in Inhambane province. The vaccine chosen was NDV4-HR given by eye drop, due to its low cost, ease of use and conservation, safety and easy substitution by I-2 vaccine to be produced by INIVE. Since May 1998, a total of five campaigns have been organised (one every four months), each one distributing between 40 000 and 54 000 doses of vaccine. It was estimated that between 20 000 and 25 000 chickens were vaccinated in all the districts as a whole for each of the first four campaigns (Pagani 1999).

From the beginning, payment for vaccines was introduced. Pamphlets on the vaccination and the price were distributed through the promoters to the poultry farmers. Initially the price of the vaccine was 200 Meticals (MZM; US\$1.00 = 14 000 MZM) per chicken, which covered only the costs of the labour of the CLW. As of 1999, the poultry farmers also had to pay for the vaccine, which translated into an increase of 100 MZM per bird vaccinated (Pagani 1999). At the end of 1998, it was decided to emphasise intensive extension and training work. Audio cassettes about ND control (with songs and radio programs in Portuguese, the official language and various local languages) produced by the ACIAR Project and INIVE were duplicated and distributed to the CLWs.

In 1999, a new working strategy was adopted with the goal of broadening the base of village chicken breeders interested in vaccination against ND. Given that the vaccine was easy to use and could be used by poultry farmers themselves, new community vaccinators were selected to be responsible only for vaccination campaigns against ND. District Livestock Officers would come to organise meetings with the farmers of their district, informing them of the possibility of preventing ND through vaccination, the number of times vaccine should be given to each bird and its cost. If farmers showed interest, two or three were chosen to receive brief training on how to use the vaccine, when it should be given and where to get the vaccine. This training program was based

on the information contained in the existing extension material produced by ACIAR/INIVE and VETAID (Pagani 1999).

As a way to monitor the vaccination campaigns, each CLW was given an information record sheet. The number of chickens vaccinated, the number of vaccinations carried out per day and the use of vaccine contained in each 100 or 1000 dose vials were recorded. On average, each promoter could vaccinate around 300 chickens per day, and used 323 doses of a 1000 dose vials and 85 of a 100 dose vial. This result is explained by the small size of the poultry-raising units, their dispersion, and the reluctance of the producers to pay for the vaccine (Pagani 1999).

Analysis of the data from the first and second vaccination campaigns, contained in the VETAID activity report, shows a substantial increase in the number of chickens per unit (from 7 to approximately 20). In November 1998, around 80% of the units had fewer than 10 chickens and a maximum of 29, while in May 1999, 53% of the units had between 11 and 30, with a maximum of 93 (Pagani 1999). Another interesting observation, which, while not quantifiable, was promising, was the increased regularity of the arrival of chicken buyers from the city of Maputo to the districts of Massingir and Mabalane, reaching even the most out-of-the-way districts. The purchase price of the chickens was between 20 000 MZM and 30 000 MZM per unit, which was quite good considering the price charged in Maputo.

Maximising the Odds

The largest problem in chicken-raising is ND, which can kill almost all the flock. In the past, the disease used to appear at two clearly defined times of the year. Now it appears at any time, but generally in the period between June and November.

The number of chickens per household varies from 2 to 60 chickens (data gathered from the vaccination files of the Mabalane promoters). Within the household, chickens belong to various persons, to the head of the household, to the women and to children of all ages. It is the most widespread and egalitarian stock breeding activity existing. This situation is a strategy aiming at dividing the risk of mortality or, in other words, of maximising the odds. Most of the farmers of both sexes consider that success in animal raising, whether of goats, cattle or chickens, depends 'on each person's luck'. This luck is considered to arise from individual spiritual forces, as well as from God. According to this concept, at birth each individual possesses a 'knack' or a 'touch' for raising a given species of animals. This 'luck' should be tried out,

for which reason chickens are also given to children. If after some attempts, the person demonstrates a lack of success, through high mortality or disappearance of birds due to predators (dogs, snakes, birds), s/he abandons the raising of chickens.

In a polygamous household, each wife will try her 'luck' with chickens, thus seeking to feed herself, her children and her husband. When the chickens assigned to a woman were bought with the husband's money, the wife, depending upon the power relationship of the couple, often possesses the right to sell them without seeking her husband's permission. Generally only after having sold or consumed them does the woman inform the husband. It is good manners for the husband to do the same. In rare cases, the wife is obliged to ask her husband for permission to kill or sell a chicken that was given to her. A husband whose wife is made to do that is considered excessively domineering. Thus, the chickens are generally under the control of the woman and she has some autonomy in their use. One woman stressed that: 'with the chickens that are mine, I don't need to get down on bended knee in order to use them'. She is referring to the act of kneeling down before the husband to request something, and one infers that even though she may kneel down to inform the husband about the use made of a chicken, the meaning attributed to this act is different: it's one thing to ask, another to inform.

In the case of chickens assigned to children, effective ownership of the animals remains with the adults who bought the first chicken. However, when the children are of school age, they exercise a certain autonomy over their chickens and may sell them to buy school supplies. Depending on the person that offered the chicken, the child will have greater or lesser authority over their raising.

Since it is essential in subsistence economies, the poorer households cannot exclude chicken-raising and it is a rare family that does not have chickens. However, a few households are in this situation. Some had chickens in the past and due to high mortality of the birds, were not interested in raising them any more. Others lost chickens because of disease and have not yet gone back to raising them. Alternatively, the households may be very poor and may not have the resources to acquire chickens. When a household loses its chickens, the neighbours or family members loan them a hen in order to help relaunch the chicken-raising effort, but some people may be very demoralised and not want to take on the commitment of borrowing a hen, for fear of it dying while in their possession, thus creating a debt.

Social, Economic and Dietary Functions of Chickens

It is a woman's role to deal with everything related to reproductive activities and a large part of the activities of a social nature (preparation of feasts and ceremonies). For this reason, chickens are of great importance in the value system and in the resources, which are accessible to and controlled by women. Chickens play this fundamental role not only because they provide food, but also because of the possibility of being sold or exchanged for staple goods or other products, the responsibility and control over which are given to women. Women exchange chickens for food products (salt, sugar, and oil), cleaning products (soap), clothes and school supplies for the children or medicinal drugs for the different members of the household.

As the men generally have larger animals under their care and control (goats and cattle), they leave the women with authority to oversee the raising of chickens and to take decisions in that regard. It is in their view an activity of lesser social prestige and lesser commercial value. Consequently, chickens are fundamentally a women's issue. Not only are they cared for and used by women, but they are also exchanged or sold to acquire goods that are used essentially to carry out the gender roles assigned to women. In addition, since most of the men have control over larger animals, they have other ways of acquiring and reproducing their power and access to the means of production and consumption that flow from that fact. However, in other areas of the country where men's access to other resources is more limited, control by women over chickens may also be different (Alders 1996; Mata et al. 2000).

In the same way as cattle or goats, chickens constitute a small-scale financial reserve, a monetary fund available to women, a female form of a living bank. The sale of a chicken will meet a small-scale need such as the purchase of staple products, medication, or clothes, pens and notebooks for children going to school. A goat is sold to buy clothing or meet medium-scale needs, while cattle are the maximum currency of exchange, serving to solve very serious problems, such as *'lobolo'* (in the south of Mozambique *'lobolo'* is both the name given to marriage under traditional custom, as well as the term used for the presents that the groom offers to the bride's family members), or house construction. Cattle are essentially used to enter into prestige negotiations.

Although cattle and goats are also slaughtered for the worship of ancestors, chickens are most frequently sacrificed and consumed on such occasions. Generally, the diviners consulted about the way to

conduct such ceremonies give voice to an ancestor's spirit who requests a bird with a specific colour and sometimes with ruffled feathers. Birds with the most requested characteristics are generally sold or exchanged at a higher price. As with goats and cattle, chickens can be attributed to an ancestor's spirit and thus cannot be sold or consumed without the performance of adequate ritual. In addition to ceremonies for the ancestors, chickens are also frequently necessary in ceremonies performed by various churches.

Chickens, like other livestock, are raised to use as a saving in order to respond to emergencies and prime necessities, and not so much for family consumption. For this reason only a very few people consume chickens and eggs. To illustrate her difficulty with consuming chickens and eggs, a woman stresses: 'it is very hard to kill a chicken and eat it. We would like to sell the chickens. I don't have the habit of always eating a chicken. I would prefer to keep it.' The proverbs gathered suggest that the limitation on use of eggs applies more to the children and women than to adult men. 'If one gives an egg to a child, he or she will become a thief'. 'If you give an egg to a child they end up bald like the egg'. 'If a woman eats an egg, at the time of giving birth she will be like a chicken running from one place to the other without knowing where to give birth'. While the food taboos related to eggs are tending to disappear, the concept that they serve to ensure the reproduction of the chickens and that eating eggs constitutes a waste and a luxury is maintained. For this reason, from a young age children are taught not to get used to eating eggs. In general, people usually do not take all or most of a hen's eggs, believing that the hen will then be sad and angry and stop laying them. Following the same logic, one cannot kill all of a hen's offspring.

As a result of the ND vaccination campaigns, the increase in total number of chickens is translated immediately into an increase in their sale and to a lesser extent in their consumption. The need for access to cash is immediate, while the change in alimentary habits is slower, and for that reason, despite the increase in the poultry flock, it is still unusual for chicken to be eaten on a regular basis. Nutritional advice could be given as part of the vaccination campaigns to promote adoption of new food habits and improve the nutritional value of diet.

Chicken is the favourite food for receiving visitors and constitutes the basic foodstuff for making a 'curry' or 'stew' on a special day. A chicken may be cooked for a guest as a sign of respect, or offered to a visitor as a gift. In the villages close to the Limpopo River, fish and chicken constitute the main alternative protein sources to the daily meal based on maize meal and vegetables. The chickens are cooked

in a 'curry' with sauce to accompany the maize meal, the pieces being apportioned between all members of the household, including the children. The father generally eats the gizzard, the head and one thigh; the woman gets a thigh and the back; the children of an age to run after chickens, get the feet 'in order to run more quickly'. The gizzard is considered the place where impurities accumulated so only men are allowed to consume it as they are considered the strongest. The habit of giving the man this privilege is disappearing and in some households, anyone at all may eat it, including the women themselves. A woman drawing a parallel between colonialism and the men's privilege explained this change: 'colonialism is over now, all of us can eat'.

In conclusion, chickens are the smallest animal raised both for consumption on special days and to supply small-scale family necessities. In this sense, chickens constitute a food reserve that fulfils a fundamental social and religious function, and provide a minimal source of money for basic needs. Because various individuals of different age and sex within the household own chickens, they constitute the most democratic animals raised.

Impact of Newcastle Disease Control among Different Social Groups

Although apparently relatively unstratified, the rural society of the districts of Mabalane and Massingir has groups with distinct social and economic characteristics. Differentiation may be carried out using factors like the composition of the household, the number of women, of adult men and of female and male children, manpower being an indicator of wealth and of access to means of production, animals and area under cultivation. The differentiation may also take into consideration access to a source of paid work within the country or in South Africa, or possessions like goats and cattle and ploughs to work the fields. The social standing resulting from a position as a leader of a political or religious-traditional nature, also determines access to power and to the resources that exist in the area. The most vulnerable and poorest group is generally made up of single-parent nuclear households, that is, widowers and widows, or men and women living alone or with children. Female heads of household are generally considered to be a less well off group economically, due to the fact that they are not able to count on manpower or incomes of males. If they also have no male children of an age to shepherd the cattle or the possibility of having a herder, they will not have access to cattle, limiting the possibility of working extensive areas of land for the growing of subsistence foodstuffs.

In the first instance, the CLWs seek to motivate the traditional and political leaders of the villages to vaccinate their chickens by adopting an extension methodology that favours contact with the leaders. The latter will then motivate and mobilise the other households and will serve as an example. For the promotion of the vaccine, the leaders run the meetings, together with the CLWs. The women are considered by the CLWs to be the most innovative. They are the ones who are willing to risk trying the solution that is proposed as a way of improving their chicken-raising. The women show their satisfaction with the vaccine and the associated increased production, consumption and sale of chickens. On the other hand, men tend to put forward problems related to the cost of the vaccine and mention chickens that died after being vaccinated.

Poorer social groupings have the least financial means and the least possibility of investing money in a vaccine. They are not in a position to be the first to spend their meagre possessions on a novelty until they are confident of its benefits. If following the first vaccination, the vaccinated chickens survive and develop well and the unvaccinated chickens die, the poorer households will be more inclined to take the risk. Otherwise, they will maintain their production on a random basis, relying on the 'luck' of the different members of the household.

Where households lack the cash to pay for the vaccine, the CLWs are proposing payment in the form of a chicken. However, this proposal is still poorly accepted by farmers and does not manage to resolve the situation in households that possess few chickens. It does not make sense to hand over a chicken worth between 20 000 MZM and 30 000 MZM to pay what is owed for the vaccination. This issue is still being discussed and ad hoc solutions should be found between the farmers and the CLWs.

Impact of Newcastle Disease Control on Households

Although vaccination brings benefits to all individuals of the family, the members are affected in different ways.

The benefit for the woman may be evaluated in terms of facilitating access to a source of protein for the preparation of family meals. The greater availability of chickens helps her search for foodstuffs for the preparation of the daily meal.

For women who manage to sell their poultry, chickens constitute a fundamental resource. In situations where only the men have access to cash crops and waged work, the women depend on them to supply their personal needs. Chickens can be compared with husbands in the sense that they can provide

women with basic supplies. As one widow explained 'the chicken is my husband, it allowed me to buy these shoes, this piece of cloth, this handkerchief.' With the increased production of chickens, women become less dependent on their husband's money and manage to satisfy some basic needs. The access to money that the possession of chickens confers is constrained by the proximity of a railway line or road, or the existence of transport to town in order to sell the product, or to convey travelling merchants to buy the chickens. Women explained that they are not able to sell their chickens and that they are not in the habit of travelling to the district headquarters to sell them. Thought must be given to the marketing of village chickens in remote areas.

Women consider chickens as the first step in animal-rearing activities. For them, selling 4 or 5 chickens offers the possibility of getting access to a goat bought in their name, with their money, and thus the hope (as in the fable by Jean de La Fontaine, 'Pierette et le pot au lait') of owning cattle one day. One woman stated: 'I am struggling to raise more chickens in order to be able to have a goat for myself'. A female CLW stressed that she has now managed to buy two goats from her chicken-raising and that her objective is to have cattle soon. In the villages where she undertook the vaccination campaign, other women did the same. This prospect might allow women improved access to resources they were denied previously. This might also modify gender relations within households, permitting women greater cash contribution to the household income and increased financial availability under their control.

For school-age children, chicken-raising (whether their own or the parents') is a source of money allowing access to notebooks, pens and the fees needed each school year. Chickens are also exchanged for clothes.

It is the consensus view that an increase in the production of chickens benefits the whole family. One male CLW stressed: 'Even the husband benefits from his wife's chicken-raising, because if he gets sick she will sell the chicken in order to buy drugs for him'. Increased production of chickens also increases the availability of food for people who pay visits to the household, and the consequent prestige that the hosts (men and women) obtain.

Conclusion

Chicken-raising is the most widespread stock breeding activity both in general and within the household. ND introduces a high risk factor into chicken-raising, therefore various strategies are established to ensure production: distribution of the

flock between the members of the household in order for each to try their luck; and a limit on the consumption of chickens and eggs. In the long term, success in vaccination against the disease may modify both the conceptions and the practices which exist at present. Although resistance to a substantial increase in consumption of chickens has been acknowledged, their greater availability implies an increase in their consumption. Greater access to animal protein improves the household diet and the nutritional status of its members. For all households, but especially for the poorest and for women who rely mainly on chickens to fulfil their basic needs, the increase in the total numbers of chickens raised represents a small improvement in diet, hygiene, clothing, medications, schooling and the possibility of getting access to a prized meal and to money.

References

- Alders, R.G. 1996. Facilitating women's participation in village poultry projects: experiences in Mozambique and Zambia. Proceedings of the XXth World's Poultry Congress, 2-5 September, New Delhi, India, III, 441-447.
- Bagnol, B. 2000. Independent evaluation for ACIAR project. Investigation into the control of Newcastle disease in village chickens in Mozambique. Maputo, ACIAR and the Mozambican National Veterinary Research Institute.
- Dohmen, C. and Faftine, O. 1998. Integration of gender issues in development cooperation EU-ACP. Final Report of a Mission on Gender and Livestock development and production in Mozambique. Amsterdam, Royal Tropical Institute.
- Harun, M. and Massango, F.A. 1996. Estudo sobre sistemas de produção de pequenas espécies nos distritos de Angónia e Tsangano na província de Tete. Tete, DANIDA.
- Instituto Nacional de Estatística 1999. II Recenseamento geral da população e habitação, 1997. Maputo, INE.
- Mata, B., dos Anjos, F., Bagnol, B., Dias, L., Alders, R.G. and Travassos, P. 2000. Study on chicken breeding and Newcastle disease in village chickens in Angoche and Manjakaze. Maputo, IFAD and Instituto Nacional de Investigação Veterinária. (in progress).
- Mavale, P.A. 1995. Epidemiology of Newcastle Disease in Rural Poultry in Mozambique. Dissertation submitted in partial fulfilment of the requirements for the Degree of Master of Science in the Development of Animal Health and Production Programmes. Reading, University of Reading.
- Ministério da Saúde and Instituto Nacional de Estatística 1997. Inquérito demográfico e de saúde. Maputo: Ministério da Saúde and Instituto Nacional de Estatística.
- Ministério da Saúde and Ministério do Plano e Finanças. 1998. Perfis distritais de segurança alimentar/Província de Gaza. Maputo, Ministério da Saúde and MPPF.

Ministério do Plano e Finanças, Universidade Eduardo Mondlane, International Food Policy Research Institute 1998. Understanding poverty and well-being in Mozambique, the first national assessment (1996–97). Maputo, Ministério do Plano e Finanças, Universidade Eduardo Mondlane, International Food Policy Research Institute.

Instituto Nacional de Estatística 1999. II Recenseamento Geral da População e Habitação, 1997. Maputo, INE.

Pagani, P. 1999. Stock Breeding Support Programme, Gaza and Inhambane Provinces/Mozambique and Projecto de Desenvolvimento Rural do Distrito de Panda. Xai-Xai, Vet-Aid Gaza/Inhambane.

USAID, Ministério da Saúde, MACRO, 1997. Situação nutricional de crianças menores e suas mães em Moçambique. Maputo, USAID, Ministério da Saúde, MACRO.

Wethli, E. 1995. Poultry Development Study, Final Report, Family Farming Rehabilitation Programme. Maputo, Austral Consultoria e Projectos, Lda.

Bibliography

- ACIAR 1992. Newcastle Disease in Village Chickens. Canberra, ACIAR Proceedings No. 39.
- ACIAR 1997. Investigation into the control of Newcastle disease in village chickens in Mozambique, Project proposal. Maputo, ACIAR.
- ACIAR 1998. Control of Newcastle disease in village chickens, Impact Assessment Series 1. Canberra, Centre for International Economics.
- ACIAR 1999. Appropriate extension methodology and training of trainers for control of Newcastle disease in Mozambique. Maputo, ACIAR. Project proposal.
- Alders, R. 1999a. Controlling Newcastle disease in village chickens in Mozambique. African Studies Association of Australasia and the Pacific. African Studies Review and Newsletter. XXI No. 1, 43–44.
- 1999b. Putting the last first: a useful concept for livestock development project in sub-Saharan Africa. African Studies Association of Australasia and the Pacific. African Studies Review and Newsletter. XX No. 1, 12–14.
- Alders, R. and Spadbrow, P. 1998. Newcastle disease in village chickens: a field manual. Brisbane, National Livestock Services Project, Ministry of Food and Agriculture, Ghana, and GRM International Pty Ltd, Australia.
- Alders, R.G., Inoue, S. and Katongo, J.C. 1994. Prevalence and evaluation of Hitchner B1 and V4 vaccines for the control of Newcastle disease in village chickens in Zambia. Preventive Veterinary Medicine, 21: 125–132.
- FAO 1997. Special programme for food security, diversification component. Guidelines for the inclusion of improved poultry production. Rome, FAO.
- FAO 1998. Village chicken production systems in rural Africa. FAO Animal Production and Health Paper No. 142. Rome, FAO.
- Mariner, J.C. 1995. Mundri Districts Poultry Assessment, a participatory rural appraisal performed in collaboration with New Sudan Women's Association for OXFAM UK/I. RDP Livestock Services.
- Ministério da Agricultura e Pescas, MPF, MISAU, DPCCN, FEWS, WFP, FAO, MSF/CIS 1999. Vulnerability assessment for Mozambique. Maputo, Ministério da Agricultura e Pescas, MPF, MISAU, DPCCN, FEWS, PMA, FAO, MSF/CIS.
- OXFAM GB 1999. Food security and livelihoods, Programme plan 1999–2002. Niassa, OXFAM GB.
- UNDP 1998. National Human Development Report, Peace and Economic Growth: Opportunities for Human Development, Mozambique. Maputo, UNDP.
- United Nations 1990. Women and nutrition. Nutrition Policy Paper No. 6. New York, UN.