WASTE NOT, WANT NOT
The circular economy to food security

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Scavenging for protein and micronutrients: village poultry in Timor-Leste

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ABSTRACT: Food loss and waste in Timor-Leste has been identified as a critical factor contributing to human undernutrition. Our project enhances natural scavenging systems by improved poultry production, with improved management, vaccination against Newcastle Disease (ND) and logistical support. We are working with the University of Sydney to implement the sustainable use of heat tolerant ND vaccine, administered as eye drops triennially by trained paraveterinarians. The Australian Department of Agriculture and Water Resources conceived and jointly manages the project with the Timor-Leste Ministry of Agriculture and Fisheries. They provide training in national biosecurity and biosecurity practices applicable to village poultry. Management systems are supported with locally made shelter to protect from predation. With the help of Berrimah Veterinary Laboratory we are improving cold chain management and vaccine potency verification. The project is funded by the Australia Department of Foreign Affairs and Trade. Increased poultry production with these improved systems leads to improved scavenging systems – more hens equals more effective searching for scraps, insects and other invertebrates as they fend for themselves with minimal carbohydrate input provided by their owners. In return more hens are available to produce eggs for sale or chickens for consumption. Each of these activities results in better availability of balanced protein and bioavailable micronutrients for growing and lactating humans. Once households observe that their flock dynamics are no longer subject to dramatic decreases, the consumption of eggs becomes an option rather than prioritising them for hatching to obtain replacement birds.

Keywords: village poultry, vaccine, protein, nutrition, women and girls

In Timor-Leste, according to the 2015 census, our human population is 1,167,242. We have a tropical climate with a wet and a dry season. There is stunting in 50% of children under five years, due to lack of nutrition and micronutrients and the energy deficiency of food for children and pregnant women. People have poor dietary diversity, with low intake of animal-sourced foods because those are expensive, especially local chickens. That is why we are trying to improve animal production, through local chickens, to feed our community and especially community farmers in the rural area.

This presentation relates to my job as the Program Coordinator for Village Poultry Health and Biosecurity. My Directorate runs the animal health services for the whole country, especially focusing on places where there are many animals and people raising animals. Expansion is bringing the animal health service closer to the community, to give them better access to it. We run

This is an edited transcript of the presentation, with some of the powerpoint slides shown.
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Jong – Case study: Scavenging for protein & micronutrients: village poultry in Timor-Leste

vaccination programs for cattle, buffalo, pigs and chickens. The agricultural population figures (Figure 1) show that of the total 184,000 households, 160,000 grow crops (86%) compared to households with no crops (20,000; 10%). However, almost all households (97%) have livestock, and 96% of those households raise pigs and 79% raise chickens.

Most households have both chickens and pigs and the farmers raise more than one type of animal (Figure 2). Households with livestock also keep sheep, goats, cattle, buffalo and horses, as well as the 420,000 pigs (2–3 pigs per household). Each household with chickens has up to six birds, totalling 929,000 chickens.

However, we are losing village poultry because of high animal mortality. The main problems in raising local chickens are:

- Newcastle Disease which is endemic, and when there is an outbreak it kills all the local chickens;

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<tr>
<th>Details</th>
<th>Numbers</th>
<th>Percentage (%)</th>
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<tr>
<td>Total Households (HH)</td>
<td>184.000</td>
<td>-</td>
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<tr>
<td>HH with Crops</td>
<td>160.000</td>
<td>86%</td>
</tr>
<tr>
<td>HH with no Crops</td>
<td>20.000</td>
<td>10%</td>
</tr>
<tr>
<td>HH with Livestock</td>
<td>178.000</td>
<td>97%</td>
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<tr>
<td>HH with Chickens</td>
<td>146.000</td>
<td>79%</td>
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<tr>
<td>HH with Pigs</td>
<td>177.000</td>
<td>96%</td>
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<tr>
<td>No of Chicken</td>
<td>929.000</td>
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<tr>
<td>No of Chicken/HH</td>
<td>6.35</td>
</tr>
<tr>
<td>No of Pigs</td>
<td>420.000</td>
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<tr>
<td>No of Pigs/HH</td>
<td>2.5</td>
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Figure 1. Agricultural population data for Timor-Leste.

Figure 2. Livestock ownership by 178,363 agricultural households.
predation, because local chickens find their own food by scavenging in the forest in the day time, and are taken by wild animals, feral cats, dogs, snakes, eagles and humans; and

• under-nutrition in the chicks.

With this particular project – Village Poultry Health and Biosecurity – we are trying to increase the consumption of chickens, as a source of animal protein for the children. Currently, people only eat chicken meat during periods of high chicken mortality from an outbreak of disease.

The project, founded by the Australian Government Partnerships for Development, aims to:

• improve production of local chickens in three pilot villages, and
• strengthen biosecurity arrangements in Timor-Leste.

One village is in the western part of the country, one is in the centre, and one is in the east. We are trying to engage the community to be involved in the vaccination programs to improve the local chickens so they can be used to feed their children and the pregnant women.

In reality, at the moment, when communities produce extra chickens, extra eggs, they prefer not to eat them but to sell them and buy something else, such as frozen chicken from Brazil, or sausages or fish. However, having bought these from the supermarket, they travel home without using ice or anything to keep them cool. There is no refrigeration in the districts anyway to keep the food fresh, so the extra production is actually creating problems in the country.

The Village Poultry Health and Biosecurity project has three main components:

• village poultry health and management, including disease investigation;
• an effective cold chain for the poultry vaccine, so as to keep the vaccine cold until it is dropped into the eye of a chicken, and for this we are collaborating with the Department of Agriculture and Berrimah Veterinary Laboratory; and

Figure 3. We are vaccinating the chickens against Newcastle Disease in three pilot villages.
strengthening poultry biosecurity, through better quarantine, for which we are working with Australian quarantine authorities to see how to set up import conditions into Timor-Leste.

Achievements so far
The project started in March 2014. We launched our first vaccination campaign in the three pilot villages in November 2014 and so far have run five campaigns including the one in March 2016 (Table 1). Up to one-third of households in the villages have been involved so far, and the number of chickens vaccinated per household has increased over the 18 months.

The project so far has produced a number of highlights. By improving the health of village poultry, there is:
• decreased loss of chickens and eggs,
• an increased amount of chicken products available for consumption or sale, and
• improved standards of living for communities.

In Timor-Leste, livestock have a critical and complex role in food security because, as you have seen, almost every household has animals. Even in Dili, people have chickens and pigs so there is no waste food at home. Anything we do not eat ourselves goes to the animals. People buy the waste food from restaurants to feed their pigs and chickens.

For us, food security is equivalent to nutrition security. This is very crucial for our developing country.

Another important point I want to leave with you is this: we are trying to encourage investment in women and girls, to get them involved in this work. I am a veterinarian, and a field veterinarian, and I am working very closely with our farmers, especially the women and girls, to improve their livelihoods for the future. If we can convince more women to become involved in this project, and even get more women to become involved in the agriculture sector, there will be good returns to their villages.

Table 1. Summary of available data from five vaccination campaigns

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<tr>
<td>Total number of chickens vaccinated</td>
<td>1865</td>
<td>2429</td>
<td>4218</td>
<td>3028</td>
<td>3076</td>
</tr>
<tr>
<td>Total number of households vaccinating</td>
<td>251</td>
<td>408</td>
<td>351</td>
<td>345</td>
<td>257</td>
</tr>
<tr>
<td>Percentage of households vaccinating</td>
<td>20.4</td>
<td>33.1</td>
<td>31.0</td>
<td>28.0</td>
<td>20.9</td>
</tr>
<tr>
<td>Average number of chickens vaccinated per household</td>
<td>7</td>
<td>8</td>
<td>12</td>
<td>11</td>
<td>12</td>
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The Timor-Leste Government, through the Ministry for Agriculture, also wants to encourage the community to be more involved in the agriculture sector, because as a country we cannot rely on petroleum or other industries to bring us national benefits.

Acknowledgements

I would like to thank the Crawford Fund, the Australian Government Department of Agriculture & Water Resources, the University of Sydney for designing the project, and also Australian Aid, for supporting our government of Timor-Leste, especially the Minister of Agriculture, to deliver this three-year project.

References


Dr Joanita Bendita da Costa Jong, the first female veterinarian in Timor-Leste, is the newly appointed National Director for the Veterinary Directorate in Timor-Leste’s Ministry of Agriculture and Fisheries. As a National Director, her role is to supervise three departments: the Department of Public Health and Animal Welfare, the Department of Controlling Medicines and Equipment for Animals, and the Department of the Veterinary Diagnostic Laboratory. All three departments play very important roles within the country’s animal health development. Joanita is responsible for the supervision of data collection for Timor-Leste’s national animal disease reporting system, and the management of data collected from vaccination programs for cattle, buffalo, pigs and chickens. She also performs ante- and post-mortem inspections at the national slaughter house. In her ten years there, Joanita has made significant contributions to the development of her profession through capacity building within the country’s network of Livestock and Veterinary Technicians, Extension Workers and other animal health staff, as well as local and international NGOs.

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Q
Today we have seen a lot of statistics around food loss and food wastage, currently estimated at 1.3 billion tonnes. We have not really been talking about how wastage is impacting on malnourishment in the sense of micronutrients. My question is about something that I perceive as food wastage, because it is intentional. What is the panel’s view on the way we under-utilise animals and animal-source foods: animal parts such as offal, which are very nutrient dense, and can be quite critical for those most vulnerable, such as children and pregnant and lactating women?

A – Ashok Gulati
Combating malnutrition and devising innovations to get better protein or vitamins, particularly at low cost in developing countries, those are challenges. Here is one example. In her Sir John Crawford address, Professor Fresco talked about the possibility of 30% of the protein in your meat coming from soya bean or lupins, through innovation and product development. In India, which I am more familiar with, for poor people the protein source is dahl – the pulses, the lentils. Pulse prices have been increasing at 30% per annum. There is a shortage. However, we have about 10 million tonnes of soya bean. In talking to farmers who produce soya bean, about 100 of them, I asked if any of them consume soya bean themselves. They said, ‘Is it to be eaten? We thought they take it away, extract the oil and then export the oil cake.’ So my team looked at the situation, and found that soya flour mixed with wheat and rice can be reconstituted into a dahl. It is half, or less than half, the price of regular pulses, and has better protein content. We cooked it and it tastes very good. It is going to be launched as a product soon.

Lupins are a very nutritious food, yet they are being sold at $300 per tonne as feed for livestock, while we pay $900–$1000 per tonne for other pulses. Surely we can innovate? The food technologies of today are capable of making lupins more palatable. As another example, in Japan, China and South East Asia, tofu (which is made from soya beans) is a basic staple. In South Asia we use paneer, a cottage cheese, in a similar way, but it is double the price of tofu. By innovating, the simple food technologies of today can give us very good protein foods for humans from materials which are currently sent to feed cattle, or rejected. No other crop can give you cheaper amounts of protein per hundred grams than soya beans. By comparison, protein from milk products is very expensive – too expensive for poor populations. We need to start paying attention to developing these alternatives to produce food at a lower cost.
Helen Garnett, Chair
Dr Jong, in East Timor I think people will eat most of an animal. They eat the parts that we in Australia would call ‘offal’ – such as the liver. You eat the whole chicken, do you not?

A – Joanita Jong
Yes, we do eat the whole of the local chickens. The frozen chickens from the supermarket include only the bones and the meat. That is why when the people in the villages have a guest they will kill a local chicken. One or two local chickens can feed all the people in the house.

Q – Alejandro Trujillo-Gonzalez, James Cook University
Thank you for the presentations. My question and comment are about biosecurity. Professor Gulati, I love the idea of Uber tractors, but they are a textbook example of what not to do if you want to prevent a combination of diseases or potential parasites moving between farms. I agree with you that innovation and education of farmers is important, so I’d like to ask how much of a priority is biosecurity in India? Is biosecurity something that should be considered when training farmers?

A – Ashok Gulati
Labour costs are increasing in the rural areas of India by about 15–20% per annum in nominal terms, and about 7% per annum in real terms. We are almost at the inflection point where capital is going to be cheaper than labour. This transition that we are making is not just a textbook example. One of the biggest companies making tractors in India, Mahendra and Mahendra, which controls about 45% of the market share, just last week announced that they are going to try making Uber tractors available. I am asking them to take that further and include farm implements such as threshers, because threshing and winnowing are done manually in the field, and materials are lost and left on the ground. Your question, about transmission of diseases from one farm to another, is not something we have really thought about. However, I am not sure that mechanisation is a real cause of diseases moving from one farm to another. We will have to think about that, and look into it. I do not have a ready answer to your question.

A – Joanita Jong
We are implementing simple biosecurity in the villages. When there has been an outbreak of disease, the people have not known they are the ones that are transferring the disease from one place to another place. That is why in our project we are teaching the community that if there is a disease outbreak then you have to be careful what you do with the dead chickens. If there are dead chickens in a neighbouring village, you should not bring in new (live) chickens from that village, because they already are diseased, and viruses in those new chickens can affect the chickens already here in this village. That is very straightforward. My team also deals with biosecurity and the broader picture, because we share a border with Indonesia. There are many illegal movements of materials across that border, and that is also part of the project I spoke about. I deliver education on how dangerous diseases such as rabies or avian influenza
which are in Indonesia – can affect our country at any time. That is our task in relation to biosecurity.

Q – Jenny Goldie, Sustainable Population Australia
My question is to Ashok Gulati, but others on the panel may care to comment also. I was entranced by your food cart that had solar panels on the roof, and it reminded me of E.F. Schumacher’s ‘appropriate development’ from the 1970s. I wonder, to what extent do you think that technology can be scaled up to solar-powered trucks for carting fruit and vegetables? Or do you think it will be confined to food carts?

A – Ashok Gulati
If you look at what is happening to solar technology, since 2010, 2011, the costs of solar power have come down by 70% – a dramatic decline. Globally, about 140 gigawatts of power are being generated by solar technology today. In India, today, 8 gigawatts of power come from solar, and India has set a target of 100 gigawatts by 2022. That is the biggest target set by any country in the world. Now, it is not going to be coming only from the rooftops in urban areas, because there are not enough roofs. But there are all sorts of possibilities, including having a solar ‘crop’ at 15 feet above the ground. That is, the farmer can have a traditional crop growing in the field, and at 15 feet high you put in a chessboard type of configuration so there is enough light for the traditional crop to photosynthesise as well. This could give the farmer a regular monthly income. It could unleash a revolution, give higher incomes to farmers, and change the rural landscape because, at present, power is not available in the rural areas. All the energy goes to Delhi dwellers and Mumbai dwellers and others in the urban areas, and the rural areas get hardly any electricity. For eight hours per day they do not have electricity. Once you generate electricity in rural areas, it can be distributed, and surplus power can be fed into the grid. You have to think totally ‘out of the box’ from the farmers’ fields to these carts. This could increase the shelf life of the commodities, via cold storage. It is going to take off, and we are already in discussions on these questions. I can send you some more literature. Five, seven years back, the costs of solar power were very high compared to traditional thermal power. Now, they are lower than from burning coal.

Q – Tony Fischer, Crawford Fund
Mr Kumar, you mentioned the hotel market at the beginning of your talk, but then you focused on the vendors in Suva. In many parts of the world, tourism is very important, and I wonder what success you had in getting tomatoes at a good price to all those big tourist hotels in Fiji?

A – Salesh Kumar
Thank you. I started with the ‘participatory guarantee scheme’ project between growers and hotels based on agreed quality and supply, and it was successful, and there is further funding of that via ACIAR – thanks to ACIAR. At one time, the hotels were importing tomatoes at $18/kg. To analyse the situation for our project, we did a market transformation study. After changes of chefs and of management in the hotels, they agreed that if the local growers were able to
provide good quality tomatoes and a consistent supply, then definitely they would buy those instead of importing. The hotels are not prepared to pay local growers $18/kg, but they would buy local tomatoes at $4/kg. In fact, because tomatoes are seasonal, being either in-season or off-season, when there is a glut in-season the growers would be happy if they get $1/kg. But these hotel personnel have agreed that they are prepared to pay $4. So that is where the market stands.

**Q – Peter Wynn, Charles Sturt University**
Simon Costa, a question to you about Africa. With true free-market forces prevailing in the marketplace, as I think happens for example in Niger, I have heard of nomadic farmers having their market destroyed by the dumping of European Union milk powder. Do the farmers you are dealing with, or were dealing with, really have the incentive to invest in storage solutions to improve their marketing?

**A – Simon Costa**
The very short answer, Peter, is ‘yes’. There were no external players involved. They could just market the crops they had available, and were able to sell their crops at times when others did not have crops available. The large-scale projects I was talking about were in the east of Africa, and large consortiums out of Kenya, for example, were willing to come and pay for the produce, because it did not have aflatoxin contamination. We were focused on not only more quantity, but also better quality. From all the testing now, we are aware of the enormous impacts that aflatoxin contamination can have on the health of the locals. The better quality, healthier product these farmers were providing to the markets was reflected in the prices that people were paying. They did not just have to accept what the locals would pay. The other massive difference was that, for the first time ever, these farmers had control over when to sell. Every other smallholder farmer in that region must sell when the buyer comes to town, and if you do not sell to him, you do not sell to anyone. But these people, for the first time, could say, “I won’t sell this week. I won’t sell this month. I’ve got a foodbank there that I can draw from. And if I need to hold it for six months, I’ll hold it for six months.” That was unheard of; it was like science fiction for these people. When you have the farmers from a district who can not only identify what crops are in storage, but also the volume of it, you have created a decentralised storage platform, instead of putting in massive centralised storage hubs. If you can imagine just a thousand farmers with a thousand kilos each safely stored, you have got a million kilos, and that lifts the food security for the region. Coming back to your question about the individual farmers, they have control over when they sell, and control over who they sell to, and the benefits just keep flowing from there.

**Helen Garnett, Chair**
It’s my pleasure to thank our four speakers this morning, coming from different parts of the world, for sharing – from the farm gate and packaging, to the processing side – that education, new technologies (and those new technologies can be very local) and new logistics are making a huge difference.