

Bridger Gordon  
Sturgis Brown High School  
Sturgis, SD  
Papua New Guinea, Factor 7: Animal Agriculture

## **Papua New Guinea: Collaborating to Increase Goat Production to Address Food Insecurity**

This year, 2015, marks the 40<sup>th</sup> anniversary since Papua New Guinea in the South Pacific gained independence from Australia. In the four decades since, Papua New Guinea has made progress with investment, development and export of their natural resources – including logging, copper, gold, oil, and natural gas. As well, projects to boost coffee and cocoa among the country's farmers are being implemented. Despite these steps toward progress, 85% of Papua New Guineans livelihood is subsistence agriculture, and the country struggles greatly with food production, food security and especially nutrition. The difference in diet, particularly availability of protein, is especially evident between urban and rural populations. To enhance diet quality in Papua New Guinea and assist the country in becoming more self-sufficient, efforts to assist farmers to implement sustainable practices for raising livestock, specifically goats, would be beneficial.

Papua New Guinea is located on the eastern half of the island of New Guinea, north of Australia. The western half of the island is part of Indonesia, which maintains a large urban population, and interestingly does not struggle with poverty and food security issues. In addition to the mainland, Papua New Guinea includes 600 large and small offshore islands. The country has a tropical climate with rugged, mountainous terrain (Omot). Papua New Guinea's history is that of a tribal nation where poverty and food security is a major concern. It is one of the few nations outside of Africa that is listed with a "high risk" food security index ("Food Is the Ultimate..."). It is one of 83 countries defined by Food and Agriculture Organization as low-income food-deficit countries (Bourke, Allen, and Salisbury). Additionally, Papua New Guinea is not highly developed, with a Human Development Index score placing it 156 of 187 studied nations ("Papua New Guinea HDI"). One-third of the Papua New Guinea's 7.2 million people make less than the \$1.25 a day poverty level ("Papua New Guinea - Country Brief").

Similar to many developing nations, the population of Papua New Guinea is relatively young; the average age is 22.4 years old ("East and Southeast Asia..."). The population is increasing due to the fairly large birth rate. For every one woman, there are 3.2 children ("East and Southeast Asia..."). The average family consists of five people. Family life is influenced by the tribal culture of Papua New Guinea. Especially in the rural highlands, Papua New Guineans historically lived in clans, made up of people who perceive themselves as descending from a common ancestor, and can be divided into sub-clans made up of people who are descendants from a known ancestor ("Papua New Guinea - The People"). Because of the many clans throughout Papua New Guinea's history, the country has more than 800 languages today. A major force in Papua New Guinea's social structure is the "Wantok System," based on a relationship between individuals from the same area who spoke the same language (wantok is derived from the English phrase "one-talk.") Historically, the men of the village would live in a central longhouse, with the women and children living in huts surrounding the longhouse. Today, families are becoming more connected, with the whole family living in a hut together ("Papua New Guinea - The People"). Now, a person's wantok consists of a group of people with whom he or she shares a common bond, not only the people he or she lives with in the clan or tribe, but also people the individuals they may work with.

Education is fairly equal between boys and girls - enrollment is 63% and 56% respectively ("Statistics At a Glance..."). But the literacy rate is far higher than the enrollment, although only 56% of girls go to school, reportedly 74.8% are literate ("Statistics At a Glance..."). This literacy and education are key factors to aid future efforts to enhance agricultural production and address poverty and food security.

The diet between the urban residents and the rural residents of Papua New Guinea is very different. The urban population consumes mainly rice, biscuits, bread, meat, and fish; the rural people eat mostly sweet potatoes, with some taro and yam consumption (Saweri). The sweet potato accounts for 43% of their food intake (Loebenstein and Thottappilly). This leads to very different nutritional intakes between the more privileged urban peoples and the rural poor. This is primarily due to the crops the rural people produce and have available for consumption compared to the fishing and import-based products available to urban residents. The urban population is located mostly in the capital city of Port Moresby. This city receives meats, grains, and other foods from imports; it also gets fish from the nearby sea and garden crops and sago from the lower altitudes (Saweri).

Regarding access to health care, immunizations in Papua New Guinea are fairly high - around 70.6%, but the availability of health and sanitation facilities is lacking ("Statistics At a Glance..."). Of the total population only 18 out of every 100 people has access to sanitation facilities such as clean drinking water and adequate sewage disposal. In the rural communities only 13.3% ("Statistics At a Glance...") have access to such facilities. This lack of sanitation facilities allows diseases to spread and worsen the state of the nation. Additionally, it has been reported that the most significant form of malnutrition in Papua New Guinea is protein - energy malnutrition which affects both children and adults (Bourke, Allen, and Salisbury). As a result, the country has a high infant mortality rate, children's growth is often stunted, and life expectancy in Papua New Guinea is low (58 years) compared to the average of the East-Asia and Pacific Region (69 years) and the Lower-Middle Income Countries (68 years) (Omot). To address these health/nutrition issues, increasing the availability of protein - such as goat meat and milk - in the diet for rural citizens is imperative, and could also enhance education and the disparity between rural and urban.

Most of the people in Papua New Guinea live in scattered rural village communities and depend on subsistence farming to feed their families, with supplemental income from tree crops, food crops, livestock and other non-agricultural activities. Subsistence agriculture provides a livelihood for 85% of the citizens ("East and Southeast Asia..."). The wantok system also allows for food to be shared/distributed through these networks. However, adequate quality and variety of foods for a nutritionally balanced diet is typically lacking (Omot). The average farm size in Papua New Guinea is 483 hectares, or approximately 1.86 square miles (Kurian). These farms produce a variety of crops: sweet potato, coffee, cocoa, palm oil, coconut, yams, taro, and bananas ("Papua New Guinea - Country Brief"). Rice and wheat are the two major imported food staples (Omot).

Three livestock production systems are found in Papua New Guinea: commercial, semi-commercial and subsistence. Poultry (chicken), pigs and beef cattle are raised primarily by a few large entities on the outskirts of the major cities for the urban market. They depend on imported feed and are owned and operated by companies which have their own processing facilities and marketing outlets. The semi-commercial production system is not widespread in Papua New Guinea and is often located on the outskirts of provincial capitals and semi-urban localities. Most of the product raised is sold at local market. The farms are individually owned or, in some cases, by a clan or sub-clan. The major species are pigs, goats, and sheep and in very few cases beef cattle (Bourke and Harwood).

The subsistence production system, where animals are kept primarily for household consumption with excess exchanged for other livestock or crops, is the most common type of livestock production in villages of Papua New Guinea. Animal species are native chicken, pigs, sheep, goats, ducks, and rabbits, and individual households usually own the farms. Animals typically graze or scavenge unattended and are housed at night. Farmers do use manure to fertilize the crop gardens. It is estimated that there are about 1.8 million village pigs, 1.5 million chicken, 20,000 goats and 10,000 sheep (Bourke and Harwood). Pigs are culturally significant among tribal groups and are used in exchanges as well as feasting. (Omot).

Because this subsistence system is currently in place and working, an opportunity exists to provide information and skills to these producers to potentially increase the number of goats being raised.

Farmers in Papua New Guinea face many barriers. One of the greatest obstacles is availability of land with secure title and tenure. This is because the majority of land in Papua New Guinea (97%) tribal owned (Armitage). The tribe owns the land, with members of the tribe working the land for them. This often causes confusion and insecurity amongst the people – farmers are unlikely to invest in land if it may subsequently be taken from them (Bourke, Allen, and Salisbury). There are also many disputes over land between tribes and with developers. Additionally, because of Papua New Guinea's tribal history and clan system, the country has over 800 different languages ("Languages..."). This creates a communication challenge among the people of Papua New Guinea, as well as workers trying to deliver aid, research and educational knowledge to them, and even in the marketplace where communication barriers can affect negotiating a fair price for goods. English is considered one of the country's official languages, but is more common in urban areas than rural ("East and Southeast Asia...").

Other agricultural challenges include natural disasters, land degradation, poor rural road infrastructure, and low productivity of livestock – primarily due to poor feed efficiency and reproduction. Facilities for harvest, post-harvest handling and storage as well as marketing of agricultural products – from fresh produce to meat – also need to be addressed. Additionally, clan fights and human disease issues can affect food production, and low cash income can affect a family's access to nutritious food (Omot).

Papua New Guinea's agricultural productivity is primarily impacted by natural disasters and diseases from drought, frost and flooding to the Cocoa Pod Borer, which is destroying farmers' crops (Bourke and Harwood). Land pressure for mineral extraction, such as copper, gold, and oil, is resulting in land degradation ("East and Southeast Asia..."). Land also is not readily available to farmers (Saweri), due to the lack of a governmental land system. Only 15% of the country's population is employed in the urban sector, the remainder of the population derives their income from agricultural practices (Omot).

Lack of infrastructure is also a major problem in Papua New Guinea and is directly related to a lack of food distribution, a major cause of food insecurity (Jacobs). The lack of infrastructure and distribution also leads to higher prices, making food less affordable and accessible (Bourke, Allen, and Salisbury). Additionally, the absence of water infrastructure is a concern throughout Papua New Guinea, where 60% of rural people do not have access to safe water ("Where We Work...").

Efforts to assist Papua New Guinea farmers in implementing sustainable animal agriculture practices, specifically focused on goats, could address the malnutrition and food security issues among the rural farm families, while also increasing income opportunities for subsistence farmers. This aligns with the recommendation that improving subsistence food production and cash income for the poorest people are the best ways of improving food security (Bourke, Allen, and Salisbury).

Increasing goat production could improve the lives of the people of Papua New Guinea in two ways. Foremost, it would provide a source of high-quality protein in the form of both meat and milk. Food security is not just having enough food, but having enough nutritious food (Bourke, Allen, and Salisbury). There are no cultural or religious barriers preventing the people of Papua New Guinea from consuming goat ("Livestock Sector"; "Goat Facts..."). The majority of Papua New Guineans (98%) are lactose intolerant (Cook), but most people who are lactose intolerant can consume goat's milk, even though it does contain lactose ("Goat's Milk..."). Secondly, livestock would increase food security in Papua New Guinea by diversifying the products grown and marketed by farmers. This is beneficial because it provides the opportunity to increase the farmer's income potential; and it provides a level of risk

management. For instance, if a natural disaster occurs, like frost or the cocoa pod borer, crops may be impacted, but the farmer would still potentially have livestock to market.

Goats are a livestock entity that Papua New Guinea smallholder farmers have already shown interest in – despite the lack of a commercial sheep or goat industry in the country. The government has provided support for sheep programs, but production has lagged, primarily due to health, breeding and nutritional problems. Meanwhile, without government policy support, smallholder goat production has been steadily increasing (“Papua New Guinea Country Brief”). Goats appear to do well with lower quality feed, can adapt to rugged terrain, tend to be prolific, fit well in the village lifestyle and can produce both milk and meat for human consumption. By tapping into Papua New Guinea farmers’ interest in goat production, animal numbers could likely be further improved with better breeding, genetics, feeding and animal health management knowledge. Increasing production would in turn improve food security and nutrition for the people. Additionally, integrating livestock production with crop production could be considered, such as using manure for fertilizer and grazing under tree crops or aftermath grazing on cropland.

As goat production is explored among Papua New Guinea farmers other issues that will need to be considered include water availability for livestock health, and improving infrastructure of rural roads to facilitate the opportunity to market goat meat to the urban population. Additionally, more research must be implemented related to livestock production in Papua New Guinea. As one source pointed out: “There is a disproportionate emphasis on research into crops—more attention needs to be given to livestock and production of feed crops. There is also a great need to increase research into land use and soil types so that recommendations for specific crops and agricultural activities can be made on the basis of the best use of available land” (Bourke, Allen, and Salisbury).

Smallholder livestock in Papua New Guinea has the potential to play an important role in the lives of rural, per-urban and urban farmers and makes significant direct and indirect contributions to the national economy. It also has the potential to develop into a major renewable industry and open up diverse opportunities for smallholder farmers to actively participate in the fast expanding national economy (Kohun). Additionally, when large-scale mining and agricultural projects result in the relocation and rehabilitation of rural communities, viable smallholder livestock development interventions provide an opportunity for rehabilitation of rural livelihoods (Bourke, Allen, and Salisbury).

Programs to introduce and increase the number of goats raised by Papua New Guinea farmers will take multiple steps and involve multiple organizations. Foremost, communication among government and other entities, including international organizations and foreign governments, should be streamlined to enhance effectiveness and efficiency. A collaborative effort would better facilitate development, dissemination, and adoption of improved agricultural technologies to farming and rural communities as well as aide in strategically planning future research efforts (Bourke, Allen, and Salisbury).

Collaborating with existing farmers and farmer programs appears to provide the best approach. For example, presently an effort called the Productive Partnerships in Agriculture Project is being implemented to enhance coffee and cocoa production among Papua New Guinea farmers. The program has successfully reached more than 20,000 small-holder farmers and increases in yield are occurring (Van Trotsenburg). Opportunities to work with this developed network of small-holder farmers to explore expansion of goat production could be explored. As well, tactics learned in communicating and sharing knowledge with these Papua New Guinea farmers should be reviewed and utilized.

Developing a collaborative effort with the National Agricultural Research Institute’s Livestock Research Station at Labu would be beneficial. NARI functions similar to the U.S. Extension system and has four other research stations established throughout the country. Staff are working to make smallholder

livestock production more effective and sustainable in Papua New Guinea, and have seen increasing interest in goats (Kohun). Establishment of a demonstration site for goat production should be considered, and could evolve into partnering with current farmers in three or four different regions of the highlands to establish regional example livestock farms. These sites would allow for important development of production skills of the partner farmers, while also allowing other farmers to familiarize themselves with goat production. Workshops could be held at the demonstration sites to attract new farmers and teach how to care for, raise, and harvest goats. Skills to be taught include genetics/breeding, feeding/grazing, fencing/herding, providing water, kidding, milking goats, and butchering the animals for meat. Demonstrations should target younger farmers, as the old are often reluctant to change. Teaching the young about livestock production offers the opportunity for generational change. (Bourke, Allen, and Salisbury). Targeting women who take large responsibility for farming efforts in Papua New Guinea should also be considered (Bourke, Allen, and Salisbury).

Working with additional governmental groups, the United Nations, and non-governmental organizations (NGOs) should also be explored. Since 2000, NGOs have become more involved, offering ag outreach services for developing Papua New Guinea (“A Critical Analysis...”). Additionally, development companies that are mining and logging in Papua New Guinea offer ag education opportunities. Already some projects to benefit agricultural efforts have been explored, such as a land lease-back system that is working to establish nucleus estates with traditional landowners. Some tax credit provisions for mining companies have also been explored to encourage investment in both infrastructure and extension aide to farmers (Bourke, Allen, and Salisbury).

Through these efforts to improve goat production and availability of protein to rural Papua New Guineans, citizen leaders must also be developed to work with the government to improve three main features of Papua New Guinea, including: addressing road infrastructure, establishing an organized land system, and supplying credit to farmers for livestock. Initiatives to build and improve infrastructure are important to facilitate future livestock marketing opportunities. Additionally, the current land system needs a federally regulated land system implemented (Saweri). This would make land more available for farmers. Perhaps most importantly is providing the people with credit to purchase livestock. Past attempts to increase the amounts of livestock in Papua New Guinea simply gave out the animals, which was not effective (Bourke, Allen, and Salisbury). Providing people with partial credit to purchase goats, should help farmers feel more motivated to keep the livestock and establish a herd.

With its abundant oil and natural gas reserves, Papua New Guinea has potential to become a major energy exporter. As well, the country has much export potential for its coffee and cocoa. But to reach its full potential in the world market, Papua New Guinea must address food security and nutrition for its native people. Reducing poverty and increasing the diversity of cash income sources will have many positive implications for urban and rural Papua New Guineans. In addition to improved food security, other benefits would include enhanced access to health; access to education; and access to information.

## Works Cited

- "A Critical Analysis of Agriculture Extension Services in Papua New Guinea: Past, Present and Future." *Key Drivers for a Robust, Dynamic and Productive Agriculture Sector in PNG* (2012): n. pag. PNG Institute of National Affairs. CIMC National Agriculture Conference, 25 May 2012. Web. 21 July 2015.
- Allen, Bryant, and Robert M. Bourke. "The 1997-98 Drought in Papua New Guinea: Failure of Policy or Triumph of the Citizenry?" *Policy Case Studies*. Australian National University, n.d. Web. 23 Mar. 2015.
- Armitage, Lynne. "Customary Land Tenure in Papua New Guinea: Status and Prospects." *Queensland University of Technology*(2001): 1-10. *Digital Library of the Commons*. Indiana University, 1 June 2001. Web. 21 July 2015.
- Bourke, Robert M., Allen, M. G., and J. G. Salisbury. *Food and Nutrition 2000 Conference*. 1st ed. Vol. 1. Lae: Papua New Guinea University of Technology, 2000. Ser. 1. *Australian Centre for International Agriculture Research*. Papua New Guinea University of Technology, 26-30 June 2000. Web. 24 Mar. 2015.
- Bourke, Robert M., and Tracy Harwood. "Food and Agriculture in Papua New Guinea." *Google Books*. N.p., 20 Jan. 2012. Web. 23 Mar. 2015.
- Cook, G. C. "Intestinal Lactase Status of Adults in Papua New Guinea." *National Center for Biotechnology Information*. U.S. National Library of Medicine, n.d. Web. 21 July 2015.
- "East and Southeast Asia - Papua New Guinea." *World Factbook*. Central Intelligence Agency, 20 June 2014. Web. 19 Mar. 2015.
- "Food Is the Ultimate Security Need, New Map Shows." *The Guardian*. MapleCroft, 2011. Web. 23 Mar. 2015.
- "Goat Facts Around the World." *International Kiko Goat Association*. International Kiko Goat Association, n.d. Web. 20 July 2015.
- "Goat's Milk: A Natural Alternative for Milk Sensitive Patients." *Dynamic Chiropractic*. Dynamic Chiropractic Canada, 1 Dec. 1997. Web. 21 July 2015.
- Gwabu, Clifton. "Agriculture Research & Development Contributions to Strengthening Food Security in Papua New Guinea." *Agriculture Research & Development Contributions to Strengthening Food Security in Papua New Guinea*. 1st ser. 1.1 (2013): 1-21. *Ministry of Agriculture - Japan*. Asia Pacific Economic Cooperation, 10-11 Sept. 2013. Web. 23 Mar. 2015.
- Igua, Passingham Bukley. "Food Security Strategies for Papua New Guinea." (n.d.): n. pag. *University of Minnesota*. CGPRT Centre, May 2001. Web. 22 Mar. 2015.
- Jacobs, Sean. "Global Subsidies, Agriculture, and Infrastructure in Papua New Guinea." *Diplomatic Courier*. The Diplomatic Courier, 13 Apr. 2013. Web. 22 Mar. 2015.
- Kohun, Pukah. "Livestock Research and Development." *National Agricultural Research Institute*. Papua New Guinea Government, n.d. Web. 23 Mar. 2015.

- Kurian, George Thomas. *Fitzroy Dearborn Book of World Rankings*. Chicago: Fitzroy Dearborn, 1998. Print.
- "Livestock Sector." *PNG Ag Resources*. Department of Agriculture and Livestock, 29 Dec. 2004. Web. 20 July 2015.
- Loebenstein, G., and G. Thottappilly. *The Sweetpotato*. Dordrecht: Springer, 2009. Print.
- MacFarlane, David. "Papua New Guinea." *Food and Agriculture Organization*. United Nations, Jan. 2009. Web. 22 Mar. 2015.
- "MyPlate Protein Foods Group." *Foods Groups*. USDA, n.d. Web. 21 Mar. 2015.
- Ohtsuka, Ryutarō. "Agricultural Sustainability and Food in Papua New Guinea." *United Nations University*. United Nations, n.d. Web. 22 Mar. 2015.
- Omat, Norah. "Food Security in Papua New Guinea." *Food Security in Papua New Guinea (2012): 1-17. AARES Convention*. University of Minnesota, 7-10 Feb. 2012. Web. 22 Mar. 2015.
- "Papua New Guinea." *Papua New Guinea: Critical Development Constraints*. N.p.: n.p., n.d. *Asian Development Bank*. Asian Development Bank, 2012. Web. 23 Mar. 2015.
- "Papua New Guinea." *Worldmark Encyclopedia of Nations*. 2007, Kristen Loschert, Blair Tindall, Michael Eames Rory Pretes, Tom McArthur, and John Cannon. "Papua New Guinea." *Encyclopedia.com*. HighBeam Research, 01 Jan. 2007. Web. 22 Mar. 2015.
- "Papua New Guinea Country Brief." *Department of Foreign Affairs and Trade*. Australian Government, n.d. Web. 23 Mar. 2015.
- "Papua New Guinea - Country Brief." *New Ag*. New Agriculturist, Mar. 2013. Web. 23 Mar. 2015.
- "Papua New Guinea HDI." *Marine Pollution Bulletin* 24.1 (1992): 7. *Human Development Report*. UNDP, 2013. Web. 23 Mar. 2015.
- "Papua New Guinea - Languages." *Languages of the World*. Ethnologue, 2015. Web. 22 Mar. 2015.
- "Papua New Guinea Profile." *BBC News*. BBC News, 22 Feb. 2015. Web. 22 Mar. 2015.
- "Papua New Guinea - The People." *Mundhenks Ministry*. Pioneers, n.d. Web. 23 Mar. 2015.
- "PNG Agriculture." *Embassy of Papua New Guinea to the Americas, Washington, DC*. Papua New Guinea Government, 2004. Web. 22 Mar. 2015.
- Saweri, Wila. "Papua New Guinea." *FAO - Nutrition Country Profiles Papua New Guinea* (n.d.): n. pag. *Food and Agriculture Organization*. United Nations, July 2003. Web. 22 Mar. 2015.
- "Statistics At a Glance: Papua New Guinea." *UNICEF*. United Nations, 27 Dec. 2013. Web. 22 Mar. 2015.
- Szalay, Jessica. "Sweet Potatoes: Health Benefits, Risks & Nutrition Facts." *LiveScience*. TechMedia Network, 22 Oct. 2014. Web. 22 Mar. 2015.

Templeton, Debbie. *Food Security in East Timor, Papua New Guinea and Pacific Island Countries and Territories*. Canberra: Australian Centre for International Agricultural Research, 2012. *Australian Centre for International Agriculture Research*. Australian Government, 2012. Web. 22 Mar. 2015.

Van Trotsenburg, Axel. "Agriculture Development in Papua New Guinea." *The World Bank News*. World Bank, 26 Sept. 2014. Web. 21 July 2015.

"Where We Work - Papua New Guinea." *WaterAid UK*. WaterAid, n.d. Web. 22 Mar. 2015.

"Women in Papua New Guinea to Play Stronger Role in Agriculture." *World Bank News*. World Bank, 16 Sept. 2013. Web. 23 Mar. 2015.