



Vanuatu-Kiribati

Livestock & Climate Change Exchange Visit

23-27 September 2013

LESSONS LEARNED REPORT

1. Background

Both Kiribati's and Vanuatu's climate are changing, and being prepared for and adaptable to the consequences of climate variability is a strategic priority for both Governments.

The Department of Agriculture and Livestock Division of the Kiribati Ministry of Environment, Lands and Agricultural Development (ALD, MELAD) has finalized a draft Kiribati Livestock Production Concept to support Climate Change Adaptation and Food Security 2013 – 2015. Increasing food security through specific livestock targeting adaptations is also integral part of the draft Kiribati Joint Implementation Plan on Climate Change and Disaster Risk Management (KJIP) currently being developed.

Vanuatu's National Adaptation Plan of Action (NAPA) has identified the key adaptation priority of Agriculture and Food Security including livestock enhancement. Novel and innovative livestock adaptation technology has been developed and trialed in Vanuatu, and these solutions must be shared and scaled up for the benefit of all communities in Vanuatu and others throughout the Pacific region.

Both countries livestock related initiatives are being supported by SPC/GIZ Coping with Climate Change in the Pacific Island Region (SPC/GIZ CCCPIR) and in Kiribati also by the SPC USAID program Enhanced Climate Change Resilience of Food Production Systems.

2. Field Exchange Justification and Approach

From 23-27 September 2013, an exchange visit in the form of a livestock climate change adaptation field school with Livestock Officers from the Republic of Kiribati and the Republic of Vanuatu took place in Vanuatu as a first attempt at up-scaling climate change adaptation capacity, knowledge and solutions between the two countries.

The field school and exchange visit provided an opportunity for participants to develop practical partnerships for provision of climate services and capacity in communities. It embraced a cross-sectoral and holistic approach, pooling resources and skills, as a necessary means for tackling climate variability and climate change impacts

The overall objectives of the field school are as follows:

- **Review and Learn in Detail:** Tried and tested strategies for climate change adaptation options for the livestock sector
- **Identify:** opportunities and challenges faced by communities in regard to adapting to climate change & opportunities to replicate some of the adaptation practices in Kiribati (in the livestock production unit in Tanna and across the country)
- **Explore:** opportunities to enhance the collaboration among Vanuatu and Kiribati in terms of climate change adaptation.

The exchange and field visit were technically and financially supported by the SPC/GIZ Coping with Climate Change in the Pacific Island Region (SPC/GIZ CCCPIR) Program and the SPC USAID program Enhanced Climate Change Resilience of Food Production Systems.

3. Vanuatu Officers Involved in the Exchange

1. Lonny Bong, Director, Vanuatu Livestock Department - lbong@vanuatu.gov.vu
2. Nambo Moses- Senior Livestock Officer, Vanuatu Livestock Department- nmoses@vanuatu.gov.vu
3. Kaltouk Kalomar, Lab Technician, Vanuatu Livestock Department- kkalomor@vanuatu.gov.vu
4. Rolyn John, Livestock Officer, Vanuatu Livestock Department, rjohn@vanuatu.gov.vu
5. Stephenson Boe, Senior Livestock Officer, Vanuatu Livestock Department Santo- sboe@vanuatu.gov.vu
6. Steglar Tabiaga- Farm Manager, VNPf- stabiaga@vnpf.com.vu
7. Sandy Mael, Vanuatu Livestock Expert, hoffmanmael@gmail.com
8. Philip Malsale, Climate Section Manager, Vanuatu Meteorology & Geohazards Department malsale@meteo.gov.vu
9. Malcolm Dalesa, Adaptation Officer, National Advisory Board on Climate Change & Disaster Risk Reduction mdaesa@meteo.gov.vu

4. Kiribati Officers Involved in the Exchange

1. Mr Neeti Kiritaake, Livestock Officer, Department of Agriculture and Livestock, MELAD- neetikiritaake@gmail.com



- 2. Ms Tiina Tetabea Livestock Officer, Department of Agriculture and Livestock, MELAD - rubeteta2108@gmail.com
- 3. (Remotely :) Mr Tianeti Beenna, Acting Director Department of Agriculture and Livestock, MELAD - jetuati@gmail.com

- 5. (Remotely:) Nichol Nonga, SPC Land Resources Division, Animal Health Team - nicholn@spc.int
- 6. (Remotely:) Hanna Sabass, Advisor on Climate Change and Education, resp. f SPC/GIZ CCCPIR – hanna.sabass@giz.de

5. SPC/GIZ Officers involved in the Exchange

- 1. Christopher Bartlett, Country Director, SPC-GIZ CCCPIR - Christopher.Bartlett@giz.de
- 2. Tari Johnny- SPC-GIZ Vanuatu Intern; tarijohnny@gmail.com
- 3. Isso Nihmei, Climate Adaptation Officer, SPC-GIZ isso.nihmei@giz.de
- 4. (Remotely:) Vuki Buadromo, Project Manager, Enhanced Climate Change Resilience of Food Production Systems (SPC/USAID) - VukiB@spc.int

6. Abbreviated Agenda

- 1. Day 1 – Discussions on Key Issues and Exchange Expectations , Visit to Biogas Demonstration sites
- 2. Day 2- Visit to SPC-GIZ adaptation projects on Pele Island
- 3. Day 3- Visit to livestock projects on Santo
- 4. Day 4- Visit to livestock Projects on Santo
- 5. Day 5- Final Debriefing and Agreed Next Steps





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Key Discussion Points, Lessons Learned and Recommendations

Question: 1. What was learned/seen that is relevant to climate change adaptation

Question 2: What is the recommendation or next step for application to Kiribati

Day 1: 23 September 2013

Vanuatu Agriculture Sector- Mr. Lonny Bong

- Starved of funds, little extension has led to a major drop in production
- Access to markets is a key constraint to production, which will require government incentives and enabling interventions
- Some of the major production issues are related to poor animal management (e.g. not castrating appropriately, feeding etc) and this is exacerbated by climate change
- Issues of recording of data make it very difficult to track successes and declines in production, programs in place with local butcheries for better recording, but not yet successful
- Small livestock market successes at Morobe in Vila where producers can easily and successfully sell chickens, pigs, ducks, goats etc. Have generated over 32 million from 2009-2012
- There is an issue to balance both local genetic material and also ensure farmers have most productive varieties. Vanuatu plans to organize a series of 'distribution pools' from which farmers can access improved livestock varieties (including for climate tolerance).
- The new Overarching Policy is a guide to investment in the sector
- A new livestock human resource structure has been submitted which would place livestock extension officers in all provinces and major islands.
- **RECOMMENDATION: Livestock and Agricultural Extension officers should have overlapping roles and provide integrated services. This is the approach of Kiribati and would be extremely useful in Vanuatu.**

Vanuatu Biogas Approaches – Kaltouk Kalomor

- Pig Manure is useful for many things: fertilizer, biogas generation and also as a medium for cultivating maggots for chick feeds
- Slurry from manure can also be used as an insecticide (dipping vegetable seeds in preparation for planting to prevent nematode attack)
- Biogas is safe and disease free, as most bacteria and worms will die in digester anaerobic conditions
- There is a challenge in getting ni-Vanuatu farmers to think that pig waste can be a useful product
- Vanuatu is also importing special 'tiger' earthworms to aid in digestion of household waste for composting



Kiribati Livestock Sector- Neeti Kiritaake

- 33 low lying atolls (<3 meters above sea level)
- Primarily focus on pigs and chickens
- Some cross breeding of pigs (duroc variety) by government facility, for climate tolerance)
- Key livestock impacts: pests in dry seasons, increased human and animal contact due to shrinking islands, increased costs of providing freshwater to pigs, salt intrusion in freshwater lenses leading to feed declines (coconuts).
- E-kiribati farmers use integrated agriculture often, composting livestock waste to enhance production
- Farmers use locally produced copra meal, kitchen waste and are opening a new fishmeal plant to produce feed for their pigs
- There is only one biogas facility in Kiribati at the Catholic Mission
- Kiribati vegetable farmers come to the pig unit facility and collect manure to use as fertilizer on crops
- Government of Kiribati runs regular workshops and trainings with farmers on climate change and livestock in southern and northern islands
- The Government provides a breeding service whereby farmers can bring in their sows to be sired by a improved boar at the livestock unit facility
- Kiribati undertakes fortnightly 15 minute radio broadcasts on the topic of livestock
- **RECOMMENDATION: Ni-Vanuatu farmers need better messages and demonstrations on integrated farming as is done in Kiribati, too often farmers see livestock and agriculture as separate activities and do not use the products and wastes from one in the other.**
- **RECOMMENDATION: Vanuatu farmers could learn more from Kiribati about providing better protein to their pigs, especially by using freshwater fish (tilapia) or fish waste in feeds.**
- **RECOMMENDATION: possible area of exchange between Kiribati and Vanuatu on the use of simple biogas designs and approaches, challenge: manure is so valuable as fertilizer in Kiribati that it may not be available for biogas digesters, although sludge and slurry is still useable.**
- **RECOMMENDATIONS: Vanuatu could provide some of the hands-on Climate Field School materials and approaches to Kiribati to use in their future trainings.**
- **RECOMMENDATION. A mobile boar system, such as that used in Vanuatu, may be useful and more accessible to Kiribati farmers, whereby the government meets the costs of transporting the boar to the outer and remote islands to mate with local sows.**
- **RECOMMENDATION: Kiribati could implement a more frequent talkback show style of radio communications like Vanuatu, which is weekly and allows more and longer (1 hour) interaction between listeners and experts.**



Livestock & Climate General Discussions – All Participants

- Vanuatu is glad to learn that Kiribati has a high focus on food security versus economic production and export
- Both teams agreed that enhanced public awareness directly to farmers is critical for climate change adaptation
- The use of meteorological information is extremely important, and Kiribati extension officers are also collecting rainfall data
- Vanuatu productive sector works closely with Dept of Meteorology in developing tailored early warning systems and products
- The issue of pig feeds and appropriate formulation is an issue in both countries.
- **RECOMMENDATION: Vanuatu and Kiribati should share info on how the agrometeorology bulletins in each country are produced**
- **RECOMMENDATION: Vanuatu should share its agro-met handbooks**
- **RECOMMENDATION: Kiribati can share information on how its livestock and agriculture extension officers are also collecting rainfall and temperature data**
- **RECOMMENDATION: A major need in both countries is to study locally available pig feeds. Undertake a SPC or NARI region program on developing and tailoring locally available and nutritious feeds for island pigs (feeds that are climate resilient.)**

Mele Septic Biogas – Kaltouk Kalomor

- Digester is Chinese design, requires a septic or well.
- Costs around 6,000USD to develop
- Pigs stay in enclosures, and water allows waste to be washed into digester
- System can accommodate the manure of up to 10 large pigs
- **RECOMMENDATION: Vanuatu finalizes the underground septic biogas construction and trials and sends lessons learned reports and digester designs to Kiribati**

Erakor Backyard Biogas – SPC-GIZ

In order avoid Greenhouse Gas Emissions from the burning of firewood to cook pig food, the SPC-GIZ program has introduced a backyard Biogas system, with technical support from the AHP at SPC. Fresh Pig manure is added to a 200L plastic drum, gas collected and used for cooking.



- Uses a collection drum and a storage plastic 200L drum
- Materials are inexpensive and locally available
- Requires manure to be brought in and added to the digester
- Can accommodate only 1 large pig
- Manure must cure for up to 2 weeks before biogas is ready
- Useful for a single stove
- **RECOMMENDATION: Vanuatu finalizes the backyard biogas construction and trials and sends lessons learned reports and digester designs to Kiribati**

Day 2 – 24 September 2013

Pele Island CC Adaptation Facility for Pigs – SPC-GIZ

In order to address the impacts of climate change on Vanuatu's pigs, the Government of Vanuatu (Department of Livestock) CCCPIR initiated a pilot site on Pele Island in collaboration with SPC-GIZ CCCPIR to examine the potential for pig adaptation. The Pele pilot site activity seeks to contribute to the achievement of the overall project goal: "As a fundamental element for sustainable management of natural resources, the adaptive capacities of ni-Vanuatu communities are strengthened to cope with the adverse effects of climate change," and the project indicator to coordinate with SPC-LRD, Vanuatu National Advisory Board on Climate Change & Disaster Risk Reduction, relevant government departments, NGOs and other stakeholders to develop and subsequently implement efficient and effective village Climate Change Adaptation Strategies. The following sections detail the specific pig related adaptations being trialed at the SPC-GIZ pilot site on Pele Island.



Genetic Selection & Selective Breeding

Most of what is eaten in Vanuatu is the result of genetic selection by local farmers over generations. The common root crops, and domesticated animals would not exist in their current forms but for human intervention and active selection. These selections were made based on natural mutations that produced desirable traits, and were selected for based on their benefit to humans. The fact that everything we eat is a product of human intervention is as true for animals as it is for plants, even though intensive selection of animal breeds is a relatively modern phenomenon. There have been massive increases in productivity in the livestock sector in the past 40 years. These gains have been achieved through a combination of genetic improvement and better husbandry, nutrition and disease control.

Selective breeding has – and will continue to offer – opportunities for enabling climate adaptability. In Vanuatu, traditional societies have over many generations drastically expanded the rates of “Narave” (pseudohermaphroditism males) pigs within the population.

Genetic improvements carry the further benefit of being easily practiced by local farmers, and as long lasting as breeders choose them to be. Genetic selection often represents an economic benefit to the farmer, as well as an improvement in eco-efficiency. Until now, selective breeding has sought merely to improve economic or socio-cultural productivity; in future, it should be used to expand adaptive traits and reduce GHG emissions.

Local selection may be used to produce animals that are better adapted to local diets and local climate conditions. A more robust but less productive animal has more adaptability and is likely to be better able to maintain health and production on a locally produced diet. While industry-scale



genomic selection requires accurate feed conversion and performance measurements on very large numbers of animals, simple farm-based selection is an option that has served humans for thousands of years and is appropriate in the Pacific Island region.

The SPC-GIZ Pele Pilot site is encouraging island farmers to think about climate resilience when selecting breeding animals. Farmers have noted that the wild pigs found on large islands such as Malekula and Espiritu Santo are of the hardiest and most tolerant of climate variability. These wild 'climate adapted' pigs are then crossed with highly productive varieties, such as the introduced large white, demonstrating that it is possible to actively select for desirable climate adaptation traits. While local varieties may be most suited to local climate conditions, they tend to have smaller litter sizes and grow substantially slower than imported varieties. Hybridization is a mechanism to overcome the weaknesses of any one variety.



Black spotted sow



Large white sow



Large white boar



Cross piglets of Wild, Local and Large White



Local spotted (Black and white) sow



Local greyish white coat sow



Local red coat sow



Wild sow

While the genetic selection activities on Pele are too small-scale to be of scientific relevance, the demonstration has enabled visiting farmers to take climate resilience into their breeding decision-making. Local farmers are now also demanding access to the wild and imported males to sire their local sows. This activity has generated some income contributing to the upkeep of the program.



Climate Enhancement of Pig Enclosures

Pigs in Vanuatu are typically left to roam freely to scavenge for foodstuffs or enclosed in open fences and fed a diet of coconut and leaves/grasses. Feral pigs cause substantial environmental damage and are also a major threat to Vanuatu's food security in many locations, as they commonly ransack food gardens and decimate root crops and vegetables. Feral pigs have been names among some of the most serious hazards by local communities, along with earthquakes, tsunamis and volcanoes for their impacts on livelihoods and development.

While enclosing pigs may prevent damage to the environment and protection of gardens, it potentially exposes pigs to additional climate stresses. If enclosures are not shaded or located in exposed areas, pigs may more likely suffer from heat, rain, wind and cold stress. In Vanuatu, village-level subsistence pig enclosures are often located in areas with limited shading from vegetation.

In order to improve the situation, and prevent the climate-related heat stress impacts discussed above, the SPC-GIZ program on Pele established a roofed enclosure. None of the islands' pig keepers had ever considered building shelter for their pigs, previously perceived as able to tolerate extreme climate conditions. The shelters demonstrated included corrugated iron roof and thatch materials. Compared with control pigs, which are left in open enclosures, the sheltered pigs were found to consume substantially more feed and maintain higher levels of activity.

In addition to the roofing innovation, the program positioned the enclosure in an South East- North West direction to take advantage of the cooling South East trade winds.

Finally, the Pig facility on Pele is trialing a variety of different walling materials to determine the most suitable to reduce exposure stress. Wire fence is found to create the coolest environment, but is prone to rusting from sea spray and moisture. Cement walls often keep pigs too warm and do not allow sufficient air flow through the piggery. A small adaptation was made in cement walls by intentionally leaving air-flow gaps between individual blocks in the wall. The best walling material however was found to be timber, as the slats provide airflow, and the timber is used for gnawing by the pigs.





Wire Fence Trials

Wooden Fence Trials

Most pig farmers provide little to no water to their pigs, forcing pigs to obtain water from coconuts or green leaves. Water is a limiting factor to pig growth and also contributes to pigs' natural ability to resist disease and infection. The program thus ensured that water storage was available for direct use by the pigs. Thus in times of drought, El Nino or other climate extreme dry periods, water remains available for pig consumption. The roofing of the pig enclosure provides the catchment for the storage tank.



Nutrition and Feeding Adaptations

The vast majority of Vanuatu's pigs are fed a diet heavy in coconuts¹ and green leaves/grass. As copra oil contains only small amounts of unsaturated fatty acids, its consumption leads to firm body fat and good flavor², but productive growth is limited. The high fiber content of copra slows the digestive process and results in decreased feed intake, lower availability of organic matter, protein, and energy in the diet and poorer growth performances³. Maximum recommended inclusion levels are about 20-25 % of the diet while optimum should be around 10% to prevent low feed conversion ratios. In addition, coconut feed is highly vulnerable to damage from climate extreme events such as storms and cyclones, leading to periods of feed unavailability for pigs.

In response, the SPC-GIZ program introduced a mixed feed system for Pele Island pigs. The new feeding regime sought to utilize locally available feed products that would not substantially interfere with local food security, enable faster production and finishing times and meet nutrient requirements. The following feeds are now utilized in the Pele Island demonstration:

Feed Ingredient	Cooking Required	Processing
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¹ While coconut oil is particularly efficient to defaunate the rumen and reduce methane production, decreased performance with whole coconut would result in an extended finishing time, which has implications for CH₄ emissions because of a longer animal lifetime <http://www.journalofanimalscience.org/content/84/1/162>

² Gohl, 1992. <http://books.google.fr/books?id=AsJCaQGjOMcC>

³ <http://www.sciencedirect.com/science/article/pii/S0377840102002535>



Green leaves/Grass	No	No processing
Taro corn	Yes	Skin is peeled off
Unmarketable Banana	Yes	Cut into small pieces. Pieces not too small
Unmarketable Manioc	Yes	Skin is peeled off
Sweet Potato skin	Yes	Skin washed with water
Coconuts	No	No processing
Silage	See silage preparation	See silage preparation
Tilapia Fish fry	Yes	Small fry (<5cm only used)

In order to increase protein intake, the Pele pilot site introduced small-pond culture Tilapia. Rather than feeding fish for adult harvest, a few breeding individuals are kept to produce fry which are then harvested for pig feed supplement. Fry up to a maximum length of 5cm are harvested and cooked with other ingredients. At such a small size, bones are not an issue and are eaten with the whole fry. The system is particularly useful as Tilapia can be raised in poor water conditions (no running water), and breed and grow quickly for regular harvest of fry.





The Silage Technique is used on Pele to store and preserve excess feeds for use during times of food shortage caused by climate extremes (cyclones etc). Pig silage has been successfully demonstrated on Pele using Taro, Manioc, Sweet Potato and Breadfruit, and is now commonly practiced by local farmers for their own pigs. The silage produced on Pele has been kept fresh for a period of up to 8 months, and potentially could be kept longer with no refrigeration. Materials necessary for silage production (plastic bags, root crops, crop leaves, and salt) are easily accessible and inexpensive.



Manure Collection/Use and Integrated Agriculture

Substantial time and energy is expended by Pele Island pig farmers foraging for pig feed. During inclement or extreme climate conditions (storms, heat waves etc), pigs are not fed. In order to address this indirect climate vulnerability of the production system, the Pele trial introduced the practice of manure collection treatment and use on proximate pig feed gardens.



The manure produced contains the feed nutrients that Pele pigs were not able to use, which can supply nutrients for crop production, and is a manageable, valuable fertilizer resource. Before use on crops, the manure is aerobically treated. The manure is collected and composted (and regularly turned for aeration) in special manure curing boxes. The odor of the manure is reduced by enhancing the breakdown of volatile fatty acids which produce odor. Treating manure aerobically before spreading can reduce odor by 50 to 80 per cent. The aerobic treatment reduces the presence of dangerous pathogenic bacteria (such as Cryptosporidium and Salmonella) as these cannot exist in the presence of oxygen. Unfortunately, aerobic treatment does cause emission of nitrogen gas, nitrous oxide, both climatically dangerous greenhouse gases.

Cropping trials on Pele have shown that crops grown in close proximity to the pig facility and fertilized with treated manure grow significantly larger than in control plots. The availability of a close and productive feed source reduces unavailability and hence vulnerability due to climate extremes.

- **RECOMMENDATION: Vanuatu to share information and technique guidebooks with Kiribati on the pig feed silage technique**
- **RECOMMENDATION: Vanuatu to share pig facility design and materials with Kiribati livestock**
- **RECOMMENDATION: Vanuatu to share cost benefit analyses undertaken on Pele Livestock Facility with Kiribati**
- **RECOMMENDATION: Vanuatu to share backyard Tilapia guidebooks and manuals once finalized in late 2013**



Poultry Unit in Santo – Mr Eli

- Faces issues to due his location in the municipal area, and the authorities would like remove his operations
- Has sought advice from Dept of Livestock to relocate farm
- Is cross breeding imported and local breeds (wild variety) to find a resilient varieties, he has found that there are many diseases in the imported chickens
- In the Kiribati unit, there are more than 500 layers, which are distributed to farmers. This visited farm had over 400 layers.
- He is using imported feeds from Australia, with kitchen waste, especially for laying purposes.
- Each day he collects 3 trays of eggs= 150 eggs per day (but just starting).
- He lives near a river, and has recently planted a water tolerant rice, which he is using to feed chickens. His soils are good because on a river plain, more fertile than in Kiribati.
- He is collecting the manure and putting it on the rice farm, also island cabbage and manioc
- Not an overcrowded farm, and there was no smell due to regular cleaning, and good management
- His house kitchen is very close to the farm and uses the kitchen waste
- **RECOMMENDATION: use the Eli poultry farm as a good practice example for integrated farming in discussions with both ni-Vanuatu and e-Kiribati farmers (e.g. manure, closeness of farm to kitchen) using pictures and stories gathered during the exchange**
- **RECOMMENDATION: Continue to monitor the results of the poultry cross breeding at Eli Farm, and if successful and productive, consider exchanging animals to Kiribati**
- **RECOMMENDATION: Vanuatu will share rice growing information and techniques using Vanuatu DARD's best practices and lessons learned**

Ian Wilson and Jeremy Piggery



- Built a farm on the coast, sea level is eroding coats and fence lines
- Trying to cut trees and logs and make a sea wall, but not helping very much



- Will be speaking with Dept of Forestry to use the vetiver grass for planting on the coastal area, but Kiribati is using a mangrove
- He built a poultry farm in the middle of a pig farm, this helps with efficiency of feeding, uses pig waste for feeding chickens for worms and insects.
- He doesn't sell any products, only for self consumption.
- He is growing local and imported varieties (but not yet crossbreeding, although has been encouraged)
- 110 pigs and 35 layers
- He plans corn and cabbage using the manure
- Feeds the pigs with coconuts and copra meal, sometimes he adds green leaves
- Bamboo feed and water trough
- Puts the farm on the coast gives good fresh air to the animals
- There is a problem with the land, and therefore the pigs are very confined, but pigs were healthy...good case study for good management.
- He is using only local materials to build his facilities, using local ropes to tie things together
- **RECOMMENDATION: Vanuatu may consider exchanging Vetiver grass to support erosion control in Kiribati.**
- **RECOMMENDATION: Kiribati will consider using the Wilson farm practice of mixing manure and blood to attract flies to produce maggots as feed for day old chicks.**
- **RECOMMENDATION: Kiribati may try the system of putting chickens directly inside pig farms as in the Jeremy piggery for more efficient recycling of materials**
- **RECOMMENDATION: Kiribati may try to use bamboo feeding and drinking devices as is used in the Wilson farm.**

Stephenson Boe's Piggery at Peleru



- Did a similar facility to Pele with cross breeding of pigs
- Does silage with sweet potatoes, with copra meal at a rate of 1:3 when feed.



- Uses a raised floor 1 high foot timber with coffee sticks, to keep pigs dry from flooding, and also helps with effective cleaning and not using too much water
- Manure is just left sitting
- Kiribati encouraged him to relocate the piggery closer to a water source
- Main issue is the lack of water, so he has to transport water, and the new design of enclosure helps reduce water use for cleaning
- 70 pigs
- Aluminum roof over the pigs but not using to collect water (Kiribati tried to allocate catchments for animals, but water is so valuable that most is for humans)
- **RECOMMENDATION: Kiribati will implement silage technique especially for peelings and leaves (as main fruits are too rare and for humans), need manuals and guides from SPC-GIZ Vanuatu, all materials are available.**
- **RECOMMENDATION: Vanuatu will get more info on raised beds from Kiribati and learn from its experiences and best practices.**
- **RECOMMENDATION: Vanuatu will get more info on slightly salty water for pig consumption from the officers from Kiribati (especially for use with local breeds, not exotic).**

Wong Zhe Sing Piggery



- Cement facility , uses shovel cleaning, but doesn't use the manure could be improved
- Lack of shading
- Large (biggest farm on Santo) exceeds 200 pigs
- Landrace, large white and duroc, does some cross with domestic varieties for good production
- Uses leftover bread, and expired products from Luganville to feed the pigs (he has to purchase for a small fee) (also very common in Kiribati, along with damaged grains)
- Feeds pigs with corn meal and copra meal
- **RECOMMENDATION: Kiribati may use the Wong Zhe Sing Piggery as an example of bad practice in waste management (not using any manure at all for any productive purpose) to better improve the use of animal waste for their own farmers**



Samansen Farm

- Located farming near a river
- Cross breeding of pigs local varieties with black exotic
- Manure waste is not used
- Slope drainage into a septic (not used).
- Design of drainage is good, but do not use.
- Beside the fence, there is a pipe of water and taps, Droplets of water filling into drinking troughs. May not be appropriate in Kiribati due to a lack of water.
- **RECOMMENDATION:** Kiribati will consider collecting the water used to rinse the unit pigs that goes into a septic tank, and using this water for liquid fertilizer
- **RECOMMENDATION:** In Kiribati Feeding troughs are very high, makes cleaning difficult, will consider using Vanuatu style of shallow troughs (less water use).
- **RECOMMENDATION:** Vanuatu could learn from the semi commercial piggeries in Kiribati which use nipples to ensure the most efficient use of water (technology from Taiwan technical mission- metal nipple).

VARTC





- Poultry farm, feeding of ducks and chickens separately (In Kiribati, there was a death of Muscovy ducks possibly due to avian influenza).
- Only deal with local chickens, trying to identify the breeds that are most productive and climate tolerance
- They do very good controls of inbreeding, keeping different lines and progeny separate.
- In Kiribati there is a lack of proper recording, making inbreeding a problem.
- Use grass house housing and local materials for chicken enclosures
- Feed mix using copra meal, meat meal, sweet potato meal and cassava, they showed how to mill it, dry it (2 days) and make meal in machine for powder.
- Use kerosene lights to keep chicks warm at night, and electric power for brooder.
- They have an incubator and hatchery
- They have built a pond in the middle of the chicken enclosure to allow chickens a place to swim and drink
- At VARTC they are growing them in coral, sand and soil, and there is a very good performance with harvest after 3 months.
- **RECOMMENDATION: Kiribati could use the results of VARTC chicken breeding to potentially exchange our best varieties.**
- **RECOMMENDATION: Kiribati is very interested in learning how to make bone meal and also considering fish meals, get manuals etc from VARTC to share with Kiribati.**
- **RECOMMENDATION: Vanuatu to collect information on duck husbandry from VARTC and share with Kiribati**
- **RECOMMENDATION: Kiribati has requested more information on costs and learning of small-scale 50 egg incubator as at VARTC for their small farmers.**
- **RECOMMENDATION: Vanuatu to share the techniques of VARTC on planting sweet potato into sandy soils and compost**
- **RECOMMENDATION: Vanuatu to share information the sweet potato cross breeds available at VARTC for potential genetic material exchange**

Final Debriefing and Additional Proposals

- **RECOMMENDATION: Pig feed formulation is of utmost importance to all livestock farmers. Vanuatu is working closely with the PNG National Agriculture Research Institute (NARI) and can share some of their learnings directly with Kiribati and put Kiribati in touch with NARI. Vanuatu also has a local feed formulation expert which may be able to share some information (Sandy Mael) directly with Kiribati.**
- **RECOMMENDATION: Both Vanuatu and Kiribati will put together e-copies of their various livestock husbandry extension materials and share with one another (despite different languages) as these may still prompt new ideas and approaches.**



- **RECOMMENDATION:** SPC print many more copies of the Climate & Livestock brochures to share with country office who have now run out.
- **RECOMMENDATION:** Both Vanuatu and Kiribati will share their policies and strategies with each other, as Vanuatu is in the process of developing a National Livestock Framework.
- **RECOMMENDATION;** Kiribati will share information with Vanuatu on strategies for organic farming, specifically burying of cans in soil for iron
- **RECOMMENDATION:** Vanuatu and Kiribati will develop a Joint trial on use of manure (pigs and chickens) run a demonstration in liquid and solid fertilizer for planting agriculture crops. Kaltouk Kalomor of Vanuatu will to develop 1st draft of the proposed joint trial by mid October, Kiribati to comment on and finalize by end of October. The trial will be funded by SPC-GIZ and other partners as necessary.
- **RECOMMENDATION:** Due to the success of this first South-South exchange of livestock experts between Vanuatu and Kiribati, it is recommended that Vanuatu Officers travel next to Kiribati to learn from and provide more specific training on issues such as biogas (Kaltouk) and pig production (Stephenson)
- **RECOMMENDATION:** A Regular email exchange (possibly skype) is established among SPC, Vanuatu and Kiribati, to follow up on key recommendations and keep the momentum from this trip flowing.

Final Recommendations For Action By Kiribati

- **RECOMMENDATION:** Kiribati will share information about providing protein to their pigs, especially by using freshwater fish (tilapia) or fish waste in feeds.
- **RECOMMENDATION.** A mobile boar system, such as that used in Vanuatu, may be useful and more accessible to Kiribati farmers, whereby the government meets the costs of transporting the boar to the outer and remote islands to mate with local sows.
- **RECOMMENDATION:** Kiribati could implement a more frequent talkback show style of radio communications like Vanuatu, which is weekly and allows more and longer (1 hour) interaction between listeners and experts.
- **RECOMMENDATION:** Kiribati can share information on how its livestock and agriculture extension officers are also collecting rainfall and temperature data
- **RECOMMENDATION:** Kiribati will consider using the Wilson farm practice of mixing manure and blood to attract flies to produce maggots as feed for day old chicks.
- **RECOMMENDATION:** Kiribati may try the system of putting chickens directly inside pig farms as in the Jeremy piggery for more efficient recycling of materials
- **RECOMMENDATION:** Kiribati may try to use bamboo feeding and drinking devices as is used in the Wilson farm.



- **RECOMMENDATION:** Kiribati will implement silage technique especially for peelings and leaves (as main fruits are too rare and for humans), need manuals and guides from SPC-GIZ Vanuatu, all materials are available.
- **RECOMMENDATION:** Kiribati will share more info on using raised beds for pigs, its experiences and best practices.
- **RECOMMENDATION:** Kiribati will share more information on the use of slightly salty water for pig consumption (especially for use with local breeds, not exotic).
- **RECOMMENDATION:** Kiribati may use the Wong Zhe Sing Piggery as an example of bad practice in waste management (not using any manure at all for any productive purpose) to better improve the use of animal waste for their own farmers
- **RECOMMENDATION:** Kiribati will consider collecting the water used to rinse the unit pigs that goes into a septic tank, and using this water for liquid fertilizer
- **RECOMMENDATION:** In Kiribati Feeding troughs are very high, makes cleaning difficult, will consider using Vanuatu style of shallow troughs (less water use).
- **RECOMMENDATION;** Kiribati will share information with Vanuatu on strategies for organic farming, specifically burying of cans in soil for iron

Final Recommendations For Action by Vanuatu

- **RECOMMENDATION:** Ni-Vanuatu farmers need better messages and demonstrations on integrated farming as is done in Kiribati, too often farmers see livestock and agriculture as separate activities and do not use the products and wastes from one in the other.
- **RECOMMENDATION:** Possible area of exchange between Kiribati and Vanuatu on the use of simple biogas designs and approaches, challenge: manure is so valuable as fertilizer in Kiribati that it may not be available for biogas digesters, although sludge and slurry is still useable.
- **RECOMMENDATIONS:** Vanuatu could provide some of the hands-on Climate Field School materials and approaches to Kiribati to use in their future trainings.
- **RECOMMENDATION:** Livestock and Agricultural Extension officers should have overlapping roles and provide integrated services. This is the approach of Kiribati and would be extremely useful in Vanuatu.
- **RECOMMENDATION:** Vanuatu should share its agro-met handbooks, developed with DARD, VMGD and SPC-GIZ
- **RECOMMENDATION:** Vanuatu finalizes the underground septic biogas construction and trials and sends lessons learned reports and digester designs to Kiribati
- **RECOMMENDATION:** Vanuatu finalizes the SPC-GIZ backyard biogas construction and trials and sends lessons learned reports and digester designs to Kiribati
- **RECOMMENDATION:** Vanuatu to share information and SPC-GIZ technique guidebooks with Kiribati on the pig feed silage technique



- **RECOMMENDATION:** Vanuatu to share Pele Island SPC-GIZ pig facility design and materials with Kiribati livestock
- **RECOMMENDATION:** Vanuatu to share cost benefit analyses undertaken on SPC-GIZ Pele Livestock Facility with Kiribati
- **RECOMMENDATION:** Vanuatu to share SPC-GIZ Backyard Tilapia guidebooks and manuals once finalized in late 2013
- **RECOMMENDATION:** Continue to monitor the results of the poultry cross breeding at Eli Farm, and if successful and productive, consider exchanging animals to Kiribati
- **RECOMMENDATION:** Vanuatu will share rice growing information and techniques using Vanuatu DARD's best practices and lessons learned
- **RECOMMENDATION:** Vanuatu may consider exchanging Vetiver grass to support erosion control in Kiribati.
- **RECOMMENDATION:** Vanuatu could learn from the semi commercial piggeries in Kiribati which use nipples to ensure the most efficient use of water (technology from Taiwan technical mission- metal nipple).
- **RECOMMENDATION:** Vanuatu will collect results and prepare reports on VARTC chicken breeding to potentially exchange our best varieties.
- **RECOMMENDATION:** Vanuatu will share manuals etc from VARTC on how to make bone meal and also considering fish meals
- **RECOMMENDATION:** Vanuatu to collect information on duck husbandry from VARTC and share with Kiribati
- **RECOMMENDATION:** Vanuatu will share info on the costs and experiences of the small-scale 50 egg incubator as at VARTC for small farmers.
- **RECOMMENDATION:** Vanuatu to share the techniques of VARTC on planting sweet potato into sandy soils and compost
- **RECOMMENDATION:** Vanuatu to share information the sweet potato cross breeds available at VARTC for potential genetic material exchange
- **RECOMMENDATION:** Pig feed formulation is of utmost importance to all livestock farmers. Vanuatu is working closely with the PNG National Agriculture Research Institute (NARI) and can share some of their learnings directly with Kiribati and put Kiribati in touch with NARI. Vanuatu also has a local feed formulation expert which may be able to share some information (Sandy Mael) directly with Kiribati.

Final Recommendations For Action By Both Countries and SPC

- **RECOMMENDATION:** Vanuatu and Kiribati should share info on how the agrometeorology bulletins in each country are produced
- **RECOMMENDATION:** A major need in both countries is to study locally available pig feeds. Undertake a SPC or NARI region program on developing and tailoring locally available and nutritious feeds for island pigs (feeds that are climate resilient.)



- **RECOMMENDATION:** Use the Eli poultry farm as a good practice example for integrated farming in discussions with both ni-Vanuatu and e-Kiribati farmers (e.g. manure, closeness of farm to kitchen) using pictures and stories gathered during the exchange
- **RECOMMENDATION:** Both Vanuatu and Kiribati will put together e-copies of their various livestock husbandry extension materials and share with one another (despite different languages) as these may still prompt new ideas and approaches.
- **RECOMMENDATION:** SPC print many more copies of the Climate & Livestock brochures to share with country office who have now run out.
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FINAL PROGRAMME

23-27 September 2013

Saturday 21 September

	Kiribati Participants arrival in Port Vila
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Day 1 – Monday 23 September 2013
Dept of Forestry Conference Room

Time	Activity	Responsible Person
09.00	Arrival at Dept of Forestry Conference Room in Port Vila	
09.10	Welcoming Remarks	Director of Livestock
09.15	Opening Comments	Kiribati Livestock Representatives
09.20	Introduction/Objectives of Exchange Visit	Christopher Bartlett, SPC-GIZ
09.30	Morning tea	
09.45	Introduction to Key Livestock and Climate Change Issues in Vanuatu	Lonny Bong Vanuatu Livestock Department
10:45	Introduction to Vanuatu Climate Change Situation and Climate Change Adaptation for Pigs by SPC-GIZ Program	Christopher Bartlett
11:15	Introduction to Vanuatu Biogas Trials and Approaches	Kaltouk Kalomor
11:45	Introduction to Key Livestock and Climate Change Issues in Kiribati	Kiribati Livestock Representatives
12:00	Questions and Discussion on key CC Issues affecting livestock in Kiribati and Vanuatu. 1. Similarities and Distinctions 2. Clarification of Exchange Objectives	
12:30	Lunch	
1:30	Tour of Livestock Operations at Tagabe	Vanuatu Livestock
	Site Visit to Biogas Project site at Mele	Kaltouk Kalomor
	Site Visit to Biogas at Erakor	Tari Johnny



Day 2 – Tuesday 24 September

8:00	Travel to Pele Island	
	Session 4 Visit to Pele Livestock Facility	Chief Tarip
5:00pm	Return to Port Vila	
7:00pm	Live Talk Back Show on Radio Vanuatu regarding climate change and livestock Issues	Elizabeth Graham

**Day 3 & 4 – Wednesday 25 September & Thursday 26 September
SANTO**

25 Sept 8:00am	Travel to Espiritu Santo	
11:00	Visit to Mark Kenneth Property, Extensive Piggery Unit	Stephenson Boe
1:00	Visit to Poultry Layer Unit	Eli
1:30	Visit to Ian Wilson and Jeremy Piggery	
2:30	Visit to Steve Boe Piggery	
26 Sept		
8:30	Visit to Vanuatu Agriculture College	
9:30	Visit to Wong Zhe Sing Piggery	
10:30	Visit to VARTC	
1:30	Santo Stakeholder Meeting to present key Kiribati and Vanuatu Climate & Livestock Issues	
5:00pm	Return to Port Vila	

Day 5 – Friday 27 September 2013

9:00	Roundtable with Kiribati & Vanuatu Livestock staff to discuss key learnings, next steps and areas of cooperation @ Dept of Forestry Conference Room	
	Review of Objectives, Agenda & Activities of Exchange Visit	Christopher Bartlett, SPC-GIZ



10:00	Review of Each Program of Exchange identifying/documenting for each <ol style="list-style-type: none"> 1. Key Learnings 2. Remaining Questions 3. Areas for Future Collaboration 	
11:00	Wrap Up comments by SPC-GIZ	Christopher Bartlett, SPC-GIZ
	Wrap Up comments by Kiribati Livestock Officers	
	Wrap Up comments by Vanuatu Department of Livestock	Nambo Moses
	Closing and Farewell Kaikai	

Day 6 – Saturday 28 September 2013

Kiribati Livestock Officers Depart

