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Activity Completion Report:

Improvement of Village Poultry Production by Communities in Limpopo National
Park Support Zone in Gaza Province, Mozambique

Final Activity Completion Report

Report N^o.2

Improvement of village poultry production by
communities in Limpopo National Park support zone
in Gaza Province, Mozambique

1 January 2009 – 19 February 2010



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i. DISCLAIMER

This report was prepared by Tanya Radosavljevic, Ana Zandamela, and Robyn Alders of the International Rural Poultry Centre (IRPC).

The findings, interpretation and conclusions expressed in this document are entirely those of the authors and should not be attributed in any manner to the Wildlife Conservation Society (WCS).

ii. ACKNOWLEDGEMENTS

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- Staff in the District Services of Economic Activities (SDAE) of Massingir: Francisco Passe, Maurico Huo and Simone Ngovene;
- Staff in the Provincial Department of Agriculture (DPA);
- The Provincial Livestock Services (SPP) of Gaza Province; and
- The Animal Science Directorate (DCA) of the Mozambican Agricultural Research Institute (IIAM) for their ongoing production of the I-2 Newcastle disease (ND) vaccine.

We would like to thank and acknowledge community leaders, male and female farmers, and community vaccinators, for sharing and committing their time to this project.

We would also like to thank the staff of the International Rural Poultry Centre (IRPC)/Kyeema Foundation for their dedication and participation in the implementation of this project.

This project would not have been possible without the support of the Wildlife Conservation Society (WCS) and the United States Agency for International Development (USAID) who generously provided funds.

Tanya Radosavljevic, Ana Zandamela, and Robyn Alders
30 January 2010

iii. LIST OF ACRONYMS & ABBREVIATIONS

AHEAD	Animal Health for the Environment And Development
AI	Avian Influenza
AIDS	Acquired Immune Deficiency Syndrome
DCA	Animal Science Directorate of the IIAM
DPA	Provincial Department of Agriculture
GLTFCA	Great Limpopo Transfrontier Conservation Area
HH	Household
HIV	Human Immuno-deficiency Virus
HPAI	Highly Pathogenic Avian Influenza
I-2	Thermotolerant, live, avirulent ND vaccine available for local production
IIAM	Agricultural Research Institute of Mozambique
IRPC	International Rural Poultry Centre
LNP	Limpopo National Park
M&E	Monitoring and Evaluation
MINAG	Ministry of Agriculture
ND	Newcastle disease
NGO	Non-governmental organization
PLWHA	People Living with HIV/AIDS
PRA	Participatory Rural Appraisal
SANDCP	Southern Africa Newcastle Disease Control Project
SDAE	District Services of Economic Activities
SPP	Provincial Livestock Services
USAID	United States Agency for International Development
USD	American dollars
WCS	Wildlife Conservation Society

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vii. EXECUTIVE SUMMARY

The International Rural Poultry Centre (IRPC)/Kyeema Foundation was successful in receiving US\$ 45,550 under the *AHEAD* Great Limpopo Transfrontier Conservation Area (GLTFCA) Seed Grant funded by the Wildlife Conservation Society (WCS), supported by the United States Agency for International Development (USAID), to implement the project entitled *Improvement of village poultry production by communities in Limpopo National Park (LNP) support zone in Gaza Province, Mozambique*.

The 13 month project commenced on 1 January 2009 and was managed and implemented by the IRPC/Kyeema Foundation, in collaboration with community leaders, government colleagues from District Services of Economic Activities (SDAE), Provincial Livestock Services (SPP), and the Animal Science Directorate (DCA) of the Mozambican Agricultural Research Institute (IIAM).

The main aim of the project was to contribute to food security and poverty alleviation through the improvement of poultry husbandry practices and disease control related to village chickens.

There were four major objectives of the project:

1. Contribute toward the control of Newcastle disease (ND) in village poultry;
2. Improve village poultry husbandry and management;
3. Development of poultry products suitable for sale to tourist centers; and
4. Improve household welfare, including improved nutrition and food security.

The first objective addresses the implementation of an effective ND control program, which comprises of five essential components:

1. An appropriate vaccine and vaccine technology;
2. Effective extension materials and methodologies that target veterinary and extension staff as well as community vaccinators and farmers;
3. Simple evaluation and monitoring systems of both technical and socio-economic indicators used by both communities and supervising agencies;
4. Economic sustainability based on the commercialization of the vaccine and vaccination services and the marketing of surplus chickens and eggs; and
5. Coordination of activities.

At an activity level significant work was undertaken in meeting these components including training and enforcement training of community vaccinators and extension officers, community awareness raising activities, ND vaccination campaigns, and development of resource materials. At a more strategic level the IPRC/Kyeema focused on improving the coordination of activities from the vaccine production, vaccine distribution, vaccination campaigns and the collection and reporting of vaccination data.

This component also focused strongly on community involvement by addressing the community leaders, as a strong social determinant of project support, men and women, and community vaccinators, to support the project through participation in activities.

Overall, the community involvement during this component should be considered positive.

The second objective centered on targeting village poultry owners to adopt improved poultry management. A range of poultry husbandry practices were introduced in the communities such as providing household food scraps for feed, the benefits of poultry housing, and how to control parasites.

The third objective focused on the development of poultry products suitable for sale to tourist centers. The project did not implement this activity as it was necessary that the target communities adopted an effective ND control program first before the introduction of Objective 3. Should funding continue for this program, then additional income generating activities can be considered.

The fourth objective focused on improved human welfare through health promotion and improved nutrition. The project has been raising awareness on improving the understanding of human nutritional intake in conjunction with healthy poultry practices. The awareness covered the importance of good food and water, shelter, and vaccination to prevent disease for both humans and chickens.

There was effective project management throughout the project cycle to achieve the project activities within the budget and planned timeframes. A reallocation of funds to support technical assistance was made possible due to the cost-saving in other areas.

Key Issues:

The Massingir district faces the challenges relating to staffing capacity. Any sustainable programs in the LNP and support zone will need to be supported by additional MINAG technicians. IRPC/Kyeema has been liaising with MINAG to establish a full-time medium-level technician at the Massingir SDAE to support field activities.

The project focused on establishing a sustainable ND control program in the target areas so that farmers can then begin investigating other poultry husbandry activities. It was difficult to engage in activities to promote the sale of poultry products at tourist centers during such a short project implementation period and the project activities continue to be focused on improving coordination of vaccination campaigns and achieving support of the vaccination campaigns.

In relation to the overall impact of the project, there is little doubt that it had a significant influence in development a more robust approach to addressing ND by emphasizing project awareness, raising awareness of ND control, and the implementation of regular vaccination campaigns.

In regards to sustainability of the project, many of the communities have taken preliminary measures towards establishing effective ND control through participating in vaccination campaigns, and paying community vaccinators for the vaccine, there are also some

investments in to poultry housing, which will contribute towards a sustainable base for ND prevention and control.

IRPC/Kyeema Foundation recommends continuing the implementation of project activities to build on the initial impact of the project, and to help the community vaccinators develop their ND control activities, and to enable communities to take control of their future direction.

This report describes the activities implemented and the impacts achieved during the project cycle. It also provides an assessment of activities that might be needed to achieve an effective and sustainable ND control program in the LNP and LNP support zone.

The total project funding was US\$ 45,550 over a 13 month period.

1 PROJECT SUMMARY

1.1. Project profile

<i>Project name</i>	Improvement of village poultry production by communities in Limpopo National Park (LNP) support zone in Gaza Province, Mozambique
<i>Executing agency</i>	International Rural Poultry Centre (IRPC)/Kyeema Foundation
<i>Project period</i>	13 months
<i>Date commenced</i>	1 January 2009
<i>Completion date</i>	1 February 2010
<i>Project location</i>	LNP and LNP support zone, Gaza province
<i>Amount (USD)</i>	45,550
<i>Submitted by</i>	Robyn Alders Director IRPC/Kyeema Foundation
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<i>Date submitted</i>	19 February 2010

1.2. Introduction and background

The main aim of this project is to contribute to food security and poverty alleviation through the improvement of poultry husbandry practices and disease control related to village chickens.

In Mozambique, village poultry (chickens, Muscovy ducks, turkeys, guinea fowl and pigeons) are generally owned and managed by women and the rural poor and are usually run under a free-range, low input management system (Bagnol, 2005; Lough *et al.* 2001; Mata, *et al.* 2000; Mavale 2001). These village poultry are a very important part of women's livelihoods in rural Mozambique. Small-scale farmers own over 90% of the national chicken flock, which is estimated to be around 25 million birds. Chickens are the type of domestic poultry most commonly raised and fulfill the most roles within the family (sale, barter, consumption and traditional ceremonies; Mavale 2001).

In the poorest households, the contribution of chickens is significant, with around 23% of income being derived from chickens. Chickens can be easily sold or exchanged, and are raised to satisfy the basic needs of the family. Some varieties of chicken are exclusively reared for use in traditional ceremonies. Chickens are sold live with about 70% of rural households selling their chickens at the farm gate while the remainders sell along the roads.

The poorest and medium poor families rarely raise chickens for home-consumption, and across the social groups, eggs are rarely consumed, as they are more highly valued for reproductive purposes (Bagnol, 2005; Lough *et al.* 2001; Mata, *et al.* 2000). Less poor families will raise chickens for home consumption. Thus if chicken numbers were to increase, the consumption of eggs would become an option and a very good use of resources (Alders and Spradbrow 2001). Additionally, increased consumption and sale of chickens and eggs in rural areas will decrease demand for bush meat.

One of the major constraints to the production of village chickens in Mozambique is Newcastle disease (ND). Community-based ND control programs improve the livelihoods of poor livestock keepers in Mozambique through the effective and sustainable control of this devastating disease.

The implementation of an effective ND control program in countries such as Mozambique, has resulted in increased chicken numbers, increased household purchasing power, increased home consumption of chicken products and increased decision-making power for women (Bagnol 2001).

The specific objectives of this project are to:

- 1) The control of ND in village poultry;
- 2) Improved village poultry husbandry and management;
- 3) The development of poultry products suitable for sale to tourist centers; and
- 4) Improved household welfare, including improved nutrition and food security.

1.3. Financial contribution of donor

The *AHEAD* Great Limpopo Transfrontier Conservation Area (GLTFCA) Seed Grant has contributed US\$45,550 to IRPC/Kyeema Foundation to implement the project entitled *Improvement of village poultry production by communities in LNP support zone in Gaza Province, Mozambique*. The project period was for 13 months, from 1 January 2009 to 1 February 2010.

On 1 January 2009, IRPC/Kyeema received US\$ 31,885. The final payment of the remaining balance of US\$ 13,665 will be forwarded in February 2010, upon receipt and approval of the final narrative and financial reports.

See Annex 2 for the Financial Report.

1.4. Area of operation

The LNP covers approximately one million hectares and is located in Gaza Province, Mozambique. The LNP is a part of the GLTFCA, shared with South Africa and Zimbabwe and is soon to be Africa's largest protected wildlife areas.

Since the end of the civil conflict and the signing of the Peace Accord in 1992 there has been effort to formulate and implement a management strategy for LNP. The first phase of development is to be achieved through working to improve the lives of people in the Park's surrounding lands and 'enclave communities'.

Under the *AHEAD*- GLTFCA Seed Grant, IRPC/Kyeema targeted activities in 14 villages, 7 villages in the LNP and 7 villages in the LNP support zone, specified in the table below:

Table 1: Target villages and number of families

No	Village	Area	No. Families	Populations
1	Chibotane	LNP	156	1,304
2	Chinhangane	Support zone	188	757
3	Chitare	Support zone	115	295
4	Cubo	Support zone	322	420
5	Macarringue	LNP	536	2,320
6	Macavene	LNP	92	533
7	Machaule	LNP	74	424
8	Madingane	LNP	97	637
9	Manhiça	Support zone	90	276
10	Massingir Velho	LNP	205	1,734
11	Mavoze	LNP	345	2,626
12	Mucatine	Support zone	258	390
13	Tihovene	Support zone	177	5,680
14	Zulo	Support zone	108	396
Total:			2,763	17,792

(1) Data given by the LNP from: community leaders in January 2010.

(2) Data in the support zone, collected by IRPC/Kyeema Foundation during 2009.

The villages in which IPRC/Kyeema Foundation worked were chosen by the Massingir SDAE during the Participatory Rural Appraisal (PRA) from 11 – 17 January 2009.

Target population and total beneficiaries

There approximately 26,535 persons living inside the park. (Data given by the LNP from: community leaders 2003/2004).

In the target communities there are a total of 9,578 beneficiaries inside the LNP and 8,214 beneficiaries in the support zone of the LNP.

2. PROJECT DELIVERABLES & RESULTS

2.1. Overall assessment

Overall the project has achieved the majority of its objectives and IRPC/Kyeema Foundation has made significant progress in increasing ND control awareness in the target communities during the project period 1 January 2009 – 1 February 2010. See End of project

evaluation at Annex 4: by Dr Brigitte Bagnol, the IRPC Social Anthropologist and Gender Expert.

Given that the project ran for 12 months, the project oversaw the implementation of three (3) vaccination campaigns in March/April, July and November/December 2009 in accordance with the recommendation that birds be vaccinated every 4 months. The first vaccination campaign was held in April instead of March, as the training of the community vaccinators only took place in March 2009. The November campaign was implemented during December due to the late production of the I-2 ND vaccine. The results of the vaccination campaigns are promising and the numbers of chickens vaccinated in 2009 have more than doubled, compared to the 2008 vaccination data. See End of project evaluation at Annex 4: by Dr Brigitte Bagnol. Equally important, the trained community vaccinators remain motivated and have carried out vaccination campaigns.

There has been sound coordination of activities between the IRPC/Kyeema and MINAG throughout the lifecycle of the project. The IRPC/Kyeema facilitated the ordering and distribution of the I-2 ND vaccine from DCA-IIAM to SPP Gaza and then to SDAE Massingir. IRPC/Kyeema Foundation shared information collected in the field through reports and meetings with SDAE Massingir, SPP Gaza and National Veterinary Services Directorate (DNSV).

At the district level the project has succeeded in strengthening the SDAE at Massingir by strengthening its cold chain system through the provision of a refrigerator, cooler boxes and ice packs, diagnostic and investigative capacity and providing the means to monitor the project activities, through the provision of fuel. In addition, IRPC/Kyeema has been coordinating with MINAG at the national level to look in to the recruitment of a government medium-level technician in to support activities in the Massingir area.

The project timeframe was too short to investigate marketing options and IRPC/Kyeema did not implement Objective 3. The implementation of a successful and effective ND control program in the LNP target area is still at being developed and explored by the communities and it is, at present, too premature to implement activities focused on the development of poultry products suitable for sale to tourist centers.

2.2. Summary of implemented activities

The following activities and training programs have been implemented during the project:

1. PRA and gender analysis, including an assessment of the cold-chain facilities available at the SDAE and the procurement of appropriate small refrigerators if required, from 11 – 17 January 2009;
2. Selection of 21 community vaccinators (10 women and 11 men) by communities during the PRA;
3. Project awareness in communities and community leaders, community mapping, and information on existing infrastructure throughout the project life cycle.
4. Training on ND control for 21 community vaccinators (10 women and 11 men) from 17 – 20 March, 2009. The training covered handling and usage of I-2 vaccine, information on ND and prevention practices, and awareness of HPAI;

5. Training of 21 farmers and 2 government extension officers (10 women and 13 men) in and experimentation with low-cost improvements to poultry husbandry including safe and low stress methods for handling and confining village poultry, housing, training in improved supplement feeding, and parasites. Training and refresher courses were in conjunction with training in ND control;
6. Refresher training and technical backstopping for 17 community vaccinators immediately prior to the implementation of the campaign from 12 – 22 June (8 women and 9 men) and 12 – 22 October (9 women and 8 men).
7. Coordination of vaccination campaigns throughout the project in accordance with the established vaccination calendar (March, July and November).
8. The collection of serum samples to monitor pre and post vaccination antibody levels to ND in poultry from 13 – 16 April and 15 – 19 June;
9. Preparation, printing and distribution of extension materials: flip charts (developing), training manual, vaccination calendar, pamphlets on vaccine usage and handling;
10. Monitoring of the project activities and vaccination campaigns throughout the project lifecycle.
11. IRPC/Kyeema supported the research projects of Samantha Swisher and Sarah Raabis, first year veterinary students from Tufts Cummings School of Veterinary Medicine, USA, from 9 June – 27 July.
12. Ongoing coordination of activities with MINAG;
13. Six monthly activity report;
14. End of project evaluation conducted from 17 – 22 January 2010; and
15. Activity completion report.

2.2.1. PRA and gender analysis

The IRPC anthropologist/gender specialist, Dr Brigitte Bagnol, conducted the PRA and gender analysis from 11 - 17 January 2009. During the PRA the project team met with SDAE Massingir, to discuss the details of the project, select the target villages and to obtain information on the LNP and LNP support zone.

During the PRA the issue of coldchain was discussed and it was recommended that the project support SDAE Massingir by purchasing a refrigerator.

2.2.2. Selection of community vaccinators

21 community vaccinators were selected during the PRA with each community from 11 – 17 January.

IRPC/Kyeema was guided by lessons learned from previous projects, which identified the need for communities to be empowered through their own decision and about use of resources and priority needs.

IRPC/Kyeema's efforts therefore focused on identifying, training and supporting the nominated community vaccinators as well as mobilizing support from their villages.

Table 2: List of selected community vaccinators

Village	Inside/Outside LNP	Community Vaccinators	Gender (Male/Female)
Massingir Velho	Inside	Domingos Sabonete Constancia Mongwe	Male Female
Mavoze	Inside	Filimone Machaule Tomas Samisone	Male Male
Macavene	Inside	Vódia Chirindza	Female
Machaule	Inside	José Mongwe	Male
Chibotane	Inside	Frazão Ngulele Racelina Ngovene	Male Female
Madingane	Inside	David Mandlaze	Male
Macarringue	Inside	Generosa Valoi	Female
Tihovene	Outside	Alda Abilio Chivoze Alcidio Novela Simiao Zitha	Female Male Male
Cubo	Outside	Hermnia Manuel Julio Mate	Female Male
Chinhangane	Outside	Pedro Jossias Cuna	Male
Chitar	Outside	Samaria Mbalane	Female
Zulo	Outside	Clemência Mundlovo	Female
Mucatine	Outside	Cacilda Mundlovo Sergia Cossa	Female Female
Manhiça	Outside	Rochete Ngovene	Male
SDAE	SDAE Massingir	Alberto Nhatumbo	Male
SDAE	SDAE Massingir	Juvencio Tomo	Male

2.2.3. Project awareness and community mobilization

For community mobilization, IRPC/Kyeema began this process by holding a series of widely announced community meetings, generally held outdoors, to introduce IRPC/Kyeema, the project and the project activities.

From 9 – 14 February, IRPC/Kyeema conducted project-awareness in the selected 14 villages for the project implementation. The project team met with MINAG staff, village leaders/chiefs and communities to discuss the project activities, the role of the community vaccinator, the prerequisites required by a community vaccinator, and finally the selection of community vaccinators.

Project awareness activities with communities and community leaders as well as community mapping, and information on existing infrastructure were conducted from 9 – 14 February, 17 – 20 March, 7 April, 25 – 27 May, 17 – 22 June, 12 – 22 October, 19 – 21 November and 15 – 18 December.

2.2.4. Training of community vaccinators in ND control and highly pathogenic avian influenza (HPAI) awareness

The IRPC technical advisor, Dr Filomena dos Anjos, conducted ND and HPAI awareness from 17 – 20 March 2009, in Tihovene. A total of 21 community vaccinators and two district extension officers were trained (10 women and 13 men).

The practical and theoretical aspects of the training included:

- The role of village chickens in the local communities;
- Characteristics of the chicken production system in the family sector;
- Characteristics of healthy and sick chicken and a basic clinical examination;
- Introduction to ND;
- Introduction to the vaccine and the process of vaccination;
- Appropriate methods for conserving and transporting the thermostat vaccine;
- Other techniques to control ND;
- Awareness raising of chicken owners, cost recovery and organization of vaccination campaigns;
- Registration, planning and coordination of ND control activities; and
- Monitoring and evaluation of vaccination campaigns against ND.

During the training each community vaccinator received a basic instruction manual on the handling and use of the I-2 vaccine on ND, a ND control flip chart, a flip chart on healthy humans and healthy chickens, a registration book, a pen, as well as a uniform (t-shirt and cap).

2.2.5. Training in low-cost improvements to poultry husbandry

This training was conducted in conjunction with training on ND control activities.

2.2.6. Refresher training and technical backstopping

Refresher training and technical backstopping for 17 community vaccinators was conducted prior to the implementation of vaccination campaigns, from 12 – 22 June (8 women and 9 men) and 12 – 22 October (9 women and 8 men).

The refresher trainings revise the key aspects covered in the original vaccinator training course but also emphasize aspects of auto-evaluation by vaccinators of their work, the identification of problems and options for their resolution. Awareness on improving the understanding of human nutritional intake in conjunction with the refresher training for community vaccinators;

During the refresher training the following subjects were emphasized:

- ND control activities and vaccination campaigns: This subject covered planning for a vaccination campaign, village leader involvement, awareness-raising, registration, coordination for the vaccine, the vaccination campaign, collection of data, follow-up with the families on the results of the vaccination.

- The reproduction of chickens, using the flip chart series *A reprodução da galinha*. The flip chart contains illustrations relating to poultry reproduction presented in conjunction with an oral presentation. This section covered the cycle of a chicken, how to see when an egg has been fertilized, the development of a chick inside an egg, how to identify eggs suitable for cooking,
- Poultry husbandry: Training was covered in the flip chart series on *Healthy chickens, Healthy*, looking at the importance of good food and water, shelter, and vaccination to prevent disease.

Nutrition awareness

IRPC/Kyeema has been raising awareness on improving the understanding of human nutritional intake in conjunction with the refresher training for community vaccinators. A flip chart series called *Healthy chickens, Healthy People* was used to for the training which detailed a variety of nutritional information, including the components of a healthy diet and the nutritional value of eggs and the benefits of eating eggs. The flip chart contains illustrations relating to healthy human nutrition (using information developed by the Mozambican Ministry of Health) and healthy poultry practices, mainly covering the importance of good food and water, shelter, and vaccination to prevent disease for both humans and chickens.

2.2.7. Coordination of vaccination campaigns

One of the main activities conducted under the project was the preparation and coordination of ND vaccination campaigns and monitoring activities.

IRPC/Kyeema, DCA-IIAM, SPP Gaza and SDAE Massingir were involved in coordination for the distribution of vaccine. A total of 8,000 doses of vaccine were distributed for March/April campaign, 10,500 doses for July campaign and 12,000 doses for the November/December campaign.

IRPC/Kyeema in collaboration with SDAE Massingir conducted refresher training for the community vaccinators before each campaign, and provided assistance in the preparation for the vaccination campaigns.

2.2.8. Collection of serum samples

IRPC/Kyeema in collaboration with DCA-IIAM technicians (MINAG), collected pre- and post-vaccination campaign serum samples for testing at DCA, from 13 – 16 April and 15 – 19 June.

This activity was conducted to monitor the effectiveness of the vaccine and vaccination.

2.2.9. Revision and development of extension materials

The revision and compilation of extension materials was implemented during the project. IRPC/Kyeema distributed a ND control flip chart, a flip chart on healthy humans and

healthy chickens, a registration book, a pen, as well as a uniform (t-shirt and cap). A vaccination calendar for 2010 is being finalized at the printers (Estetica).

See Annex 5: Vaccination calendar for 2010.

2.2.10. Monitoring and technical backstopping

Monitoring activities were carried out in the project target area including a field visit by IRPC Director, Dr Robyn Alders, in May 2009. In the villages inside the LNP, the ND vaccination campaigns were well accepted by the majority of farmers, despite a small number of them refusing to participate in the vaccination program. The community vaccinators inside the LNP advised that they were satisfied with the campaigns and said that they received payment for their services.

During monitoring visits, IRPC/Kyeema evaluated the vaccination campaigns with the community vaccinators and SDAE Massingir technicians to learn about the experiences and constraints relating to the implementation of the program. The following constraints were presented:

- Farmers do not collect their chickens in advance of the vaccination campaigns;
- The emergence of other diseases that cause mortality in chickens;
- Lack of chicken housing; and
- Lack of collaboration and support of the community leaders in the sensitization of the campaigns.

During community consultations, farmers indicated that they do not provide poultry housing for their flocks because of concerns of theft, and also because of the belief that when one chicken is diseased all the chickens in close proximity will be affected. Chickens are housed overnight either with families in their homes or in the trees. The survival rate of newly hatched chicks is low. It has been reported that many newly hatched chicks do not survive because of predators.

Extension staff from SDAE Massingir have been active in the field accompanying ND control activities. During the visits the vaccinators' performances were considered satisfactory.

2.2.11. Support of Tufts Cummings School of Veterinary Medicine student's first year research project

IRPC/Kyeema supported the research projects of Samantha Swisher and Sarah Raabis, first year veterinary students from Tufts Cummings School of Veterinary Medicine, USA, from 9 June – 27 July.

Samantha Swisher's researched focused on village poultry production and meat consumption. See Annex 6: Assessment of village poultry production and meat consumption in Limpopo National Park and Surrounding Areas, by Samantha Swisher.

2.2.12. Coordination of activities with MINAG and communities

The project is built on cooperation and collaboration with MINAG, and local communities inside and in the support zone of LNP. The project was designed to ensure that the project added value to MINAG in their national ND control program.

All IRPC/Kyeema activities were closely coordinated with all levels of MINAG. The project was implemented so that IRPC/Kyeema field activities were carried out in association with the Massingir SDAE, to ensure that MINAG participation underpinned all of IRPC/Kyeema's field activities.

IRPC/Kyeema worked directly with the Massingir SDAE, SPP Gaza, and DCA. Continuous feedback was provided through meetings and through Activity Reports and training reports, which were submitted to the Massingir SDAE, SPP Gaza, and the Department of Veterinary Services (DVS).

IRPC/Kyeema supported SDAE Massingir to conduct monitoring of the vaccination campaigns by funding travel costs to visit the target communities.

2.3. Project results

2.3.1. Results from the April, July and December 2009 vaccination campaign

The project implemented ND vaccination campaigns every four months (i.e. in March/April, July and November/December), in accordance with the established vaccination calendar for I-2 vaccine in Gaza Province. The March and November campaigns were delayed in to the following months: April and December.

The successful implementation of vaccination campaigns involves community mobilization, recording the number of birds owned by farmers willing to pay for vaccination, ordering vaccine, collecting vaccine, conducting the campaign (including both vaccination and cost-recovery activities) and monitoring the progress.

Following 12 months of the project, the majority of community vaccinators advised that they were satisfied with the payment of birds during the vaccination campaign. In Mucatine, the community leader and vaccinator said that they were not interested in vaccinating their flocks as the community preferred to concentrate on the preparation of charcoal.

The table below provides data from the vaccination campaigns conducted in 2009.

Table 3: Results of the March/April, July and November/December 2009 vaccination campaigns.

		March campaign (2009)	July campaign (2009)	November campaign (2009)
--	--	------------------------------	-----------------------------	---------------------------------

Village	HH vilge	Chkns vac'd	HH vac'g	Av ckn /HH	% HH vac'g	Chkns vac'd	HH vac'g	Av ckn /HH	% HH vac'g	Chkns vac'd	HH vac'g	Av ckn /HH	% HH vac'g
Chibotane	156	386	30	12.9	19.2	514	41	12.5	26.3	314	22	14.3	14.1
Chinhangane	188	519	27	19.2	14.4	316	16	19.8	8.5	0	0	0	0.0
Chitar	115	240	25	9.6	21.7	363	38	9.6	33.0	0	0	0	0.0
Cubo	322	159	-	-	-	244	18	13.6	5.6	670	58	11.6	18.0
Macarringue	536	221	33	6.7	6.2	283	38	7.4	7.1	90	15	6.0	2.8
Macavene	92	599	57	10.5	62.0	661	36	18.4	39.1	211	7	30.1	7.6
Machaule	74	377	37	10.2	50.0	422	35	12.1	47.3	22	4	5.5	5.4
Madingane	97	269	24	11.2	24.7	438	37	11.8	38.1	0	0	0	0.0
Manhica	90	421	43	9.8	47.8	130	16	8.1	17.8	48	9	5.3	10.0
Massingir Velho	205	588	34	17.3	16.6	673	37	18.2	18.0	407	15	27.1	7.3
Mavoze	345	1327	161	8.2	46.7	535	35	15.3	10.1	278	45	6.2	13.0
Mucatine	258	68	8	8.5	3.1	0	0	0	0.0	0	0	0	0.0
Tilhovene	177	283	26	10.9	14.7	626	63	9.9	35.6	141	15	9.4	8.5
Zulo	108	102	10	10.2	9.3	148	9	16.4	8.3	44	9	4.9	8.3
Mean of all villages	2,763	5,559	515	10.5	21.1	5,353	419	12.8	15.2	2,225	199	11.2	7.2

A total of 5,559 chickens were vaccinated during the March/April campaign, 5,353 during the July campaign, and 2,225 during the November/December campaign.

The decline in the number of chickens vaccinated during the November campaign was anticipated because of the i) evolution of the chicken flock size; and, ii) the calendar of agriculture and poultry activities in the project area.

Based on research into the evolution of the flock of chickens, developed by Dr Brigitte Bagnol (IRPC Gender/Social Anthropology advisor), the chicken flocks reach their lowest number between Christmas and New Year. It is during November to January, that the chicken flock numbers are decreasing as it is a time where most rural families will consume chickens. This is also a hunger period, following the drought, and people will tend to sell their chickens for cash to buy staple food. (See page 14 of PRA Report by Brigitte Bagnol).

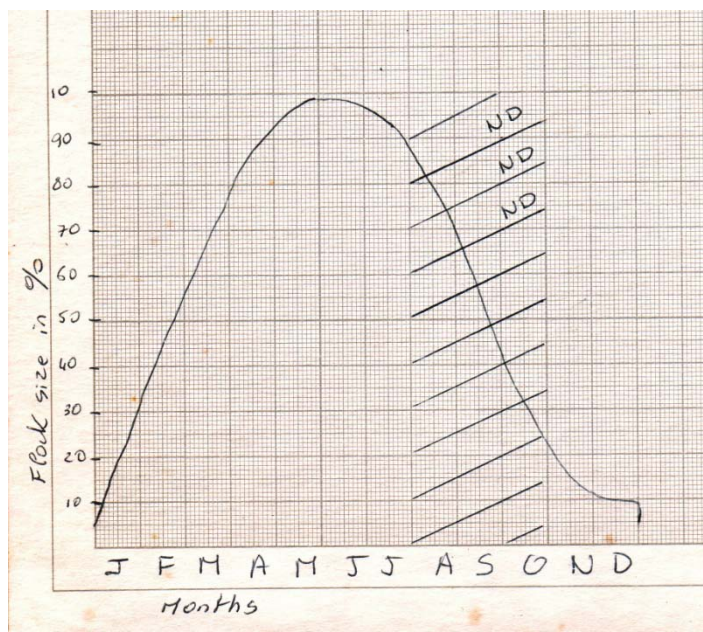


Figure 1: Evolution of flock size during the year and period of incidence of ND LNP (Graph from the PRA Report by Brigitte Bagnol, 2009. Submitted to AHEAD in the Six-monthly report)

Table 4: Calendar of agriculture and poultry activities in LNP, 2009

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
ND								X	X	X		
Rainy season	X	X										X
Hunger	X	X					X	X	X	X	X	X
Harvest			X	X	X							
High n° of chickens/ eggs				X	X							
Less chickens	X	X					X	X	X	X		

Table from: PRA Report by Brigitte Bagnol, 2009. Submitted to AHEAD in the Six-monthly report.

The impact of the project on the number of birds being vaccinated is can be seen in Table 5 below, by a comparative analysis of the number of birds vaccinated in 2007, 2008 and 2009 in the target villages.

Table 5: No. of birds vaccinated from the vaccination campaigns in 2007, 2008 and 2009.

Village	2007			2008			2009		
	March	July	Nov	March	July	Nov	March	July	Nov
Admin Post Mavoze									
Bingo	92	0	0	0	0	0			
Chibotane	435	246	0	0	0	0	386	514	314
Chimangue	0	0	0	0	0	0			
Macavene	312	223	279	0	0	0	599	661	211
Machamba	0	0	0	0	0	0			
Madingane	0	0	0	0	0	0	269	438	0
Massingir Velho	708	676	330	552	0	280	588	673	407
Mavoze	741	675	874	602	0	443	1,327	535	278
Muchaule	0	0	0	0	0	0	377	422	22
TOTAL	2,288	1,820	1,483	1,154	0	723	3,546	3,243	1,232
Admin Post Tihovene									
Cahane	143	0	0	0	0	0			
Chinhangane	712	562	673	0	0	186	519	316	0
Cubo	0	147	0	0	0	0	159	244	670
Decada da Vitória	0	0	0	0	0	0			
Ringane	0	0	0	0	0	0			
Tihovene	0	0	0	0	1266	0	283	626	141
TOTAL	855	709	673	238	1,266	186	961	1,186	811
Admin Post Zulo									
Chipandzo	0	0	0	0	0	0			
Chitar	162	220	0	0	0	0	240	363	0
Cuze	0	0	0	0	0	0			
Macaringue	306	850	193	238	0	0	221	283	90
Maconguene	0	0	0	0	0	0			
Macuachane	0	0	0	0	0	0			

Manhiça	0	0	0	0	0	0	421	130	48
Mucatine	0	0	0	0	0	0	68	0	0
Munhamane	0	0	0	0	0	0			
Tchake	0	0	0	0	0	0			
Zulo(1)	76	211	0	0	0	0	102	148	44
TOTAL	544	1,281	193	0	0	0	1,052	924	182
TOTAL SUM	3,687	3,810	2,349	1,392	1,266	909	5,559	5,353	2,225

- (1) ** Target villages under the project
 (2) Data provided by the Massingir SDAE.

The data in Table 5 shows a significant increase of the number of chickens being vaccinated from 2007 until 2009, under the AHEAD funded project.

The percentage of households vaccinating their flocks during the vaccination campaigns were 21.1% during March, 15.2% during July, and 7.2% during November. See Table 6 below.

Table 6: Number and percentage of households vaccinating their chickens during the 2009 vaccination campaigns

Village	Nº HH/ villages	1 st campaign		2 nd campaign		3 rd campaign	
		Nº of HH	% of HH	Nº of HH	% of HH	Nº of HH	% of HH
Chibotane	156	30	19.2	41	26.3	22	14.1
Chinyangane	188	27	14.4	16	8.5	0	0.0
Chitar	115	25	21.7	38	33.0	0	0.0
Cubo	322	-	-	18	5.6	58	18.0
Macarringue	536	33	6.2	38	7.1	15	2.8
Macavene	92	57	62.0	36	39.1	7	7.6
Machaule	74	37	50.0	35	47.3	4	5.4
Madingane	97	24	24.7	37	38.1	0	0.0
Manhiça	90	43	47.8	16	17.8	9	10.0
Massingir Velho	205	34	16.6	37	18.0	15	7.3
Mavoze	345	161	46.7	35	10.1	45	13.0
Mucatine	258	8	3.1	0	0.0	0	0.0
Tihovene	177	26	14.7	63	35.6	15	8.5
Zulo	108	10	9.3	9	8.3	9	8.3
Total	2,763	515	21.1	419	15.2	199	7.2

The implementation of the third vaccination campaign commenced in mid-December because of the delay in vaccine distribution and due to the commencement of the rainy season. Consequently, during the December campaign, the number of participating families in the December vaccination campaign was lower not only because of the planned sale and consumption of the chicken flocks but also because the majority of villagers were working in their fields planting their crops.

Future project activities should focus on increasing the number of households vaccinating in each village, particularly in increasing the number of chickens in households that have 1 or 2 chickens.

In relation to the overall impact of the project, there is little doubt that it had a significant influence in development a more robust approach to addressing ND by increasing the awareness and participation of ND control activities through the implementation of regular vaccination campaigns.

The project had a goal of increasing poultry productions as a means of enhancing food security and alleviating poverty. The project contributed to the improved household food security in the target villages through regular ND vaccination campaigns to control flock mortality. With the increased number of vaccinated chickens in 2009, participating households have been able to consume more chicken, and sell chickens for cash.

3. STRENGTHS & LESSONS LEARNT

3.1. Challenges

There were several significant challenges currently facing the project. These include the lack of cold-chain at the commencement of the project, the great distances within the park, the lack of a communication network, poor village leader support in some villages, and the lack of an appropriate project vehicle to work in the LNP and LNP support zones to implement the project.

Challenges and weaknesses:

- The lack of district staff capacity at SDAE Massingir is an issue for sustainability. The staff shortage creates difficulty in following up on vaccination campaigns and the timely collection of data.
- The production and distribution of the I-2 vaccine was delayed in December, causing the vaccination campaigns to be delayed. The delay then causes the poor participation in vaccination campaign due to the start of the rainy season and the planting of crops.
- Community vaccinators require more monitoring and support on how to fill in the registration books with the vaccination data.
- Objective 3 of the project was premature for the short length of the project. The failure to implement objective 3, was regrettable, however the project focused first on establishing effective an ND control program.
- Many farmers do not collect the chickens prior to the vaccination campaigns and community vaccinators are unable to vaccinate complete flocks of chickens.
- Another challenge at the community level is improving poultry husbandry practices in a cost-efficient manner. The community does not invest in overnight shelter for poultry because of theft, or the belief that keeping the birds together is not healthy because if one bird is sick, they all get sick.

- Farmers wanted information on ducks and duck rearing, as there is also high duck mortality in the area. Adult ducks are resistant to ND, therefore, this mortality is likely due to Duck Viral Enteritis.

3.2. Strengths and achievements

Strengths and achievements

- The establishment of a cold chain system at Massingir SDAE. This included the purchase and delivery of a 60 L refrigerator on 17 March, 2009, in preparation for the April 2009 vaccination campaign, and 2 x cooler boxes with ice packs.
- The project has been gender sensitive and gender responsive. Women farmers participated in vaccination campaigns which have contributed towards the increase in chickens, opportunity to cash income, and their empowerment.
- MINAG cooperation and commitment the project activities enabled the achievement of objectives, particularly in the preparation and implementation of vaccination campaigns.
- An excellent harmonious partnership between IRPC/Kyeema and SDAE Massingir has enabled strong gains and support to be made that would have been difficult for the project operating in isolation.
- By the end of the project farmers started to complain that they have little knowledge on managing other poultry diseases and parasites, a sign that their interest in poultry husbandry is growing.
- The manner in which the project management, data collection, and M&E processes were undertaken in conjunction with MINAG has developed local capacity in these areas that can be utilized in future projects.
- The commencement and implementation of the project in LNP and the support zone has laid the platform for future action. The project has enabled real gains to be observed and assessed, providing valuable lessons for the extension or future project activities.
- Preliminary steps have been made with MINAG to establish a medium technician to be based at the SDAE in Massingir.
- The Massingir SDAE is committed to the continuation of future project activities to strengthen and sustain the activities and recommendations identified in this report.

4. CONCLUSIONS & RECOMMENDATIONS

4.1. Recommendations

The recommendations include the following points. These recommendations need to be considered for the improved implementation of the project and for any future project:

- The ND control program should be a model that is adopted as a mid to long-term approach to address ND to allow the completion and full impact of an ND program to be demonstrated.

- Additional activities and awareness is needed with village leaders and chiefs. It is necessary for village leaders/chiefs to be aware and support the project activities. The project will focus on activities to encourage further village leader input to the project. Active village leaders/chiefs have a positive effect on the participation of the community during the vaccination campaigns.
- Additional extension materials (posters and pamphlets) on poultry husbandry, including building chicken housing, providing alternative feed to the chickens, pest/external parasite control, is recommended to help raise awareness and information on improving lost-cost poultry husbandry experimentation.
- An increase in staff capacity is required at the district level to focus on providing continual support to communities in monitoring and providing technical backstopping to the area. In addition, increased staff capacity at the district level would reflect on the timely collection of data as well as the provision of support to community vaccinators.
- More attention needs to be paid to the registration books to ensure that vaccination data is being recorded correctly.
- Additional encouragement from the community vaccinators and village leaders to the communities to collect their flocks the day before the vaccination campaign is required. This will benefit both the farmers as well as the community vaccinators.
- The collection and/or tabulation of chicken mortality data (e.g. epidemiological, economic) are vital to assist in highlighting the impact that ND control is having on the communities. This activity would require additional funding.
- The investigation of the cause of death of ducks and guinea fowl, in conjunction with the epidemiological study of chicken mortality as well as the investigation of activities to reduce duck mortality.
- The implementation of the project activities should be continued throughout the upcoming year (2010), particularly the establishment of an effective and sustainable ND control program and to compare the data over two consecutive years.

4.2. Conclusion

With the US\$ 45,550 funded by the WCS, IRPC/Kyeema worked in 14 villages, indirectly reaching a total population of 17,792.

There was considerable progress and success over a limited period (13 months), on an issue that clearly requires a long term and strategic approach. The groundwork for such an approach was put in place. While capacity has undoubtedly been increased, further external input will be required to ensure that the project activities come to fruition and are sustained.

The project has made significant progress in raising-awareness of ND and coordinating ND control activities in the target communities. The participation in vaccination campaigns is increasing, with the implementation of the second vaccination campaign (July campaign) currently taking place. The target communities in the LNP and the LNP support zone now have broader knowledge on the clinical signs of ND and the benefits of vaccinating against ND as well as issues of related to the nutritional value of eggs and chicken. The number of

chickens vaccinated in 2009 has more than doubled from the number of chickens vaccinated in 2008. IRPC/Kyeema Foundation recommends that any future activities should now focus on increasing household participation in the vaccination campaigns in the project villages.

IRPC/Kyeema recommends supporting the project activities to build on the initial impact of the project, and to help the community vaccinators develop their ND control activities, and to enable communities to take control of their future direction.

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ANNEX 2: FINANCIAL REPORT

Type of Expense	Description	Budget	Spent to 19 February 2010	Remaining
Salaries Field / Staff and Assistants	Staff and assistants	12,600.00	19,069.52	- 6,469.52
Purchased Services		-	-	-
Equipment \$250-\$5,000	Vaccinator's kits	720.00	511.77	208.23
Equipment over \$5,000		-	-	-
Expendable supplies and materials	Training materials	2,300.00	3,693.70	- 1,393.70
Repairs and maintenance	Equipment and office maintenance	3,600.00	827.55	2,772.45
Food/per diems	696 people and \$31.39/day	21,850.00	15,745.73	6,104.27
Communications	Meetings	800.00	198.68	601.32
Postage and freight		-	-	-
Travel	Airfares, vehicle transport	3,500.00	4,938.85	- 1,438.85
Miscellaneous	Bank fees	180.00	271.42	- 154.56
	TOTAL	45,550.00	45,320.36	229.64

As of 19 February 2010.

ANNEX 3: PHOTOGRAPHS



Photo 1: Kyeema’s veterinarian, Dr Ana Zandamela, assisting with the November vaccination campaign in Tihovene. (Photo by Louise Grayson).



Photo 2: Kyeema’s veterinarian, Dr Ana Zandamela, showing a farmer how to hold this chicken during the November vaccination campaign in Chibotane. (Photo by Louise Grayson).



Photo 3: Chicks being vaccinated during the November campaign in Tihovene. (Photo by Louise Grayson).



Photo 4: Close up of a chick being vaccinated during the November campaign in Tihovene. (Photo by Louise Grayson).



Photo 5: Doses of I-2 ND vaccination at SDAE Massingir, November. (Photo by Louise Grayson).



Photo 6: SDAE Massingir, November. (Photo by Louise Grayson).



Photo 7: Female farmer and son carrying chickens to be vaccinated during the November campaign. (Photo by Louise Grayson).



Photo 8: Vaccinator at Tihovene vaccinating a female farmers chickens. (Photo by Louise Grayson)



Photo 9: Female vaccinator from Mucavene during the November vaccination. (Photo by Louise Grayson).



Photo 10: Chickens in Mavoze, November. (Photo by Louise Grayson).

Improvement of village poultry production by communities in the Limpopo National Park Support Zone in Gaza Province

Internal evaluation

Gaza Province (17 to 23 January 2010)

**By Brigitte Bagnol
Gender/Social Anthropology Advisor**



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ABBREVIATIONS

ACIAR	Australian Centre for International Agricultural Research
AHEAD	Animal and Human Health for the Environment and Development
CAHW	Community Animal Health Worker
DPA	Provincial Directorate of Agriculture
HH	Household
LNP	Limpopo National Park
ND	Newcastle disease
PME	Participatory Monitoring & Evaluation
PRA	Participatory Rural Appraisal
SDAE	District Services of Economic Activities
SMS	Subject Matter Specialist
SPA	Provincial Agricultural Services
SPER	Provincial Rural Extension Services
SPP	Provincial Livestock Services
ToR	Terms of Reference
WCS	Wildlife Conservation Society

In January 2010

1 US\$ = 30 MZM

1 Rand = 4.2 MZM

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1. INTRODUCTION

The International Rural Poultry Centre (IRPC) of the Kyeema Foundation undertook Newcastle Disease control activities to improve village poultry production in and around the Limpopo National Park (LNP). The LNP was created in 2001 and affects approximately 27,000 people. Of these, approximately 6,000 live inside the park and the remaining people are located in the buffer zone. Households living inside the park will be resettled in the buffer zone or in the periphery of the park.

The project was financed by AHEAD/WCS and had a duration of one year with a beginning in January 2009. Three vaccination campaigns using I-2 were carried out in March/April, July and November/December 2009. The project trained 21 vaccinators (10 in the NLP and 11 in the buffer zone or resettlement area).

ND is a high-risk factor to chicken-raising with a mortality rate ranging in village flocks between 50% and 100% (Mavale, 1995; Wethli, 1995; Harun and Massango, 1996). 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).

Improving the quality of poultry health services, their reliability and accessibility to small farmers offer an opportunity to increase inadequate household incomes and to curtail food shortages. The introduction of a thermotolerant ND vaccine into a region with an adequate extension package offers us a possibility to contribute to the relief of extreme levels of poverty registered in Southern African countries.

The objectives of the projects were:

1. The control of ND in village poultry;
2. Improved village poultry husbandry and management;
3. The development of poultry products suitable for sale to tourist centers; and
4. Improved household welfare, including improved nutrition and food security.

During the mission carried out between the 17 and the 23 January 2010, the gender/social anthropologist was requested to determine whether the project has achieved its project goal of improving the livelihoods of resource poor households, through improved village poultry production. (see Annex 1: Terms of Reference (ToR):

- To determine the extent to which the project goal and objectives have, or have not, been fulfilled during the project cycle.
- To assess the extent to which target villages have engaged in vaccination campaigns after receiving training and whether any benefits are contributing towards sustainability.
- To assess the increased awareness of the benefits of vaccinating against ND.
- To evaluate whether the project has improved food safety practices and information on nutrition.

- To find out the impacts that the project has had on the communities and individual households, both positive and negative.
- To observe the strength of community support for the project.
- To evaluate the efficiency of the project outcomes for rural advancement of the women inside and outside the LNP.

In order to carry out this task, several meetings were held with the SPP Gaza, SDAE Massingir, vaccinators and beneficiaries of vaccination campaigns (see Annex 2: List of people met and activities undertaken).

2. BACKGROUND INFORMATION ON THE LNP AND AREA OF PROJECT IMPLEMENTATION

The Limpopo National Park (LNP) created in 2001 spreads over three districts Chicualacula (59%), Massingir (35%) and Mabalane (15%). As the map below shows it has its border defined by the Limpopo river on the East, the Elephant river at South. There approximately 26,535 persons inside the park. The villages along the Shingwedzi river are the one whose population need to be displaced. The population started to be displaced slowly.

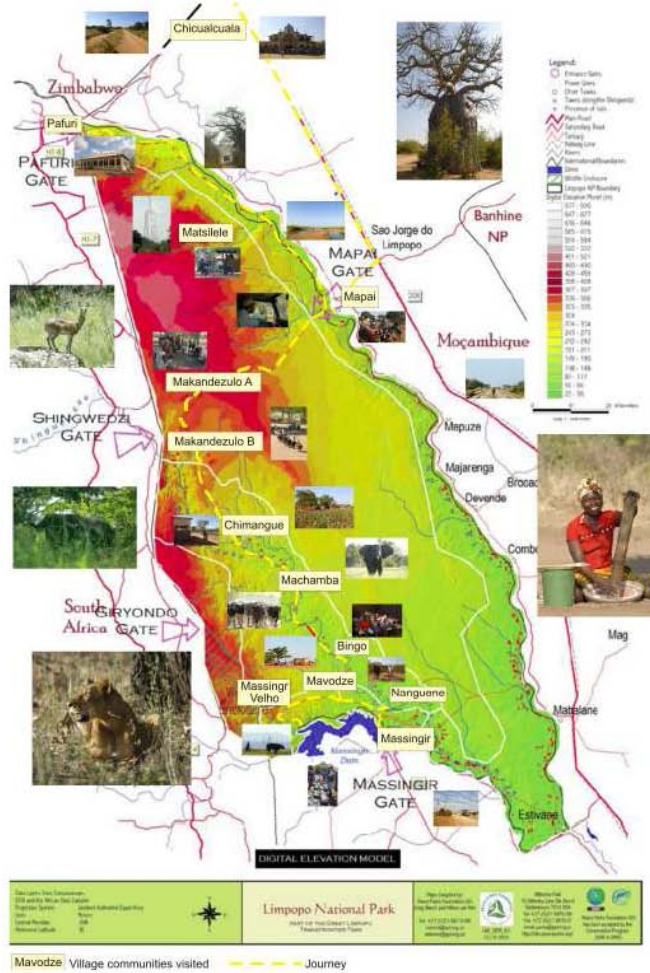


Figure 1. Map illustrating journey and places visited

Figure 1: Limpopo National Park (From: Ministry of Agriculture and Ministry of Tourism, 2007)

The IRPC/KYEEMA project was implemented in a total of 14 villages, 7 inside the park and 7 outside the park. Table 1 below indicates the different villages where vaccination activities were carried out.

Table 1: *Village participating in the project.*

PA Mavoze	Villages inside the park	Villages outside the park
Chibotane	X	
Macavene	X	
Madingane	X	
Massingir Velho	X	
Mavoze	X	
Muchaule	X	
PA Tihovene		
Chinyangane		X
Cubo		X
Tihovene		X
PA Zulo		
Chitare		X
Macaringue	X	
Manhiça		X
Mucatine		X
Zulo(1)		X

3. EXPERIENCES WITH VACCINATION CAMPAIGNS AGAINST ND PRIOR TO THE BEGINNING OF PROJECT ACTIVITIES

The district of Massingir was one of the first districts to benefit from ND control in 1998 through vaccination campaigns every four months carried out by community animal health workers (CAHWs) with the support of VetAID (a British NGO with a livestock development project in Gaza Province) (Bagnol, 2000). The vaccine chosen was NDV4-HR administered via eye drop, due to its low cost, ease of use and conservation, safety and easy substitution by Vaccine I-2, which has been produced in Mozambique since 1999 within the framework of the ACIAR Project (Pagani: 1999 quoted in Bagnol, 2001).

From the beginning, payment of the vaccines was introduced in all areas, pamphlets having been distributed through the CAHWs to the poultry farmers, on the vaccination and the price. The price of 300 MZM per bird vaccinated covered the costs of the labour of the CAHW and the cost of the vaccine (Pagani: 1999 quoted in Bagnol, 200X?). By the end of 1998 audio cassettes about ND control produced by the ACIAR Project and INIVE were duplicated and distributed (with songs and radio programs in Portuguese, Shangana and Chitswa) to poultry farmers (Bagnol, 2000).

Some of the CAHWs still working in the area were trained in 1999 and vaccination campaigns have been carried out since then with support from the government services after VetAID left. However, at the start of the AHEAD project, the activity was registering serious difficulty due to the lack of transport for distribution of the vaccine, the lack of a refrigerator at the district agriculture office to keep the vaccine and lack of

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per-diem for the staff to do the supervision in the field and contact the vaccinators/CAHWs. The vaccinators only carry out vaccination against ND while CAHWs are involved in all veterinarian activities such as the caring for cattle and goats.

In 2006 a total of 10 vaccinators were trained by district services. Table 1 below shows the evolution of the number of birds vaccinated during the 3 campaigns of 2007 and 2008. In Annex 3 the same data are available per village.

Table 2: *Number of birds vaccinated with I-2 ND vaccine per campaign in 2007 and 2008*

AP	March 07	July 07	Nov. 07	March 08	July 08	Nov. 08
AP Mavoze	2288	1820	1483	1154	0	723
AP Tihovene	1161	1559	866	238	1266	186
AP Zulo	238	431	0	0	0	0
GENERAL TOTAL	3687	3810	2349	1392	1266	909

The data available show that the number of birds decreased from 6687 birds in March 2007 to 909 birds in November 2008. Vaccination activities in November 2008 were very poor due to two consecutive bad harvests in September/November 2007 and 2008. Most of the birds were sold to buy food. Similarly cattle were sold showing the seriousness of hunger. In addition to this factor, vaccinators mentioned the farmers' lack of money to pay for the vaccination and the lack of supervision by district services.

Each bird vaccinated was charged 0.5 MZM. All the money was for the vaccinator/CAHW. The price of the vial is not charged to the vaccinator.

In general, experience of farmers with vaccination was good especially in Mavoze and Massingir Velho. In Chinyangane the women complained that in 2007 after the vaccination campaign the chickens died and they suspect that the vaccination was carried too late with an outbreak already underway in the village.

In the district of Massingir there were two extension workers who are already trained to carry out and supervise ND control.

4. EXPERIENCES WITH VACCINATION CAMPAIGNS AGAINST ND DURING KYEEMA PROJECT ACTIVITIES

With the beginning of the implementation of the IRPC/KYEEMA project 21 vaccinators (10 women and 11 men) were trained in March 2009 during a period of three days. Ten vaccinators were selected in the 7 villages inside the park and 11 were selected from the 7 villages outside the park. In June and October 2009 a one day refreshment training was carried out.

Data in Table 3 and Figure 2 below show the evolution of the coverage of vaccination campaigns against ND in 2007, 2008 and 2009. Since the beginning of IRPC/KYEEMA

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project in the first campaign of 2009 the number of chickens vaccinated rose significantly.

The low coverage in November/December 2009 is due to the fact that it started raining before the vaccination campaign and farmers were all involved in the preparation of the fields and seedling and very few people were left in the village to vaccinate.

During last campaign there were difficulties because people were in the fields and children were grazing the cattle. (Mavoze, vaccinator 18/01/10)

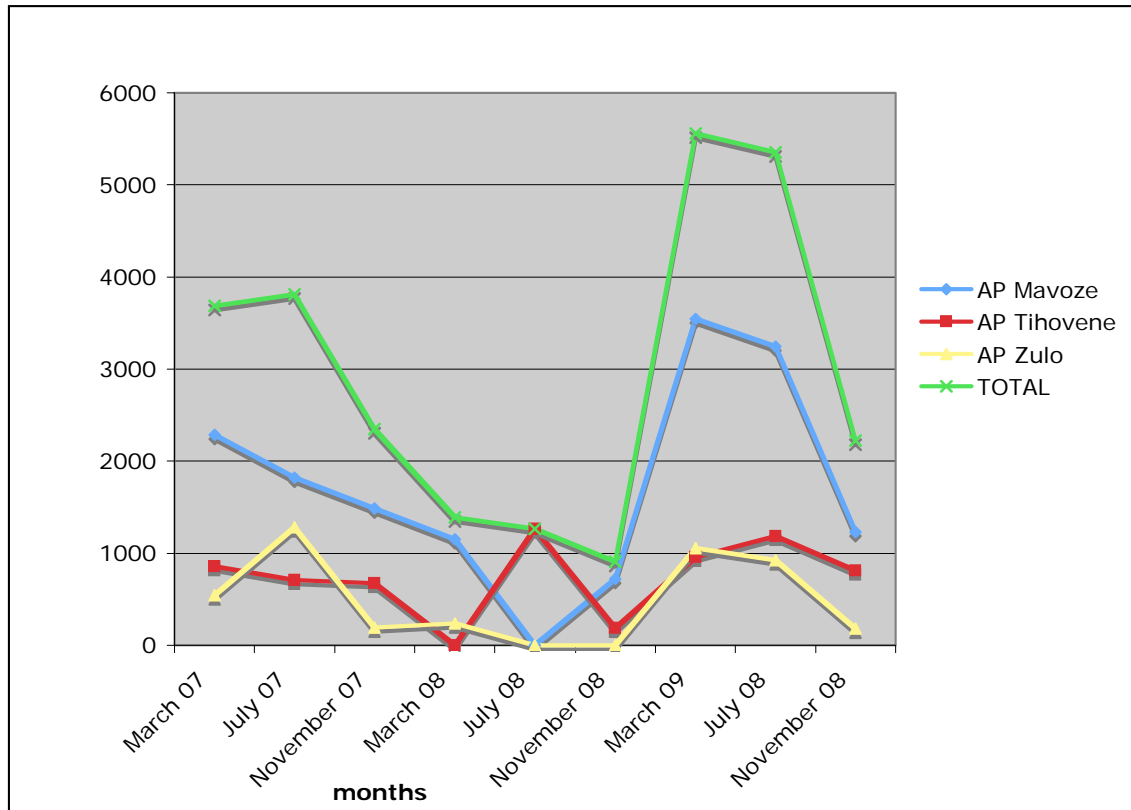
November is also the period of hunger when the granary are empty and people have no money, they are selling chickens to buy food and are not very willing to vaccinate chickens that they are going to sell soon or consume during the feast of Christmas and New Year.

In July and in November we did not vaccinate. In July people did not want to catch the birds. In November people said they had no money. They said they wanted to sell the birds during the festive period. I do not want to be vaccinator any more. You need to find another person. It is better to choose somebody else. I was trained in 2005 [and also received refresher training through this seed grant]. And at the beginning the people were less reluctant. People do not vaccinate all the chickens so that the non-vaccinated birds die. And for them even when they are dead it is meat. They want to do charcoal and they stay in the bush all day. They do not want to catch the birds. We had the same problem with the agricultural association. Nobody wanted to participate. (Cacilda Mundlovo, female vaccinators, Mucatine, 21/02/10)

Table 3: Number of birds vaccinated with I-2 ND vaccine per campaign in 2007, 2008 and 2009

Adm Post	March 07	July 07	November 07	March 08	July 08	November 08	March 09	July 09	November 09
AP Mavoze	2288	1820	1483	1154	0	723	3546	3243	1232
AP Tihovene	855	709	673	0	1266	186	961	1186	811
AP Zulo	544	1281	193	238	0	0	1052	924	182
TOTAL	3687	3810	2349	1392	1266	909	5559	5353	2225

Figure 2: Graph of the number of birds vaccinated per campaign in 2007, 2008 and 2009



5. IMPACT OF VACCINATION CAMPAIGNS

The focus group and PRA exercises carried out in January 2009 and January 2010 determined the patterns of production of chicken within this specific economical and ecological system.

Participants explained that they raise cattle, goats, sheep, chickens and chickens. The most valuable animals are cattle but not everybody owns them. Goats are the most popular after the chickens. Cattle are valued both because they allow men to give bride-wealth to the bride family (“lobolo”) and can be sold in time of hunger. Goats can be sold in time of need. However it is easier to sell a chicken than a goat. Thus, even if cattle are most valued by men and women they mentioned that chicken and goats are more important for their livelihood. Animal traction is also quite common and cattle are used to plough and to cart water, the harvest, construction material and other goods.

The rainy season usually occurs from November to February with harvest starting in March and being carried out until May. It is with the beginning of the rain and with the harvest that chicken flock raise because there is more food available and more possibility

to hide from predators in the grass. Table 4 below depicts the agricultural and chickens breeding calendar.

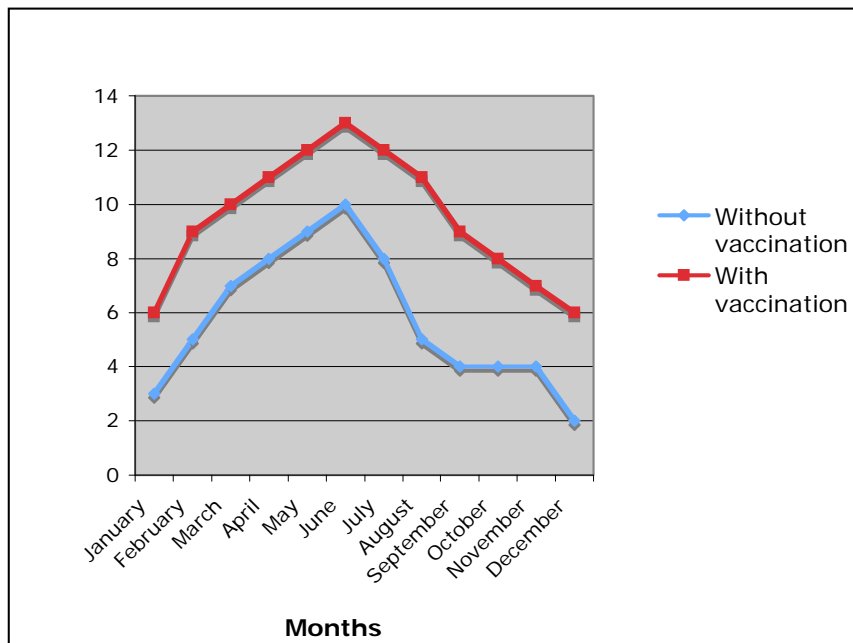
Table 4: Agricultural and chicken-breeding activity in Limpopo National Park

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
ND								X	X	X		
Rainy season	X	X										X
Hunger	X	X					X	X	X	X	X	X
Harvest			X	X	X							
High n° of chickens/ eggs				X	X							
Less chickens	X	X					X	X	X	X		

During the months of January and February there is no food for people or chickens, and people sell their chicken to buy staple food, hence the low number of chickens available. The flocks reach their lowest levels between Christmas and New Year. It is during this period of celebration of the festive season that most rural families eat chicken for the first and only time in the whole year.

Table 3, below has been developed based on data collected with participants as well as with quantitative data collected by vaccinators as the result of their activities. However it is an estimative of the evolution of the flock size. It does not show the chicken eaten and sold as a result of the increased reproduction of the flock. It is an estimate of the evolution of the flock size during the year.

Figure 3: Estimated evolution of flock size during the year with and without vaccination



The graph without vaccination shows the estimated evolution of the flock due to the fear of ND (people sell or eat chicken before the outbreak of August/September/October) and resulting from the death during the outbreak itself. With vaccination the flock size is larger than without vaccination and people are more likely to have more animal to sell during the hunger period from September to March.

5.1 Ownership

Most of the activities related to chicken raising are under the responsibility of women and girls. With vaccination women contribution to the household increases. Access to money to face daily needs is facilitated.

Due to the fact that people believe that each individual can have “luck” for certain activity or species. People use to test their family members including their children. For this reason often children are given birds to raise and they can use them to support them for school material and clothes.

The birds translate into petty cash, the smallest bank or purse which is managed by women. Women usually take care of the birds and manage the money to pay for the household expenses.

5.2 Husbandry

The birds usually live outside and roost in the trees. As a consequence, people have difficulties to isolate the chickens when there is an outbreak and to catch the chickens to vaccinate. Usually birds scavenge during the day and come back at night to sleep on the trees around the house.

Data from the study carried out by Swisher¹ (2009) indicates that villages inside the park had more chickens of all age classes than villages outside the park. In all villages the husbandry practices were similar and in most cases the chicken roosted in the trees, except in Manhica where many people had chicken houses.

5.3 Consumption

People eat chickens very rarely and mainly when they have visitors or during festive season, for Christmas and New Year. Eggs are also very seldom eaten. Men are more likely to eat eggs than women due to cultural reason. Participants explained that there is less strict division of the part of the chickens according to sex and age than in the past. However, they still mentioned that wings are for children, the legs for women, the liver for the mother and the gizzard for the father. They do not eat the head of the chicken.

Data from Swisher (2009) indicates that chicken was mostly eaten once a year around Christmas. When families ate chicken all family members were allowed to eat, however

¹ The study uses information gained from four villages, in June/July 2009 two inside (Mavoze & Massingir Velho) and two outside the park in the support area (Mucatine & Manhica). The method of selection was not mentioned in this report, thus we cannot assume that it is representative of the population.

if there was not enough adult men had the priority. The eating of eggs was a rare occurrence the main reason being that it is more important to have more chickens (Swisher, 2009).

I exchange chickens with rice... I only eat when there is a visitor. Since I vaccinate my chickens I eat more birds. The production improved and I eat more... (Man, Massingir Velho 18/01/10)

According to participants with the increase of flock size resulting from the vaccination campaigns, they ate more birds than in the past.

I do not eat chickens. This thing in this area of not eating chickens it is due to poverty. To be able to eat chicken you need to have cattle, goats and chickens. We do not have work. We would like to eat chicken but we cannot kill a bird to eat when we do not have food and eat the chicken alone. No, it is better to take the bird and exchange it for rice. On Christmas day you can kill a bird or a goat. I did not kill even a chicken. I had none. I sold all the chickens to buy food. I have children and they do not work. They are in my hand. It is why I do not have food. (Female farmers, Massingir Velho, 18/01/10)

5.4 Sale

When they need cash, people usually sell chickens in their own neighbourhood or by going to the district capital. It is often by selling birds that a family can afford to pay the healer, the health centre or the school fees, buy soap and oil. Selling animals serves as a buffer and allows households to buy food in time of hunger. There are no passing traders that sell and buy chickens in most of the villages inside the park.

According to participants the price of chicken is stable being 100 MZM for a big bird and 50-80 MZM for a medium one. People never sell eggs.

With the increase of flock size due to the vaccination campaigns, participants were unanimous in saying that the sale of chickens increased.

5.5 Knowledge of ND, aetiology of the disease and ND control

People characterise “*muzungo*” as a disease that kills most of the chickens every year and whose clinical signs are those of ND. It occurs generally between August and September. People seem to know the signs quite well.

When the birds are sick they do not know anything, they let the birds die and then bury them. However most of the people kill and eat the sick chickens before they die.

I really thank the Project because since it started we had no chicken mortality. Now I have around 70 chickens thanks to vaccination. The production increased. The only problem now is the swelling of the eyes, mainly with the chicks. But, in relation to adult birds, since the Project started the production increased. I am a chicken producer. Birds have a lot of importance because with them I can buy products of first need. It is not like goat and cattle which are more expensive and that are more difficult to sell than chickens. (Man, Madingane, 19/01/10)

With the project intervention most of the people now are aware that it is possible to avoid ND through vaccination. However, a significant number of people still do not adopt this methodology as they fear that it will bring disease and kill their birds.

Since the Project started, vaccinated chickens do not die. All the people who vaccinated had no problem. In 2009 there was no disease. In 2009 even the people who did not vaccinate had no problem during the outbreak period. (Male leader, Chibotane 20/01/10)

In Mucatine there was no vaccination campaign in July and in November. The people are extremely reluctant to participate and the vaccinator Caçilda Ndlovo asked to be substituted as she received no support from the community and the leaders.

Sr. Pass, veterinary technician: *Here in Mucatine we have a problem with vaccination since 2005. But we have been insisting. In November 2009. I came personally and give the vials of vaccine and sat with the two vaccinators and the leader, so that they can assume responsibility for the vaccination. But, even like that they did not manage.*

Community leader: *The people know about vaccination but they are not vaccinating. If it was possible to give vaccine to eat and not to have to catch the bird it would be better.*

Female vaccinator: *If there was an incentive to pay the children to catch the chicken maybe it was possible to help. But as I do not receive a salary to pay for chickens. Even when a person wants to eat a bird, they ask children to catch it and in exchange they give them the feet and intestine. (Mucatine, 21/01/10)*

In Mucatine, after discussion with leaders it was decided to remove the project activity from the village.

In 2005 we vaccinated against ND while the disease was already there and since then the farmers do not trust. They say that the vaccine kills the birds. Also when you took blood sample, they said that the chickens died. (Female Vaccinator, Samaria Balane, Chitar)

As the quote above showed, in Chitar the farmers complained but vaccinated few birds.

5.6 Other problems with chickens after vaccinating against ND

The main problem mentioned after ND vaccination campaign was fowl pox, “*variola aviaria*” in Portuguese (swollen eyes, blindness) that kills chicks and adult birds (although mortality is usually lower than that caused by ND). This situation was found as the first problem in all villages.

Male leader: *There is a weak participation because after vaccination the chickens get swollen eyes and die. This is mainly with chicks. This happened after the July vaccination.*

Man: *This disease existed before but not all chickens died. Before it was ND that killed all chickens. (Chinangane)*

Table 4: Identification of problems after vaccination in Mazove

	Men	Women
Fowl pox/Swollen eyes/ <i>variola aviária</i>	36	43
Greenish saliva	7	23
Diarrhoea	15	40

6. ANALYSIS OF VACCINATION CAMPAIGNS

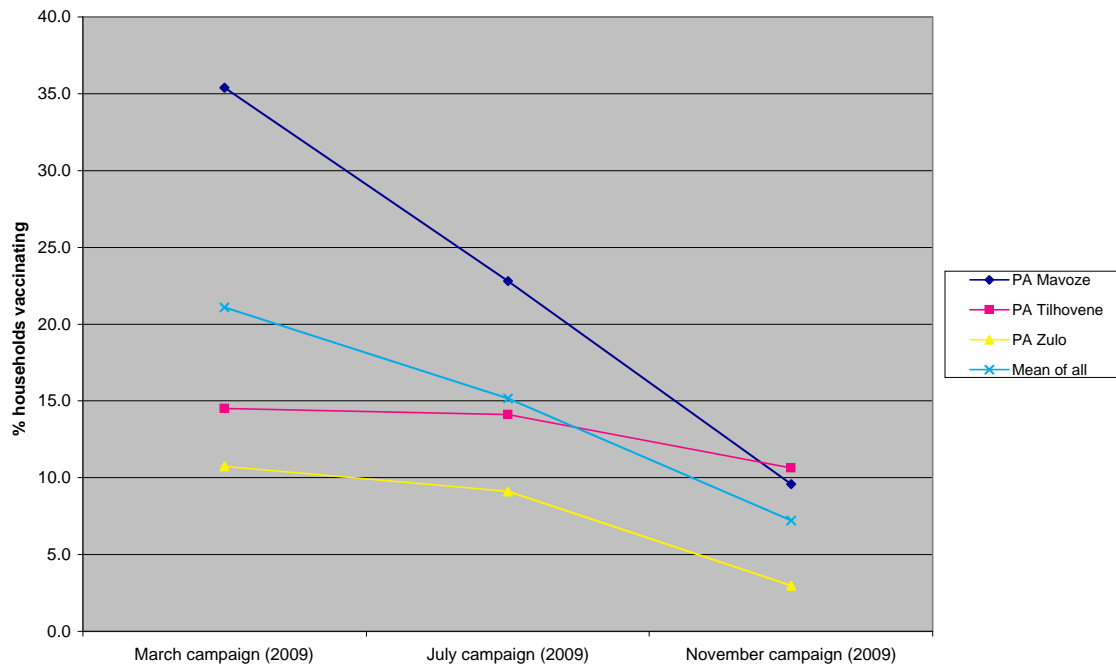
As shown in Table 5 below, the highest number of chickens vaccinated was reached in March 2009 with a total of 5,550 birds. In July 2009 the number slightly decreased to 5,353 birds. The lowest coverage is reached in November 2009 with only 2,225 birds vaccinated. This situation, as seen above, is consistent with the evolution of the flock during the year and the fact that people are more likely to have money in March, while in November, due to the hunger period people have less money, less chickens and are not willing to vaccinate the few birds left that they are expecting to sell to buy food or eat during the feasts.

Table 5: Analysis of the three vaccination campaigns of 2009

Village	HH in village	March (2009)				July (2009)				Nov (2009)			
		Chkns vacc'd	HH vacc'g	Av ckn /HH	% HH vac'g	Chkns vacc'd	HH vacc'g	Av ckn /HH	% HH vac'g	Chkns vacc'd	HH vacc'g	Av ckn /HH	% HH vac'g
PA Mavoze													
Massingir Velho	205	588	34	17.3	16.6	673	37	18.2	18.0	407	15	27.1	
Mavoze	345	1327	161	8.2	46.7	535	35	15.3	10.1	278	45	6.2	
Macavene	92	599	57	10.5	62.0	661	36	18.4	39.1	211	7	30.1	
Machaule	74	377	37	10.2	50.0	422	35	12.1	47.3	22	4	5.5	
Chibotana	156	386	30	12.9	19.2	514	41	12.5	26.3	314	22	14.3	
Madingane	97	269	24	11.2	24.7	438	37	11.8	38.1	0	0	0.0	
Total	969	3546	343	10.3	35.4	3243	221	14.7	22.8	1232	93	13.2	
PA Tilhovene													
Tilhovene	177	283	26	10.9	14.7	626	63	9.9	35.6	141	15	9.4	
Cubo	322	159		0.0	0.0	244	18	13.6	5.6	670	58	11.6	
Chinhangane	188	519	27	19.2	14.4	316	16	19.8	8.5	0	0	0.0	
Total	687	961	53	15.1	14.5	1186	97	12.2	14.1	811	73	11.1	
PA Zulo													
Chitare	115	240	25	9.6	21.7	363	38	9.6	33.0	0	0	0.0	
Zulo	108	102	10	10.2	9.3	148	9	16.4	8.3	44	9	4.9	
Mucatine	258	68	8	8.5	3.1	0	0	0.0	0.0	0	0	0.0	
Manhica	90	421	43	9.8	47.8	130	16	8.1	17.8	48	9	5.3	
Macarringue	536	221	33	6.7	6.2	283	38	7.4	7.1	90	15	6.0	
Total	1107	1052	119	8.8	10.7	924	101	9.1	9.1	182	33	5.5	
Mean of all Villages	2763	5559	515	10.5	21.1	5353	419	12.8	15.2	2225	199	11.2	

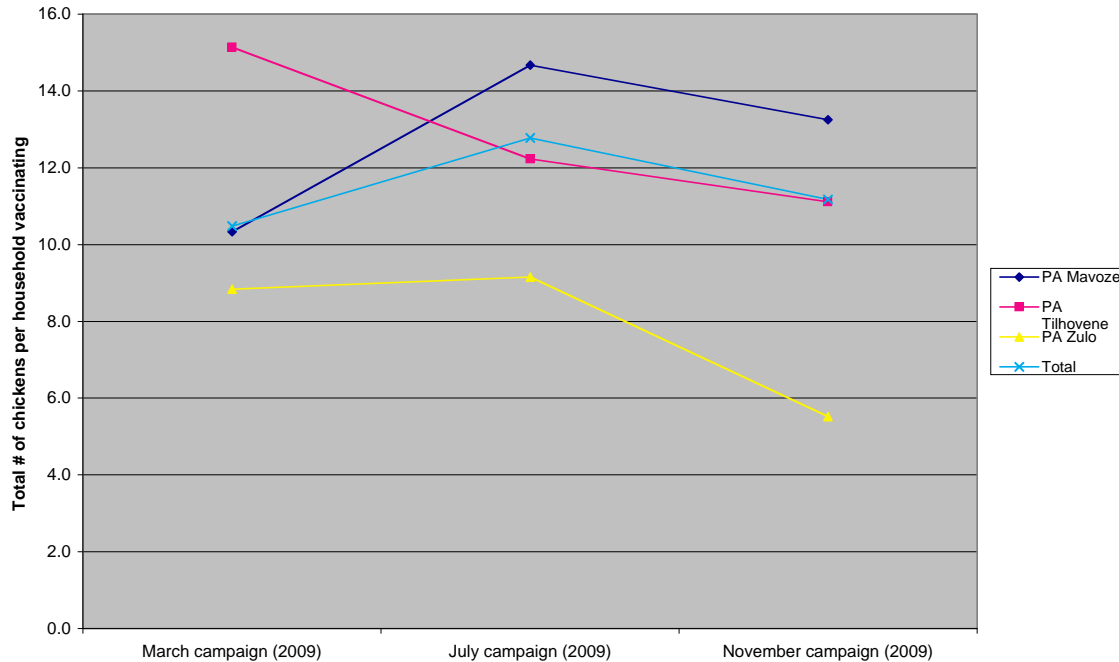
Similarly the percentage of households vaccinating in all villages decreases from 21.1% in March 2009 to 15.2% in July 2009 and 7.2% in November 2009. The Administrative Post of Mavoze shows the highest coverage in March 2009 with 35% of households vaccinating, while the Administrative Post of Zulu in November 2009 indicates a coverage of only 3% of households vaccinating.

Figure 4: Mean of households vaccinating per Administrative Post



If we analyse the average number of chicken vaccinated per household we can observe that the mean in all villages is 10.5 birds in March 2009. It increases to 12.8 birds in July 2009 and decreases to 11.2 birds in November 2009. The mean per Administrative Posts shows huge disparity. The Administrative Post of Tihovene registers the highest average in March 2009 with an average of 15.1 birds vaccinated per household while the Administrative Post of Zulu indicates an average of 5.5 birds vaccinated per household in November 2009.

Figure 5: Average number of chickens per household vaccinating, per Administrative Post



Data collected in vaccinators book shows a difference between campaigns in relation to the total number of chicken vaccinated, the number of households involved and the average number of chickens per household.

Table 6: Analysis of individual data from four vaccinators

Village	Vacc.	March			July			November		
		HH	N° birds	N°/HH	HH	N° birds	N°/HH	HH	N° birds	N°/HH
Madingane	David	24	269	11.2	37	438	11.8	0	0	0
Macaringue	Generosa	33	221	6.7	38	283	7.5	10	48	4.8
	Rosa	0	0	0	0	0	0	5	42	8.4
Macavene	Vodia	49	599	12.2	36	661	18.3	7	211	30.1

The percentage of households vaccinating during the second and third campaigns also varies from village to village. In Madingane 32% of farmers vaccinating vaccinated twice and none vaccinated three times. In Macaringue data from Generosa indicates that 14% of vaccinating households vaccinated twice and 10% vaccinated three times.

6.1 Coordination with community leaders

Although the community leaders were not invited to participate in the training, they seem well involved in the activities and willing to support the vaccination campaign. None of the vaccinators complained of lack of support on the contrary all leaders were present in the meeting held during the evaluation.

Any activity in the village I am informed and I disseminate the information. I give support to the vaccinator. In relation to the payment of the vaccinators, it is necessary to coordinate with the vaccinator, so that they find alternative. They can give eggs, chickens, maize. It is necessary to coordinate with the vaccinator in relation to payment. (Madingane, Male community leader, 19/01/10)

6.2 Payment of vaccination to vaccinators

Payment of the vaccination is an issue that needs to be monitored to make sure that vaccinators get a compensation for their work and that they are going to be able to pay for the vials they received and continue to carry out the following campaigns. Payment can be done straight away in cash or product or delayed depending on the agreement between the vaccinator and the producer.

The majority of the people pay, but sometimes they pay late, they are slow to pay. (Sabonete, male vaccinator, Massingir Velho (18/01/10)

It seems that inside the park people are more likely to pay than outside. However I do not have complete data to confirm that. As payment is a sensitive issue, the SDAE and IRPC/KYEEMA do not collect information on payment.

A lot of people pay, the majority pay. To vaccinate cattle it is the same thing. As soon as you vaccinate they say that they will sell maize. But, after they do not pay. But when there is the vaccine I usually vaccinate without payment. Because if I do not, anyway the vaccine is going to expire (Male vaccinator, Madingane 19/01/10)

Vaccinators have different approach to non-paying farmers. Some prefer to vaccinate because anyway the vaccine is going to be lost as it will expire within three days once the vial is opened.

The majority of the farmers pay for vaccination. Most of them pay cash. If they do not pay during one campaign, it is fine. I continued to vaccinate the following campaign. (Mavoze, Male vaccinator 18/01/10)

Some vaccinators consider that vaccinating without payment is not fair for the one who pay and abstain to do so.

People can catch the birds but do not want to pay. If I vaccinate without payment it is not fair for the farmers who pay and next time they will not want to pay. (Pedro, male vaccinator,

Chinangane)

Outside the park vaccinators registered more difficulty vaccinating due to the complexity of gathering the chickens. Some vaccinators work with their own children to catch the birds and facilitate their work.

6.3 Doses received, payment of vials to SDAE and ratio of use

Vaccinators received a number of vial according to the data collected during the census of chickens carried out prior to the vaccination. Vaccinators are requested to pay 25 MZM for the vial of 250 doses. Most of the vaccinators do not pay for their vial. While one third of vaccinators paid their vial in March 2009, only one vaccinator paid in November 2009. In Massingir Velho the vials were paid in the three campaigns.

The ratio of dose usage varies from village to village and from vaccination campaign to vaccination campaign. However it is noticeable that the ratio of usage of doses delivered is quite high (above 50%) with exception in the last campaign of November 2009.

Table 7: Doses received, payment of vials and ratio of use

Village	March 2009				July 2009				November 2009			
	Doses received	Doses used	used / received ratio	Paid	Doses received	Doses used	used / received ratio	Paid	Doses received	Doses used	used / received ratio	Paid
PA Mavoze												
Massingir Velho	1000	588	59%	Y	750	673	90%	Y	750	407	54%	500
Mavoze	1500	1327	88%	Y	1000	535	54%	N	750	268	36%	N
Macavene	750	599	80%	Y	750	661	88%	Y	250	211	84%	N
Machaule	750	387	52%	Y	750	453	60%	Y	500	22	4%	N
Chibotana	500	386	77%	Y	1250	572	46%	N	500	314	63%	N
Madingane	500	269	54%		500	438	88%	N	0	0	0%	
PA Tilhovene												
Tilhovene	500	283	57%	N	1500	626	42%	N	500	141	28%	N
Cubo	500	159	32%	N	750	244	33%	N	750	670	89%	N
Chinhangane	750	519	69%	N	750	316	42%	N	0	0	0%	
PA Zulo												
Chitar	500	240	48%	Y	500	363	73%	Y	0	0	0%	
Zulo	250	102	41%		250	148	59%	Y	250	44	18%	N
Mucatine	250	68	27%		500	0	0%	N	500	0	0%	N
Manhica	500	421	84%	Y	250	130	52%	N	250	48	19%	N
Macarringue	250	211	84%		750	283	38%	N	500	90	18%	N

Male leader: *All people who vaccinated had no problem. Last year there was no disease. The only thing is to sensitize people who do not vaccinate. The one who do not vaccinate are the one who will make the disease to occur. The production improved. I think that people without Money should have their chickens vaccinated.*

Female vaccinator: *If we vaccinate people without receiving a payment then we will not be able to pay for the vial. The vial is 25 MZM. In July and November we did not pay.*

Sr Pass, veterinarian technician: *When the vaccinator sends the data to me they need to pay for the vaccine. It is only where vaccination was weak that I do not request payment.*

(Chibotane 20/01/10)

7. DATA ON VACCINATORS

Out of the 21 vaccinators trained as ND vaccinator by the IRPC/KYEEMA project, most of them (twelve) were involved in similar activities before. The project decided to continue working with them to improve their skills and knowledge about poultry raising activity and ND control. Among them, 10 are women and 11 are men. Six vaccinators are CAHW and in addition to vaccinating chickens are also caring for goats and cattle.

Currently 22 vaccinators are working (11 women and 11 men) as Rosa Matteus from Macarringue was included in the refreshment training in June to support her colleague in the village.

Table 8: Training of vaccinators

Village	Name of vaccinator	Sex	First training before project	Activity	Training March	Refresher Training June	Refresher Training October
PA Mavoze							
Massingir Velho	Domingo Sabonete	M	2002	Promotor	X	X	X
	Constancia Mongwe	F		Vaccinator	X	–	X
Mavoze	Filimone Machaule	M	1998	Promotor	X	X	X
	Tomas Samisone	M		Vaccinator	X	X	X
Macavene	Vodia Chirindza	F		Vaccinator	X	X	X
Machaule	Jose Mongwe	M		Vaccinator	X	X	–
Chibotana	Fraza Ngulele	M	2001	Promotor	X	X	X
	Racelina Ngovene	F	2005	Vaccinator	X	X	–
Madingane	David Mandlaze	M	2001	Promotor	X	X	X
PA Tihovene							
Tihovene	Alda Abilio Chivoze	M		Vaccinator	X	–	–
	Alcidio Novela	M		Vaccinator	X	–	X
	Simiao Zitha	M		Vaccinator	X	–	–
Cubo	Hermnia Manuel	F		Vaccinator	X	–	X
	Julio Mate	M	2005	Promotor	X	–	X
Chinhangane	Pedro Jossias Cuna	M	2005	Vaccinator	X	X	X
PA Zulo							
Chitar	Samaria Mbalane	F	2005	Vaccinator	X	X	X
Zulo	Clemencia Mundlovo	F		Vaccinator	X	–	X
Mucatine	Cacilda Mundlovo	F	2005	Vaccinator	X	–	–
	Sergia Cossa	F		Vaccinator	X	X	–

Manhica	Rochete Ngovene	F	2002	Promotor	X	X	X
Macarringue	Generossa Valoi	F	2005	Vaccinator	X	X	X
	Rosa Mateus	F	2005	Vaccinator	-	X	X

8. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

1. Community, community leaders and district services are enthusiastic about the vaccination campaigns impact and are requesting the continuation of the activities.
2. Vaccinating households saw a significant increase of their bird flock.
3. As a result of the increase of the number of birds household were able to eat and sell more chicken. Thus vaccination contributed to household food security.
4. Vaccination against ND under Kyeema support has received adequate supervision and support for monitoring.
5. Refreshment training was carried out regularly (June and October 2009) after the initial training (March 2009).
6. Vaccinators collect data adequately from each campaign in their book. They received manual to study and flip-chart available to do sensitisation during their training.

RECOMMENDATIONS

1. Ensure that the data in vaccinators' book are checked regularly and data collected from the book. Develop analysis of data after each campaign with vaccinators.
2. Ensure that the community leaders from the Administrative Post and the secretary and of each village are invited to an afternoon meeting to support the activity and receive basic information on ND control.
3. Promote vaccination campaigns during the weekends or school holidays to ensure the children can help in catching chickens.
4. Increase training of vaccinators on Highly Pathogenic Avian Influenza, biosecurity, building of suitable nest boxes for the effective collection of eggs and control of egg production, the care with chicks (protection and feeding) to reduce chicks mortality and building henhouses for protection against the weather and predators.
5. Increase nutritional education about benefit of eggs for children and pregnant/lactating women in community, school and health centre.
6. Complete a viability study to commercialize organic village chicken from LNP to Xai-Xai, Maputo and inside the park (including Kruger Park).

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ANNEX 1

TERMS OF REFERENCE

O Melhoramento da Produção de Galinhas Rurais pelas comunidades no Parque Nacional de Limpopo

O projecto sobre o controle da doença de Newcastle “**O Melhoramento da Produção de Galinhas Rurais pelas comunidades no Parque Nacional de Limpopo**”, financiado pelo AHEAD, tem o seu término previsto para 10 de Janeiro de 2010, tendo em vista efectuar a avaliação do projecto está prevista a deslocação da Dra. Brigitte Bagnol no período de 17 a 23 de Janeiro de 2010 às áreas de implementação das actividades do projecto em Massingir.

Os principais objectivos da viagem são:

1. Avaliação do projecto para:
 - Determinar se o projecto alcançou as metas no melhoramento de meio de vida nas famílias pobres através do melhoramento da produção de galinhas rurais
 - Determinar se as metas e objectivos do Projecto foram ou não alcançados
 - Avaliar a extensão da campanha de vacinação nas aldeias alvo depois da formação e os benefícios que contribuíam para a sua sustentabilidade
 - Avaliar se o nível de consciência do benefício da vacina contra ND aumentou
 - Avaliar se projecto melhorou as práticas da segurança alimentar e informação sobre a nutrição
 - Encontrar impactos positivos e negativos que o projecto teve com as comunidades e famílias individuais
 - Observar o efeito do projecto no fortalecimento da comunidade
 - Avaliar a eficiência dos resultados do projecto no progresso das mulheres que vivem dentro e fora do PNL

ANNEX 2**LIST OF PEOPLE MET AND ACTIVITIES UNDERTAKEN**

Date	Activity
Sunday 17 January	<ul style="list-style-type: none"> • Flight Johannesburg/ Maputo • Trip Maputo/Massingir with Ana Zandamela, Tanya Radosavljevic and with Tristan Kamps and Dalphne van Ende students from Utrecht University • Meeting to prepare the plan of work with Ana Zandamela, Tanya Radosavljevic and with Tristan Kamps and Dalphne van Ende, students
Monday 18 January	<ul style="list-style-type: none"> • Meeting with Mauricio Huo, Director SDAE, Ana Zandamela; Francisco Passe, Veterinary in charge in Massingir SDAE; Tanya Radosavljevic and with Tristan Kamps and Dalphne van Ende, students. • Trip to Massingir Velho with the team (Ana, Tanya, Passa and the 2 students). Meeting with promotor Domingo Sabonete and 8 women and 4 men. • Trip to Mavoze with the team and meeting with 17 women and 8 men. • In Macavene meeting with Vodia Chirindza, vaccinator and focus group with 7 men and 7 women
Tuesday 19 January	<ul style="list-style-type: none"> • Meeting in Macaringue with Rosa Mateus Mandlaze and Generosa Vicente Valoi, vaccinators and the team • Meeting in Madingane with 15 women e 8 men, the vaccinator, David Mandlaze and community líder and the team
Wednesday 20 January	<ul style="list-style-type: none"> • In Chibotane meeting with the líder and the vacciantor Frazão Ngulele and the team • In Machaule, meeting with José Mongue, vacinator and the team • In Tihovene meeting with vaccinators, Simião Zita, Alda Abílio Chivoze and the team • Preparation of tables on vaccinators and use of vial by Ana Zandamela • Development of tables and graphs
Thursday 21 January	<ul style="list-style-type: none"> • Trip to Cubu to collect data on total household number • Trip to Mucatine to collect data from July and November campaign. Meeting with Cacilda Mundlovo, vaccinator and the community leader • Trip to Zulu to speak with the vaccinator, • Trip to Chitar to collect data on vaccination • Trip to Chinhangane and meeting with 9 men including leader and Pedro, vaccinator
Friday 22 January	<ul style="list-style-type: none"> • Meeting with the team to analyse the activities carried out • Preparation of table, graph and data analysis • Feedback on mission work and discussion of ways forwards with Mauricio Huo, Director SDAE • Trip back to Maputo
Saturday 23 January	<ul style="list-style-type: none"> • Brigitte Bagnol fly back to Johannesburg

ANNEX 3**BIRDS VACCINATED PER VILLAGE AND CAMPAIGNS IN 2007, 2008 AND 2009**

Aldeia	Março 07	Julho	Novembro	Março 08	Julho	Novembro	Março 09	Julho 09	Novembro 09
PA Mavoze									
Bingo	92	0	0	0	0	0	0	0	0
Chibotane	435	246	0	0	0	0	386	514	314
Chimangue	0	0	0	0	0	0	0	0	0
Macavene	312	223	279	0	0	0	599	661	211
Machamba	0	0	0	0	0	0	0	0	0
Madingane	0	0	0	0	0	0	269	438	0
Massingir Velho	708	676	330	552	0	280	588	673	407
Mavoze	741	675	874	602	0	443	1327	535	278
Muchaule	0	0	0	0	0	0	377	422	22
TOTAL	2288	1820	1483	1154	0	723	3546	3243	1232
PA Tihovene									
Cahane	143	0	0	0	0	0	0	0	0
Chinyangane	712	562	673	0	0	186	519	316	0
Cubo	0	147	0	0	0	0	159	244	670
Decada da Vitória	0	0	0	0	0	0	0	0	0
Ringane	0	0	0	0	0	0	0	0	0
Tihovene	0	0	0	0	1266	0	283	626	141
TOTAL	855	709	673	0	1266	186	961	1186	811
PA Zulo									
Chipandzo	0	0	0	0	0	0	0	0	0
Chitare	162	220	0	0	0	0	240	363	0
Cuze	0	0	0	0	0	0	0	0	0
Macaringue	306	850	193	238	0	0	221	283	90
Mucatine	0	0	0	0	0	0	68	0	0
Maconguene	0	0	0	0	0	0	0	0	0
Macuachane	0	0	0	0	0	0	0	0	0
Manhiça	0	0	0	0	0	0	421	130	48
Munhamane	0	0	0	0	0	0	0	0	0
Tchake	0	0	0	0	0	0	0	0	0
Zulo(1)	76	211	0	0	0	0	102	148	44
TOTAL	544	1281	193	238	0	0	1052	924	182
TOTAL GERAL	3687	3810	2349	1392	1266	909	5559	5353	2225

ANNEX 4:
TABLES FOR THE MONITORING AND EVALUATION SYSTEM

1- Collection of data from each campaign

Table 1. Households Involved in the Vaccination Campaign in March 2009 by vaccinator and neighbourhood

Vaccinators/group of vaccinator	N° of HH in village/ neighborhood	N° HH vaccinating	% HH vaccinating
Chibotane	156	30	19.2
Chinyangane	188	27	14.4
Chitar	115	25	21.7
Cubo	322	?	?
Macarringue	536	33	6.2
Macavene	92	57	62
Machaule	74	37	50
Madingane	97	24	24.7
Manhiça	90	43	47.8
Massingir Velho	205	34	16.6
Mavoze	345	161	46.7
Mucatine	258	8	3.1
Tihovene	177	26	14.7
Zulo	108	10	9.3
Total	2,763	515	18.6

Table 2. Households Involved in the Vaccination Campaign in July 2009 by vaccinator and neighbourhood

Vaccinators/group of vaccinator	N° of HH in village/ neighborhood	N° HH vaccinating	% HH vaccinating
Chibotane	156	41	26.3
Chinyangane	188	16	8.5
Chitar	115	38	33
Cubo	322	18	5.6
Macarringue	536	38	7.1
Macavene	92	36	39.1
Machaule	74	35	47.3
Madingane	97	37	38.1
Manhiça	90	16	17.8
Massingir Velho	205	37	18
Mavoze	345	35	10.1
Mucatine	258	0	0
Tihovene	177	63	35.6
Zulo	108	9	8.3
Total	2,763	419	15.2

Table 3. Households Involved in the Vaccination Campaign in November 2009 by vaccinator and neighbourhood

Vaccinators/group of vaccinator	N° of HH in village/ neighborhood	N° HH vaccinating	% HH vaccinating
Chibotane	156	22	14.1
Chinyangane	188	0	0
Chitar	115	0	0
Cubo	322	58	18
Macarringue	536	15	2.8
Macavene	92	7	7.6
Machaule	74	4	5.4
Madingane	97	0	0
Manhiça	90	9	10
Massingir Velho	205	15	7.3
Mavoze	345	45	13
Mucatine	258	0	0
Tihovene	177	15	8.5
Zulo	108	9	8.3
Total	2,763	199	7.2

Table 4. Average number of chickens vaccinated per vaccinator/group and per household in the Vaccination Campaign in March/April 2009 by vaccinator/group

Vaccinators/group of vaccinator	N° vaccinators	N° HH vaccinating	N° chickens vaccinated	Average n° of chickens vaccinated per HH	Average n° of chickens vaccinated per vaccinator/ Group
Chibotane	2	30	386	12.9	193
Chinyangane	1	27	519	19.2	519
Chitar	1	25	240	9.6	240
Cubo	2		159		79.5
Macarringue	1	33	221	6.7	221
Macavene	1	57	599	10.5	599
Machaule	1	37	377	10.2	377
Madingane	1	24	269	21.3	269
Manhiça	1	43	421	9.8	421
Massingir Velho	2	34	588	17.3	294
Mavoze	2	161	1327	8.2	663.5
Mucatine	2	8	68	6.9	34
Tihovene	2	26	283	10.9	141.5
Zulo	1	10	102	10.2	51
Total	20	515	5,559	10.8	

Table 5. Average number of chickens vaccinated per vaccinator/group and per household in the Vaccination Campaign in July 2009 by vaccinator/group

Vaccinators/group of vaccinator	N° vaccinators	N° HH vaccinating	N° chickens vaccinated	Average n° of chickens vaccinated per HH	Average n° of chickens vaccinated per vaccinator/Group
Chibotane	2	41	514	12.5	257
Chinyangane	1	16	316	19.8	316
Chitar	1	38	363	7.6	363
Cubo	2	18	244	13.6	122
Macarringue	1	38	283	7.4	283
Macavene	1	36	661	18.4	611
Machaule	1	35	422	12.1	422
Madingane	1	37	438	11.8	438
Manhiça	1	16	130	8.1	130
Massingir Velho	2	37	673	18.2	336.5
Mavoze	2	35	535	15.3	267.5
Mucatine	2	0	0	0	0
Tihovene	2	63	626	9.9	313
Zulo	1	9	148	16.4	148
Total	20	419	5,353	12.8	

Table 6. Average number of chickens vaccinated per vaccinator/group and per household in the Vaccination Campaign in November 2009 by vaccinator/group

Vaccinators/group of vaccinator	N° vaccinators	N° HH vaccinating	N° chickens vaccinated	Average n° of chickens vaccinated per HH	Average n° of chickens vaccinated per vaccinator/Group	N° of vials
Chibotane	2	22	314	14.3	157	
Chinyangane	1	0	0	0	0	
Chitar	1	0	0	0	-	
Cubo	2	58	670	11.6	335	
Macarringue	2	15	90	6	45	
Macavene	1	7	211	30.1	211	
Machaule	1	4	22	5.5	22	
Madingane	1	0	0	0	0	
Manhiça	1	9	48	5.3	48	
Massingir Velho	2	15	407	27.1	203.5	
Mavoze	2	45	278	6.2	139	
Mucatine	2	0	0	0	-	
Tihovene	1	15	141	9.4	141	
Zulo	1	9	44	4.9	44	
Total	20	199	2,225	11.2		

2. Analysis per Administrative Post/village

Table 7. Households Involved in the Vaccination Campaign in March/April 2009 by vaccinator and neighbourhoods

AP/ village	N° of HH in village/ neighborhood	N° HH vaccinating	% HH vaccinating
Chibotane	156	30	19.2
Chinyangane	188	27	14.4
Chitar	115	25	21.7
Cubo	322	?	0.0
Macarringue	536	33	6.2
Macavene	92	57	62.0
Machaule	74	37	50.0
Madingane	97	24	24.7
Manhiça	90	43	47.8
Massingir Velho	205	34	16.6
Mavoze	345	161	46.7
Mucatine	258	8	3.1
Tihovene	177	26	14.7
Zulo	108	10	9.3
Total	2,763	515	18.9

Table 8. Households Involved in the Vaccination Campaign in July 2009 by vaccinator and neighbourhood

AP/ village	N° of HH in village/ neighborhood	N° HH vaccinating	% HH vaccinating
Chibotane	156	41	26.3
Chinyangane	188	16	8.5
Chitar	115	38	33.0
Cubo	322	18	5.6
Macarringue	536	38	7.1
Macavene	92	36	39.1
Machaule	74	35	47.3
Madingane	97	37	38.1
Manhiça	90	16	17.8
Massingir Velho	205	37	18.0
Mavoze	345	35	10.1
Mucatine	258	0	0.0
Tihovene	177	63	35.6
Zulo	108	9	8.3
Total	2,763	419	15.2

Table 9. Households Involved in the Vaccination Campaign in November 2009 by vaccinator and neighbourhood

AP/ village	N° of HH in village/ neighborhood	N° HH vaccinating	% HH vaccinating
Chibotane	156	22	14.1
Chinyangane	188	0	0
Chitar	115	0	0
Cubo	322	58	18
Macarringue	536	15	2.8
Macavene	92	7	7.6
Machaule	74	4	5.4
Madingane	97	0	0
Manhiça	90	9	10
Massingir Velho	205	15	7.3
Mavoze	345	45	13
Mucatine	258	0	0
Tihovene	177	15	8.5
Zulo	108	9	8.3
Total	2,763	199	7.2

Table 10. Composition of beneficiaries of the vaccination campaign March/April 2009 per village

AP/ village	N° vaccinators	N° HH vaccinating	N° chickens vaccinated	Average n° of chickens vaccinated per HH	Average n° of chickens vaccinated per vaccinator/group
Chibotane	2	30	386	12.9	193
Chinyangane	1	27	519	19.2	519
Chitar	1	25	240	9.6	240
Cubo	2		159		79.5
Macarringue	1	33	221	6.7	221
Macavene	1	57	599	10.5	599
Machaule	1	37	377	10.2	377
Madingane	1	24	269	21.3	269
Manhiça	1	43	421	9.8	421
Massingir Velho	2	34	588	17.3	294
Mavoze	2	161	1327	8.2	663.5
Mucatine	2	8	68	6.9	34
Tihovene	2	26	283	10.9	141.5
Zulo	1	10	102	10.2	51
Total	20	515	5,559	10.8	

Table 11. Composition of beneficiaries of the vaccination campaign July 2009 per village

AP/ village	N° vaccinators	N° HH vaccinating	N° chickens vaccinated	Average n° of chickens vaccinated per HH	Average n° of chickens vaccinated per vaccinator/group
Chibotane	2	41	514	12.5	257
Chinyangane	1	16	316	19.8	316
Chitar	1	38	363	9.6	363
Cubo	2	18	244	13.6	122
Macarringue	1	38	283	7.4	283
Macavene	1	36	661	18.4	611
Machaule	1	35	422	12.1	422
Madingane	1	37	438	11.8	438
Manhiça	1	16	130	8.1	130
Massingir Velho	2	37	673	18.2	336.5
Mavoze	2	35	535	15.3	267.5
Mucatine	2	0	0		0
Tihovene	2	63	626	9.9	313
Zulo	1	9	148	16.4	148
Total	20	419	5,353	12.8	

Table 12. Composition of beneficiaries of the vaccination campaign November 2009 per village

AP/ village	N° vaccinators	N° HH vaccinating	N° chickens vaccinated	Average n° of chickens vaccinated per HH	Average n° of chickens vaccinated per vaccinator/group
Chibotane	2	22	314	14.3	157
Chinyangane	1	0	0	0	0
Chitar	1	0	0	0	-
Cubo	2	58	670	11.6	335
Macarringue	1	15	90	6	45
Macavene	1	7	211	30.1	211
Machaule	1	4	22	5.5	22
Madingane	1	0	0	0	0
Manhiça	1	9	48	5.3	48
Massingir Velho	2	15	407	27.1	203.5
Mavoze	2	45	278	6.2	139
Mucatine	2	0	0	0	-
Tihovene	1	15	141	9.4	141
Zulo	1	9	44	4.9	44
Total	19	199	2,225	11.2	

3. Data from different campaigns

Table 12. Number and Percentage of Households Registering their Chickens during the 2009 Vaccination Campaigns

Village	N° HH/ villages	1 st campaign		2 nd campaign		3 rd campaign	
		N° of HH	% of HH	N° of HH	% of HH	N° of HH	% of HH
Chibotane	156	30	19.2	41	26.3	22	14.1
Chinyangane	188	27	14.4	16	8.5	0	0.0
Chitar	115	25	21.7	38	33.0	0	0.0
Cubo	322	?	0.0	18	5.6	58	18.0
Macarringue	536	33	6.2	38	7.1	15	2.8
Macavene	92	57	62.0	36	39.1	7	7.6
Machaule	74	37	50.0	35	47.3	4	5.4
Madingane	97	24	24.7	37	38.1	0	0.0
Manhiça	90	43	47.8	16	17.8	9	10.0
Massingir Velho	205	34	16.6	37	18.0	15	7.3
Mavoze	345	161	46.7	35	10.1	45	13.0
Mucatine	258	8	3.1	0	0.0	0	0.0
Tihovene	177	26	14.7	63	35.6	15	8.5
Zulo	108	10	9.3	9	8.3	9	8.3
Total	2,763	515	18.6	419	15.2	199	7.2



REPÚBLICA DE MOÇAMBIQUE
MINISTÉRIO DA AGRICULTURA

2010



Feriados Nacionais

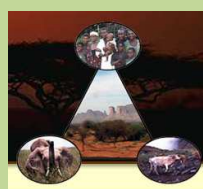
- 1 de Janeiro – Ano Novo
- 3 de Fevereiro — Dia dos Heróis Moçambicanos
- 7 de Abril — Dia da Mulher Moçambicana
- 1 de Maio — Dia Internacional dos Trabalhadores
- 25 de Junho — Dia da Independência Nacional
- 7 de Setembro — Dia dos Acordos de Lusaka
- 25 de Setembro — Dia das forças armadas
- 4 de Outubro — Dia do Acordo Geral de Paz
- 25 de Dezembro — Dia da Família

Calendário de Vacinação



Trabalho feito

Contar as galinhas e encomendar a vacina	Ter a vacina nos Distritos	Períodos de vacinação	Avaliar a campanha
JANEIRO <input type="checkbox"/> D S T Q Q S S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	FEVEREIRO <input type="checkbox"/> D S T Q Q S S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	MARÇO <input type="checkbox"/> D S T Q Q S S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	ABRIL <input type="checkbox"/> D S T Q Q S S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
MAIO <input type="checkbox"/> D S T Q Q S S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	JUNHO <input type="checkbox"/> D S T Q Q S S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	JULHO <input type="checkbox"/> D S T Q Q S S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	AGOSTO <input type="checkbox"/> D S T Q Q S S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
SETEMBRO <input type="checkbox"/> D S T Q Q S S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	OUTUBRO <input type="checkbox"/> D S T Q Q S S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	NOVEMBRO <input type="checkbox"/> D S T Q Q S S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	DEZEMBRO <input type="checkbox"/> D S T Q Q S S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31



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Assessment of Village Poultry Production and Meat Consumption in Limpopo National Park and Surrounding Areas

Gaza Province (9 June – 27 July 2009)



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Introduction

Rural poultry play an important role in the livelihoods of farmers in developing countries around the world. They are a nutritious addition to the family's diet and a good source of cash for family expenses like clothes, school fees, and medical bills (Alders *et al.*, 2008). Development programs that focus on rural poultry help everyone in the community; even very poor families that might not be able to afford larger livestock almost always have chickens (Bagnol, 2000).

Newcastle Disease (ND) is a highly communicable viral disease of poultry caused by paramyxovirus and transmitted by inhalation and ingestion (Spradbrow, 2001). Outbreaks of ND in village poultry can be devastating, causing 50-100% mortality in an affected flock (Bagnol, 2009). Newcastle disease is currently considered the single greatest constrain on rural poultry production in Mozambique (Mavale, 2001). An effective, thermotolerant vaccine is available and easy to administer in the form of eyedrops (Bell, 2001). Community vaccination programs using this vaccine have been successfully set up in many parts of Africa and have resulted in decreased poultry mortality and increased yields (Alders, 2008). The International Rural Poultry Centre of the Kyeema Foundation initiated such a program in several communities in Limpopo National Park, Mozambique, in January 2009. The goal of the program for 2009 is to train 24 local people to become community vaccinators. The vaccine, which is provided by the Ministry of Agriculture, is prepared in Mozambique using the I-2 strain of the ND virus. This report describes poultry production in the area and provides a preliminary evaluation of the success of the program and recommendations to improve its effectiveness.

Study Population

This project was conducted in and around Limpopo National Park, in Gaza Province, Mozambique. Limpopo National Park is the Mozambican portion of the Great Limpopo Transfrontier Park, which was created in 2001 and also includes South Africa's Kruger National Park and Gonarezhou National Park of Zimbabwe. It has been estimated that there are approximately 27,000 people living in the park and its support zone (Bagnol, 2009). Of those, the government intends to relocate an estimated 6,500 people living in the Shingwedzi River valley to areas outside the park (Mozambique Ministry of Tourism, 2005).

We visited four villages in Gaza Province between 9 June and 27 July 2009. Two of the villages, Mavoze and Massingir Velho, were inside the park in the Shingwedzi River valley, while the remaining two, Mucatine and Manhiça, were in the support zone. The villages inside the park have received ND vaccinations for their chickens in the past, though the service has not been consistent, especially in recent years (Bagnol, 2009). Mucatine and Manhiça had not received poultry vaccines until the arrival of Kyeema in the area this year. We visited 20 households in each community, except in Manhiça, where we were only able to obtain 15 interviews because of the small size of the village.

We interviewed one individual from each household, usually the head of the household or a spouse. In all communities, we interviewed slightly more women than men, but there was no significant difference in the gender ratio of the respondents between communities. There was no significant difference in participant age or education between communities. The number of adults in the household was not significantly different, but there was a significant difference in the number of children per household; households inside the park had significantly more children than households outside the park (Figure 1). There was, however, no difference in the number of children enrolled in school.

Poultry Husbandry

In villages inside the park, all 75 households surveyed owned chickens. In the villages outside of the park, a total of 5 respondents out of 35 (14%) did not currently own chickens. However, all of them had owned chickens in the past and they planned to buy more as soon as they had the resources to do so. We did encounter individuals inside the park who had lost all of their chickens to disease or because they were forced to sell. However, none of these people were without chickens because the community had a system in place to help them. In Mavoze and Massingir Velho, a family that has lost their chickens can borrow a few hens from a neighbor free of charge. In return, the neighbor receives a certain number of chicks from the first brood. We did not observe this practice in communities outside the park, though it may occur there as well.

Communities inside the park had significantly more chickens of all age classes than communities outside of the park (Figure 2). The mean number of chickens owned by households inside the park was more than double the number outside of the park. This difference may be due to the fact that villages inside of the park had been receiving vaccinations from a previously established program. Community members reported a breakdown in services in recent years, but were still receiving vaccine sporadically as recently as November 2008 (Bagnol, 2009). It is interesting to note that villages inside of the park also had significantly more large livestock (Sarah Raabis, unpublished data).

Husbandry practices in all four communities were similar (Figure 3). All respondents fed their chickens the waste left over from pounding maize, and most respondents provided water. In most communities, the chickens roost in the trees at night, except in Manhiça, where 6 respondents (40%) had chicken houses. In the other three communities, however, chicken houses were essentially non-existent. Several respondents in the communities without henhouses mentioned that henhouses increased the severity of disease outbreaks, and one respondent said that the houses left the birds vulnerable to snakes. Given the style of henhouse design observed in Manhiça, these statements are probably true. The houses were small and built directly on the ground, with no way to clean the inside and no measures to protect against snakes. It is likely that many of the problems that people experienced with keeping chickens in henhouses could be reduced or eliminated if a better design were introduced (Ahlers *et al.*, 2009).

When asked about challenges that they faced raising chickens, the problem that respondents mentioned most frequently was Newcastle Disease (93% of respondents).

The only other major concern mentioned was predators (71% of respondents), which included dogs, snakes, and birds of prey. In all communities, birds of prey were the predator mentioned most frequently. Theft seemed to be a localized problem and generally not very significant. While only one respondent mentioned weather as a significant constraint to poultry production, the vast majority of respondents in Massingir Velho, Mucatine, and Manhiça said that they had more chickens in the summer because fewer chicks died of cold. The prevalence of these problems was not significantly different across the communities visited (Figure 4), and thus cannot provide an explanation for the difference in flock sizes inside and outside the park. However, our questionnaire did not include any measure of the severity of these problems, and it is possible that they may result in greater mortality outside the park. It is also worth noting that when asked to compare their current flock size to the previous year, the majority of people inside the park said that their flock was larger this year, while the majority of people outside the park said that they had more chickens the previous year; this difference was not statistically significant.

A number of families also owned Muscovy ducks. There was not a significant difference in the number households owning ducks in each village. Among households that owned ducks, the median number of ducks was four. People liked owning ducks because they could get more money for them (120 MT vs. 80-100 MT for a chicken), but they are also harder to raise because they cannot forage for themselves as chickens can, and feeding can be difficult when maize stores are low. We also observed very few juveniles, suggesting that they may have suffered from reproductive problems.

Vaccination

The vast majority of respondents had heard about vaccinating chickens against Newcastle Disease. Out of 75 respondents, only four had not heard about it, all of them in Mucatine. Mucatine was also the only village that had not yet had a full vaccination campaign. When the two community vaccinators returned from their initial training in April, they had demonstrated the vaccination process at a few houses, but had not yet offered the service to the community as a whole. They received a batch of vaccine while we were there and were planning to administer it soon, though most community members did not seem to be aware of this (in contrast with other communities, where many respondents were able to tell us when the next vaccine would be coming). Many respondents in Mucatine told us that they had heard that two women were going to Massingir to be trained as vaccinators in April, but had not heard anything about the project since.

This stood in stark contrast with Manhiça, which was also in the early stages of establishing a vaccination program; they had one campaign in April and the second occurred while we were in the village (July). Manhiça had 100% participation among households with chickens that we surveyed and it was the only village in which a substantial number (43%) of people understood that vaccination could only benefit a healthy chicken. There are several possible reasons for this. Manhiça was the only village where most people reported that they had heard about vaccination directly from

the vaccinator (rather than from the leader or his messengers). Manhiça is also dramatically smaller than the other villages, allowing for more direct communication of information. It is also possible that the vaccinator in Manhiça was the only one who chose to emphasize the distinction.

It is worth noting that, in many cases when we asked “Which chickens benefit from vaccination: sick, healthy, or all?” the response was often “They take all,” suggesting that a) the issue had never been discussed and they were basing their understanding purely on what they had seen the vaccinator do, and b) that vaccinators were vaccinating sick chickens. When we sat in on a vaccinator training session, the vaccinators seemed to understand that vaccines were only for healthy chickens, but it might be advisable to emphasize this point even more strongly. If vaccinators accept sick animals and then the animals die, the immediate assumption is likely to be that the vaccine killed them. This appears to have happened in Mucatine, where many of the birds that received demonstration vaccinations in April died, a piece of information that was widely circulated and speculated about in the community. It is also important that the vaccinator discuss the appropriate application of vaccination with his clients, so that they do not develop unrealistic expectations about what the vaccine can do.

The major concern that people expressed about the vaccine was the cost (5 MT per chicken inside the park and 1 MT per chicken outside the park). For people who have very limited access to cash, collecting enough money to have all of their chickens vaccinated can be very difficult. They have the option to exchange one of their chickens for vaccination services, but in general people who cannot afford to pay in cash have very small flocks and cannot afford to give up an entire chicken. A number of respondents reported that they had vaccinated some of their chickens, but could not afford to vaccinate all of them.

Another problem, especially for elderly people without children, was catching the chickens to be vaccinated. In Manhiça, the use of chicken houses greatly facilitated the process, but in the other communities the chickens had to be caught. Catching free-range poultry is a very strenuous task that proved impossible for some elderly owners who, as a result, were unable to vaccinate their chickens. Several people suggested that they would prefer a vaccine that could be delivered in water, thus eliminating the necessity for catching the chickens. The use of the oral vaccine may not be feasible because of the need for frequent revaccination (Alders *et al.*, 2003; Dias *et al.*, 2001). However, it is crucial to consider the needs of the elderly and sick, as these are often the people who are most dependent on chickens because they are unable to manage larger livestock or maintain large maize fields.

Good communication is also very important. The people in these communities are gone for large parts of the day, working in their fields. If they do not realize that the vaccinator is coming that day, there is a good chance that they will not be around when she arrives. We spoke to several people whose chickens had not been vaccinated because the owners were absent when the vaccinator came. Knowing when the vaccinator is coming is also important because the chickens are also much harder to catch during the day because they

are more active and often wander onto other homesteads in search of food; the families that had the most success catching all of their chickens were the ones that had caught and tied them the night before.

In general, Kyeema's approach to the vaccination campaign seems to be working well. Only 3 people out of 75 said that they did not intend to vaccinate their chickens during the next campaign. Of these, two said that the vaccine did not work, and one said that she could not afford it, but would vaccinate if she could find the money. The leader's approval is crucial to the success of such programs. In these communities, the leader has an extraordinary degree of control, and if he says that people should vaccinate their chickens, most people will comply if they can afford to do so. At the same time, in many cases it may not be appropriate to rely on the leader to disseminate information. The organizational skills and leadership ability of community leaders vary dramatically from village to village, and not all leaders can be relied upon to organize a vaccination campaign effectively or educate their communities accurately about vaccination. In one community, we found that the leader himself did not understand that only healthy chickens should be vaccinated. For this reason, it is important that vaccinators take it upon themselves to make sure that their clients understand the product that they are receiving and when they are to receive it. The IRPC should also meet directly with the community leaders to support the work of the vaccinators and ensure that leaders have an adequate understanding of the project.

Meat Consumption

We asked respondents about their consumption of specific meats in the past month. Of the meats that we asked about (beef, goat, sheep, pig, chicken, duck, fish, and bushmeat), only chicken and fish were consumed on a regular basis. Beef was usually reserved for very special occasions (primarily engagement of a daughter). While sheep and duck were highly prized, they were eaten very rarely because they are expensive. Goats were almost exclusively sold. While we saw evidence of the consumption of small game (cane rats, guinea fowl, etc.), most people were not willing to discuss this practice with us because the penalties for poaching are very high.

Because it was so rare for people to eat meats other than fish or chicken, we chose to analyze total meat consumption, rather than consider consumption of each type of meat separately. There was no significant difference in total meat consumption inside the park compared to outside the park. There was, however, a significant difference between villages (Figure 5). This was most likely due to the fact that people in Mavoze, Massingir Velho, and Mucatine had much better access to fish than people in Manhiça; people in the first three villages often reported eating fish almost every day, whereas most people in Manhiça only ate it 1-2 times per month, if at all. When fish was excluded from the analysis, there was no significant difference in meat consumption between the villages.

We also asked respondents how many times they ate chicken in a year. While asking about the past month allowed for better recall, asking about the whole year removed biases based on the time of year that we were in the area. People inside the park reported eating chicken three times as often as people outside of the park (Figure 6), though in both places there was considerable variation, depending on the number of chickens the family owned. Most people ate chicken at least once a year, usually around Christmas time. The most that any household reported eating chicken was 6 times per month. The difference in chicken consumption between villages inside and outside the park is consistent with the fact that people in the park owned significantly more chickens. In general, when families ate chicken, all family members were allowed to eat it. However, if there was not enough to go around, adult men had priority.

In Mucatine and Manhiça, we also asked people how important chicken was in their diet and if there was a time of year when it was most important. Half of respondents said that it was very important and the rest said it was somewhat or not very important (Figure 7). Twenty-six people (81%) said that chicken was most important to them during the hungry time, when their primary source of calories, maize, was scarce. One elderly couple also mentioned that chickens were important for days when they were feeling too tired to go to the fields.

Consumption of eggs was very rare in all of the villages visited. None of the respondents ate eggs from their own chickens unless they had been abandoned, though several families occasionally bought eggs to eat. In general, the eggs were boiled or fried and were eaten only by men. The reasons for this were two-fold. Firstly, eggs are a scarce commodity, and when a particular food is only available in small quantities, it almost always goes to the head of the household. Secondly, many people (including female respondents) told us that women do not like eggs. One male respondent explained that in the past, women were not allowed to eat eggs. While they are technically allowed to do so now, very few have developed the taste for them. Even in families where women eat eggs, it is very rare for children to be allowed to eat them. Several people in Manhiça mentioned that this was because the children were left at home with the chickens during the day while the parents were in the field; if the children were to develop a taste for eggs, they might start stealing eggs from the family's chickens while the parents were away.

The primary reason the people gave for not eating eggs from their own chickens was that it was much more important to have more chickens. Therefore, it is possible that egg consumption might increase if vaccination is successful in substantially increasing flock size. However, there are also several traditional views and practices that prevent egg consumption by women and children, the groups who would arguably benefit most from eating them. If Kyeema hopes to improve nutrition by increasing egg consumption, it would be advisable to develop programs to educate women about the nutritional value of eggs, especially for children and pregnant/lactating women.

Recommendations

Vaccination Program

- **Number of vaccinators:** Instead of training two vaccinators for each village, regardless of size, it might be a better use of resources to determine the number of vaccinators assigned to a village based on the size of the village. This might help to resolve some of the communication difficulties seen in larger villages.
- **Education:** Try as much as possible to explain the concept of vaccination to all recipients, with an emphasis on the fact that vaccines can only help healthy birds. When we asked people about services that they had received for their animals in the past, most had no idea what the treatment was intended to accomplish. If people think that vaccines can cure or that they prevent all poultry disease, they are bound to become disillusioned when this turns out not to be true. It is important to take as much as time as necessary to make sure that the leader understands the appropriate application of vaccination, as he is the primary source of information in the community. However, the vaccinator should also emphasize this concept with all of her clients and should not agree to vaccinate birds that are sick.
- **Communication:** Do everything possible to make sure that people know when the vaccinator is coming. This assures that they will be at home when the vaccinator arrives and allows them to properly restrain their birds in advance.
- **Timing:** Ideally vaccination campaigns should be delivered on weekends or school holidays to increase the likelihood that children will be home to help catch chickens for vaccination, especially in households headed by an elderly or sick person.
- **Record-keeping:** It would be helpful if the village leader received a copy of the vaccination records, clearly labeled with the type of vaccine delivered and the organization responsible. When we were asking people about the medical history of their animals, they usually were not able to tell us when their animals had been treated, what kind of treatment they had received, or from whom they had received it. In many cases, even the village leader could not tell us which organizations had been working in the area or what services they had provided. Providing the leader with a written record of veterinary services provided would facilitate coordination with other organizations that might want to provide livestock services in the area.

Husbandry & Nutrition Training

- **Henhouses:** Many of the husbandry problems that respondents reported could be solved by the introduction of appropriately designed henhouses. Not only would the houses provide protection against predators and the elements, but they would allow the monitoring and isolation of sick chickens and make it easier to capture healthy chickens for vaccination. The recently published ACIAR manual on improving rural poultry production (Ahlers *et al.*, 2009) has detailed information about how to build housing suited to the needs of rural poultry.
- **Nest boxes:** Even in communities that do have henhouses, nest boxes are not provided. As a result, hens lay their eggs in bush, in locations that are vulnerable

- to predators and often undiscovered by the owners. If the hens are healthy and adequately nourished, owners should be able to collect eggs from the boxes periodically without reducing the reproductive rate of their flock. They would also be better able to monitor how many eggs their hens are laying, which would allow them to cull birds that are not producing. Education on the management of laying hens could allow families to substantially increase their protein consumption without reducing their flock size. See the ACIAR manual for more information.
- **Creep feeders:** Providing supplemental feed that is only available to chicks could significantly reduce chick mortality. While most people reported that higher chick mortality in the winter was due to cold, winter is also the time of year when very little food is available, and it is likely that poor nutrition is at least a contributing factor. Providing a creep feeder in a safe location also keeps chicks closer to home, where they are at less risk for predation.
 - **Carrying capacity:** As the vaccine reduces mortality in the village flocks, it will become important to educate people about the importance of not letting their flock get too large. While there is some supplemental feed provided, the vast majority of the diet of rural poultry is scavenged, and if the flock grows beyond the carrying capacity of the environment, the birds will be malnourished and more vulnerable to disease. Therefore, the family would receive greater benefit from eating or selling birds and keeping the flock small, but healthy. This may be a very difficult concept to convey, but it is essential in order for families to get maximal benefit from their flock. It may also be possible to increase the carrying capacity of their property by creating microenvironments that attract insect for the birds (see the ACIAR manual for more details).
 - **Nutrition education:** In order for increased poultry production to have maximal impact on the nutritional status of people in the area, it is important to educate women about the importance of protein for growing children and pregnant/lactating women. We saw no evidence that these groups were given special access to what little protein was available; if anything, they received less than the rest of the family. An especial emphasis should be placed on the nutritional value of eggs, which are an excellent source of protein and other nutrients that is vast underutilized in this area.

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FIGURES

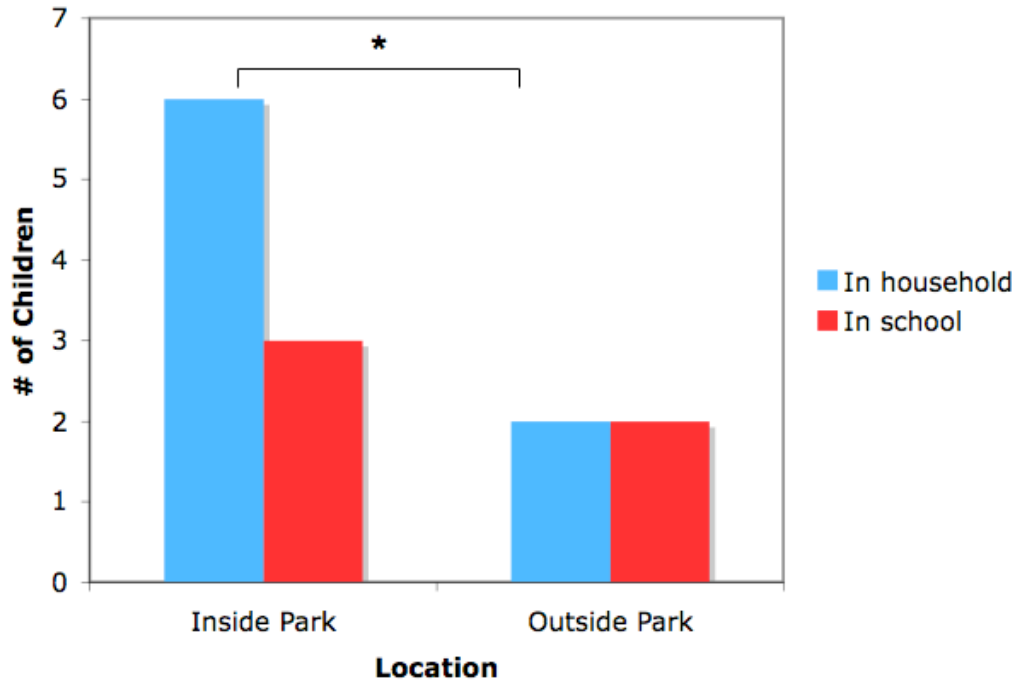


Figure 1. Median number of children per family and median number of children in school in villages inside and outside the park. There was a significant difference in the number of children per household (* $P = 0.002$), but not the number of children in school.

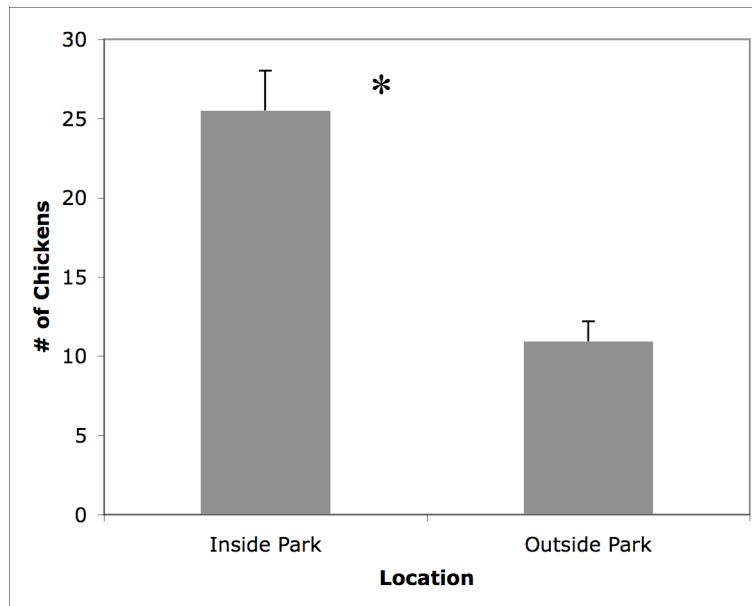


Figure 2. Mean flock size (chicks, growers, and adult chickens) \pm standard error owned by households inside and outside of the park. Households inside the park had significantly more chickens. * $P = 0.00$

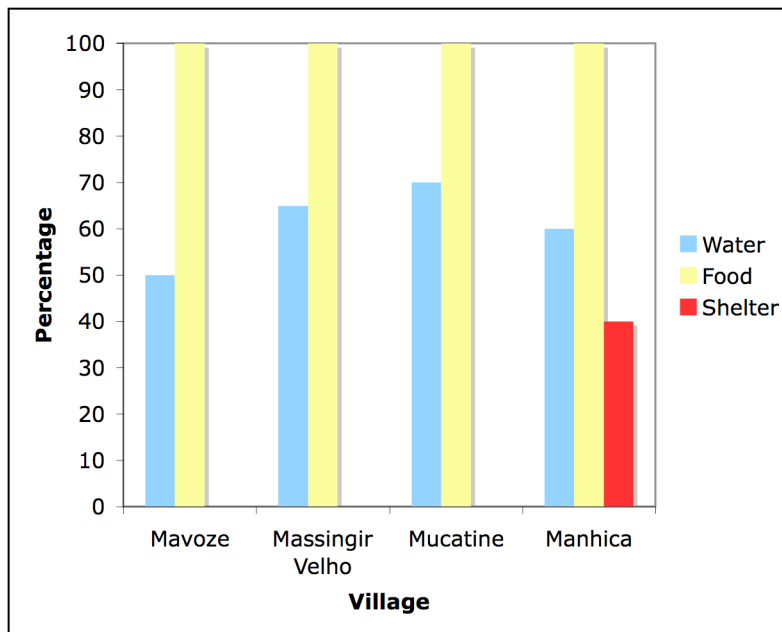


Figure 3. Percentage of respondents in each village providing specific types of care. The only significant difference was in the provision of housing ($P = 0.00$).

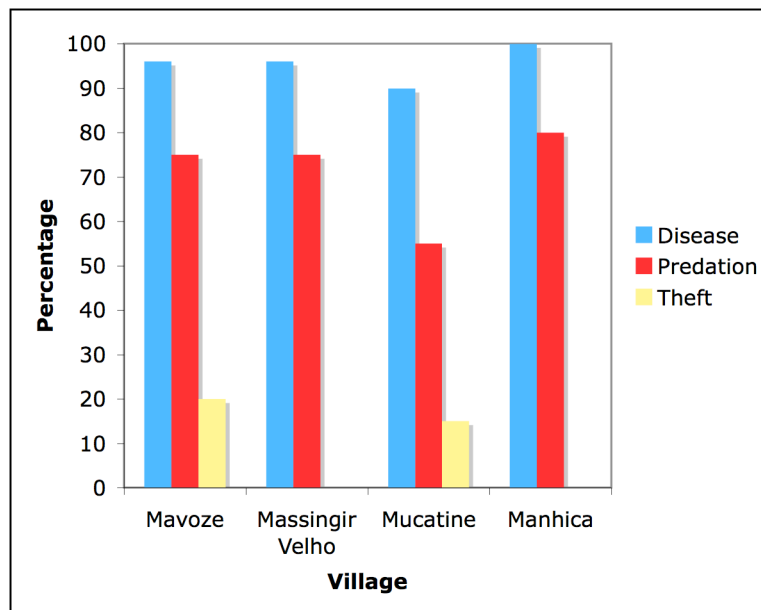


Figure 4. Sources of poultry loss/mortality. There was no significant difference between villages.

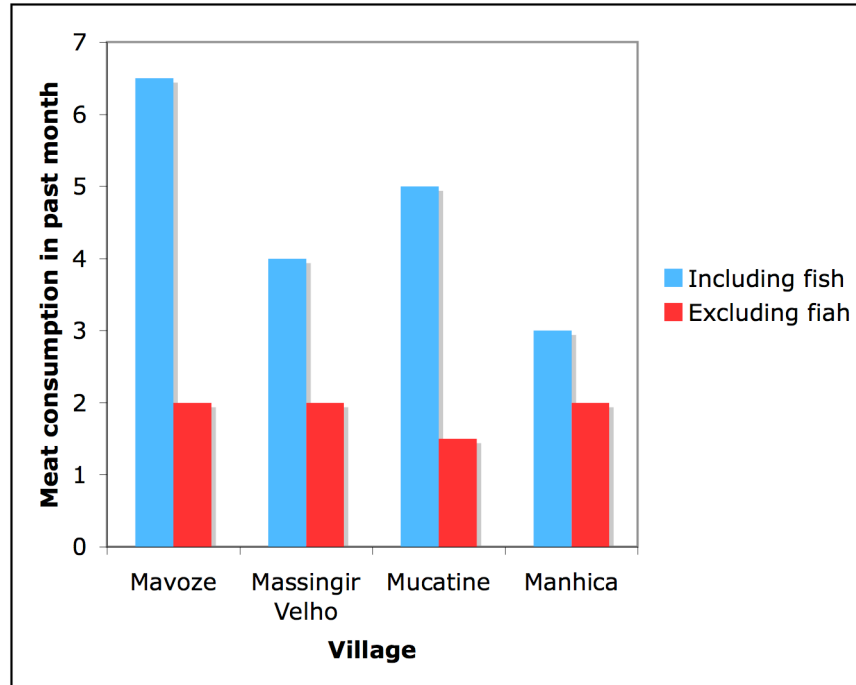


Figure 5. Total meat consumption reported by respondents for the past month. Blue bars represent total meat consumption and red bars represent meat consumption, excluding fish, which were the major protein source for many families. Total meat consumption was significantly different between villages ($P = 0.017$), but the differences did not remain significant when fish was excluded.

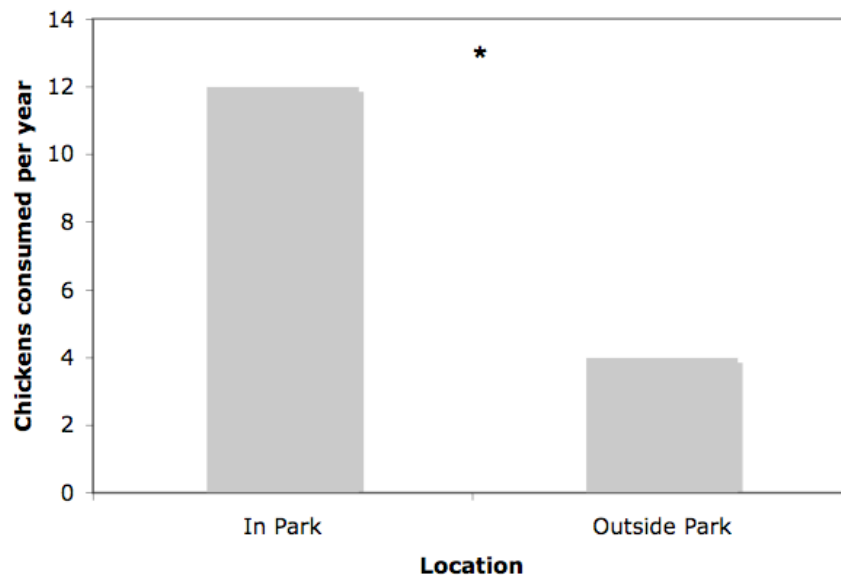


Figure 6. Median number of chickens that respondents consumed per year. Households inside the park consumed significantly more chicken. * $P = 0.042$

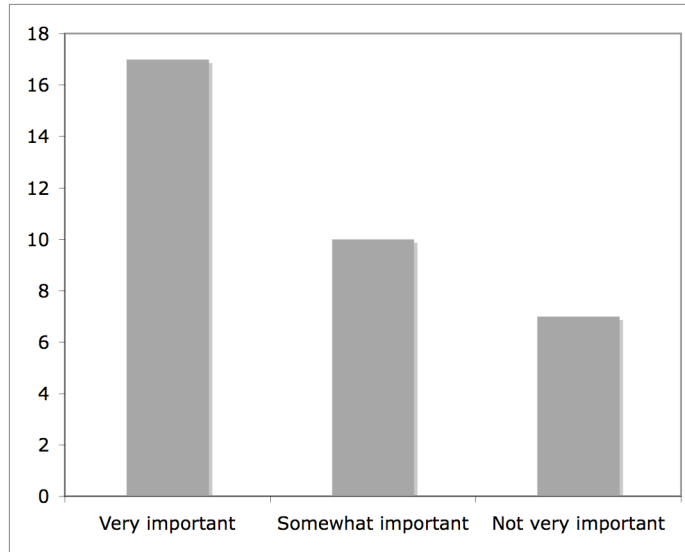


Figure 7. Respondents' rating of how important chicken was in their diets. This data is only available from communities outside the park.

TRANSLINKS

TransLinks is a 5-year Leader with Associates cooperative agreement that has been funded by the United States Agency for International Development (USAID) to further the objective of increasing social, economic and environmental benefits through sustainable natural resource management. This new partnership of the Wildlife Conservation Society (lead organization), the Earth Institute of Columbia University, Enterprise Works/VITA, Forest Trends, the Land Tenure Center of the University of Wisconsin, and USAID is designed to support income growth of the rural poor through conservation and sustainable use of the natural resource base upon which their livelihoods depend.

The program is organized around four core activities that will be implemented in overlapping phases over the life of the program. These are:

1. Knowledge building including an initial review, synthesis and dissemination of current knowledge, and applied comparative research in a number of different field locations to help fill gaps in our knowledge;
2. Identification and development of diagnostic and decision support tools that will help us better understand the positive, negative or neutral relationships among natural resource conservation, natural resource governance and alleviation of rural poverty;
3. Cross-partner skill exchange to better enable planning, implementing and adaptively managing projects and programs in ways that maximize synergies among good governance, conservation and wealth creation; and
4. Global dissemination of knowledge, tools and best practices for promoting wealth creation of the rural poor, environmental governance and resource conservation.

Over the 5-year life of the program, TransLinks aims to develop a coherent, compelling and, most importantly, useful corpus of information about the value of, and approaches to, integrating Nature, Wealth and Power. To do this, TransLinks is structuring the work around two core issues – 1) payments for ecosystem services and 2) property rights and resource tenure.



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TRANSLINKS

A partnership of NGOs, Universities and USAID led by The Wildlife Conservation Society, dedicated to finding and sharing practical ways to generate benefits from conserving natural resources that are of global importance, and that serve as the supermarkets, bank accounts and insurance for many of the poorest people on earth.

For more information please visit our website at www.translinks.org or contact Dr. David Wilkie, the program director, at dwilkie@wcs.org.



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