

# VILLAGE CHICKEN DEVELOPMENT

Technical Report 15 | August 2017

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# Abbreviations & acronyms

ACIAR	Australian Centre for International Agricultural Research
AEW	Agricultural Extension Worker (MAF)
AI-COM	Agricultural Innovations for Communities for Intensified and Sustainable Farming Systems in Timor Leste (ACIAR)
ASI	Adam Smith International Pty Ltd
AVANSA	Avansa Agricultura Project (USAID)
AWPB	Annual workplan and budget
BA	Barrier analysis
BESIK	Community Water, Sanitation and Hygiene Program (Australian Aid)
CDE	Centre for Enterprise Development
DBC	Designing for behaviour change
DFAT	Australian Department of Foreign Affairs and Trade
DLC	District Liaison Committee
F&AO	Finance & admin officer (TOMAK)
GBV	Gender-based violence
GoTL	Government of Timor Leste
GSIA	Gender & social inclusion analysis
H&S	Health & safety
H&SP	Health & safety plan
IADE	Institute for Business Support
IAS	Independent Advisory Services
IDD	Investment design document
IGS	International gender specialist (TOMAK)
IM	Intervention manager (TOMAK)
INGO	International NGO
INS	International nutrition specialist (TOMAK)
IVCS	International value chain specialist (TOMAK)
KAP	Knowledge, attitudes & practice
KONSSANTIL	National council for food security, sovereignty and nutrition in Timor Leste
LTA	Long term adviser
M&EO	M&E officer (TOMAK)
M4P	Making markets work for the poor
MAF	Ministry of Agriculture and Fisheries
MCIE	Ministry of Commerce, Industry and the Environment
MDF	Market Development Facility (Australian Aid)
MECAE	Ministry of State for Coordination of Economic Affairs
MEP	Monitoring & evaluation plan
MEF	Monitoring & evaluation framework
MIYCN	Mother, infant & young child nutrition
MLC	Municipal liaison committee
MoH	Ministry of Health
MRG	Monitoring review group
NGO	Non-government organisation
NGS	National gender specialist (TOMAK)

NNS	National nutrition specialist (TOMAK)
NPO	National Program Office (TOMAK)
NSA	Nutrition sensitive agriculture
OFM	Operations & finance manager (TOMAK)
OH&S	Occupational health & safety
PD	Program Director (TOMAK)
PHD	Partnership for Human Development (Australian Aid)
PM	Program Manager (TOMAK)
PNDS	National Program for Village Development Support (GoTL executed, Australian TA support)
R4D	Roads for Development Program (Australian Aid)
<i>Redi Komodi</i>	Smallholder cattle enterprise development in Timor-Leste (ACIAR)
RM	Regional manager (TOMAK)
RMF	Results measurement framework
RMP	Risk management plan
RPM	Regional Program Manager
RPO	Regional program office (TOMAK)
SAPIP	Sustainable Agricultural Productivity Improvement Program
SBCC	Social behaviour change communication
SEM	Secretariat of State for the Socio-Economic Support of Women
SOL	Seeds of Life Program (ACIAR)
ST	Short term
STA	Short term adviser
TAF	The Asia Foundation
TL	Team Leader (TOMAK)
ToR	Terms of reference
TRG	TOMAK Reference Group
VC	Value chain
VfM	Value for money
WEE	Women's economic empowerment
WFP	World Food Program
WSS	Water supply & sanitation

# Executive summary

Over 70% of households in Timor-Leste own chickens, with a 32% reported increase in the total chicken population between 2010 and 2015. On average, a typical household owns 4.5 birds. Chickens (and eggs) are an important source of food, as well as an important source of cash income for many households.

**Key constraints** currently affecting production include:

- Chickens are generally managed in a low-input low-output free-range system, relying mainly on scavenged food. Farmers' knowledge of improved husbandry practices is very low.
- Newcastle's Disease (ND) has been reported to cause the loss of around 15% of all chickens. A village is likely to be affected by ND at least once every 2 years depending on location. An outbreak can kill almost all chickens in a village within a few weeks. Poultry usually die within days of contracting the disease and often entire flocks are decimated within a week of first infection.
- While considerable progress has been made by MAF in recent years to improve ND vaccination delivery, national coverage rates remain low. Access to other poultry animal health treatments (e.g. de-worming) is virtually non-existent, as is access to poultry-related extension support.
- Losses due to predation (cats, dogs, snakes) and lack of protection from the weather can account for over 70% of all chickens hatched. Most of these losses occur in the six weeks after hatching when young chicks are most vulnerable, and at night-time when chickens are roosting and nocturnal predators such as cats and snakes are most active.
- Reproduction rates are low, due to sub-optimal nutrition and use of local breeds.
- Knowledge concerning the nutritional value of eggs and poultry meat is limited. Consumption of eggs during pregnancy is also adversely affected by food taboos, which can be highly localised.

Given the widespread ownership of chickens, addressing the above constraints in some measure has the potential to close one of Timor-Leste's most important nutrition gaps – protein deficiency – by augmenting the supply of eggs and chicken meat.

## **Development strategy.**

The proposed development strategy has three main components:

Component 1: Increased ND vaccination coverage. For villages that are already receiving ND vaccination, chicken populations have increased significantly due to reduced death rates. Control of ND has also proven to be an important first step in shifting household attitudes towards managing chickens as a productive resource that justifies investment of time and money, rather than simply regarding them as a scavenging, unmanaged resource. Under this component, TOMAK will therefore support the progressive roll-out of MAF's ND vaccination program to all 66 target suku.

Component 2: Promoting increased consumption of eggs and chickens. Malnutrition in Timor-Leste is amongst the highest in the world, across a range of key indicators. Lack of dietary protein is consistently identified as one of the major issues. Eggs are an ideal option for addressing this nutritional gap, especially for pregnant women and children; they are a generally accepted (and valued) food source; and are easy to prepare. Increased consumption of chicken meat is also an important potential contributor to improved nutritional status. Around 65% of chicken flocks are cared for by women, with important implications for control over production, and self-consumption versus sale. Under this component, TOMAK will employ Social Behaviour Change (SBC) approaches to promote the nutritional benefits of eggs and chicken meat. Phasing of SBC activities will be linked to roll-out of the ND vaccination campaign.

Component 3: Introduction of improved chicken husbandry practices. Coupling increased supply (through ND vaccination) with increased consumption and demand (through SBC approaches) is expected over time to incentivise households to adopt improved husbandry practices and more intensive production systems. Under this component, TOMAK will support the adoption of secure pens for housing chickens at night, designed to reduce predation as the next most important cause of death after ND. Penning will also provide the opportunity to introduce improved husbandry practices covering animal health (for diseases other than ND), flock management, and supplementary feeding using local resources. Under this component, it is proposed to establish around 30 demonstration sites in three TOMAK suku over the first 12 months, and to use these sites

for initial training of MAF field staff and farmers. Expansion of this preliminary demonstration/ training program will be based on results achieved over the first year.

### **Key activities.**

#### Component 1:

- Coordinating with MAFs Veterinary Department to ensure reliable ND vaccination of chickens in TOMAK's target 66 suku.

#### Component 2:

- Developing / adapting SBC materials designed to promote the consumption of eggs and chicken meat in these communities.
- Engaging with communities (e.g. through Mother Support Groups and Family Nutrition Groups) to promote the consumption of eggs and chicken meat.

#### Component 3:

- Establishing demonstration sites selected suku to promote a shift towards more productive semi-intensive chicken husbandry in suku where ND vaccination rates are high and related SBC campaigns are being implemented. Elements of this include (TBC):
  - Constructing pens from permanent materials to reduce predation rates<sup>1</sup>. The pens would be used primarily for housing chickens at night, which would be allowed to free-range and scavenge throughout the day.
  - Trialing alternative pen designs that are less costly (e.g. a raised chicken coop made from local materials).
  - Training MAF Veterinary Department staff to improve capability for field diagnosis and treatment of diseases other than ND.
  - Training MAF Animal Production Department staff on improved chicken husbandry practices.
  - Developing simple and practical chicken production/ extension materials for use by farmers and SEOs.
  - Training farmers to improve knowledge and skills related to basic chicken husbandry, including supplementary feeding using local feed resources<sup>2</sup>.
  - Facilitating the supply of production inputs such as netting, medicines, feeders, and feed supplements through local agricultural kiosks.

### **Implementation arrangements.**

Roll-out of the ND vaccination program will be implemented by MAF, with support from TOMAK's Lead NGOs and their local partners to socialise and coordinate arrangements with local communities.

Design and development of SBC materials that promote the nutritional benefits of eggs and poultry meat will be led by TOMAK, building on whatever materials are already available. These materials will then be incorporated within relevant Lead NGO community training/ promotion programs, through their various community engagement mechanisms including Mother Support Groups and Family Nutrition Groups, and Parents Clubs.

Establishment and management of the chicken pen demonstrations will be sub-contracted/ sub-granted to suitably experienced local organisations<sup>3</sup>. The contractor will be required to work closely with TOMAK, Lead NGO and MAF staff at national and regional levels to ensure full coordination across the three components of this activity.

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<sup>1</sup> Equipped with dividers to allow for protection of newly hatched chicks and isolation of aggressive birds, nesting boxes, water dispensers, feed dispensers etc.

<sup>2</sup> To also include training on the nutritional value of eggs and chickens.

<sup>3</sup> Some of this work may also be managed by the Lead NGOs, depending on capability and interest.

# Main Report

## 1. Background

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To'os Ba Moris Diak Program (TOMAK) is a A\$25 million, 5-year agricultural livelihoods program funded by the Australian government in Timor-Leste. Its goal is to ensure rural households live more prosperous and sustainable lives. TOMAK will achieve this through parallel and linked interventions that aim to:

- Establish a foundation of food security and good nutrition for targeted rural households;
- Build their capacity to confidently and ably engage in profitable agricultural markets.

TOMAK will work on both the supply and demand sides of food security and nutrition (FS&N), applying nutrition sensitive agriculture (NSA) approaches. On the supply-side it seeks to improve the availability and diversity of nutritious food, while on the demand side it is working to influence the behaviour of target communities towards better nutritional practice using social and behaviour change communication (SBC) approaches. In relation to improving household incomes, TOMAK supports the development of commercial agriculture with a focus on developing selected value chains and their wider market systems to underpin scaled impact and sustainability. SBC approaches are also being applied under Outcome 2 to influence the attitudes of deeply traditional subsistence communities in relation profit seeking and advancement. Gender equality and women's economic empowerment is systematically incorporated into the design, implementation and monitoring of all interventions across the program.

TOMAK's target area comprises inland mid-altitude suku that have reasonable agricultural potential. For Phase 1 (2016-2021) implementation is being focussed in 66 suku (villages), located in Baucau, Viqueque and Bobonaro municipalities.

Village chicken production has considerable potential for improving household nutrition. Eggs, in particular, are an ideal option for addressing a known nutrition gap (protein) especially for pregnant women and children; are a generally accepted (and valued) food source; and are easy to prepare.

There have been a number of initiatives in recent years to begin to address production constraints, including the Australian Centre for International Agricultural Research (ACIAR) Village Poultry Health and Biosecurity Program; the World Vision (WVTL) Better Foods Better Health (BFBH) pilot project in Ailieu, about to be scaled up to also cover parts of Bobonaro, Baucau and Covalima; the Community-Driven Nutrition Improvement (CD-NIP) Program being implemented by CRS in Baucau and Viqueque; and a pilot project being implemented by the local NGO *Kadi Kapasidade*. FAO are also planning an activity that will support village poultry production in some of TOMAK's target areas.

TOMAK plans to provide additional support for village chicken development, commencing 2017-18, including support for improved ND vaccination coverage; improved housing, feeding, disease control and hygiene; combined with SBC messaging promoting the nutritional benefits of eggs and chicken meat.

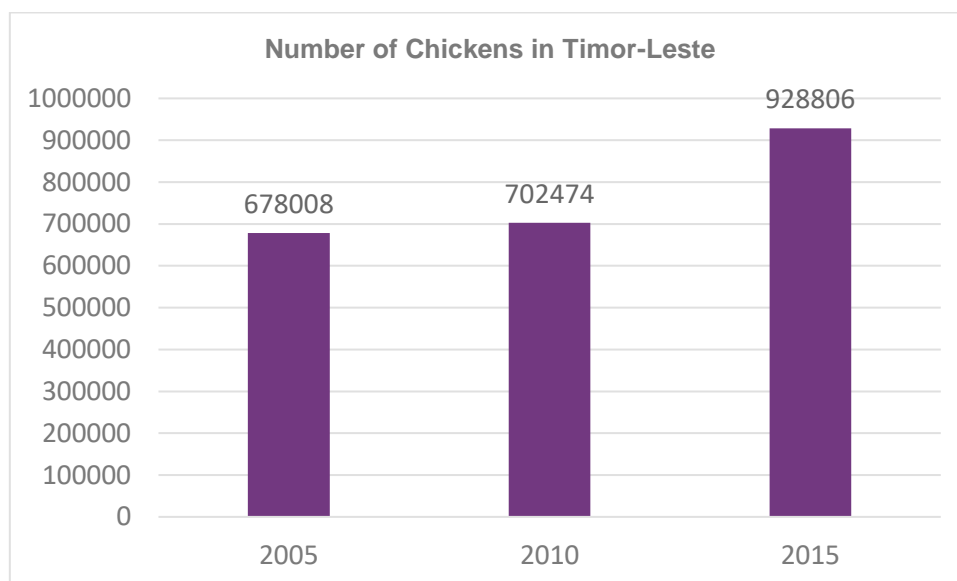
The objective of this study is to review and draw lessons from previous village chicken development initiatives; and to propose a preliminary design for TOMAK's involvement in this area.



## 2. Village chicken production in Timor-Leste: present situation

### 2.1. Ownership, husbandry practices and productivity

Chickens are already an important source of nutrition and income for subsistence farmers across Timor-Leste, both from meat and eggs. Over 70% of households own chickens, with a 32% reported increase in the total chicken population between 2010 and 2015. On average, a typical household owns 4.5 birds (2015 data). Chickens are also an important part of Timorese culture. Cock fighting is a favourite pastime for Timorese men and aggressive roosters are highly prized.



Source: National Census Data, Government of Timor-Leste

A survey of 308 small-scale chicken owners conducted in 2009<sup>4</sup> investigated key production constraints. Results include (Table 1):

- Chickens are economically important for 92% of households.
- 65% of flocks are cared for by women, with important implications for control over production, whether for consumption or sale.
- Chickens commonly roam freely around the house and roost in nearby trees or in the outdoor kitchen at night. Only 16% of households surveyed provided shelter for their chickens.
- Village chickens are commonly left to scratch and forage for food, with limited supplementary feeding from cracked corn, cassava, rice, coconut and rice bran.
- On average, hens produce three clutches per year, with 12 eggs per clutch.
- Only two eggs per clutch are eaten by the household.
- The remaining 30 eggs incubated per hen per year result in 25 chickens being hatched.
- Eighteen of these are destined to die from predation (especially cats, snakes, dogs and rats) and lack of protection from the climate. A further four will die of disease.
- Overall, only three chickens survive from the 30 incubated, for an overall survival rate of just 10%.

<sup>4</sup> Source: Constraints to production of village chickens in Timor-Leste, (Serrão, 2012).

**Table 1: Breakdown of causes of chicken mortality in Timor-Leste**

Age	Description	Deaths (% of stage)	Deaths (% of total)	Death by disease	Death by predation or climate
Hatch	Average hatching rate	18%	18%		18%
0-6 wks	Deaths predominately from predation and climate	58%	48%		48%
Growing	Deaths predominately from disease and predation	56%	19%	10%	10%
Adult	Deaths predominately from disease	39%	6%	5%	1%
		<b>Totals</b>	<b>91%</b>	<b>14%</b>	<b>76%</b>

Source: *Constraints to production of village chickens in Timor-Leste*, (Serrão, 2012).

## 2.2. Summary of key constraints

From the above survey results, together with field observations, the major constraints affecting village chicken production include:

- Chickens are generally managed in a low-input low-output free-range system, relying mainly on scavenged food. Farmers' knowledge of improved husbandry practices is very low.
- Newcastle's Disease (ND) has been reported to cause the loss of around 15% of all chickens. A village is likely to be affected by ND at least once every 2 years depending on location. An outbreak can kill almost all chickens in a village within a few weeks. Poultry usually die within days of contracting the disease and often entire flocks are decimated within a week of first infection.
- While considerable progress has been made by MAF in recent years to improve ND vaccination delivery, national coverage rates remain low. Access to other animal health treatments (e.g. de-worming) is virtually non-existent, as is access to poultry-related extension support.
- Losses due to predation (cats, dogs, snakes) and lack of protection from the weather can account for over 70% of all chickens hatched. Most of these losses occur in the six weeks after hatching when young chicks are most vulnerable, and at night-time when chickens are roosting and nocturnal predators such as cats and snakes are most active.
- Reproduction rates are low, due to sub-optimal nutrition and use of local breeds.
- Knowledge concerning the nutritional value of eggs and poultry meat is limited. Consumption of eggs during pregnancy is also adversely affected by food taboos, which can be highly localised.

## 2.3. Proposed development strategy

Given the widespread ownership of chickens, addressing the above constraints in some measure has the potential to address one of Timor-Leste's most important nutrition gaps – protein deficiency – by augmenting the supply of eggs and chicken meat. There is also potential for chicken production to contribute to increased household incomes, with local adult chickens (*ayam kampung*) selling for as much as US\$15 for a scrawny old chook in major markets.

There is potential to couple MAF's recently improved capacity to deliver ND vaccination with improved basic husbandry practices. This would start with promoting the use of chicken pens, reducing predation as the next most important cause of chicken death after ND. Protecting chickens by locking them up in a secure pen at night and releasing them mid-morning can result in a high reduction of death by predation, and also provides protection from climatic extremes such as storms and heat. Penning would however require increased attention to disease control, flock management, and some additional supplementary feeding. The capacity of MAF staff would need to be developed so that they are able to provide effective support in the areas of animal health services (extending beyond ND vaccination) and production advice to farmers; and the market-based supply of

required inputs (e.g. pen construction materials, feeders, poultry medicines) would need to be facilitated to underpin longer-term sustainability. With a focus on achieving the desired nutritional outcomes, increased consumption of eggs and chicken meat would need to be promoted in parallel with improved disease control and husbandry practices, with particular emphasis on increasing the protein intake of pregnant women and young children.

### 3. Review of recent chicken development activities

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#### 3.1. KADI

##### 3.1.1. Description

*Kadi Kapasidade* (a local NGO) is promoting a small-scale semi-intensive management approach which seeks to protect chickens from a range of predators (especially at night) by providing well-constructed chicken pens. Farmers are provided with materials to construct a chicken pen, trained on semi-intensive chicken husbandry practices, and linked in to MAF's ND vaccination program. Farmers are required to supply their own chickens and feed. During the last 12 months, eight chicken pens have been established in four municipalities: Los Palos (Pairara, Fuiloro and Cacavein); Viqueque (Viqueque Vila); Dili (Comoro); and Bobonaro (Atabae). Initially, farmers were given only a roll of chicken wire with basic guidelines on construction. During the second 6-month period, pens were fully constructed by *Kadi* staff. Performance is being closely monitored on a monthly basis, including information on births, deaths, and egg production, with data being collected via phone. On-site support visits are made by *Kadi* staff throughout the year.



*The Kadi 'flat-pack' chicken pen is constructed in panels before delivery. Construction uses light-weight square tube steel wrapped in small diameter mesh, installed on a thin bed of concrete. Farmers are encouraged to add palm leaves if there is not enough natural shade.*

##### 3.1.2. Results

Over the 12-month pilot period, the number of chickens kept in the pens has increased from 36 to 102. Around 180 chicks have been hatched, of which 61 (34%) have survived. This compares with a baseline 9% survival rate for chickens that are not kept in pens or vaccinated.

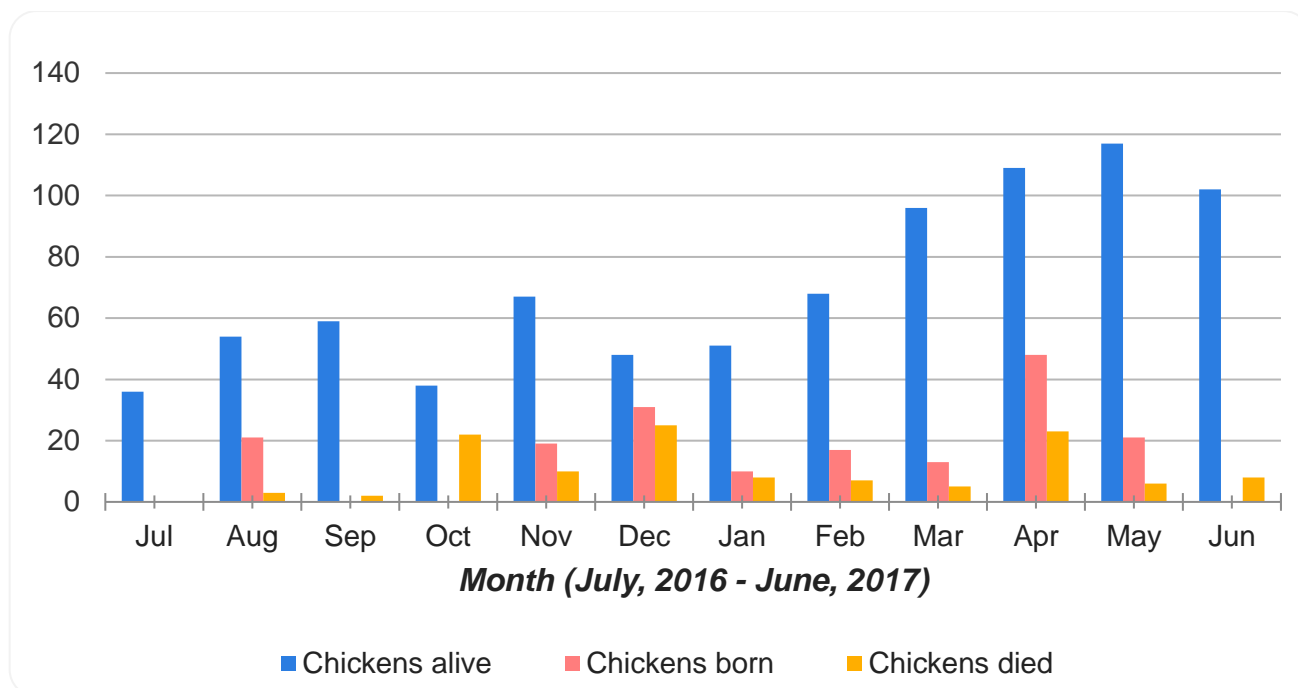


Figure 1. Chicken population in Kadi chicken project during 12 months of monitoring. Chicken deaths were highest when more chicks hatched, probably because young chicks are more vulnerable to sickness and predation.

Performance over the first 12-months of operation has steadily improved as skills and experience have increased. The chicken survival rate for the first six months was only 13%. For the second six months this increased to 60%, in response to additional training and mentoring. Pen design has also been improved, specifically in relation to reducing the size of the chicken mesh at ground level from 5cm to 1cm to prevent small chicks escaping. A number of other interventions were also introduced including improved laying boxes, improved clean water delivery systems and separation of chickens at different growth stages.

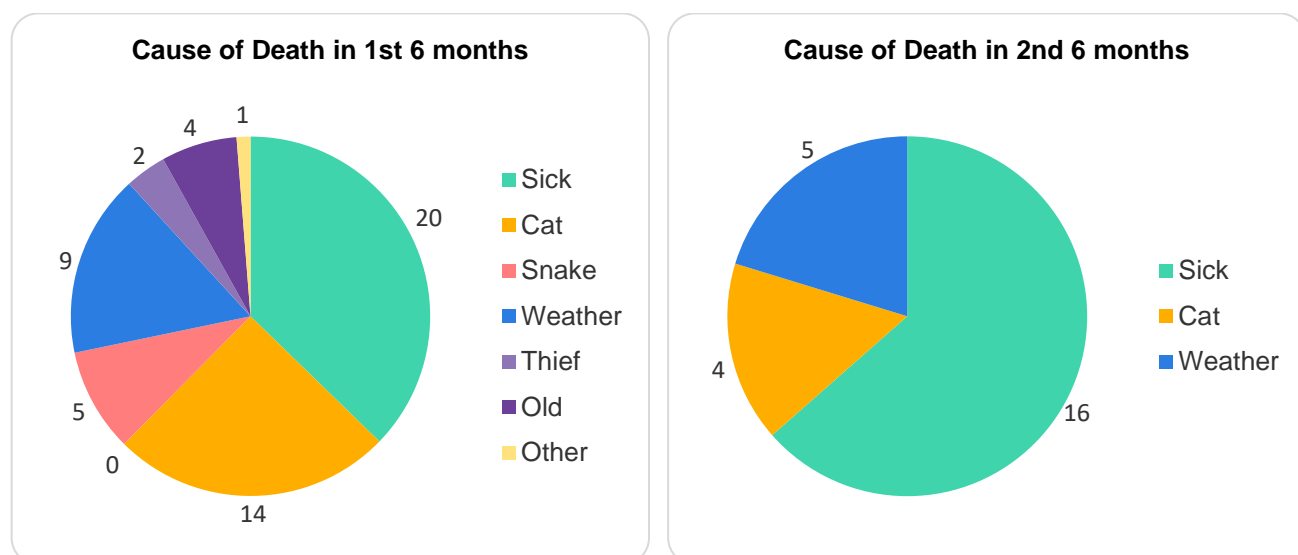


Figure 2. Comparison of causes of chicken deaths between the first and second 6-months of the Kadi program. When predation is reduced, sickness becomes the next big challenge.



*Chicken mesh at ground level has 1cm square mesh size. This prevents small chicks from escaping and being eaten by cats. This mesh is relatively expensive (approximately \$2/m) and rusts within 2-3 years. Improved galvanised mesh is on order through Vinod Patel hardware at a cost of \$1.50/m. Note the secure concrete base.*



*Kadi recently introduced this water dispenser using a dripper nipple attached to the lid of a water bottle, providing a reliable supply of clean water. A cut clove of garlic can be added to the water to improve animal health. The nipples cost \$1 each retail.*



*A simple feeder constructed of PVC pipe and suitable for wet or dry feed.*





*Food preparation: a simple hand grinder can assist in cracking grains and grinding leaves (left).  
Rice, corn and commercial feed mixed together (middle).  
Various fresh vegetables, fruit and leaves chopped for easy digestion (right).*

The provision of a reliable supply of nutritious food for chickens can be a significant challenge, particularly in more remote and resource-poor communities. The amount of time to prepare food can also be an issue. The *Kadi* model therefore encourages farmers to let their chickens out during the day to scratch for food, so as to minimise the need for supplementary feeding.

Timorese chickens are fairly aggressive with fighting qualities being prized by men. This contributes to a higher death rate in penned situations. Division of the large pen into smaller sections (as incorporated into the World Vision chicken activity in Aileu – see section 3.2), allows the separation of more aggressive or sick birds. The original *Kadi* design has been modified and now subdivides the main pen into five sections to allow for separation of aggressive birds as necessary, with a further eight small grower cages being used to protect chicks.



*Separated small 'growing cages' for chick raising are now being incorporated into the Kadi design after seeing a similar idea implemented by a nearby household. This enables increased protection of young chicks during the first six weeks. The increased cost of these pens needs to be weighed against returns. Note that disease can still be transmitted through the mesh from one pen to the next.*

During the second six-month period of the *Kadi* project, two thirds of all deaths were due to sickness. *Kadi* has found that keeping chickens in pens has led to extra challenges in terms of nutrition and disease. Half of the eight pens were not considered to be active by the end of 12 months. Various diseases were difficult to diagnose for untrained farmers.



*A chicken disease diagnosed as fowlpox spread quickly among the young chicks in one Kadi pen, resulting in seven deaths in one month. Kadi staff are discussing modifications to chick pen design so that they are easier to clean and maintain in a hygienic disease-free state.*

Security was also an issue for two pens, with all the chickens being stolen in one event. This resulted in the farmers concerned terminating their involvement in the project. In both cases, the farmers lived in communities that were different to their place of origin. Padlocking pens needs to be weighed against the need to maintain relatively easy access for members of the family tending to the chickens.

*Kadi* has successfully crossed a local chicken with an 'Isa Brown' (which is a prolific egg producer, and is less aggressive than local breeds), and plans to continue work on breeding to select for egg production, disease resistance and less aggressive behaviour.



*The Kadi chicken – a rooster resulting from a cross between a local rooster and an 'Isa Brown' hen from the Railaco chicken farm.*



## 3.2. World Vision: Aileu

### 3.2.1. Description

World Vision (WV) began implementing a pilot chicken project in Aileu Municipality in February 2017, as part of the 'Better Food Better Health' program<sup>5</sup>. Twenty-two of MoH's Community Health Volunteers (PSFs<sup>6</sup>) have been trained in improved husbandry techniques and provided with a chicken pen. By August 2017 six pens had been established, with 10 chickens and one rooster supplied for each pen. PSFs have been trained by WV staff in chicken management, including production of suitable feed from locally available ingredients such as rice bran, corn, copra meal and fish meal. This training included calculation of the protein ratio required for chickens at different growth stages, and how to formulate suitable chicken feed from locally available feed resources. Training materials include a set of simple presentations (powerpoint format) on biosecurity, disease control and feed formulation. WV has financed construction of the pens (USD400-500 per pen), provided the chickens, as well as some support for purchase of initial feed supplies. The pens are of durable steel construction following the concept demonstrated by *Kadi* (see section 3.1), and are generally well-built. They are equipped with a security lock, feeders, drinkers and laying boxes. WV is liaising with MAF to ensure that chickens are vaccinated for ND – the first vaccination took place in July, 2017.



*WV chicken pen. The pen is separated into four sections, and is located close to trees to provide shade.*

### 3.2.2. Results

With chickens only being introduced in June 2017, more time is needed to assess results. However, over the first two months one clutch of chickens had been hatched and several other hens were incubating eggs in the six pens that had been stocked at the time of the field inspection. A major modification to the *Kadi* design was the separation of the pen into four separate sections. This has since been adopted by *Kadi* with improved results in chicken management. The ability to separate chickens reduces the impact of aggressive birds which can lead to a decline in chicken health or even death. The owner of at least one pen had added his own chickens into other sections of the pen. Other chickens owned by neighbours were being vaccinated for ND at the same time as chickens in the pens. This helps to improve immunity across the village and aids in protecting the new (unvaccinated) chicks in the pen. There was no further quantitative information available at the time of the field visit on chicken numbers, deaths, sickness, sales or egg production.

A visit to a pen in Fahisoi Suku, Aileu, identified the following issues:

- Chicken mesh size at ground level is 5cm, allowing young chicks to escape.

<sup>5</sup> The BFBH pilot program will be extended to selected suku in Bacau, Bobonaro and Covalima Municipalities in late 2017.

<sup>6</sup> *Promoter Saude Familiar* (PSF).

- The water system appeared prone to failure with one dispenser falling apart during the visit.
- Food supplied by the farmer consisted of whole corn kernels only – which are difficult to digest and nutritionally not a complete diet.
- Walls were made of mesh only – during the wet season there will be little protection from driving rains.
- Nesting boxes were located close to the roof – hens were able to get in but chicks are at risk of falling from >2m and unable to return to the safety of the box.
- Nesting boxes located at roof height are likely to over-heat.
- The ground inside the pens had been completely bared during construction, leaving little vegetative cover for the chickens.
- The perimeter of the pen at ground level had several gaps which had been temporarily blocked with branches, creating a weak spot for entry by predators such as cats and dogs.



*Water dispenser (left) and food dispenser (right) hanging from chicken pen roof.*

Good quality water and feed dispensers were being used, hung from the roof. The red base of one water dispenser fell off during the visit due to 'flighty' chicken activity. The feed dispenser was stocked with a small amount of whole corn grains only.



*Nesting boxes for chickens with a roosting bar for entry. Note the bamboo roost further below.*





*The farmer had stocked other sections of the pen with his own chickens. Water was provided in small tins or bamboo sections – these containers were at risk of tipping over (tins) or cracking (bamboo).*



*Small chicks were able to escape through the large-diameter mesh, placing them at risk from predators.*



*Gaps at the bottom of the pen were a weak spot for entry by predators.*



The selection of PHFs to own and manage the first six pens established appears to be an issue, as there is no direct link between their role as PHFs and their motivation and skills to raise chickens. As a result, PHFs are now being encouraged to recommend an alternative family member who is interested in chicken raising, and training will be targeted towards this person.

In summary, WV has invested in strong and durable pens, provision of chickens, training on improved production, and facilitation of ND vaccination by MAF. The ability to separate aggressive chickens is a sensible modification of the original *Kadi* design. Other issues regarding pen design and improved supply of nutritious food supply will need to be addressed as the project progresses.

### 3.3. ACIAR Village Poultry Health and Biosecurity Program

#### 3.3.1. Description

ND in chickens is prevalent throughout Timor-Leste and results in the rapid death of entire flocks of poultry. The disease spreads easily through contact between infected chickens or their bodily fluids. Ensuring that poultry are vaccinated against ND is foundational to the success of any future poultry project in Timor-Leste. The Australian Government (through ACIAR) recently funded the 'Timor-Leste Village Poultry Health and Biosecurity Program', a major objective of which was to develop MAF's capacity to improve vaccination coverage for ND. This project was a collaborative effort between the Faculty of Veterinary Science of the University of Sydney, and MAF's Veterinary Department. Strengthened ND vaccination procedures were trialed in a number of villages, while building the capacity of the MAF to deliver ND vaccine nationwide. Vaccination is provided using an eye dropper, coordinated by MAF staff at Administration Post level. MAF staff vaccinate the chickens or, in some areas, work through trained voluntary vaccinators operating in their local communities. Vaccine needs to be kept cool. Once a vial is opened it can be used to vaccinate up to 100 chickens but must be used within 2-3 days.



*Applying the ND vaccine with an eye dropper is quick and simple.*

In addition to the strengthening capacity for ND vaccination, improved chicken pens were also trialed under the project. Nine sites were selected and chicken pens were built for active voluntary vaccinators. These pens were located in Pairara and Lospalos (Lautem Municipality), Hato'o (Aileu), and Saborai (Bobonaro). Pens were constructed in 2014 with local materials and metal sheet roofing.

One poster was also developed to promote the consumption of eggs.

### **3.3.2. Results**

MAF has recently initiated a vaccination program nation-wide. ND vaccination services are reported to be available at no cost<sup>7</sup> to farmers in all Municipalities. Vaccination has been successfully scaled-up with almost 77,000 chickens (8% of the total national flock) vaccinated in July, 2016. However, this number declined to 67,000 in November and 42,000 March, 2017. The decline in March was attributed to a decline in chicken population due to the wet season. This project may explain, at least in part, the reported increase in the total poultry population from 700,000 head in 2010 to almost 930,000 in 2015.

In relation to the small chicken pen pilot, difficulties included lack of farmer interest in raising chickens in pens, and accessing adequate food for supplementary feeding. At the time of preparing this report, these sites have not been revisited to assess results, although this will be done in coming months. MAF staff at national level indicated that a few of the pens are still operational.

## **3.4. CRS: Baucau and Viqueque**

### **3.4.1. Description**

CRS assists farmers across Baucau and Viqueque with chicken raising by liaising with MAF to improve ND vaccination coverage rates. CRS supports ND vaccination in Baucau (Baguia, Laga, Quelicai and Venilale Administrative Posts); and Viqueque (Ossu, Uatulari, Uatucabau and Viqueque)<sup>8</sup>. CRS staff collect information from target villages including the names of farmers owning chickens and the number of chickens owned, and also socialise the idea of ND vaccination with households. This information is passed to local MAF veterinary staff so that they can organise vaccination. CRS also provide meals and transport for staff involved in vaccination activities. This support has been provided since 2016. Since March 2017, 1,397 households have had their chickens vaccinated.

### **3.4.2. Results**

While hard data is not available, the program is an excellent example of an NGO using its established community presence to support the roll-out MAF's relatively new ND vaccination program. The 1,400 households that have had their chickens vaccinated are almost certainly experiencing reduced chicken losses, providing a valuable entry point for targeting these households with SBC activities around the nutritional benefits of eggs and chicken meat.

## **3.5. FAO Poultry Project**

### **3.5.1. Description**

FAO is currently finalising arrangements for implementation of a capacity building program promoting improved management of cattle, goats and poultry<sup>9</sup>. The project will be implemented from 2017 to 2018 in eight locations in four municipalities: Atauro (Dili); Baucau (Quelicae) Manufahi (Alas and Fatuberliu). In total, 600 households will be targeted for poultry-related activities. Farmers will be provided with materials that need to be purchased to build their own chicken pens (e.g. nails, netting, catches), but are required to provide their own locally-available construction materials (e.g. bamboo). They will also be provided with ten local hens and one rooster per pen. Chickens will be vaccinated for ND prior to distribution. Training, technical assistance, coaching and mentoring will be provided on improved chicken management, including control and prevention of ND, in close collaboration with MAF. FAO and MAF will implement a monitoring system which will involve each household maintaining a log book to record key activities. Municipal livestock staff will be mobilized to regularly check on chicken health and survival during implementation.

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<sup>7</sup> Until at least 2021.

<sup>8</sup> Suku supported are listed in Appendix 3.

<sup>9</sup> As part of a program supporting for livelihoods, recovery and resilience-building for improved food and nutrition security of El Niño affected households.

### 3.5.2. Results

At the time of preparing this report implementation had not commenced, and little other information was available.

There is likely to be an issue with the availability of local materials for pen construction in at least some of the target areas. While a resourceful farmer with an adequate supply of local materials can build a suitable pen using traditional construction methods, wood for posts and bamboo are not readily available in many areas, or they need to be bought from other farmers at a high price. Availability of labour to construct pens is also a constraint in some areas. A further problem is that pens made from local materials are expected to last for only 2-3 years, being susceptible to rot, borer and termites. A significant quantity of leaves or grass will be required to provide an adequate roof. Pens constructed from local materials are also often not sufficiently secure to contain young chickens, or to provide protection from predators. A mix of local materials with wire mesh and metal roofing could provide a viable solution. Developing farmer interest for improved chicken management if they do not have access to materials for a more secure and durable pen may also be a challenge.

### 3.6. MAF initiative in Manufahi

In early 2017, the Animal Production Department worked with at least one community in Manufahi (suku Besusu) to install a relatively large chicken pen. MAF supplied rolls of mesh and 145 chickens, with the community supplying local materials and labour. The design is an interesting construction of two long, raised pens with internal walls to create numerous smaller sections. Although chickens were vaccinated for ND, 125 chickens died from unknown causes one month after establishment. Despite this loss, the farmers involved remain positive and are working to increase the chicken population.



*The chicken pen at Besusu, Manufahi, supported by MAF's Animal Production Department*

### 3.7. Feed and Storage Projects

A critical limiting factor for improving poultry production is the availability of surplus feed. The following two projects are not directly poultry-related and have recently closed; however, they have helped lay the foundation for a successful chicken project. Farmers that have been directly involved in these projects are more likely to have a food surplus and are therefore more likely to be interested in adopting improved chicken husbandry practices.

### 3.7.1. Seeds of Life Project

The Seeds of Life Project (SoL), funded by the Australian Government through ACIAR, aimed to increase the production of maize, rice, cassava, sweet potato and peanuts. The project was implemented across all municipalities, providing farmers with improved access to seed and cuttings of higher-yielding varieties with proven results in Timor-Leste.

Other relevant technologies tested and disseminated by Seeds of Life included:

- Air-tight drums for grain and seed storage.
- Food grinders.
- Corn shellers.
- Velvet bean mulching.

These technologies, combined with quality seed and improved production techniques have been important factors in lifting many households from producing insufficient food to meet basic household needs, to being food surplus.

### 3.7.2. IFAD Maize Storage Project

The Maize Storage Project (or 'Drums for Maize Project'), funded by IFAD, promoted the use of air-tight 200 litre drums for the storage of maize on-farm, with the aim of reducing post-harvest losses that are reported to be as high as 30% under traditional storage systems. Around 40,000 drums were distributed across all Municipalities (excluding Oecusse). Households in TOMAK's target municipalities (Baucau, Viqueque and Bobonaro) had the opportunity to purchase from two to four drums at a subsidised price. They were also able to obtain a manual corn sheller for an additional \$5. The project concluded in 2015, however the drums should last for at least 10 years if properly cared for.

Farmers who continue to use improved crop varieties as introduced by SoL, and store their surplus grain in air-tight drums as provided by the IFAD project (or other projects supplying air-tight storage) are more likely to have surplus grain that can be diverted to poultry production, and have the means to reliably store grain throughout the year.

## 3.8. FAO poultry production guidelines

FAO has produced a set of guidelines entitled 'Decision Tools for Family Poultry Development' in collaboration with the International Network for Family Poultry Development and the International Rural Poultry Centre of the Kyeema Foundation. These guidelines set out a range of considerations for family poultry production, from how to conduct preliminary assessments through to exit strategies. There are a number of practical recommendations including housing design and feed sources. The guidelines provide a useful reference source for developing village chicken production in Timor-Leste.

Use of raised housing that offers protection from predators at night, while allowing chickens to range freely during the day, is recommended.



*Example of raised chicken pen recommended in the FAO guidelines.*

It is assumed that the ladder is removed each evening, although it is uncertain how the design prevents entry of cats which are a major predator in Timor-Leste. This concept, suitably adapted to improve protection from cats, could be worth trialling. Note that this type of enclosure maintains the nutritional and health/ hygiene advantages associated with free-range systems. However, the issues previously noted associated with the availability, cost and longevity of locally available-construction materials also need to be considered.

The guidelines also discuss various options for nutritionally-balanced feeding of poultry. They note the importance of avoiding competition for human food; as well as the need to carefully balance the number of chickens being managed within intensive or semi-intensive systems with locally-available feed resources. In Timor-Leste, it is likely to be difficult to access a reliable and affordable source of manufactured feed. It is therefore important to provide chickens with access to scavengeable feed resources within the local community.

These could include:

- Household kitchen waste.
- Grains and grain by-products.
- Roots and tubers meals.
- Oilseed cakes and meals.
- Leaves of trees, shrubs (including *Leucaena*, *Calliandra* and *Sesbania*) and fruits.
- Animal protein: blood, termites, maggots, earthworms, oysters (lucky chooks), and snails.
- Various aquatic plants (*Lemna*, *Azolla* and *Ipomoea aquatica*).

## 4. MAF Support Services

MAF services related to poultry production are currently focussed mainly on providing reliable ND vaccination support services. In some cases, trained MAF staff are also able to advise on chicken management, such as disease diagnosis, but capacity in this area is not well-developed. The accuracy of diagnosis depends significantly on the expertise of MAF veterinary staff located at Administration Post (subdistrict) level. There is no other veterinary support (e.g. other medications) or farmer training being provided. Availability of poultry production extension materials is highly limited.

### 4.1.1. MAF services across various levels of Government

**Table 2: Services provided by the Veterinary and Animal Production departments of MAF**

Level	Veterinary Department	Animal Production
National	<ul style="list-style-type: none"> <li>• Animal health and disease monitoring</li> <li>• Ordering ND vaccines, and management of the ND vaccination program.</li> <li>• Storage of data related to ND vaccination – numbers of chickens vaccinated by suku.</li> </ul>	<ul style="list-style-type: none"> <li>• Research on improved animal production systems.</li> </ul>
Municipal	<ul style="list-style-type: none"> <li>• Animal clinic in each Municipality (but not currently in Aileu or Ermera) where farmers can access antibiotics as well as diagnosis and recommendations regarding disease.</li> <li>• Organisation of ND vaccination campaigns and collation of data.</li> </ul>	<ul style="list-style-type: none"> <li>• Oversight of research on improved animal production.</li> </ul>
Administration Post	<ul style="list-style-type: none"> <li>• One staff member, administers ND vaccines and collects data.</li> </ul>	<ul style="list-style-type: none"> <li>• One staff member, provides advice on management and production, often in collaboration with vet staff.</li> <li>• Provides livestock extension material when available.</li> </ul>



Level	Veterinary Department	Animal Production
Suku	Suku Extension Officers, mainly focused on crop production, but may accompany vet and animal production staff from the Administration Post MAF office when they are available, although this is most likely on an <i>ad hoc</i> basis.	

### 4.1.2. ND vaccination services

ND vaccination is provided as follows:

- Three campaigns each year: in March, July, November.
- Generally provided on the request of farmers.
- In the preceding month, vaccinators (or volunteers) collect data on the number of chickens in a target village.
- On a pre-arranged day, farmers catch and restrain chickens and the vaccinator administers the vaccine
- The vaccine is applied using an eye dropper.
- All chickens caught are vaccinated every time – one vaccination is not enough to protect a chicken for its entire life.
- Vaccines come in a vial with 100 doses – hence vaccinators are not inclined to vaccinate in a location where less than 100 chickens are available.
- During vaccination, data is collected including farmers' names, location and the number of chickens vaccinated.
- Government has made a commitment that vaccination is provided free-of-charge through until 2021.

MAF only work in villages that have requested vaccination support. It appears that not all requesting villages receive this service – i.e. demand exceeds MAF's ability to supply, although reliable data on this is not available.

For ND vaccination, MAF is actively working with a number of the projects described earlier, including the *Kadi*, WV, CRS and FAO activities. This requires solid collaboration with the Veterinary Department at national level so that any problems experienced in accessing vaccination services at local level can be resolved.

## 5. Private sector

The private sector has a potentially important role in the supply of inputs required to support semi-intensive smallholder poultry production, but development of this role will need to be facilitated. In particular, the market-based supply of medicines, pen construction materials, feeders, feed processing equipment (eg shellers/grinders) and feed supplements will need to be strengthened.

Issues exist around moving from zero-input scavenging systems to higher input, higher cost and riskier systems. At this early stage, farmers in general lack the confidence to invest in more intensive systems, being unsure of whether the benefits will justify the investment of time and money. Until this change in mindset occurs, it will remain difficult to stimulate private sector activity. TOMAK should nevertheless aim to promote the use of private sector supply channels to the maximum extent possible. One way that this could be achieved is through the use of voucher-based systems for farmers to purchase necessary inputs, even if these are being subsidised initially by the project.

**Table 3: Current availability of relevant poultry production inputs**

Inputs Available	Current Source
Live chickens	Informally traded at local markets and various street locations in major towns
De-worming medicine (no other poultry related medicines)	Ag shop ( <i>Bairro Pite</i> )
Chicken wire mesh	Vinod Patel, <i>Kadi</i>
Feeders, drinkers	Ag shop ( <i>Bairro Pite</i> ), <i>Kadi</i>
Formulated feed	Hera, Dili \$1.50/kg

## 6. Lessons Learned

- The recently improved ND vaccination services being implemented by MAF have provided a solid foundation for improving smallholder poultry production practices. However, further support to MAF may be required in some areas to ensure reliable delivery of these services.
- Research into chicken raising has demonstrated that, after ND, predation is the main killer of chickens, especially chicks. The use of well-designed, small-scale chicken pens can help to address this, although they need to be introduced in tandem with measures that promote improved hygiene/ disease control, and some level of supplementary feeding.
- Chicken pens need to be constructed with durable materials that provide adequate protection against predators and climate extremes including heat and storms. The use of local materials such as bamboo and thatch has multiple disadvantages: supply is limited in many villages; these materials are often relatively expensive; they are labour intensive to use; they are generally less effective in providing protection from predators; and they have a life of only one to two years before requiring replacement.
- A small-scale semi-intensive approach where farmers are encouraged to let the chickens out through the day aids in supplying basic nutritional requirements and is likely to reduce the disease/ hygiene risks associated with more intensive systems.
- Chicken pen design needs to include separate sections allowing chickens to be segregated, especially where more aggressive local breeds are being caged. This is especially important for protecting chicks during the first six weeks of life.
- Adequate protection needs to be provided from the sun, heat, rain and wind. A full roof is recommended but with sunshine available in early morning and late afternoon. Chickens should not be forced to roost, lay, or incubate eggs too close to the roof. Walls should be constructed to prevent excessive wind and rain but allow adequate ventilation.
- Careful consideration must be given to the supply of clean drinking water, adequate food and treatment of disease.
- Careful selection of target farmers is critical. Selection criteria should focus on identifying farmers that currently show interest and capacity in chicken raising. These farmers are more likely to become successful early adopters.
- MAF has a reasonably well-established network down to suku level. At present (in relation to chicken production) the MAF system functions mainly to support the ND vaccination program. Knowledge and skills related to improving chicken husbandry are limited. Suitable farmer extension materials are also limited.
- Efforts to promote chicken production need to be complemented with SBC initiatives aimed at promoting awareness of the nutritional benefits of eggs and poultry meat. Consumption of eggs by pregnant women (one of TOMAK's core target groups) is a taboo in some areas, and is likely to require a more innovative and longer-term approach to changing behaviour.

## 7. Recommended approach

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### 7.1. Component 1: ND vaccination

#### 7.1.1. Objective

To reduce chicken losses by increasing ND vaccination coverage.

#### 7.1.2. Context

MAF's capacity to provide vaccination coverage has increased significantly in recent years. For villages that are already receiving ND vaccination, chicken populations have increased significantly due to reduced death rates. Control of ND has also proven to be an important first step in shifting farmers towards managing chickens as a productive resource that justifies investment of time and money, rather than simply regarding them as a scavenging, unmanaged resource.

#### 7.1.3. Scope and phasing

Under this component, TOMAK will support the roll-out of ND vaccination services to any of the 66 TOMAK target suku that are interested in becoming involved. Phasing will be determined in line with MAF's local capacity to sustain a vaccination service in a particular suku once it had been initiated. SBC activities promoting increased consumption of eggs and chicken meat would be initiated in a suku at the same time as the vaccination campaign.

#### 7.1.4. Summary of key activities and implementation responsibilities

- Promote benefits of ND vaccination to communities (Lead NGO with AEW)
- Ascertain community interest in becoming involved in the ND control program (Lead NGO with AEW)
- Liaise with MAF to organise vaccination schedule (Lead NGO with AEW)
- Mobilise community to present chickens for vaccination on scheduled day (Lead NGO with AEW)
- Provide vaccination service (MAF)
- Monitor status of chicken health and report to MAF when there is a major problem (Lead NGO with AEW)

### 7.2. Component 2: Increasing demand for eggs and chickens through Social and Behaviour Change (SBC)

#### 7.2.1. Objective

To improve awareness of the nutritional benefits of eggs and chicken meat, thereby increasing consumption (and demand).

#### 7.2.2. Context

Malnutrition in Timor-Leste is amongst the highest in the world, across a range of key indicators. Lack of dietary protein is consistently identified as one of the major issues. Eggs are an ideal option for addressing this nutritional gap, especially for pregnant women and children; they are a generally accepted<sup>10</sup> (and valued) food source; and are easy to prepare. Increased consumption of chicken meat is also an important potential contributor to improved nutritional status. Around 65% of chicken flocks are cared for by women, with important implications for control over production, and self-consumption versus sale.

Increased village chicken populations resulting from sustained ND control provides the opportunity for parallel SBC efforts that promote the nutritional benefits of eggs and chicken meat. Combining increased supply with

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<sup>10</sup> Although consumption of eggs by pregnant women is a food taboo in some areas. It is likely to require mosr sustained, longer term SBC efforts to break down these taboos.

increased demand is expected over time to incentivise households to adopt improved husbandry practices and more intensive production systems.

### **7.2.3. Scope and phasing**

Under this component, TOMAK will support the development of SBC messages, materials and approaches supporting increased consumption of eggs and chicken meat in coordination with the MoH and MAF.. This would be conducted as an integral part of the broader SBC efforts TOMAK is supporting to promote adoption of improved nutrition-related behaviors and aim to build on relevant existing materials and activities. Phasing would be linked to roll-out of the ND vaccination campaign, with progressive expansion to cover all 66 of TOMAK's target suku.

### **7.2.4. Summary of key activities and implementation responsibilities**

- Develop and test appropriate SBC messages and interpersonal communication materials, in line with TOMAK's SBC strategy (TOMAK, in consultation with Lead NGOs).
- Refinement of existing Lead NGO training curricula to reinforce key SBC messages (including a session on household decision-making around competing priorities for sale and consumption of eggs and poultry). (Lead NGOs, with support from TOMAK).
- Community-level promotion/ training, focussed through groups such as Mother Support Groups and Family Nutrition Groups, and Parents Clubs

## **7.3. Component 3: Improved chicken husbandry demonstrations**

### **7.3.1. Objective**

To promote a shift towards semi-intensive chicken production practices in villages that already have high ND vaccination coverage and where demand for poultry products is being stimulated through SBC activities.

### **7.3.2. Context**

Increased village chicken populations due to improved ND control, coupled with increased demand for eggs and chicken meat stimulated through SBC activities, provides the basis for a gradual shift towards the adoption of more intensive management practices. After ND, the most important cause of chicken deaths is predation. These losses can be significantly reduced with a shift to towards a semi-intensive management model where chickens are penned at night, but still left to scavenge during the day. This approach does however require improved husbandry particularly in relation to nutrition (some degree of supplementary feeding is required for optimal production), prevention/ treatment of animal health issues other than ND, and flock management (in particular the management of aggressive birds). Previous efforts to develop a more intensive production model have had variable results, and in some cases have been costly. However, results are sufficiently encouraging to warrant establishing additional demonstration sites and use of these sites to identify and resolve issues associated with more intensive management models.

### **7.3.3. Scope and phasing (draft)<sup>11</sup>**

Following on from successful roll-out of Component 1 and 2 activities, it is proposed that this component would be implemented in one suku in each of Bobonaro, Baucau and Viqueque, involving around 10 demonstration sites per suku as follows:

- Four demonstrations located with progressive farmers, who will be supported to construct chicken pens using permanent materials.
- Four demonstrations located with active ND vaccinators (MAF staff or voluntary), who will also be supported to construct chicken pens using permanent materials.
- 2 demonstrations located with progressive farmers, who will be supported to test the FAO free-range chicken coop concept.

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<sup>11</sup> To be finalised in consultation with Lead NGO partners.

The suku selected for the demonstrations should already be actively involved in the ND vaccination program; and nutrition-related SBC activities promoting increased consumption of eggs and chicken meat should already be well advanced.

Chicken pens would be designed for 10 adult hens, hatching a total of 15 clutches per year with 7 surviving chicks per clutch.

#### **7.3.4. Summary of key activities**

- Provision of support for constructing pens from permanent materials<sup>12</sup>. The pens would be used primarily for housing chickens at night, which would be allowed to free-range and scavenge throughout the day.
- Provision of support for constructing alternative pen designs that are less costly, initially based on the raised chicken coop described in the FAO Manual.
- Training of MAF Veterinary Department staff to improve capability for field diagnosis and treatment of diseases other than ND.
- Training of MAF Animal Production Department staff (and AEWs) on improved chicken husbandry practices.
- Developing simple and practical chicken production/ extension materials.
- Training farmers through Farmer Field Days conducted around the demonstration sites to improve knowledge and skills on improved chicken husbandry.
- Facilitating the supply of production inputs such as netting, medicines, feeders, and feed supplements through local agricultural kiosks.
- Intensive monthly monitoring of key indicators including the number of chickens penned, births, deaths and sickness, egg and poultry consumption and sales.

#### **7.3.5. Implementation responsibilities**

Establishment and management of the demonstration sites would be sub-contracted/ sub-granted to a suitably experienced local organisation, who would be required to work in close coordination with the Lead NGO in each area. The contractor would work closely with TOMAK, Lead NGO and MAF staff at national and regional levels to:

- Finalise the design of the activity, taking into account emerging results from other chicken development initiatives being implemented (as identified in section 3).
- Conduct initial socialisation of the project with MAF staff at municipal and sub-municipal levels.
- Oversee the selection of participants.
- Manage procurement of supplies and installation of pens.
- Develop simple and practical training/ extension materials.
- Organise production-related training for MAF staff, Lead NGO staff, TOMAK Regional Office staff, and farmers.
- Organise Farmer Field Days (FFDs) based on the demonstration sites.
- Liaise with MAF to ensure ND vaccination is being reliably provided in the suku where the pens are located (NB: available to all households).
- Collaborate closely with MAF staff for ongoing animal health delivery and production training.
- Conduct monthly monitoring visits to record key aspects of chicken health, production and mortality using a streamlined, online data collection system.

TOMAK would separately fund specialised training for MAF Veterinary Department staff if this is considered necessary.

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<sup>12</sup> Equipped with dividers to allow for protection of newly hatched chicks and isolation of aggressive birds, nesting boxes, brooding cages, water dispensers, feed dispensers etc.



# Appendices

## Appendix 1: Additional Design Guidelines for Demonstrations

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### Selection criteria

#### Suku/ aldeia selection

- Included in TOMAK's 66 target sukus for Phase 1.
- Actively engaged in ND vaccination program.
- Nutrition-related SBC activities promoting increased consumption of eggs and chicken meat already underway.
- Has surplus food production (or potential surplus production).

#### Farmer/ vaccinator selection criteria

- Demonstrated interest in chicken raising, evidenced by having a more than average number of chickens compared to other households in the suku.
- Usually grain surplus.
- Preferably has air-tight storage capacity (eg from the IFAD drums program).
- Preferably already involved in one of the community groups that TOMAK is or will be working with for C1 activities e.g. Mother Support Groups, Family Nutrition Groups, Savings and Loan Groups etc.

#### Farmer/ vaccinator selection process

- A longlist of farmers/ ND vaccinators where the demonstration sites could be located should be prepared by the relevant Lead NGO, in consultation with MAF and local government officials.
- Note that MAF collects data on the number of chickens vaccinated per household in villages where its ND vaccination program is active. This is useful and objective data that can be used to identify farmers that are more active in chicken production, are ready to adopt new recommendations, and care enough about their poultry to get them vaccinated. This data should be used for the initial identification of possible participants.
- Final selection of farmers/ ND vaccinators should be made following interview of candidates on the longlist, taking into account:
  - interest in poultry production
  - interest in being involved in the pilot and willingness to act as a demonstration site for other farmers in the suku
  - availability of surplus food and/or access to surplus from other sources eg from a nearby rice mill
  - use of high yielding crop varieties (such as varieties released by the Seeds of Life program)
  - availability of adequate grain storage containers (visual inspection of air tight drums in use, such as those from the IFAD drum storage program)
  - use of other relevant technology such as food grinders
  - access to possible feed supplements such as maringa, leucaena and neem
  - experience and the ability to adopt new ideas, ie in an age range of 25-45 years.

### Pen design

- Construction using permanent materials: 3m x 5m standard pen in two sections.
- Construction using local materials: a 2m x 1.5m raised pen (based on a modified FAO design). This would be less expensive than pens constructed from permanent materials and is designed to promote more free-range time for chickens by allowing them to enter and exit at will. It would incorporate many of the recommendations used in other pens but with increased focus on less intensive, free-range management.

For the initial pilot, the project would provide:

- All materials for the chicken pens (fully installed but with assistance provided by the farmer). This approach allows for control over design and build quality.
- Nesting boxes, brooding cages, water and feed dispensers.
- Hand food grinder for cracking corn, beans and other grains.

Farmers would be required to supply sufficient chickens to stock the pen, plus feed resources.

## Chicken Health

Sickness has proven to be a major challenge for chicken keeping in a semi-intensive management regime, even at small-scale. While many initiatives can be undertaken to improve chicken health, it is important to minimise the number of changes introduced to farmers, especially in the initial implementation phase. Preventative strategies to improve chicken health could include:

- Allowing chickens to free range during the day.
- Consistent supply of clean water with dripper bottles.
- ND vaccination every four months supplied by MAF (March, July, November).
- Addition of a garlic clove to water to improve immune function.
- Supply of maringa leaves mixed with feed.
- Addition of leucaena leaves to improve protein and B carotene intake.

Recommended standard treatment strategies include:

- De-worming every four months (supplied by the project through MAF in February, June, October).
- Use of antiseptic medication (diluted Betadine) when chickens are suffering from bacterial infections.
- Use of Neem to assist in control of mites and to develop disease resistance.

## Training and mentoring

Training would be provided for farmers on the following topics:

- ND diagnosis and vaccination.
- Benefits of free-range management (letting the chickens out through the day).
- Supply of clean water.
- Continuity of feed supply.
- Nutrition – including what comprises an adequate diet, locally available feed resources, feed formulation etc.
- Preventative treatments – pen hygiene, garlic, maringa, neem, etc.
- Poultry medication – de-worming and use of antiseptic.
- Young chick management.
- Pen environment.

The FAO guidelines provide an excellent training outline, including a list of topics that should be covered for different production systems (see Appendix 2).

Following initial training, ongoing support would be provided by suitably qualified personnel through monthly site visits. These visits would initially be led by a contracted implementing organisation, but in collaboration with MAF staff and selected staff from Lead NGO partners, supported by TOMAK Regional Staff. By the end of the project, the aim would be for MAF staff (especially staff from Administration Post level and the AEWs), and local NGO implementing partner staff, to have sufficient confidence to advise on chicken management without external support.

## Monitoring and Evaluation

### Monitoring

All pens will be monitored during the monthly visits, including:

- Number of chickens in the pen.

- Number of chickens born.
- Number of chickens lost (deaths/ theft).
- Number of chickens removed (eaten, sold, shared).
- Average daily egg collection (eaten, sold).
- Other difficulties or comments.

#### Evaluation: target outcomes

The project should aim to have achieved the following benchmarks over 12 months:

- 30 pens established.
- 10 adult chickens per pen.
- 70% survival rate for top 8 pens during the 2<sup>nd</sup> 6-month period.

### **Technical support**

TOMAK would engage a suitably experienced local organisation to provide the following technical support over the first year-

- Collaborate closely with TOMAK staff, Lead NGO staff and MAF to finalise the design of the activity.
- Conduct initial socialisation of the project with MAF staff at municipal and sub-municipal levels.
- Oversee the selection of participants.
- Manage procurement of supplies and installation of pens.
- Develop simple and practical training/ extension materials.
- Provide training to MAF staff, Lead NGO staff, TOMAK Regional Office staff, and farmers.
- Organise Farmer Field Days (FFDs) based on the demonstration sites.
- Liaise with MAF to ensure ND vaccination is reliably provided in the suku where the pens are located (NB: available to all households).
- Collaborate closely with MAF staff for ongoing animal health delivery and production training.
- Conduct monthly monitoring visits to record key aspects of chicken health, production and mortality using a streamlined, online data collection system.

A total input of 19 person-months of local TA support is anticipated over the 12-month duration of the pilot, including:

- 12 months from a national facilitator with poultry production experience.
- 5 months (split inputs) for a national M&E officer with poultry production experience.
- 2 months for a national office assistant to assist with production and collation of training materials and other logistical matters.

### **Phased roll-out**

Subject to the results achieved in Year 1, future roll-out could be implemented as follows:

- Year 1: Establish and intensively monitor the initial 30 pens. Implemented with 100% subsidy for pen construction.
- Year 2: Expansion to an additional 30 sites with continued project-funded TA, and with a 75% subsidy for pen construction. Year 2 could also be used to make a more detailed assessment of costs and benefits.
- Year 3: Full implementation by TOMAK partner organisations, with a 50% subsidy for pen construction, with the number of sites to be decided.
- Year 4 on: Extension support only.

Note that the style of pen construction (permanent materials or local materials) would be determined during year 1.

## Cost estimate for Year 1

Description	Unit	Unit cost	Qty	Total
National Facilitator	months	\$300	14	\$4,200
National M&E Officer	months	\$400	5	\$2,000
National Office Assistant	months	\$150	2	\$300
Construction standard pen	Item	\$500	24	\$12,000
Construction raised pen	Item	\$250	6	\$1,500
Installation labour	days	\$15	168	\$2,520
Per Diem	days	\$25	112	\$2,800
Food grinders	Item	\$20	28	\$560
Animal health treatments	Item	\$15	84	\$1,260
Communications	Item	\$30	16	\$480
Administration	item	\$100	13	\$1,300
Miscellaeneous	item	\$500	1	\$500
<b>TOTAL</b>				<b>\$29,420</b>

In addition to the above costs, TOMAK/ Lead NGOs would directly support:

- Transport during installation and for follow-up visits to pens.
- Support for monitoring and extension services.
- Logistics including related costs for regional training days (3 x 4 sites).
- Printing of extension materials.

## Exit strategy

The exit strategy will include:

- Clear timeline communicated to all stakeholders, including farmers.
- Staged reduction of subsidies with clear objectives following the phased roll-out.
- Developing increased capacity and market connections of input suppliers.
- MAF and local NGO staff trained to support improved chicken husbandry, including nutrition and disease management.
- All assets (chicken pens and equipment) transferred to farmers at the time of installation.

Management of pens would be funded entirely by participating farmers following establishment. Success will ultimately depend on benefits (financial, social and/or nutritional) outweighing costs.

## Simple cost benefit estimate for farmer

The following simplified cost benefit analysis is based of a pen of 10 hens hatching 15 clutches per year with 7 surviving chicks per clutch. Average feed costs are calculated at 60c per kilo (including labour) using locally available food plus some purchased food, at a feeding rate of 60g per day per hen (based on average 18 chickens/chicks).

**Table: simple cost benefit calculation over one year for chicken keeping**

	Description	Unit	Unit cost	Qty	Total
<b>Revenue</b>	15 clutches of 7	chicken	\$5	105	\$525
<b>Costs</b>	60g food/day/chicken	kg	\$0.60	394.2	\$237
	Medication	item	\$15	3	\$45
	Miscellaneous	item	\$25	1	\$25
<b>Net Income</b>					<b>\$218</b>



## Appendix 2: FAO guidelines for poultry training

Priority topics for family poultry training according to production system				
Training needs	Small extensive scavenging	Extensive scavenging	Semi-intensive	Small-scale Intensive
<b>Features of a chicken</b>				
- Simple anatomy	-	**	***	****
- Poultry handling	*	**	***	****
- Recognition of healthy and sick chickens	**	**	***	****
<b>Husbandry</b>				
- Indigenous breeds	****	***	*	-
- Improved breeds	*	*	****	****
- Housing, ventilation, cleaning	*	**	***	****
- Protection from predators	****	***	**	*
- Scavenging	****	**	**	-
- Supplementary feeding	****	***	***	****
- Nutrition, diets for growing and laying birds	*	*	***	****
- Sanitation	*	*	***	****
<b>Diseases</b>				
- Vaccination	*	**	***	****
- Medication	*	**	***	****
- Signs of common diseases, treatment and control of ND	*	**	***	****
- External and internal parasites	**	***	****	****
- Vaccination techniques	**	**	***	****
- Biosecurity measures	-	**	****	****
<b>Record keeping</b>				
- Egg production and sales	-	**	***	****
- Mortality	***	***	***	****
- Diseases: diagnosis, number of cases, treatment, treatment outcome	*	**	***	****
- Inventory of stock (pharmaceuticals, feed, etc.)	-	*	***	****
- Vaccinations performed, payment received	*	**	***	****
<b>Marketing</b>				
- Egg handling, storage and marketing	-	**	***	****

Note: a larger number of stars \* Indicates higher priority.

Source: FAO, 2014, Decision tools for family poultry development, p.52.

## Appendix 3: Table of suku supported by CRS for ND vaccination

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Municipality	Administration Post	Suku	Recipients
Baucau	Baguia	Abafala	22
		Afaloicai	46
		Alaua Craic	44
		Alaua Leten	37
		Atelari	180
		Defa Uassi	32
		Haeconi	63
		Lari Sula	47
		Larisula	46
		Lavateri	20
		Lavateri	48
		Osso-Huna	31
		Samalari	37
		Uacala	36
	Laga	Libagua	32
		Saelari	178
	Quelicaí	Sagadati	114
		Abafala	3
		Abo	45
		Guruca	13
		Laisorolai De Baixo	14
		Laisorolai De Cima	21
		Lelalai	16
		Maluro	16
		Namanei	1
		Waitame	1
	Venilale	Bado Ho'o	31
		Uaioli	26
Viqueque	Ossu	Bualale	6
	Uato-Lari	Waitame	2
	Uatucarbau	Loi Ulu	21
	Viqueque	Bahalara Uain	55
		Bibileo	63
		Luca	36
		Uai Mori	14
		Total	1397





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