



Ministry of Agriculture, Food Security and Enterprise

ANNUAL TECHNICAL REPORT

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A Message from the Minister

Hon. Jose Abelardo Mai
Minister of Agriculture, Food Security and Enterprise

I am very happy to share this report with stakeholders and the public at large. Agriculture has had a year of challenges, especially because of COVID-19. Despite the setbacks, the sector has been leading the Belizean economy in our country's recovery.

We commenced our efforts to reboot the sector by re-structuring our Ministry with a view of becoming more efficient and strategic. We also further strengthened our ties with our international partners and friends in Agriculture. By making these first bold moves we have been able to immediately impact sectors that were in dire need of assistance and gained the confidence of the agricultural producers and Belizean public.

All this has been in keeping with our *#planBelize* goals that we remain committed to serving the Belizean public and ensuring that Belize has sufficient, quality, cost-effective, healthy products available, while also supporting producers in becoming more competitive, facilitating their trade, and securing access to markets.

We remain committed to working with our many stakeholders and partners to keep agriculture as the mainstay of the Belizean economy and to assure our food sovereignty. The adaptation of agricultural smart practices is of high priority in the Ministry's agenda; it is essential to increase production, minimize risk and ensure our pristine environment for generations to come. We remain committed to helping our farmers and producers find the best markets for their products and bring food to the table for their families and jobs to the country.

To end, I thank my staff for their hard work, dedication, and commitment to making this year as successful as it has been. I reiterate my statement that my ministry has the best trained technical officers, and I am confident that with this level of support my administration has been able to garner from my agriculture team and the agriculture producers, the Ministry will achieve even more this coming year.

As my administration's term progresses, we look forward to working together to grow and build our nation and keep it strong and healthy.



List of Abbreviations

ASR-----	American Sugar Refineries
BAIMS-----	Belize Agriculture Information Management System
BGA-----	Banana Growers Association
BAHA-----	Belize Agricultural Health Authority
BBS-----	Belize Bureau of Standards
BLR-----	Belize Livestock Registry
BLPA-----	Belize Livestock Producers Association
BPA-----	Belize Poultry Association
BSCFA-----	Belize Sugar Cane Farmers Association
BSI-----	Belize Sugar Industries
CARICOM-----	Caribbean Community
CARDI-----	Caribbean Research and Development Institute
CERC-----	Contingent Emergency Response Component
CIAT-----	International Center for Tropical Agriculture (Colombia)
CGA-----	Citrus Growers Association
CPBL-----	Citrus Products of Belize, Limited
CRESAP-----	Climate Resilient Agriculture Project
CRIP-----	Climate Resilient Infrastructure Project
DFC-----	Development Finance Corporation
FAO-----	Food and Agriculture Organization
GoB-----	Government of Belize
IICA-----	Inter-American Institute for Cooperation on Agriculture
ITC-----	International Trade Center
JICA-----	Japan International Cooperation Agency
MAFSE-----	Ministry of Agriculture, Food Security and Enterprise
NATS-----	National Agriculture and Trade Show
NDV-----	Newcastle Disease Virus
PCB-----	Pesticides Control Board
OIRSA-----	International Regional Organization for Agricultural Health
RDIC-----	Research, Development and Innovation Center
SENASICA-----	National Agro-Alimentary Health, Safety and Quality Service (Mexico)
SICB-----	Sugar Industry Control Board
SIMIS-----	Sugar Industry Management Information System
SIRDI-----	Sugar Industry Research and Development Institute
TCP-----	Technical Cooperation Program
WB-----	World Bank

1. Executive Summary

The vision of the Ministry of Agriculture, Food Security and Enterprise is to have an industry that is competitive, innovative, diversified, and sustainable. Its mission is to grow and continue as an economic pillar, ensuring food and nutrition security, diversifying business opportunities, reducing poverty and enhancing human resources capacity in a sustainable and competitive environment. At the same time its broad objective includes ensuring greater efficiency and effectiveness in the structure and institutional management systems of the Agriculture and Food Sector in Belize. This will be through well-defined roles of regulatory and promotional bodies, enhancing greater collaboration among key stakeholders, and the establishment of clear policy incentive frameworks for the production, utilization, climate smart adaptation and marketing of agriculture and food products. This is expected to enhance the sustainable growth of the sector, to ensure food and nutrition security, to improve farmer/processor income, to create employment, and to attract private sector investment and participation in the sector. The Ministry recognizes five pillars needed for success in Agriculture:

- Production, Productivity, and Competitiveness.
- Market Development, Access and Penetration.
- National Food and Nutrition Security and Rural Livelihoods.
- Sustainable Agriculture and Risk Management; and
- Governance

For the past year, the agriculture and food sector has been the main pillar of the Belizean economy, contributing approximately \$590 million annually to economic output, representing 80% of domestic exports, and directly employing 17.9% of the Belizean population. In the heat of the COVID-19 pandemic with the border lockdowns, the decline of the tourism markets and disruption of regular commercial activities, agriculture floated the economy, maintaining jobs, securing food and the inflow of much needed foreign exchange.

During the year 2021, the Agriculture Industry experienced many successes. The livestock trade, particularly cattle, saw an upward surge over BZE\$49 million worth of cattle trade to markets in Mexico and Guatemala. Traditional commodities like sugar, and bananas stabilized while citrus is in recovery. New export markets are being aggressively pursued for non-traditional commodities such as the emergent Salvadoran market for onions and oranges.

While new opportunities for partnership and co-investment are being pursued with neighbouring countries like Mexico and CARCIOM. Partial Scope Agreements are in process of being finalized with our neighbours, Mexico and Guatemala, so that commodities like cattle, shrimp, and grains will have favourable terms of trade. Meanwhile new opportunities are being constantly explored in the research, production, and manufacturing of potatoes, soybean pineapples, plantains, coconuts, pitahaya, and soursop.

The Belizean public has been very supportive of our farmers, influenced heavily by the Ministry's Buy Belize campaign focussing on successfully raising the level of awareness of the public of Belizean agricultural products and production markets available in the country. This support for Belizean food products has in fact helped the economy tremendously and has kept foreign exchange at home, while ensuring healthy eating in a pandemic-stricken environment.

The country has maintained production of vegetable commodities necessary for healthy eating and imports have been reduced substantially, ensuring a sustainable livelihood for the local farmers and entrepreneurs. Meats such as poultry, beef, mutton, and pork are being produced at levels that have stabilised the demand for these. Diseases affecting the sector such as rabies, Newcastle, brucellosis, and tuberculosis are actively surveyed and in positive cases being contained and eradicated by BAHA.

In agriculture production the risks are many and so are the challenges; even so the sector continues to adapt and grow and find ways to diversify agricultural production and improve food standards to ensure Belizean products are of the finest quality. Strides are being made in carrot, onion and potato production to ensure post-harvest management guarantees products of excellent quality; the Ministry has sought partnership with international organizations like JICA to secure technology for post-harvest management in cold storage of agriculture products. This technology will also extend the life of products for an additional three months, contributing more to the livelihoods of local producers. Moreover, the Ministry continues working with farmers and agricultural cooperatives to improve their conditions by introducing contract farming terms with buyers of their products. All to ensure that farmer's production has a guaranteed market prior to planting.

Financing, high-energy costs and tax burdens present a major challenge in any productive sector and MAFSE continues to find ways to support, mitigate and reduce costs for agricultural production. We have involved line ministries such as Trade, Investment, Finance, Customs and organizations like the Central Bank, the DFC, Credit Union League among to strategize and develop packages which can ease the cost of doing business in Belize and make finance available and accessible to the farming community.

We continue actively and continuously lobbying to international partners to ensure grants and projects are directed to support the development of farmers and producers. Successful interventions like CRESAP are in the pipeline to support farmers in increasing production, productivity, and the adaptation of climate smart technologies. Ongoing initiatives include training and capacity building to farmers in all the sectors of production including grains, roots and tubers, legumes, livestock, aquaculture, vegetables, and fruit trees. The Ministry also works arduously to encourage the production of local foods and works along with other public or private stakeholders in developing school, urban and rural gardens, and aquaculture units.

2. Introduction

The Ministry of Agriculture has existed as a Ministry since 1961 when a Ministerial system was introduced to the country's legislature. From the days of mahogany cutting to chicle export, to sugar and now newer export commodities like livestock and grains, agriculture is a strong foreign exchange earner that has underpinned the economy of Belize. Currently directly impacting approximately 13,000 farmers. Recently, the COVID-19 pandemic has underscored the importance of the sector. In recognition of the importance of the sector the new government elected in 2020 under the lead of PM John Briceño has also completely supported the sector resulting in major upward surges in the socio-economic contributions of the sector to the country's well-being.

With the sweep of elections in 2020 by the PUP, newly appointed Minister of Agriculture, Food Security and Enterprise, Hon. Jose Abelardo Mai, with his experience, dynamism and drive, assumed responsibilities as Minister and immediately set to work to revive the sector. His first action on being named Minister of Agriculture was symbolic of his ability to set things in motion: an instruction to 'move the cattle NOW', a reference to the halted cattle trade, worth millions of dollars that the previous government had stymied.

Next came re-organization of the Ministry's organizational structure to optimize efficiency and resources of Ministry personnel; opening of the Corozal Free Zone, returning hundreds of jobs to Belizeans suffering from the pandemic's economic effects; establishing contacts with Mexico and meeting at the highest levels to facilitate trade and bi-lateral cooperation in livestock and the agro-industry; exploration of new commodities and markets for Belizean products; exploration of financial support through lending agencies for producers and farmers; establishing credibility with international partners in development; streamlining of sectors such as sugar to protect small farmers; support for school and urban gardening; tours of districts to reveal the state of agriculture and the Ministry personnel in each district; meetings with each productive sector in agriculture to become familiar with the challenges and opportunities of each sub sector; promotion of a Buy Belize Campaign aimed at agricultural products; liaising with educational institutions to ensure the teaching and practice of agriculture in schools is carried out; and perhaps, most importantly, being the chief coach and cheerleader for the staff and personnel in the ministry.

3. Mission Statement and Priorities of the Ministry

The Ministry of Agriculture, Food Security and Enterprise's mission is to continue as a key economic pillar, ensuring food and nutrition security, diversifying business opportunities, reducing poverty and enhancing human resource capacity in a sustainable and competitive environment. This is in keeping with the Ministry's profile as a partner with regional and international organizations such as the FAO, CARDI, OIRSA, and IICA; it is in keeping with the mandate of *#planBelize*, where 11 points are declared for the *#planBelize Agriculture Policy* as outputs to be achieved in the next 5 years.

1. Food security- Encourage import replacement and substitution, support export expansion and strengthen the linkages of tourism with our local productive sectors.
2. Tax cuts- Review the entire tax system and enact reforms to have a simplified, fair, efficient, and development-driven system.
3. Trade- Review, improve and aggressively implement our trade policy agreements in our region.
4. Exports- Work with the associations of the four traditional exports, i.e., sugar, citrus, banana, and shrimp to develop a strategy for development.
5. Financing- Support farmers in accessing affordable financing.
6. Diversification- Diversify production and the support the adaptation innovative climate-smart systems.
7. Research- Increase the collaboration of Research and Development with partners and renowned universities.
8. Grow more- Encourage rural and urban communities to grow and produce more of what we eat and promote implement a Buy Local Campaign.
9. Teach- Lobby for agriculture and agri-business to be taught in schools.
10. Storage- Improve storage and logistics facilities for farmers.
11. New markets- Improve trade and market intelligence for international access and find niche markets for the export of the non- traditional commodities.

The overall goal of this policy is to increase, diversify and sustain agricultural production, food security, income, and employment generation in Belize. This goal will require the Ministry to:

- Increase Production, Productivity, and Competitiveness.
- Develop Market Access and Penetration.
- Ensure National Food and Nutrition Security.
- Implement Sustainable Agriculture practices and implement Risk Management measures
- Improve the Governance of the Ministry

4. The Traditional Exports

Main achievements of program/unit

The main objective in the traditional export sub sector which includes sugar, banana and citrus was to improve the competitiveness of the export commodities along the value chain to satisfy the domestic market, national food security and to increase exports to generate foreign exchange earnings and employment.

Sugarcane and sugar production experienced the most significant growth by 23% and 23.5 % respectively comparing 2020 to 2021 figures. Sugarcane production increased from 1.536 million tons to 1.893 million tons and sugar production increased from 144,000 metric tons to 177,875. Acreage increased by 5% from 98,700 to 103,385. The increase in production can be attributed to improved weather conditions primarily better rainfall distribution coupled with fertilization of fields and additional acreage coming into harvest from the Cayo district. Annex 1 provides detailed information.

Banana exports increased by 7% from 5 million boxes in 2020 to 5.37 million in 2021. There was a slight increase in acreage of 3.85 from 7,518 in 2020 to 7,809 in 2021. Improved management practices were the primary reason for improved production. Annex 2 has detailed production information.

Citrus production continued to decline. Orange production fell by 21% from 2.3 million boxes in 2020 to 1.3 million boxes in 2021. However, acreage increased by 12% from 16,794 in 2020 to 18,811 acres in 2021 representing new plantings with certified and in a few cases with new germplasm from HLB tolerant varieties. Grapefruit production declined by 58 % from 144,847 boxes in 2020 to 115,029 boxes in 2022. HLB and other deficient management practices were responsible for declined production coupled with labor shortages to harvest fruit as a result of COVID 19. Grapefruit acreage declined by 58% from 4,144 in 2020 to 1,745 in 2021. Annex 3 has detailed production information.

The BZ\$15 million loan facility which the GoB is making available through the DFC for the recovery of the industry demonstrates the commitment of the GoB to channel resources to an industry which has significant socio-economic impact for southern Belize. The funds can also be used for diversification into soursop, coconut and pineapple.

Plan Belize contemplated providing support to the traditional export subsector to make them more resilient to climate change. In the case of sugarcane, it was important to recover from successive droughts and floods as well as low prices for sugar. For the citrus industry, government appointed a working group to conduct a thorough analysis of the industry and identify measures to revive the ailing industry. The sugar cane producers received support for production inputs from the World Bank through the Contingent Emergency Response Component (CERC) of the Climate Resilient Infrastructure Project (CRIP) and from a USD \$1 loan from the CDB. Sugar cane farmers

registered in the Belize Agriculture Information Management System (BAIMS) were the beneficiaries. Work on amending the Sugar Industry Act also commenced. A working group is working on recommendations to amend the Act before the commencement of the 2022/2023 sugar cane crop.

Lessons learnt

- a. Like with most other agricultural commodities, the COVID 19 pandemic halted the normal flow of produce to different markets. The Ministry of Agriculture had to work in close collaboration with the Ministries of Health, National Security, and Transportation to secure the flow of produce. Likewise special consideration had to be given to: (i) cane cutters and truck drivers to deliver cane to the two factories, (ii) citrus harvesters and truck drivers to deliver citrus to the processor, and (iii) to banana harvesters to harvest fruit and to the fruit handlers at the packing shed to continue processing fruit for export. Strict protocols had to be adhered to prevent the spread of COVID 19. Obtaining containers to ship products was a major challenge. The COVID 19 Response Team established by the Ministry of Agriculture was instrumental in guiding recovery efforts by staying focused in receiving feedback from producers, and packers and conveying these messages to decision makers who kept changing measures to delay the spread of COVID 19. Collaboration and communication were necessary to ensure that decisions made in Belmopan to facilitate agriculture trade were conveyed to the management at district level to facilitate movement of goods and services.
- b. In the case of citrus, the labour issue needed to be addressed expeditiously to avoid further fruit loss. Improved collaboration was required among the Ministry of Economic Development, Health, and Immigration and the various farmer organisations. It's an ongoing complicated problem which needs to be resolved since it's a critical element in the success of the citrus industry.
- c. A disaster response mechanism is required for the sugar cane, citrus and banana industries. Attempts have been made in the past to address insurance in these industries, however these industries are considered high risk. Collaboration with the Food and Agriculture Organization (FAO) the World Bank (WB) and other organisations can help us establish a viable scheme which could be co funded by funding agencies, farmers and Government of Belize.

Future priorities and plans

- a. Traditional exports should be supported to become more economically viable in an environment of rising agricultural inputs and competition. In sugarcane work on the review of the sugar industry will continue. MAFSE will also support the ongoing commercial agreement negotiations between the BSCFA and BSI/ASR before the conclusion of the 2021/2022 sugar cane crop. It's important to establish confidence in the industry. Through

the Sugar Industry control Board (SICB) the Sugar Industry Management Information System (SIMIS) will be implemented with a larger number of farmers.

- b. In citrus the rehabilitation of the citrus industry will continue using HLB tolerant varieties and a set of best management practices which should result increased productivity and establishment of new groves. The legislative framework will be reviewed. Diversification in coconut, pineapple and soursop will be encouraged. The Citrus Products of Belize Limited (CPBL) is investing in additional processing equipment to process the fruits.
- c. In bananas, both the Ministry of Economic Development and Ministry of Agriculture will explore options for obtaining assistance for the industry through the Green Climate Fund to make it more resilient to climate change.
- d. Across the three industries there is an urgent need to address rising costs in fertilisers and pest management products. More greener production agriculture shall be explored with the producers along with lowering costs along the value chain.

Conclusions and recommendations

- a. MAFSE should continue building relationships with producers and producer organisations with the objective of improve technological exchange, information gathering and finding alternative markets for products.
- b. The tax regime on agriculture inputs should be reviewed and zero rated. Taxes can be levied subsequently on finished product. Product diversification should also be encouraged.
- c. As previously mentioned, a disaster response mechanism should be explored and implemented.

5. Livestock

Main Achievements by Program

5.1 Beef Cattle

The major achievement of the cattle sub-sector was the successful exportation of bovines to Mexico and Guatemala. To date a total of 49,567 beef cattle were exported and has generated approximately BZE\$48 million in foreign exchange. The cattle export initiative could have not been possible without the commitment and dedication of our close allies such as BLPA, BAHA, OIRSA and the public-private partnership. The cattle Industry is of great significance to the growth and development of the Belizean Economy. According to the Belize Livestock Registry (BLR) there is a total of 5,693 cattle producers with approximately 170,000 bovines officially registered on the BLR. Many of the cattle ranchers are small farming operations with less than 50 animals per famer. Approximately 70% of the total producers or 3,985 ranchers are in this category making it a high priority in Plan Belize to develop the sector in one that is productive, competitive, and sustainable.

The socio-economic and food security benefits of supporting the cattle sector are therefore immense, directly benefiting 25,425 persons in the remote rural communities in Belize. Cattle ranching is a major farming activity that contributes significantly to reduce poverty, increase food and nutrition security. It is a major sector that helps to generates meaningful employment and actively contributing to improved livelihoods particular in vulnerable underdeveloped rural villages.

Major activities under this sector include:

- I. Amendments to the Export Protocols to make trade of cattle more efficient and cost competitive.
 - a. The days of validity of the Brucellosis test increased from 21 days to 30 days.
 - b. A second test (Cervical Comparative Test) for Tuberculosis was allowed for quarantined animals so as not to eliminate the herd on one positive screening test.
 - c. A second test was also allowed for Brucellosis (Rivanol Test) so as not to eliminate the herd on one positive screening test.
 - d. The Kakabish corral met all specification requirements and was certified by SENASICA for cattle inspection.
 - e. BAHA submitted a request for the entire country to be able to export to Mexico. All supporting documents of Tuberculosis and Brucellosis program have been forwarded to SENASICA. The Ministry awaits the technical analysis report from SENASICA with the feedback as to the status of the entire country of Belize being eligible to export Cattle to Mexico. As it is now, only Orange Walk District can export to cattle to Mexico.
- II. In the area of technology and innovation transfer a total of 90 purebred bulls were imported from Mexico and 110 embryos of Brangus, and Bradford breeds were imported from South America. This was carried out in close collaboration with BAHA to facilitate the growth and competitiveness of the industry both in production and meat quality. Central Farm and Yo

Creek Agriculture Stations will continue to provide bull rental services to small and medium cattle producers to improve their cattle herd genetics. At least 100 farmers have benefited from the bull rental program in 2021.

- III. Ten (10) heifers and one (1) young bull have been transferred to the Ministry of Agriculture substation in Elridge, Toledo District. This will be the beginning of a genetic improvement of beef cattle program in the district with the objective of providing breeding stock of high genetic value to farmers.
- IV. The Ministry of Agriculture, Food Security and Enterprise and the Belize Livestock Producers Association in collaboration with the BAHA facilitated the artificial insemination of 30 cows from the Central Farm herd on the 17th of September 2021 at Central Farm. Thereafter a theory session was carried out 3 months ago for farmers and technicians. These cows were selected and inseminated with imported semen from Champion Angus and Brahman purebred bulls from the United States of America. This activity will ensure better genetics in the breeding program at Central Farm that supports the cattle industry by providing quality-breeding animals and through bull rental.

5.2 Dairy

The dairy industry invested BZE\$2.5 million in setting up the Ultra High Temperature Machine. With this technology in place, the quality has significantly improved, and the shelf life of the product has increased significantly from 14 days to 3 months. Additionally, the Ministry of Agriculture completed a final draft of the Dairy strategy that will serve as a major tool to guide the development of the dairy sector along the value chain.

5.3 Sheep

On the 21st of November 2021, 27 Nubians, 10 Boer and 2 Kathadin were imported from the USA through Ag. World Ltd. The importation was done with the assistance of BAHA and Customs and the technical team of the project. The goal is to consistently provide improved sheep genetics to sheep producers.

For the year 2021 a total of 157 sheep were sold to sheep producers. In the area of market access a market value chain analysis and a marketing program was completed with the objective to promote consumption and market penetration for sheep and goat products. A total of 13 trainings, 4 workshops and one field day was successfully carried out along the sheep value chain.

More than 25 sheep producers directly benefited from the institutional and capacity building program. As part of the program's initiative to promote food security to the most vulnerable farmers in Cayo, 20 families recently received a total of 85 breeding sheep, which included breed varieties such as Barbados Blackbelly, Dorper and Katahdin. A new barn measuring 60'x135' was also completed to house the animals.

5.4 Swine

The Ministry of Agriculture Belize developed a national plan to mitigate African Swine Fever after it was reported in the Dominican Republic thus threatening the region. The Ministry in collaboration with BAHA began public awareness on the threat and mitigation measures to pig farmers located in major producing communities. The present inventory of pigs in the country is made up of more than 21,000 animals. More than 425 swine producers have been recorded in the 2021 swine survey conducted by the extension officers in the Ministry of Agriculture. The industry value is approximately BZE \$30 million.

5.5 Poultry

Newcastle Disease Virus (NDV) was detected on the 22nd of June 2021 in non-commercial areas of San Pedro Columbia, San Miguel, and Silver Creek. Immediate coordinated efforts however were carried out by BAHA, with the support of the Ministry of Agriculture and the Belize Poultry Association to contain the spread of the disease.

The surveillance of poultry disease is active among poultry stakeholders primarily because the industry is commercial in size, a major source of food and nutrition security, economic returns, and employer of over 2,500 Belizeans mostly in rural areas of the country. The economic contribution of the poultry sector to the Belizean economy is approximately BZE\$123 million for the year 2021.

5.6 Aquaculture

The Aquaculture Unit primarily provides technical support to farmers involved in tilapia production. The facility also sells fingerlings to farmers and shrimp farms. In the year 2021 236,159 fingerlings sold valued at \$38,409. The Unit also performed 2 training workshops. Other activities completed throughout the year were the establishment of an experimental aquaponics system in Central Farm to serve a training and sensitization system for farmers visiting the grounds. A comprehensive Value Chain Analysis document was also completed under the support of the FAO Value Chain Project.

Currently there are 103 small-scale fish farmers producing at a total water surface area of 32.29 acres. It is estimated that the 151,141 lbs. of whole gutted tilapia will be produced by small scale farmers at an estimated value of BZE\$755,705.00.

Future priorities and Plans:

- I. Intensification of livestock production through improved Management, breeding, feeding and the adoption of environmentally friendly and climate smart mitigation technologies.
- II. Strengthen the epidemiological surveillance of Tuberculosis, Brucellosis, and other important cattle diseases of socio-economic & quarantine importance.

- III. Maintain the Livestock Industry Platform to enhance communication and coordination for the sustainable development of the cattle industry.
- IV. Livestock Market research to understand new market perspectives in the region.
- V. Capacity building and Institutional strengthening of BAHA and extension to provide timely and targeted extension service along the livestock production chain.
- VI. Work closely with the Mexican competent authorities to acquire Tuberculosis and Brucellosis free status recognition for the entire country of Belize.
- VII. Negotiate the reduction or elimination of the 15% Mexican Tariff levied on Belize cattle exported to Mexico through the Partial Scope Agreement.
- VIII. Work closely with all livestock stakeholders to Facilitate Trade which is critical to allow the smooth flow of livestock goods and technical services particularly now under the Covid-19 pandemic.
- IX. Continue to promote and advocate for all livestock farmers become registered in the BLR/Traceability system and incorporate honey, poultry and sheep in the OIRSA/Trazar-Agro Traceability system
- X. Revise and harmonize livestock regulations.
- XI. Support and facilitate investment in Agro-processing and value adding in livestock products
- XII. Increase product standard certifications to access and penetrate the local tourism and regional markets.

Lesson Learnt:

- I. Timely and proper planning from the onset with all stakeholders is imperative to succeed
- II. Timely Monitoring and evaluation of the livestock development plan of work is important to adjust the plan and make it relevant to prevailing circumstances.
- III. Implementation of the livestock plan under the Covid 19 pandemic was a challenge but we learnt to innovate and still achieve the desired results by using the virtual networking capacities and current internet connectivity.
- IV. Effective Communication/reporting, Coordination, and networking with all parties involved was necessary to achieve the expected results. Public/private partnership is indispensable.

Conclusions and Recommendations:

- I. Enhance communication and coordination/networking capacities.
- II. Stronger linkage with extension is vital as they are the implementation unit.
- III. Enhance data management. Digitization of data is crucial.
- IV. Considering that the Ministry of Agriculture has performed in all areas with outstanding high marks, we should use our tangible results to convince Ministry of Finance to increase the annual budget to the Ministry of Agriculture.
- V. More support to the Agriculture Programs particularly extension. A modernized extension service with relevant tools, well equipped and reliable transportation as some of the vehicles need to be replaced.

6. Grains

Main achievements

The main objective in the grains sub-sector was to improve the competitiveness of grain and legume commodities along the value chain to satisfy increasing domestic demand, national food security and exports to generate foreign exchange earnings. All legume commodities experienced growth in acreage and production except for cowpeas which suffered significant yield losses of 33% (thirty-three) compared to 2020 because of an infestation of thrips. See Annex 1 for details.

In grains, yellow corn production grew by 41% (forty-one) from 15.29 million pounds in 2020 to 21.52 in 2021. White corn production and acreage decreased significantly by 20 and 19 percent respectively. Producers attributed decrease to increased imports of white corn flour for corn tortilla mills. Other grains saw slight reduction in acreage at the expense of increased corn acreage. Annex 2 contains production data.

#planBelize contemplated increased productivity which was achieved despite the COVID 19 pandemic. The World Bank through the Contingent Emergency Response Component (CERC) of the Climate Resilient Infrastructure Project (CRIP) financially assisted grain farmers registered in the Belize Agriculture Information Management System (BAIMS) to recover from market losses. Resulting from the successful implementation of the CERC, the World Bank recently approved the Climate Resilient Agriculture Project (CRESAP) which should assist farmers to address climate change related production challenges.

Lessons learnt

- I. The COVID 19 pandemic exacerbated the vulnerability of the agriculture sector and taught us the importance of collaboration, data collection and information sharing. The COVID 19 Response Team established by the Ministry of Agriculture was instrumental in guiding recovery efforts, determining the availability of basic grains and legumes for food security and maintaining the flow and distribution of food countrywide. Collaboration between the Ministries of Health, National Security, Transport and Agriculture secured food distribution. Farmers and processors recognized the importance of information sharing and facilitated data. All these alliances should be maintained and strengthened. This also assisted with exports. While tourism collapsed, agriculture repositioned itself as one of the most important socio-economic pillars of Belize.
- II. In terms of response to drought and floods impacts resulting from climate change, the agriculture sector and the Ministry need to have a disaster response mechanism. Collaboration with the Food and Agriculture Organization (FAO) and World Bank (WB) can assist us with the development of programmes which could be co-funded by funding agencies, the farmers, and Government of Belize.

Future priorities and plans

The grain and legume sub-sectors are continually growing. However, there are challenges which need to be resolved. The rising cost of inputs and market saturation are two fundamental issues which need attention. Alternative sources of fertilizers and pesticides should be explored. Research and development to select improved better yielding and drought resistant varieties should be implemented. Along with the Ministry of Foreign Trade additional markets should be obtained to expand production. Value adding to substitute imported products should be encouraged. A company in Spanish Lookout is contemplating investing in a corn mill. A previous one operating out of the Cayo District experienced consistency and quality issues. All these form part of the plans which the Ministry of Agriculture should consider implementing.

Conclusions and recommendations

- I. Legume and grain producers are excited about the future of their subsector. While the domestic market for some commodities in their raw form are about to become saturated, there are opportunities for value adding and exports.
- II. Closer monitoring of food availability should be continued. With additional personnel monitoring and verification of food availability stocks this can be better facilitated.

7. Horticulture

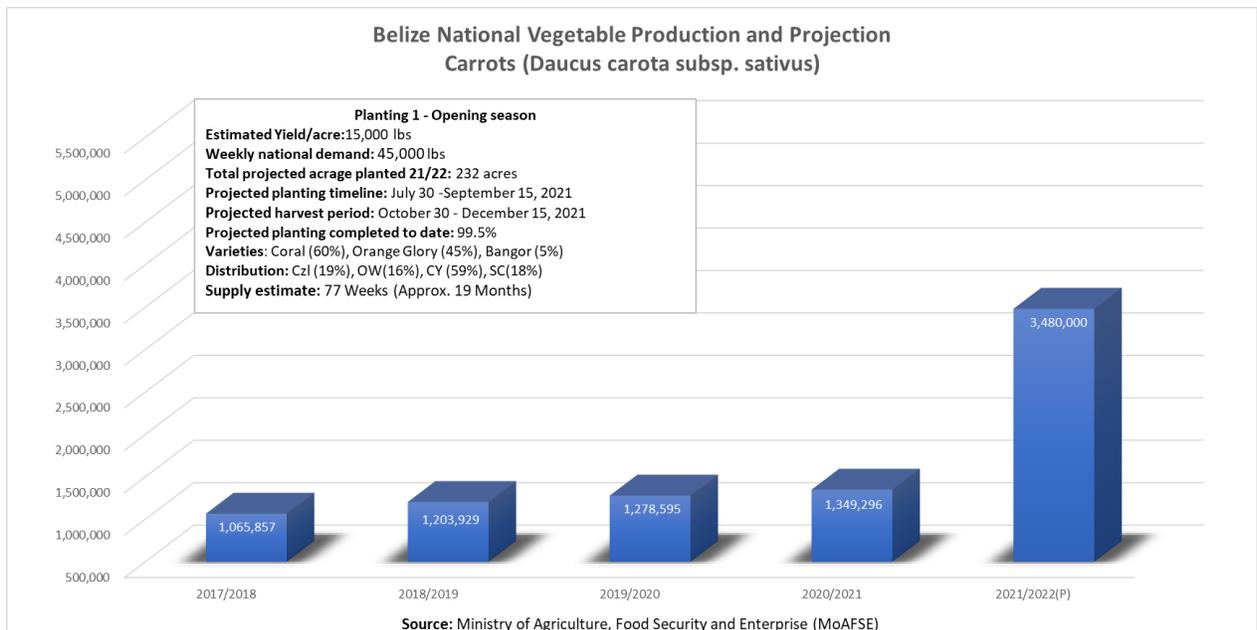
Introduction

The Horticulture Unit is a part of the Research, Development, and Innovation Centre in Central Farm.

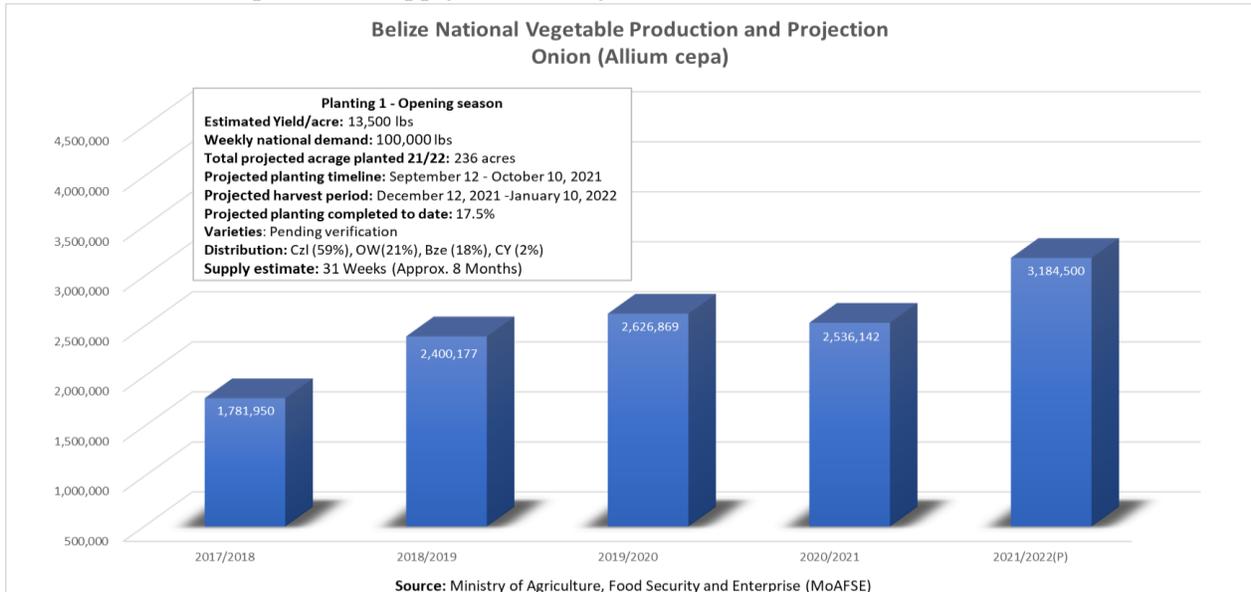
Although the Unit operates from its office in Central Farm, its responsibility is national as it provides support and work in conjunction with the National Extension Service.

Vegetable Production Overview

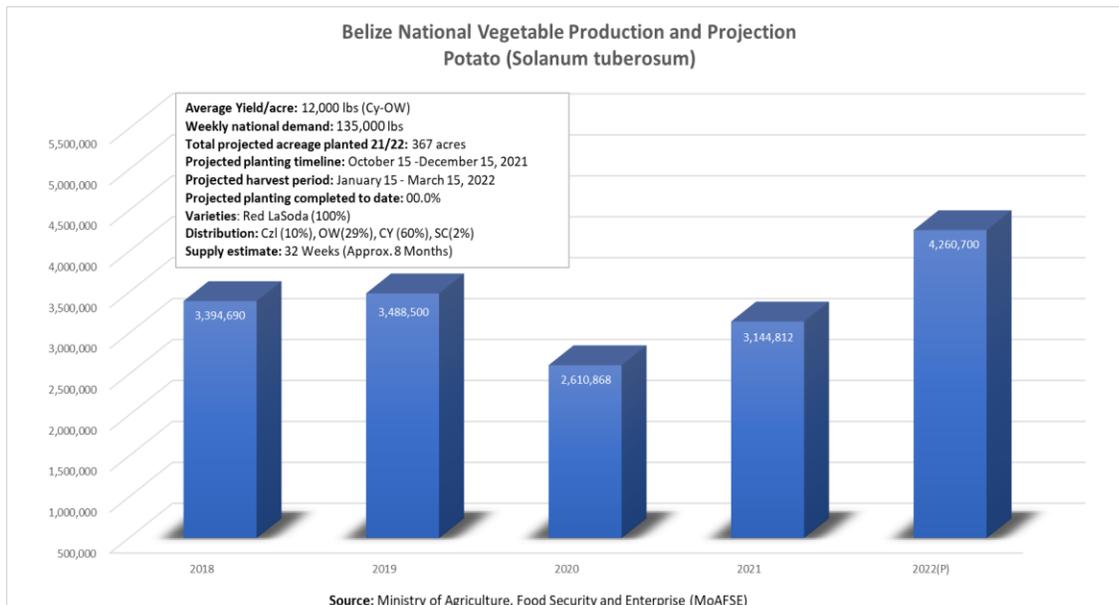
The national potato production output is expected to increase by 35% over the 2021/2022 period. Given an estimated weekly national demand of 135,000 lbs, the forecasted national production of 4,260,700 lbs is expected to provide a steady supply of quality potatoes to the country for the next 8 months. Investments in storage facilities will be critical going forward.



The 2021/2022 national onion production is expected to increase by 26% over this period. Given an estimated weekly national demand of 100,000 lbs, the forecasted national production of 3,184,500 lbs is expected to supply the country for the next 8 months.



The 2021/2022 national potato production is expected to increase by 158% during the productive year. Given an estimated weekly national demand of 45,000 lbs, the forecasted national production of 3,480,000 lbs is estimated as excess product. Efforts to process or develop alternative uses for the crop will be key to ensure producers have a suitable market for their crops.



Main

Objectives

The primary role of the Unit is to contribute to the competitiveness of the agriculture sector through the validation of innovative technologies.

Additionally, the Unit provides a range of development support such as facilitating training sessions, site visit and tours of the various sites in Central Farm and NATS, designing and construction of covered structures, assistance in irrigation and drainage, school garden development, etc.

The Horticulture Unit currently consists of five (5) sub-program areas.

- I. Protective/Covered structure
- II. Horticulture
- III. Small Scale Agriculture
- IV. Irrigation and Drainage
- V. NATS Garden

4 of the 5 sub-programs operates crop trail/evaluation, training, and demonstration sites.

Lessons learnt:

- I. The implementation of project activities over the last few months have had consistent bottlenecks created by the lack of familiarity with the stringent procurement requirements set out by the funding agencies. To become more effective in project execution, it will be critical for technical officers and coordinators to become more familiar with the rules and regulations of the various agencies when sponsor projects in Belize.
- II. With the reduced working hours, reduced budget allocation and loss of staff members, it is critical that the workload on the team be adequately evaluated, and the level of commitment made to provide support and/or service does not overly burden the team.
- III. Documentation and detail information of activities and level of support provided by the program continues to be a challenge. The ability to generate regular reports and other tracking information was supported in the past by the secretary assigned to the program. The removal of the individual with no replacement has impacted this area of our work.

Proposed /Pipeline Activities

- I. Research & Development
 - a. Program: Horticulture (Vegetables) Commodity: Potato (*Solanum tuberosum* L.)

Objective: Contribute to food security and reduce importation by identifying at least two (2) potato varieties per usage type that are high yielding and can grow well in local climate and soil conditions.

- b. Commodity: Onion (*Allium cepa* L.)
Objective: Contribute to food security and reduce importation by increasing productivity by 15% and extending Program: Horticulture (Vegetables)
 - c. Commodity: Carrots (*Daucus carota*)

Objective: Contribute to food security and reduce importation by increasing productivity by 10%.

d. Development and Innovation

Program: Horticulture (Vegetables)

Commodity: Hot Pepper (*Capsicum Chinense*)

the planting season by at least 1 month.

II. Collection & Publication of critical information

a. Covered structure

The last covered structure survey was conducted in 2012. A current survey would capitalize on information available in BAIMS to reduce the amount of time and resources necessary for the completion of the report.

b. Irrigation and Fertigation

There is no evidence that a specific irrigation and fertigation use survey has ever been done. Considering the impact on Belize with an extended dry season in 2019 and another such season predicted for this year, farmers' ability to adequately provide plant water requirement will be critical to Belizean Agriculture. This survey would capture information type of irrigation system used in the country, water source, water usage rate and conservation practices, challenges, equipment utilized and area under irrigation in Belize. The survey can perhaps be conducted simultaneously with efforts to update the covered structure national database.

Recommendations

Short term

- a. Evaluate and revamp national agriculture data collection and reporting system.
- b. Production data is currently reported mid and end of year unlike in the past where planting and harvest data was submitted monthly.
- c. New and technology strategies for data collection and reporting needs to be explored and developed. For example, given the challenges in Extension Service to cover the wide range of communities and farmers across the country to collect production data on a monthly basis, a platform should be developed to allow farmers/producers to self-report their production plans, plantings, harvestings, challenges, and losses. (i.e Mobile numbers for District officers or Stats Unit where farmers/producers can call-in, text-in, or use WhatsApp to share information). This data can be aggregated, and fields monitored for production forecasting and planning. Production system assessment for priority crops.
- d. Develop and support an multi agency contraband suppression strategy.
- e. Embark on an aggressive and nationwide "buy + Eat local" campaign.
- f. Promote Protected Agriculture Initiatives
- g. Conduct assessment on the number of structures countrywide and current user rate (The last Covered Structure survey was 2015). Promote the calendarization and diversification of production among operators of the structure.

- h. Promote of Home/Backyard/School gardening.
- i. Nationwide meeting/consultation with farmers and producers.
- j. Increase Visibility and Communication of the work of the unit.
- k. Production planning/Calendarization of priority and high import commodities

Medium Term

- l. Propose & design high impact/Wide coverage/Collective Community Benefit projects for major farmer organizations/Farming clusters/Agro productive regions

Some examples	Target groups
Macro Irrigation systems	Maskall/Bomba area San Carlos Valley of Peace San Antonio Etc.
Water Catchment System	
Centralized Seedling Production Units	
Storage/Post Harvest Mgmt System	
Transportation & Distribution	
Roads/Farm access	

- m. Engagement of private sector investors to establish buying/receiving centers and even storage for fresh produce.
- n. Promote the development and strengthening of farmer organization

8. Agro-Processing

The main goal of the Agro-processing multi-service facility in Central Farm is to provide training and technical assistance for the creation and expansion of small and medium sized Agro-processing enterprises. The unit also focuses on product research and development for the transformation of local produce into value-added agricultural products and the transfer of technology for agri-business development to improve income generation and food security.

Main Achievements of Agro-processing unit:

- I. The unit builds capacity of those interested in agro-processing techniques and methods:
 - a. The Unit conducted 2 capacity building trainings to 11 producers from the San Antonio Women’s Cooperative in the production of cassava flour to be used in the production of baked goods.

- b. The Unit also trained a Cooperative Officer and 12 members of the Hopkins Farmers Association in the production of cassava, banana, peanut, sesame seed to produce a cereal mix that can be used as a replacement for imported oats.
- c. Supported small farmers in southern Belize with the development of Banana, Habanero Pepper sauce, labels following labelling standards of the Belize Bureau of Standards.
- d. Five members of the Selena Rancho Paraiso received technical support in the production of Jugo de Maracoya. Information was shared by the processor on the potential of passionfruit to be used as a form of pectin in fruit jams.
- e. The Truly Turmeric team received technical training in the production of Yellow Ginger Powder. The entire process flow for turmeric was demonstrated to her and her team as part of capacity building and information sharing.
- f. Benque House of Culture and NICH, women building women initiative, product development training to 8 females of Benque Viejo town in production of Salsa Casera.
- g. Nine members of the Asharra Land Farm of San Antonio Village were also trained in product development in the processing of coconut oil, utilization of by-products of the coconut in the processing of coconut oil.



Training of the San Antonio Women's Cooperation



Training of the Hopkins Farmers Association



Training of the Dangriga Urban Farmers



Training of the Truly Turmeric business

II. The Unit also introduces tools and machinery to increase the productivity of small-scale producers.

- a. Tools and machinery developed to increase the efficiency of coconut oil processing. Below from left to right are, coconut husker made from spring blade of a vehicle as the shaft and a disc from a plough as the base. The tip of the spring blade is sharpened to pierce the coconut husk. Previously this process was done using sharp machete and was risky and time consuming.
- b. Second photo is that of a shop press that was purchased from Farmers Trading Center in Spanish Lookout. The shop press has been modified to accommodate a small stainless steel square holding chamber in which shredded coconut is placed for coconut milk to extraction. Previously, milk extraction was done manually using bare hands as the pressing tool.
- c. Third photo is the coconut copra extractor (coconut grater, coconut grinder, coconut grinder), this machine was developed out of the necessity to reduce the time required for the extraction of coconut copra from mature nuts. The machine uses the motor of a twin tube washing machine, modified with a coconut shredder attached to the shaft of the motor.



The motor chosen for this initiative has the appropriate revolutions per minute that is safe for both males and females to operate.

- d. Utilization of solar Energy to dehydrate local fruits, vegetables, and root crops. Chimney solar dryer design was obtained from University of California, Davis. The construction of the Chimney Solar dryer was done by Central Farm Carpentry section. Site selection was conducted by the processing assistants. The area selected allows for maximum use of solar energy for dehydration of fruits and vegetables. The area was prepared using pieces of pond liner obtained from aquaculture unit to prevent grass from growing through the stones/chippings that were placed on top of the liner. The objective of this activity is to replicate to best the conditions small processors are facing, lack of financing to construct a concrete floor to support the solar structure.

Lessons Learnt:

- I. Closer collaboration with the unit, extension, cooperative, BBS, BAHA, public health, BMDC needs to improve to increase the number of processors who access the services of the unit as well as capacity building needs.
- II. As a result of the pandemic, the importance of food safety was heightened, wearing protective gears, face mask, etc. this allowed for processors to examine their processing techniques ensure that food safety protocols were adhered to.
- III. It is very important to collect data on processors as institutions who assist processors can have a central database from which they can contact processors when markets are identified.
- IV. Very few persons know of the existence of the unit, increased awareness of the unit is important as it will allow for entrepreneurs and processors to know that there is a facility that can assist them in product development and enhancement.
- V. Train the processing unit in the production system of all commodities supported by the Ministry for officers to have greater understanding of post management practices done at the field.

Future Priorities and Plans:

- I. To enhance the collaboration between our partners for development to be able to access a wider portion of the population. BBS to build capacity in labelling and labelling standards, BMDC to build capacity in marketing and market information, BAHA to build capacity in food safety within processing facilities, Public Health to certify processors with a food handlers permit that will allow them to perform product development activities.
- II. Include more women and youths in capacity building trainings such as product development, product enhancement. Working along with the Women's Department to engage more women in value addition of locally grown produce. Further engage the Youth Department and technical schools as it pertains to development of machines, increasing efficiency of certain processing steps. Example development of coconut grinder, coconut de-husker, coconut shredder. These ideas will be shared to the vocational schools to get the students to create and develop tools to improve the efficient of processing activities.
- III. Increase the sales of Baking Pot Foods by supplying consistent and affordable products in the shop located in Central Farm. With the installation of a small building in front the Cayo extension service office in Central Farm the unit will be able to better market their product and obtain market feedback directly from purchases. This feedback will allow for improvement of the product and will serve as a guide that the unit will use to assist the processors.
- IV. Improve the facility to accommodate bulk processing such as dehydration. Infrastructure improvement to allow for dehydration to occur in large quantities without hampering the use of the facility for training or tours when dehydration is ongoing.

Conclusion and Recommendations:

- I. It is recommended for the Ministry to invest in providing processors needed for bulk processing such as de-seeding, dehydration, and grounding in all the districts to allow for bulk processing to occur. Equipping the agriculture stations with a small processing area containing machines for bulk de-seeding will allow for decreased number of wasted seasonal fruits such

as mangoes, papayas, sour sap, passionfruit, just to name a few and provide livelihoods for those in the community.

- II. Due to increased cost of fuel the small processors are faced with a significant challenge of continuing business with this increase. Recommendation is to identify key players in the value chain that can assist the small processors to continue business. Example, a significant increase in advertisement of Belizeans products on the radio, television, social media. Have a giveaway/contest to those households that have the most locally manufactured products in their homes such as coconut oil, local soap, local detergent, local insect repellent, local jams, local juices, local salsa, local meats just to name a few. Increased awareness of locally manufactured products will allow for the public to be made aware of a substitute product that is produced locally.

9. Water Management, Climate Change and Project Unit

Under the thematic areas of Water Management & Climate Change and Project Unit the Ministry is implementing the following activity:

- I. **The Climate Resilient Sustainable Agriculture Project (CRESAP)** is a 5-year USD 25M project funded through the World Bank and the Government of Belize.

The project main objectives are to (i) increase agricultural productivity and the adoption of climate-smart agricultural approaches among project beneficiaries; and (ii) respond effectively to an Eligible Crisis or Emergency event. The Project will provide support to agricultural producers, with a particular emphasis on individual smallholder farmers who are transitioning to more commercial production. The Project aims to benefit an estimated 7,300 beneficiaries directly.

The Project has 3 main components:

Component 1: Institutional Strengthening-This component focuses on strengthening the capacity of key public institutions (government agencies and academic organizations) to support a more productive and sustainable agricultural sector.

Component 2: Investments in Climate-Smart Agriculture

- a. Strengthening the capacity of PFIs, individual farmers and farmer organizations participating in the CRESAP matching grants program in support of CSA investments.
- b. Promotion of CSA technologies and practices via matching grants and leveraging of private capital
- c. Provision of selected strategic collective assets to strengthen resilience.

The project was approved by the World Bank Board of Directors on March 14th, 2022, and the project is expected to start by September of this 2022.

Component 3: Project Management, Monitoring and Evaluation
Component 4: Contingent Emergency Response Component

ii. Caricom Development Fund- Honey production redevelopment support project USD 281959.00

In December 2019 Caribbean Development Fund/ GOB Bee Keeping Project was launched.

Project Objectives:

- Increase rural livelihood opportunities through beekeeping in farming communities especially among women and youth.
- Increase national honey production.
- Increase the quality of honey and honey products through the promotion of standards and good manufacturing practices.

Notable Accomplishments:

There 100 farmers were selected for this program. Basic trainings in Bee keeping management were held in all six districts. Those who successfully completed the program (91) were placed in a mentorship support program with more experienced beekeepers. The new beekeepers were provided with suits, veils, gloves and hive tools. Apart from the capacity building to new and existing beekeepers, the project successfully completed a demonstration apiaries and flower multiplication plot. The project has completed 80% of its activities and is expected to complete the additional activities by the end of 2022. Pending activities includes the continued distribution of Starter Colonies (Belize, Cayo and Tol), continued distribution of supers and frames (Belize, Cayo and Tol), Graduation (North and Central), Advanced trainings, Signing of MOU, Closing ceremony of the program.

III. Support to The Rural Resilient Belize (RRB) Project USD 20M

The programme's Goal is to address climate change at the smallholder farm level, expanding resilient production systems and improving the livelihoods and food security of poor rural households. The programme aims to increase the economic, social, and environmental resilience of small farmers, creating the conditions for sustainable market access for their products, improving incomes and livelihoods.

The direct beneficiary to the project is 6,000 household and they will be getting CSA technical assistance, investments through matching grant fund, assistance through backyard gardening, organizational strengthening, market access support and public infrastructure investments. Since December 2021 the MAFSE along with other line ministries have reviewed and evaluated approximately 40 business plans which will be developed in to fully funded matching grant proposals that will support producers' organizations. The plans include activities such as water climate resilient activities such irrigation for producers' organization, water harvesting and water source, improved seed technologies, capacity building for farmers organization, cover structures,

cool storages etc. As of today approximately 5 matching grant agreements have been signed with producers organizations and project implementation is under way.

IV. Japan International Cooperation Agency (JICA) -Follow- up Cooperation on for Training on the Development of Agriculture Cooperative and Improvement of Management Capacity. USD 75.000

Project Objectives:

Improve the capacity of farmers organization/groups on post-harvest management of agricultural products of potatoes and onions.

As a pilot project, 4 forty storage containers were retrofitted as cool storages and distributed to farmer organizations in four districts. The cool storage facilities have a holding capacity of approximately 100,000 lbs of potatoes/ onions. Approximately 50 farmers were trained in post-harvest management of onion and potatoes in addition to management of the 4 cool storages. The ministry will be working closely with other institutions and organization to expand storage facilities throughout the country as storage is a major challenge in the agriculture sector. The ministry expects that with adequate storage capacity we would be able to minimize importation of both onions and potatoes in the long term.

V. Support Livestock Coordinator

In keeping with the thematic area of building famers resiliency to climate change. The livestock section provided several trainings, one of which was pasture management and maintenance. The objective of the training was to disseminate best practices and intensive climate-smart production technologies to cattle farmers, aimed at increasing their productivity and reducing vulnerability to climate change. Topics covered were pasture establishment and management, supplemental feeding, forage utilization and Climate Smart Agriculture practices.

VI. School Gardens/Back yard Urban Gardening and support to Rural Farmers.

Approximately 70 individuals (Farmers, students and potential farmers) were given training in back yard, urban gardening, plant management under cover structures. Beneficiaries were from the Toledo, Stann Creek and Orange Walk district. Beneficiaries were being trained in seed sowing and setting, vegetable seed care and management. Farmer were provided with seedlings and small machines while urban garden groups and schools were provided with cover structures seed nurseries and seedlings.

VII. Global Environmental Fund 6 (GEF6) Total Budget including Co-financing (\$24.8million)

The Ministry of Agriculture is working closely with the Ministry of Sustainable Development, Climate Change and Disaster Risk Management to implement a 5-year project entitled Integrated Management of Production Landscapes to Deliver Multiple Global Environmental Benefits. The objective of the project is to mainstream biodiversity conservation and sustainable land/water

management into production landscapes in Belize. The project will use integrated landscape/watershed approach that will allow combining sustainable production of key agricultural and forest products and conservation practices in productive landscapes. The project is to be implemented across the extended Belize River Watershed which is the largest watershed in the country and one of the most heavily used. The MAFSE will support all the various outcome under this project but are primarily focused on:

Outcome 2.2 Increased area of agriculture and forest production under sustainable practices.
Outcome 2.3 Accessible markets for producers implementing sustainable practices.

VIII. Sembrando Vida Project: USD 2M

The Sembrando Vida Project is a regional initiative funded by the Government of Mexico, through dialogue with our Mexican counterpart the Prime Minister of Belize and the Minister of Agriculture, the Sembrando Vida project has been extended to Belize. The program seeks to address two problems: rural poverty and environmental degradation. The project is estimated at over BZ\$ 4 million and will assist over 2000 farmers. Farmers engaged in the program will be given packages of seeds (vegetable, fruit trees, grains, timber) and will be provided with technical assistance. Farmers will also be given a stipend of Bz 500.00 per month to assist them as a means of bridging the gap while the short-term crops are growing.

IX. Food and Agriculture Organization (FAO) Technical Cooperation Program (TCP) USD 225,000.00

The Ministry of Agriculture in collaboration with the FAO has embarked on several activities under the Technical Cooperation Program (TCP) 2022-2025. The current allocation is USD 225,000.00 with however the current allocation can be increase.

Some initiative under the TCP includes

- I.** The development of a national Seed policy to promote, guide, develop and regulate the seed subsector to ensure availability and access to safe and high-quality seed to stakeholders for increased food and nutrition security and income generation.

The outcomes are:

- a. Improved availability and access of all farmers to improved quantity and quality of seed and planting material in cooperation and through collaboration with public and private stakeholders in the seed industry.
- b. Improved efficiency and competitiveness of the agricultural sector through significant increases in food crop productivity, with consequent enhancement of its food security goals, improvement of per capita farm income, export earnings and the social and healthy wellbeing of the population.

II. Agriculture Crop Diversification-Regional Market Access Strategy

- III.** Efforts to diversify the agriculture product base have led to the selection and investment in a small subset of non-traditional priority commodities. Efforts for climate resilience and enhancement of commodity value chains are faced with challenges to provide sustainable market access for rural small farmers. Local market opportunities are limited and are often

saturated by slight increases in production which translate into losses for the small producers. Export market penetration requires defined market assessment to identify viable market opportunities and a strategy to provide sustainable market access to the region.

The outcomes are:

- a. Reduced poverty and hunger through increased regional agricultural trade as a means for income generation opportunities and strengthened food security
- b. Enhanced capacity of the Trade Negotiating Team to engage in effective and results-based negotiations for regional Agriculture trade (Latin America).
- c. Improved institutional trade policy framework for Agriculture and enhanced networking, communication and information sharing between Ministry for Agriculture, Ministry for Trade and Ministry for Foreign Affairs to improve access to regional agricultural trade opportunities.
- d. Increased regional market opportunities for non-traditional priority crops

IV. National Agriculture Policy- Build on plan Belize and strengthen the agriculture sector

- a. An agricultural and food sector with a governance environment that is conducive to increasing production and productivity, promoting innovation, investment, application of new technologies, diversification, food and nutrition security and encourages private sector involvement in agribusiness enterprises in a manner that ensures competitiveness, quality production, export market development, trade, and sustainability.

V. Digital Agriculture extension E Extension-The ministry sees the need to update and modernize its extension service and farmers outreach and as such, to complement the Belize Agriculture Information Management System (BAIMS), e extension will become a tool through which farmers or other extension actors share, access or discuss agricultural information or knowledge.

Lessons learnt

- a. Projects are time bound and as such the project management team should be cognizant of project timeline and project activities to make sure that projects are completed within its timeframe to avoid asking for extension. Project implementation activities should be constantly reviewed to ensure that challenges are pointed out early and addressed accordingly.
- b. Project management team should ensure that technical officers provide the procurement officers with the specification for procuring good and services on time to avoid project delays.
- c. Technical officers should be timely in submitting reports and highlights to keep their supervisors are kept abreast with ongoing activities out districts.
- d. Whenever the project team is in the project development phase, it is important to keep constant dialogue with all stakeholders to be affected by the project activities as project buy in by stakeholders will facilitate implementation.
- e. Technical officers should thoroughly review project document so that they are aware of project timelines, implementation and activities in order for them to plan accordingly.
- f. Strengthen the monitoring and evaluation process within our ministry

Future priorities and plans

- a. Keep working closely with our partners in development to seek innovative ways for making the agriculture sector more resilient to climate change.
- b. Continue dialogue with national and regional counterparts to develop a plan that will shed light on operationalizing agriculture insurance.
- c. Ensure that programs and plan under the PEU are properly executed so that the overall objectives of the project and that the beneficiaries are positively impacted by the results of the project.
- d. As the MAFSE seeks support from partners in development/multilateral institutions and other allies to strengthen the agriculture sector it is our plan to continue building capacity within the PEU and dialogue to increase personnel to ensure that plans and project are drafted, finalized, consulted on, and executed at its earliest.
- e. Ensure that activities for increasing productivity, storages, sustainable land practices, improve livelihood etc. under both CRESAP, GEF 6 and the Sembrando Vida project are properly implemented so that objectives of climate resiliency, food security and poverty reduction are met. The projects are in line with plan Belize policy priority 1,5,6,8,9 and 10.
- f. CDF-USD118,356.50 Cover structure project will be implemented, and beneficiaries will be receiving their structures this coming year.

Conclusions and recommendations

Strengths	Weakness	Desirable Changes
Qualified and experience staff in PEU	Understaffed	Increase staff
Good collaboration with development partners, local financial institutions and international financial institutions, regional bodies such as Sistema de Integracion Centro Americana (SICA)		

10. Research and Development

Main achievements

The technical arm of the Ministry consists of four national programs - Livestock, Grains and Traditional Commodities, Vegetable and Root Crops, and Non-traditional Fruit trees. These support, and are supported by, both the Research and Development (R&D) Program and the National Extension Service. The Ministry's organogram reflects the key role of both research and extension – the former generates information via relevant and adaptive research and the latter, through its district offices, disseminates that information while also providing feedback on research needs for sustained development of the sector.

The program has its roots at the Research, Development, and Innovation Center (RDIC) at Central Farm whose development and actions are guided by the following statements and values:

Vision

To be the research and development center of excellence that is innovative, relevant and responsive to the emerging issues, challenges and opportunities in agriculture.

Mission

To continue conducting relevant adaptive/on-farm research, validating technologies, promoting innovative techniques and methodologies, and providing developmental services that increases the competitiveness of producers while enhancing sustainable agriculture.

Values

Integrity; Hard work; Professionalism; Teamwork; Dedication; Positive attitude, Equity

The Research, Development and Innovation Center provides a space for knowledge generation and transfer in varied thematic areas, including crops and livestock. At the same time the center providing key services to the agriculture community.

a. Tilapia Hatchery

Provide a steady supply of quality, sex-reversed tilapia fingerlings to aquaculture producers, and to provide technical support through its Extension Service.

b. Open field and Protected Structure Vegetable

Research and demonstration of vegetable crops under Protective Covered Structures and open field conditions. Support to districts in urban/backyard gardening, technical assistance with irrigation and drainage. The unit has small machinery and equipment for small scale agriculture, facility for the production of soil amendments and healthy seedlings.

c. Crops and Fruit Tree

The main focus is to supply quality germplasm of corn and beans, and fruit trees including hybrid coconut, grafted fruit trees and upkeep of a germplasm

bank. Also provides technical support to fruit tree farmers on best practices and recommendations.

d. Livestock

The main focus is the supply of beef cattle breeding stock. With the assistance of ROC Taiwan, the Ministry has established a Sheep and Goat Breeding Program with relevant facilities (AI, ET, barns, improved pastures, etc.) that will supply quality breeding stock to producers.

e. Agro-processing

This facility has a variety of equipment for the preparation and processing of agricultural commodities. It engages in product development and evaluation, capacity of building of agro-processors and interested entrepreneurs in agro-processing.

f. Mechanical and Engineering Support

The mechanization subunit provides tractor services including bush-hogging, plowing, harrowing, trailer hauling, vehicle and tractor maintenance and repairs among other services. Furthermore, this section assists with carpentry, masonry, plumbing, welding, and landscaping needs to the entire RDIC grounds.

Main Achievements

Activities	Planned	Executed	Progress	Observations/results
Evaluation of Open Pollinated Varieties in protected structure and open field in Central Farm	3	1	Ongoing	Evaluations were conducted in protected structures (Bel tunnel and Tai Tunnel) and only for sweet pepper. Two open pollinated sweet peeper varieties were evaluated against a know hybrid and observed for yield and adaptability. This project is still ongoing.
Establish field trials with the University of Belize	4	2	Completed	The RDIC supported research initiatives led by students and supervised by the MAFSE Research Coordinator. Due to the lingering COVID 19 restrictions with regards to on site teaching only two trials were supported. These focused on measuring the effect of lombricompost as a fertilizer substitute to produce lettuce and cilantro. Both trials showed the yield advantage of replacing a percent of synthetic fertilizers with this

				amendment and will result beneficial for farmers considering the increased cost of N-based fertilizers.
Evaluation of 51 bio-fortified bean lines	3	2	Ongoing	<p>The trial was established in December 2021 by CARDI at the Central Farm Station, EO Marvin Blades in Stann Creek and EO Federico Chi in Orange Walk, with funding and technical support from the MAFSE, technical expert guidance from CIAT. This is the third Observation Yield Trial established in country and the results of this trial will determine the selection of varieties for a commercial yield trial.</p> <p>Only two locations were successful with collection of yield data since the Orange Walk trial was lost due to interference with livestock.</p>
Best practices in potato pre-harvest	1	1	90%	The post-harvest quality of potatoes begins with the field practices that support adequate curing of the tubers prior to harvest. Farmers do not practice advanced curing methods such as desiccation. A field evaluation was done in Barton Creek to observe whether trimming or desiccating with a herbicide would result favorable for post-harvest quality. Harvest data showed no significant difference in weight but did highlight a high percentage of discarded tubers was due to cracking as a result of fluctuations in water availability. Data collection of tubers per treatment under cold storage is still ongoing.
Observation trial of two white potato varieties	1	1	90%	Two imported white potato varieties (Gold Rush and Langlade) were evaluated in Springfield and La Gracia in Cayo and San Carlos in Orange Walk District. These varieties were grown using conventional farming practices and alongside the commercial variety Red Lasoda.

				<p>These trials were farmer led, and the varieties proved adaptable to local growing conditions and practices. Preliminary value adding processes proved Langlade to be the most adequate for fries while GoldRush is best for chips and mashed potatoes. From a yield perspective, this season was not a favourable year for yield comparison considering severe losses in Red LaSoda variety due to diseased seeds.</p> <p>The storage potential, under refrigerated temperature, of these varieties is still being evaluated.</p>
Capacity building in the area of harvest and post-harvest management for onion and potato	12 trainings – 4 districts	12 - 4	100%	The program supported the JICA cold storage project with planning, preparing of training materials and the delivery of training to onion and potato farmers in Corozal, Orange Walk, Belize and Cayo District. The farmers (70) received training on pre and post-harvest best practices and management of commodities under cold storage.
Preservation of Germplasm	3 collections	3 collections	100%	The program continued the preservation and maintenance of germplasm collections of fruit tree (coconut, mango, citrus, pitahaya), root crops (cassava, yampie, coco yam, dasheen) and traditional crops (Chaya).
Income generation	\$200,000	\$243,601.50	+43,601.50	The RDIC through its different sections provides services and products for sale to the farming community and general public. In 2021, revenue generation exceeded the estimate considerably and is mostly attributed to the sale of cattle genetics. This is a direct reflection of the efforts being placed in ensuring a steady supply of quality breeding material. [See Annex 1]

A. Lessons learnt

- Priority setting is at the core of proper planning and strategizing to achieve common goals and maximize available funds. There is an increased demand for enhanced individual, team and stakeholder partnership capabilities to help address the agriculture R&D needs of this country and for R&D to remain relevant, effective and efficient. The MAFSE has moved in positive strides towards targeting the priorities of the sector and, after 2021's increased demand for R&D actions, alternative modes of interactive partnerships need to be explored.
- The R&D program is still challenged with not having enough technical personnel to lead thematic areas and not enough capital for sustained long-term projects. National programs are not aligned with long-term priority setting and follow a reactive work plan that does not align or engage in R&D; this needs to be addressed for R&D to be strengthened institutionally.
- Timely submission of fund request enabled much work to be achieved but this needs to be done at the onset of the fiscal year rather than the end of first quarter as was done in 2021. This will allow the program to properly schedule the work on station.

B. Future priorities and plans

The objective of R&I should be the conceptualization, development, planning, and implementation of crop and livestock research designed to provide the technologies and production systems that will improve competitiveness, expand export capacity, and enhance food security. Now more than ever, effective research is a must; the COVID 19 pandemic has highlighted the need for a strong and diverse agriculture system that can respond to drastic and unexpected changes.

We've seen a high demand and motivation for sustainable food systems that include a farm to fork approach; furthermore, disruptions in transportation logistics highlight the need for locally available farm inputs such as natural pesticides and amendments. Agriculture producers will need to modify their management systems to include less dependence on external inputs that would cut down their production costs. The Ministry must prioritize the development of regenerative local food systems and support local production and manufacturing of food-based products.

Proposed area of work

Description/Specification	Justification	Deliverables/outputs/Targets
<p>Enhance research and extension services capabilities, especially with regard to identifying and supporting productivity in crops and livestock production, the cultivation of non-traditional crops, and new agro-processing activities, through the adoption of new technologies.</p>	<p>The R&I program has ventured into key collaborative activities with INIFAP, CARDI, IICA, CIAT (as international agencies) and various tertiary level institutions for the execution of research activities. We are required to support these ventures via in-kind contribution which translate into supporting certain procurement of materials, support national capacity building exercises and promotion of field activities via field days/open days.</p>	<ol style="list-style-type: none"> 1. Research in priority crops and thematic areas undertaken through collaboration with regional entities (NGO, academia, International research organizations etc). 2. Increase/enhance knowledge and skills of technical personnel through capacity building.
<p>A reinvigorated research and development center supporting the development of the agriculture sector through the validation of adoptive technologies.</p>	<p>The objective of RDIC includes the conceptualization, development, planning, and implementation of crop and livestock research designed to provide the technologies and production systems that will improve competitiveness, expand export capacity, and enhance food security. Now more than ever, effective research is a must; the COVID 19 pandemic has highlighted the need for a strong and diverse agriculture system that can respond to drastic and unexpected changes.</p>	<ol style="list-style-type: none"> 1. A research and development plan for the center describing the prioritized interventions for research in priority crops and thematic areas. 2. Technical staff able to conduct on station and on farm research. 3. By extension, support research projects at the three district agriculture stations including on farm trials, (Orange Walk, Stann Creek, and Toledo)
<p>Enhance research and extension services capabilities, especially with regard to identifying and supporting livestock production, the cultivation of non-traditional crops, and new agro-processing activities.</p>	<p>The results of on the ground research, demonstration and evaluations are valuable when they are able to reach the actual users of the information. Having access to research results, in a user-friendly mode will have a positive impact on the adoption of technology and</p>	<ol style="list-style-type: none"> 1. Production of video manuals in selected commodities/ production systems 2. Support the process of transfer and adoption of technology within the farming community. 3. Compilation of research and

	use of data for better decision making. Furthermore, it is important to document the work that is carried out at the different research stations for prosperity and as an M&E tool.	demonstration projects executed by the MAFSE
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Key Performance Indicators

Expected Results: Increase the productivity of farmers by 5% through the adaptation and promotion of technology, innovation, research and development.

Alignment with *#planBelize*: Economic Transformation and Growth, trade deficit reduction, poverty reduction

Indicator	Level at present	2022	2023	2024
Increase in vegetable demonstration plots	3	6	8	10
Number of livestock evaluations carried out	0	1	2	3
Number of revised crop and animal information sheets produced by national programs	0	4	6	6
Number of research evaluation reports revised and approved	1	6	8	10
Number of evaluation/validation plots established in priority crops	2	6	6	12
Number of trainings plans developed and executed for extension officers	0	5	5	5
Number of manuals and/or informative material produced by R&D on priority commodities	0	3	3	5
Number of meetings/forums held with national R&D stakeholders	0	1	1	2
Number of improved varieties of varied crops validated prior to	0	2	3	3

introduction into the agro-production stream				
Number of technical entries into R&D national database	0	6	6	15
Increase by 10% in overall income generated from technology transfer and services in Central Farm	\$ 240,000.00	\$ 253,000.00	\$ 278,300.00	\$ 306,130.00
Number trainees adopting skills and techniques in agro-processing to improve enterprises		10	10	20

C. Conclusions and recommendations

- a. Consideration should be given to restructure and formalize the research arm of the Ministry. An effective research program requires dedicated and full time staff that have an appreciation for the scientific approach and understand the important role that research plays in the development of and adoption of technology. At the moment, the Ministry does not have a team dedicated and tasked to conduct research as their main duty and this hinders how much can be planned and achieved.
- b. Each national program needs to have a realistic work plan for their interventions at the district level, preferably at the agriculture stations. This will ensure that they are in fact conducting work at the national level. The work conducted at the stations need to be jointly led by the respective DAC's and the Program Coordinators.
- c. Each national program should aim at generating at least one research oriented per work year. These activities should not be limited to field trials but also include the systematization of their activities (record keeping, SOPs, reporting etc.)
- d. The national programs need technical and administrative support if they are expected to conduct duties at the national level. The Crops program, for example, consists of one technical officer and a program coordinator. I strongly recommend that an additional technical officer be assigned to this program to carry out the work related to validation of legume and grain varieties in addition to other related work.
- e. The national programs each need to have a vision and mission vetted by the ministry that will guide their work. Some programs have both statements but these need to be in line with the strategic goal of the ministry.

11.

11. Cooperatives Department

Strategic Objective: Regulatory Oversight of and Technical & Administrative Support to Industrial, Artisanal and Service Producers' Co-operatives.

Mission: To conduct regulatory services that conform to established standards and provide dynamic and proficient entrepreneurial development programs that are responsive to the increasing human resource, financial, and technical needs of the co-operative sector in Belize.

Vision: Empowering people through the transfer of knowledge, the promotion of collective participation, and the furtherance of self-sufficiency for the socio-economic development of Belize.

Main Achievements of Program

- I. Registered three new co-operatives.
 - a. Valley of Peace Lagoon Farmers Co-operative, Cayo
 - b. Bomba United Farmers Co-operative , Belize
 - c. Toledo Coconut Growers Co-operative of Dump Community, Toledo
- II. Audited eleven co-operatives.
- III. Training programs for co-operatives were conducted countrywide as follows: two on the benefits of organization for small scale producers and service providers; six on co-operative administration and management; four on the conduct of meetings and minutes taking; and two on introduction to finance and accounting procedures in a co-operative enterprise.
- IV. Facilitated six exchange visits where co-operatives shared information on best practices and established communication channels.

Name of Cooperative	New Registered coops	Audited	Trained on these topics			
			Benefits of Coops	Coop Admin & Managemen	Conduct of meetings	Fin and Accounting
Bomba United Farmers Co-operative		X	X	X	X	X
Cayo Quality Honey Producers Co-operative	X					
Concepcion Vegetable Farmers Co-operative		X	X	X	X	X
First Stop Taxi Co-operative	X					
Golden Crops Co-operative	X					
Maskall Farmers Co-operative	X					
Maya Fresh Water Co-operative	X					
National Fishermen Co-operative	X					
Northern Fishermen Co-operative	X					
Northern Sustainable Agro-Producers Co-operative		X	X	X	X	X

Orange Walk Beekeepers Co-operative		X	X	X	X	X
Placencia Producers Co-operative	X					
Placencia Tour Guides Co-operative	X					
Productores Bromelia Co-operative	X					
Servicios Varios del Desarrollo Co-operative	X					
Toledo Coconut Growers Co-operative		X	X	X	X	X
Valley of Peace Lagoon Farmers Co-operative		X	X	X	X	X

Figure 1. Matrix of services to co-operatives by Co-operatives Department

- V. Furthered development and enhancement of the staff manual and undertook a comprehensive revision and remake of the co-operative registration and capacity building curriculum.
- VI. Provided support to the Resilient Rural Belize (RRB) project by facilitating twenty-three capacity building workshops for eleven farmer organizations.
- VII. Provided support to the Belize Spiny Lobster Fisheries Improvement Project by participation on the oversight committee.
- VIII. Along with Belize Enterprise for Sustainable Technology (BEST), drafted and was approved by UNDP GEF- Small Grants program, a project entitled Cooperatives' Rapid Response to COVID19 and the 2020 Floods in Belize. Eleven (11) co-operatives are beneficiaries of this project.
- IX. Provided support to the Japan International Cooperation Agency (JICA) Cold Storage Units for Agriculture Co-operatives.

Lessons Learnt

Successes

- I. Interest in and comprehension of the capacity building programs to stakeholders was higher than anticipated.
- II. Bundled procurement of material resources resulted in some cost savings and more ready availability of materials.
- III. By using a consolidation methodology, a higher number of activities were undertaken despite the reduced budget.

Potential Improvements

- I. The utilization of project management methodology would have minimized delays and possibly made more efficient use of resources (material and human).
- II. There is insufficient staff to meet the increasing demand for the program's services.

Future Priorities and Plans

- I. Advance good governance practices and elevate member/owner participation within co-operative and other collective enterprises to heightened levels by: 1. Gathering, collating, and disseminating information about modern business best practices (international as well as local); 2. Exposing bad practices while developing tools and techniques to improve or eliminate them; 3. Examining and challenging existing practices of co-operative or collective enterprise democracy and formulating trials and evaluation of alternative approaches.
- II. Mentor co-operative and other collective enterprises toward sustainability by: 1. Ensuring that members/owners are trained on their rights/obligations and on modern business practices and principles; 2. Ensuring that they, through diversification or otherwise, engage in concerted efforts to ensure that they continue to identify economic opportunities for their members/owners; 3. That they provide security by allowing the conversion of individual risks to collective risks; and, 4. That they expand youth and women's opportunities to participate in society and in the economy.
- III. Construct a message and identity for co-operative and collective enterprises. This is as it is important to distinguish between 'identity' and 'message'. Broadly speaking, 'identity' is the meaning of co-operative enterprises for the sector itself and its members, how it recognises itself when looking in the mirror; 'message' is the way in which the identity of co-operative enterprises is communicated and projected to the outside world, through education and information distribution, marketing, and other forms of engagement with non-members.
- IV. Ensure supportive legal frameworks for co-operative growth by identifying specific improvements to be made particularly relating to registration, fiduciary obligations, facilitating cluster formation, and compelling modern management practices.
- V. Facilitate access to capital while guaranteeing member control by promoting and encouraging (generally) the funding of co-operative enterprises by existing members, identifying institutions which can act as aggregators or intermediaries for co-operative enterprises (large and small) needing capital, ensuring that co-operative enterprises have a clear proposition to make to providers of funds, and advocating for incentives/concessions for co-operative enterprises.
- VI.
- VII. Induce and support the formation of other types of collective small producer/service provider enterprises, e.g., partnerships.

Activities to include:

- Finalize and present legal revision to Co-operative Societies Act, CAP 313, Laws of Belize.
- Conduct sectorial education and familiarization campaign on revised provisions.

- Review and revise template enterprise by-laws and other statutes for consistency with new provisions.
- Design and develop criteria for other models of collective enterprises.
- Run Business Performance Assessment System (internally developed module) on co-operatives.
- Conduct training programs on cooperative management and administration.
- Conduct training programs on cooperative financing and accounting procedures.
- Conduct training programs on marketing and promotion.
- Develop a sustainability/resiliency strategy for co-operatives – post COVID19 economy.
- Develop a recovery strategy for co-operatives.
- Audit cooperatives.

Expected Impact:

- A more vibrant and dynamic co-operative sector with increased contributions to the economy and to #planBelize outcomes, i.e., creating jobs, generating income, expanding exports, and engaging the youth, women, and Indigenous Peoples in productive enterprises.
- Improved livelihoods of co-operative members.

Conclusions and Recommendations

Recommendations

- I. Need for additional and higher qualified (educational) staff.
- II. Need to replace derelict vehicle fleet: most clients are in rural and remote areas; this limits access and mobility and there is also a high cost to maintenance.
- III. Need to increase budgetary allocation particularly at operational and training lines.
- IV. Include subject matter on co-operatives in the curriculum of secondary and tertiary level national education business programs, following point 9 of #planBelize’s Agriculture Policy to ensure the teaching of agriculture and agri-business in schools.

Conclusions

- I. Significant effort went into the revision of the staff manual and the co-operative capacity building curriculum. It continues to be a “living catalogue” ready to be updated as the knowledge base diversifies. This has been recognized by clientele and stakeholders.
- II. The Belize Enterprise for Sustainable Technology/Department of Cooperatives project proposal and approval with UNDP GEF-SGP was a major achievement. Not only for the Department but more so for the eleven co-operative who were the project beneficiaries with a total grant of BZ\$200,000 to be disbursed in equipment and materials and another in kind contribution to me made in training and capacity building.

12. Pesticides Control Board (PCB)

Introduction

This report documents the activities of the Pesticides Control Board (PCB) for the year 2021. It highlights the accomplishments and discusses constraints associated with the PCB's objectives with respect to activities initiated during the year under review. This report highlights the tools utilized towards achieving sound chemicals management, identifies gaps and mechanisms implemented to address all aspects of chemicals management in Belize.

Main achievements

I. Registration

- a. There was a total of forty-six (46) new registrations approved by the Board for the year 2021. Of the total six (6) were categorized under Restricted-Use and forty (40) under General-Use. All Restricted-Use are for agricultural applications. Only nine (9) of General-Use registrations were registered of public health applications and the remaining thirty-one (31) for agricultural applications.

The agricultural and public health registrations are as follows:

	Agriculture		Public Health	
	Adjuvants		Rodenticides	3
Bio-Pesticides		Wood Preservative	1	
Fungicides		Insect Repellent	2	
Herbicides		Insecticides	3	
Insecticides				
Total			9	

The online register of pesticides provides more, real-time details on each registration application along with approved label and pamphlet. The register of pesticides is now searchable at the following link: <https://login.pcbbelize.com/registrations/manual>

- b. Throughout the year, the unit also manages the renewal of registration applications. The year 2021 saw a total of ninety-nine (99) registration renewals. Ninety-four (94) of these were agricultural registrations and the remaining five (5) were public health pesticides.

Since the administrative purge of the Register of Pesticides was finalized in 2017, registration clients have been asked to notify the secretariat in writing of any voluntarily registration withdrawal to keep the Register current. For the year 2021, there was only one (1) agricultural withdrawal for Ally 60 WG (*metsulfuron-methyl*).

- c. The applications for registration undergo scientific and technical assessment by the Registration Committee that is comprised of the BAHA-Plant Health Department, Research and Development unit of the Ministry of Agriculture, the Ministry of Health, and the Department of the Environment. The applications are evaluated in three-month cycles and a registration can take anywhere from six (6) to nine (9) months to be registered. In the last cycle of 2021, the evaluators moved into the online portal evaluation platform off the Management Information System of the Registration and Permits Unit that was launched in August 2020. This was a major accomplishment for the unit because the evaluators were now able to access registration applications from any time and space removing the burden of them carrying around registration dossiers with them and the unit received real-time assessments for each application.

II. Permits

An unregistered pesticide can enter the country via the permits system. There are two types of permits: Minor-Use Authorizations and Experimental Permits. Minor-Use Authorizations are for end users with critical agronomic or public health need(s) and Experimental permits which are for end users that wish to either conduct a demonstration and/or laboratory trial or run an efficacy trial to support a registration application.

In the year 2021, a total of a hundred and sixty-eight (168) permits were issued by the unit. Minor-use Authorization's account for a hundred and sixty-seven (167) of the permits and experimental permit accounts for one (1).

Small farmers were the end-users that mostly benefited of the Minor-Use Authorization accounting for 70% of all the applications under this category. The Banana Industry accounted for 25% of the whole and the pest-control operators 5%.

Throughout the year the critical agronomic need confronted by small farmers were fall army worms both in the larva and adult phase. Of all the registered pesticides, anecdotally none seemed to be able to offer the correct crop protection to the crop either at its early growth stage or later.

The Banana Industry keeps having challenges with the Maximum Residue Limits (MRLs) of pesticides thus they had to alter the insecticidal tree bags they normally used with new ones to

meet European standards. In the last quarter of the year 2021, two of these insecticidal tree bags were registered.

A new farm in the Cayo District is growing soursop to export. However, there are no in-country registered pesticides for this commodity. Thus, the permit system allows the farm to import products recommended for this use.

The Ministry of Health is also a permit client of the PCB. Their vector control program uses public health larvicides, insecticides and on occasions impregnated bed nets for mosquitos.

The permit system allows end-users to access to deal with their needs on a case-by-case basis.

III. Promotion & Outreach

The Unit planned and executed its first virtual pesticides awareness week with the following activities:

- a. Virtual Opening of the week via the Facebook page
- b. Talking Pesticides: A virtual platform where followers were able to get basic pesticide information
- c. Story Time with Miriam: A story reading segment to bring awareness to children about the environmental problems. The story read was *The Lorax*, by Dr. Suess.

IV. Unit

The technical person that manages the unit completed the post-graduate diploma course on Pesticide Risk Management from the University of Cape Town in July 2021.

The unit also started the hiring process in late 2021 for an additional staff to assist with the workload.

The goal of *#planBelize* is to “*increase, diversify and sustain agricultural production, food security, and income generation in Belize by increasing farm-level capacity, improving technology and innovation, raising labor productivity, and increasing regional competitiveness*”.

The unit delivers on this goal day-in and day-out. Maximizing on efficiency with online platforms, hiring of new staff, updating internal procedures, and hosting stakeholder consultation sessions.

Lessons learnt

The mission of the PCB is to safeguard Belizean human health and the environment through responsible pesticide management. The first measure of control is the registration process. Throughout the years leading up to the culmination of the strategic plan, the unit has understood the following:

- a. Agriculture is one of the most vulnerable sectors to natural disasters and the impacts of climate change. Thus, increasing the use of pesticides.

- b. To become key partners in integrated sustainable development processes, including Pesticide Risk Management, as a ministry we need to improve organization among ourselves, for planning and implementing an integrated agricultural approach.
- c. Revision of policy implementation to identify gaps, constraints, and blockages to assist in replacing chemicals with biology wherever possible.

Future priorities and plans

The criteria for classifying Restricted-Use pesticides were updated by the Board in 2016. Since then, approximately 20 active ingredients have been assessed. The Restricted-Use list currently stands at 122 registrations. The priority this coming year will be to assess the remaining active ingredients and update the list.

The recent survey done by the FAO/Rotterdam Convention on Acute Pesticide Intoxications have also condensed the list of the pesticide priorities for the unit.

Conclusions and Recommendations

- I. Draw out successful models that have helped promote adoption of replacing chemicals with biology to stimulate the production and utilization of evidence for the policy process
- II. Share experience at the regional or global level
- III. Operationalize or pilot national policy at the local level
- IV. Promote inter-agency dialogue

Farmers receiving certificates at Trio village, Toledo District



13. Belize Marketing and Development Corporation

Introduction

Established under Chapter 281 of the Substantive Laws of Belize, the Belize Marketing and Development Corporation (BMDC) is mandated to assist in the economic development of Belize by ensuring food security, enhancing product development and marketing services to the agriculture sector. BMDC aims to continue to provide services to agriculture stakeholders through actionable programs that fall into scope of the broader objectives of Plan Belize to make agriculture more productive, profitable, gender-responsive, youth-conscious, and environmentally sustainable.

MAIN ACHIEVEMENTS OF BMDC

The main achievements of BMDC are summarized under three strategic objectives (SO) with their respective actions and results.

SO 1: Improve the livelihoods of producers through product development and market access

Target: Increase market access for two existing commodities so that producers from at least 20 communities by end of 2021 will receive access to a viable income.

I. Expansion of the Honey Market

Through BMDC's Honey Buying Centre, the beekeepers of the northern districts of Belize can deliver their honey with assurance of being paid 100% for honey when tested to be of acceptable quality. In 2021 the BMDC bought honey from 28 beekeepers who originate from 20 rural communities of the Orange Walk District (Annex 10). These beekeepers include women and youths, and it is expected that BMDC will be able to attract 11 new entrants of beekeepers in 2022, who will be primarily youths.

BMDC has expanded its market reach for its honey and has introduced the Belize Jewel Brand in San Pedro, Cayo and Toledo markets (Annex 10). Further to this, the BMDC has improved its human resources capacity to have two trained staff dedicated to serving the beekeeper's delivery and quality assurance of honey.

II. Revitalization of the Milpa Rice Industry

In 2021, BMDC carried out stakeholder consultations with 21 milpa rice producing communities of the Toledo and Stann Creek Districts. Through these consultations, BMDC was able to record information from 307 farmers (Annex 10). Likewise, BMDC was able to encourage milpa farmers to have a renewed commitment to the rice sector. BMDC shared with each community that its Big Falls branch will be reactivated for the purchasing and milling of milpa rice on an industrial scale again. Historically, the milpa sector provided a livelihood option for the people of these communities, however; the industry had seen a downturn. BMDC was able to create an actionable program to revitalize the industry by providing incentives to the farmer to deliver the commodity

to the Big Falls Mill of the BMDC. Included in the program was full rebranding of the milpa rice with associated logo, color scheme, key messages, and marketing targets (Annex 10).

The Milpa rice produced in the southern district of Belize aligns directly with the United Nations Sustainable Development Goals (SDGs) 1, 2, 8, and 12. As such over 250,000 lbs of milpa rice were delivered to the mill, while 600,000 lbs of mechanized rice also was delivered. This program received significant support from the Ministry responsible for Local Government which provided these producers with transportation services for their rice to be delivered at the mill.

SO 2: Reduce food losses and improve national food security

Targets: Initiate at least 1 intervention to target the reduction in food losses

III. El Salvador exportation program

Each year the producers of horticultural commodities of Belize experience market challenges in the form of market access and stable and good prices. As a result, they experience significant losses to their production. In 2021, the BMDC along with the Ministry of Agriculture, Food Security and Enterprise (MAFSE) explored the option of exporting fruits and vegetables to the El Salvadorian market. This initiative encompasses the exportation of goods from a wide range of producers belonging to all the districts of Belize. Preliminary work has been completed and the initiative has successfully identified buyers for citrus goods and onions from El Salvador. It is estimated that over 2,400 persons (SIB, 2019) are directly employed in the citrus industry and the onion industry supports the livelihoods of six (6) communities from the Corozal District, two (2) from the Orange Walk and three (3) from the Belize District.

IV. Food security program

BMDC provides effective food security services for the entire country of Belize through a partnership with the MAFSE. The MAFSE collects production information for the major fruits and vegetables in Belize and provides national production forecasts to all its stakeholders which assist in the food availability of these goods. BMDC also carries out data validation for its importation mandate. With the information shared by the Ministry and the market analysis BMDC conducts, the supply of potatoes, onion, and other vegetables are imported into Belize for the country to consume. Onions and potatoes are very important commodities for the nutrition of locals and for domestic commerce, especially the tourism sector.

SO 3: Increase the Corporation Capacity to provide high quality service to producers

Targets: Identify at least 3 investment opportunities by end 2021 that will enable the Corporation to provide producers with value added services.

Improve human resource capacity to enable the corporation to be more efficient

V. Establishment of storage facility

After seeing the need for adequate storage of agricultural products, the BMDC purchased two refrigerated 48 ft. containers each with storage capacity of 100,000lbs of produce that will be

commissioned for storage of main vegetables such as onions and potatoes at first and then extended to other agricultural products. Production trends determined by the Ministry have shown that producers are becoming more aggressive with their commodity outputs, but experience significant losses when more goods are produced than can be consumed. One immediate intervention to this challenge is to have viable cold storage.

The objectives for establishing storage are to neutralize the production glut, extend perishable goods shelf, and to remove excessive competition within the domestic market. Ultimately, this cold storage will deliver value in good market prices for all producers during the time of production, minimize production losses, and improve the national food security index. It is estimated that these two containers will be able to storage at any given time the amount equivalent to one to two weeks national consumption demand for potatoes and onions. These storage containers will be in the northern region to strategically regulate the northern supply.

VI. Establishment of the San Pedro Depot

Currently the San Pedro, Ambergris Caye market is one influenced primarily by supply chain bottlenecks experienced by suppliers from the mainland and influx of contraband goods. This market, however; is a tourism hotspot which accounts for more than 24% of the country's hotel and accommodations (SIB, 2020). Most of these accommodations include a restaurant or attract nearby food services.

With the aim to expand the domestic market for its producers, the BMDC has established a depot on the island which will primarily focus on providing storage (including cold) and distribution services for the products under its portfolio.

VII. Establishment of a BMDC Printing Unit

The Corporation has noticed that sourcing of printed labels is a major issue especially for small agro-processors. To address this gap, the BMDC has invested in the purchase of an industrial label printer. Aim is to recruit 150 processors by end of 2023. This will be incorporated as part of the services the BMDC will offer to agro-processors nationwide. This additional service will not only help in lowering the cost of labels to these processors but will also lessen the time spent in the sourcing and acquiring of labels.

VIII. Research Projects

The Projects Unit of the BMDC has engaged in several surveys and projects in the last year.

- The Agricultural Marketing Infrastructure Project which covered the two northern districts helped the corporation to identify the present infrastructure available in the agricultural sector and also helped to identify the needs of the various farming communities in these districts (Annex 10). This endeavor reached a total of 84 farmers from 14 farming communities in the Corozal District and 91 farmers from 7 communities in the Orange Walk District. The intelligence provided through this survey helped the BMDC in prioritizing cold storage for onion and potatoes. This survey also provided training and experience to five (7) youths.

- The Supply Chain Management Surveys encompassed different rapid field examination done by the Projects Unit, such as supply assessments for onions, potatoes, lettuce, carrots, rice and honey. Under each of these surveys done, the team investigated supply availability, market need for these commodities and the establishment of linkages from farmers to market. These surveys were conducted throughout the year.
- Agribusiness COVID-19 Impact Survey was carried out in early 2021 as a follow up to the initial impact survey done to understand how the pandemic has affected processing enterprises in Belize. While there are similar studies done by institutions such as SIB, BMDC's survey focused only of the operational and economic aspects contingent to the agribusiness enterprises. A published report to this study has been circulated on the BMDC website and to its stakeholders (Annex 10.1).

LESSONS LEARNT

I. Timing, phasing, and actions

Revamping the strategic path of the BMDC to align with the robust goals of #planBelize, and recognizing the need to introduce new pathways for the corporation came with the challenge of prioritizing its operational activities. As a lesson learnt, the corporation will map out its activities with clear identification of partnerships to minimize duplication of efforts and the categorization of actions by three main implementation criteria: priority level, feasibility level and their respective readiness to implement.

II. Institutional capacity

Technical support to the stakeholders of BMDC requires human resources services and infrastructure and equipment capacity which were required to be developed during this period of operation. BMDC has learnt that to effectively complete its work plans, it must make the necessary investments in equipment that will be used to serve farmers and producers. Similarly, the technical team of the BMDC is limited to two staff and this is an area needed for development as the BMDC moves towards its goals and objectives.

FUTURE PRIORITIES AND PLANS

- I. As an entity tasked with assisting farmers and agro-processors throughout the country, BMDC will be investing in packaging equipment at the Big Falls Rice Facility to add value to the milled rice from our local farmers. This will enable the establishment of a brand associated with Milpa Rice and Mechanized Rice Produced.
- II. Another major investment will be in the honey bottling and packaging at the Buying Center where the process will be more of an automated one. This will not only guarantee the quality of the packaged honey but also improve on the efficiency of the unit in regard to time taken for packaging.
- III. The purchase of pulping and refrigerating equipment is another investment that the corporation is embarking on. Through the investment in these equipment, BMDC will lead in product diversification for commodities that are constrained by high perishability and seasonality. This process will not only provide additional income for these farmers but will also lessen wastage of fruits and prolong shelf life of these products.

- IV. The consolidation of partnerships to assist farmer groups is yet another plan of the BMDC. At the moment, MOUs are being drafted with future partners such as the ITC (coconut project), the FAO (Soursop Value Chain) and the RRB (Product Development Activities and assistance with Market access). By teaming up with these entities, the corporation will be better equipped to assist the different farmer groups to generate income for their members.

CONCLUSIONS AND RECOMMENDATIONS

As the mission and vision of BMDC becomes more congruent with its mandate to support the MAFSE in product development and marketing, the corporation will need to incrementally align its capacity to meet this obligation. Currently, the Corporation has been able to efficiently utilize its human resources, however; in the horizon it is recommended that BMDC increase its technical human resource pool to include export and processing capabilities to carry out the work the office is mandated to do.

The Corporation, being very poised to prioritize its product development responsibility, sees it necessary for the Corporation to be a direct partner with the MAFSE and trade partners in becoming more active in more value chain development programs for its local commodities, for example, the pulping of fruits for the tourism market. Similarly, BMDC recommends that it be more active in addressing market demand gaps in locations where contraband is prevalent through licensing of commodities known to be prone to contraband. External, but very critical to the agriculture sector, the Corporation believes that prioritization of market-based economic legislative instruments and commodity standards is the way forward for Belize. Whereby, Belize incentivizes high quality commodities that garner more profitable market prices in domestic and international markets.

In summary, the BMDC recognizes its role as a support agency for the agriculture and service industries. In 2021, the Corporation employed a stakeholder focused approach to its work plan activities, by implementing impactful interventions that saw great successes. In the northern and central regions of Belize, BMDC plays its role in minimizing supply chain gluts and facilitated implementation to ensure food security of the national population. In the south, the Corporation infused new life into a once inactive rice sector and projects a substantial growth for the upcoming rice production season. Significant positives have been made in 2021 in the form of capacity building and institutional strengthening which the Corporation will use as a steppingstone to further impact the lives of producers in Belize.

References

People's United Party (2020) *#planBelize Agriculture Policy*. <https://planbelize.bz/agriculture-policy/>

Annexes

Annex 1: Sugar Cane and Sugar Production Data for 2020 and 2021

<u>TABLE 1.</u>	<u>Sugar Cane and Sugar Production Data – 2020 and 2021</u>		
Description	2020	2021	% Farm Change
<u>Sugarcane (million lbs.)</u>	1.536	1.893	23
Sugar (Metric Tons)	144,020	177,875	23.5
Acreage	98,700	103,385	5

Annex 2: Banana Production Data for 2020 and 2021

<u>TABLE 2.</u>	<u>Banana Production Data - 2020 and 2021</u>		
Description	2020	2021	% Change
Banana (million boxes)	5	5.37	7
Acreage	7,518	7,809	3.8

Annex 3: Citrus Production Data for 2020 and 2021

<u>TABLE 3.</u>	<u>Citrus Production Data – 2020 and 2021</u>		
Description	2020	2021	% Change
Orange (million boxes) (90 lb boxes)	2.3	1.3	-43
Acreage	16,794	18,811	12
Grapefruit (80 lb boxes)	144,847	115,029	-21
Acreage	4,144	1,745	-58

Annex 4: Legume Production Data for 2020 and 2021

<u>TABLE 1.</u>	<u>Legume Production Data – 2020 and 2021</u>		
<u>Legumes</u>	2020	2021	% Change
RK Beans (million lbs.)	11.34	14.07	24
Acreage	11,769	16,679	42
Black Beans (million lbs.)	4.12	4.87	18
Acreage	4,369	5,234	20
Soybeans (million lbs.)	30.13	38.15	27
Acreage	26,342	26,851	10
Cowpeas (million lbs.)	5.77	3.85	-33
Acreage	6,136	7,915	29%

Annex 5: Grain Production Data for 2020 and 2021

<u>TABLE 2.</u>	<u>Grain Production Data – 2020 and 2021</u>		
<u>Grains</u>	2020	2021	% Change
Yellow Corn (million lbs.)	152.91	215.29	41
Acreage	42,014	52,377	25
White Corn (million lbs.)	30.81	24.43	-20
Acreage	15,446	12,428	-19
Rice Paddy (million lbs.)	30.7	33.04	0.4
Acreage	7,609	6,531	-14
Sorghum (million lbs.)	32.5	28.39	-13
Acreage	13,385	12,614	-6

Annex 6. Horticulture Unit Achievements



Women's Group, Indian Church, Orange Walk



Irrigation in open field



Covered Structure Units at Yo Creek Station



Covered Structure Units at Stann Creek



Days of Healing Community Garden, Bze City



The Hub Community Resource Center, Bze City



Police Street Extension, Belize City



Hattieville Community Garden



Capacity building for farmers and students



Bokashi production at *The Hub* in Belize City



Land Preparation including bedding



Transplanting at Harmonyville

Annex 7. Project Unit Achievements



Fig 1. Cool storage Containers provided to farmer groups



Fig 2. Construction of seedling nursery and seedlings inside nursery (Toledo)



Fig 3. FAO planning meeting with UN agencies



Fig 4. Discussing the *Sembrando Vida* project

Annex 8. Research, Development and Innovation Center Revenue Report

Annex 8.1. Three-year revenue report for the Research, Development and Innovation Center

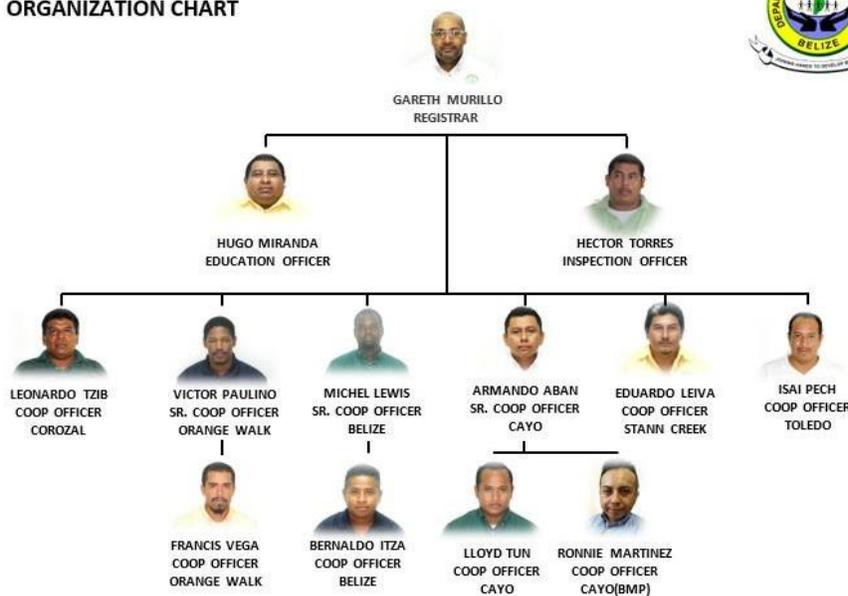
Source	2019 (BZ\$)	2020 (BZ\$)	2021 (BZ\$)
Livestock	52,204.50	65,137.50	138,153.00
Horticulture	5,689.00	8,164.35	2,866.03
Crops, Plants & Fruit Trees	8,729.75	9,677.50	2,032.25
Miscellaneous	48,280.00	30,856.50	41,120.80
Agro-processing	890.00	1,331.75	1,610.00
Tractor Services	6,370.00	11,701.75	8,757.50
Aquaculture	25,023.87	22,079.03	45,403.17
Rice & Corn	1,657.25	3,459.25	3,658.75
Total	148,844.37	152,407.63	243,601.50
Sheep & Goat Project	15,459.00	15,306.00	57,686.00

Contact Information

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Annex 9. Department of Cooperatives Organizational Chart

ORGANIZATION CHART



Annex 10. Belize Marketing and Development Corporation Achievements



BMDC Officer accompanies beekeeper in San Estevan, Orange Walk District, to carry out field assessment on apiary performance and Good Beekeeping Practices.



Labelling and packaging for the *Belize Jewel* Brand that is of high quality and modern.



BMDC Officers partners with MAFSE Extension team in rice consultations for the revitalization of the rice industry in southern Belize.



Revised logo and packaging for the Big Falls rice brand of BMDC



BMDC Officer providing enumerators with a brief for the field data collection for the AMI project in San Carlos Village, Orange Walk District.

Annex 10.1 Belize Agribusinesses COVID-19 Impact Survey Report

(<https://bmdc.bz/belize-agri-business-covid-19-impact-survey-report-june-2021/>)



Belize Agribusinesses COVID-19 Impact Survey

Report | March 2022

Demographics



47

Respondents



55/45%

Female/Male



48

Average age



Business Profiles

Size

Micro	8.1%	Sole Prop.	84%
Small	71%	Partnership	9%
Medium	14%	Corporation	7%
Large	4%		

Classes

Introduction

Since the onset of COVID-19, Belize has recorded over 12,000 confirmed cases of the virus and over 300 deaths that were determined to be as a result of the infection. Similarly to other sectors of the nation, the food sector has had to maneuver through the required lifestyle changes the pandemic presents. Beyond the life and health ramifications, the pandemic has led to the largest economic contraction in Belize in recent decades. It is estimated that the economy has contracted by 15.5% in 2020, owing to a substantial decline in tourism, manufacturing, and distribution sectors. Job losses in these sectors have led to higher unemployment in 2020, which has carried over to 2021. As the pandemic progressed, the micro, small, and medium enterprises (MSMEs) have had to adjust to mitigate against the impacts of the pandemic. Particularly, the agribusinesses, with limited economies of scale, are being challenged to revamp their business models to overcome the effects of COVID-19. Similarly, the pandemic provides important opportunities and presents a case study for improved efficiencies within the sector.

In 2020, The Belize Marketing and Development Corporation (BMDC) launched an Agribusiness COVID-19 Impact Survey to gather data on the impacts of the pandemic to the agro-processors on topics such as operations, inputs, income, and market access.

This report provides information on the second round of data collection covering the period June 2020 to February 2021. Apart from being an update to the first round of the

survey, this report provides comparative information to identify the changes within the sector since May 2020. Data was collected from March 16 to 26, 2021.

Summary of findings

- 71% of the respondents interviewed are recurrent from the first round of the study.
- 85% of the enterprises are micro, 10% are small, and 5% are medium-sized.
- Lack of capital and income loss are major constraints for production.
- More of the enterprises are being affected by the pandemic due to losses in income.
- Since June 2020 demand has shown slow improvement and the entrepreneurs have demonstrated resiliency to cope with the instability.
- There has been a considerable shift in the direction of the micro enterprise.
- In production, services has been proven important for success.
- Estimated economic loss to the agro-sector for the period is at 15.5% (BZD).
- While 70% of the respondents believe their business will be able to recover, more than 70% of the enterprises do not see this recovery happening before a period of 12 months.