

# Adaptive Design in Zambia: Lessons from the Zambia Biofortified Maize Challenge Project

## Background to the Zambia Project

In Africa, more than 500,000 women and children die each year because they do not receive enough Vitamin A in their daily diets. Vitamin A deficiency causes blindness, a greater susceptibility to infection, stunting, and slowed growth in children. In Zambia, approximately 31% of children and 21% of women are affected by this preventable illness.

In 2012, as part of an effort to address the Vitamin A deficiency in Zambia, HarvestPlus, a multidonor agricultural health and nutrition program coordinated by the International Center for Tropical Agriculture (CIAT) and the International Food Policy Research Institute (IFPRI), released three hybrid seed varieties of Pro-Vitamin A (PVA) maize. Unlike prevailing white maize varieties, PVA maize contains high levels of beta-carotene – an organic, red-orange pigment found in certain plants and fruits that the body converts to vitamin A. HarvestPlus initially distributed the improved seed through farmer extension services and subsidies focused on smallholder farmers. However, there were gaps in the commercialization of PVA maize in order to create the scale needed to improve nutritional outcomes in a greater population.



Nshima, a staple in the Zambian diet, made with PVA maize

## Key Lessons Learned and Recommendations

### Lessons Learned

- Pay-for-results mechanisms may have difficulty addressing both supply- and demand-side constraints simultaneously.
- Commodity-based incentive prizes could face distortions due to the political economy of most developing countries.
- Requiring changes to prevalent business models forces competitors outside their comfort zone, with potentially negative consequences if the changes are too extreme.

### Recommendations

- Choose appropriate targets and incentives that are reasonable given existing private sector business models.
- Use value chain and political economy analyses to better understand potential roadblocks.
- Allow for iterations based on unforeseen developments in policy or in the value chain.

To support HarvestPlus promotion of PVA maize, AgResults designed a Pay-for-Results (PfR) private-sector-focused prize competition to promote the adoption and consumption of PVA maize in Zambia. Because Zambians consume *nshima*, a porridge traditionally made from white maize meal, up to three times a day, the potential to increase vitamin A intake through the PVA-based maize meal is significant. The Project aimed to stimulate demand by incentivizing industrial grain millers to produce and market PVA maize meal to urban and peri-urban consumers. Initial research revealed that millers were

best suited to increase commercial supply at the scale needed to influence demand as their market penetration reportedly reaches over 70% of the Zambian population through retail and wholesale sales depot networks.

AgResults initially designed a Project prize structure to build up supply while taking into consideration demand-side constraints:

- In the pre-selection phase, interested millers would submit a business plan and approved entrants would receive a marketing grant of up to US \$50,000 each.
- Pre-qualified millers would compete for and receive rewards on a per-unit basis.
- Additionally, on an annual basis over four years, participating millers would proportionally share a fixed prize pool amount. Millers would contribute to collective and increasing minimum sales targets of PVA maize meal to be eligible to participate in the annual prize pool.

Implementation began in 2015, but almost immediately challenges surfaced that threatened the viability of the pay-for-results mechanism.



A farmer shows off his PVA maize

## Zambia Prize Overview

The AgResults Zambia Biofortified Maize Challenge Project is a five-year, \$7M Pay-for-Results prize contest that incentivizes seed companies and millers to increase awareness and consumption of biofortified PVA maize. The competition targets both maize millers and seed companies to increase demand and supply of PVA maize meal and seed respectively.

The contest consists of annual ex-post incentive prizes to two private sector groups: 1) to seed companies that produce and sell PVA maize seed to farmers; and 2) to commercial millers that produce and sell maize meal. The pilot is managed by Agribusiness Systems International (ASI).

## Initial Design Challenges

From the beginning, AgResults faced pressure to start implementation. As such, the program used initially-developed assumptions without having enough time to reconfirm them. Some assumptions and related challenges are below:

- **Disconnected Supply and Demand:** As a still unknown commodity, PVA maize was not rapidly becoming a wide-reaching crop as envisioned. The sale and distribution of PVA maize seed to smallholder farmers was not achieved. Farmers growing PVA maize were few and lived in remote areas, posing difficulties for millers to source maize. Without sufficient seed produced and distributed to farmers close to commercial centers, the supply was uncoordinated with anticipated demand. It is very difficult to synchronize supply and demand within a short-term period. It may take several crop cycles for this to align even in the absence of policy distortions.
- **Government Policy Variations:** Despite initial hopes to the contrary, PVA maize had not been included in the Government of Zambia's Food Reserve Agency (FRA) depots that serve much of the Zambian miller population. Since PVA maize was not available in the FRA depots, millers were required to purchase it in outlying areas from farmers and suffer high transport costs. These transport costs increased the price of orange maize above white maize, which was readily available in the FRA depots. AgResults attempted to provide small "push" transport subsidies to counteract the availability

issue. Even with the AgResults incentives, millers still did not perceive a benefit to purchase PVA maize and sell meal due to the price differential. Therefore, the original maize meal sales targets proved to be unrealistic due to the lower than expected supply of PVA maize in the market. More recent export bans on maize have distorted prices and further complicated the ability of millers to access suitable quantities of maize.

- **Unrealistic Incentive Structure:** Due to the newness of PVA maize, AgResults designed the incentive structure with the expectation that millers would market and promote PVA maize meal to drive awareness and demand. Millers were unaccustomed to these activities since their business model focused on selling white maize meal, a commodity that is well known and consumed with minimal promotion and marketing requirements. The need to develop awareness among consumers forced millers to move outside of their traditional business model, increasing their costs and reducing incentives to participate in the Project. AgResults attempted a small marketing “push” to help increase PVA awareness, but it was not enough to make an overall difference in demand.

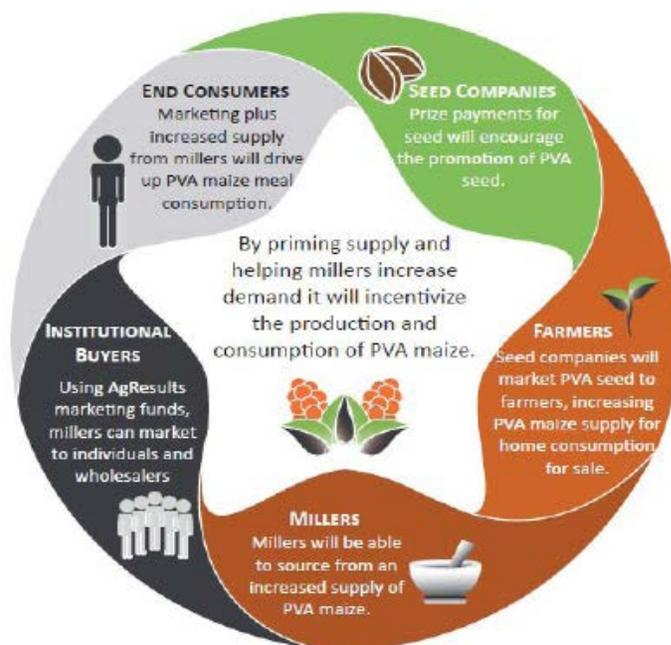
The incentive structure also required millers to collaborate with one another to achieve shared national sales goals; a requirement that proved impossible due to the fragmented and diverse nature of the Zambian milling industry. Requiring millers to move beyond their traditional business model and to work together where they usually do not proved difficult to incentivize. It became evident that it was necessary for AgResults to fully understand and respect millers’ prevalent business model by aligning the incentive-based prize structure along those parameters.



PVA maize seed displayed at an AgResults marketing event

## Redesign of the Zambia Project

Due to the afore-mentioned challenges, the Zambia Biofortified Maize Project was in jeopardy of not achieving its objectives and target sales goals. However, as AgResults had awarded minimal prize awards to date, it had the financial flexibility to modify the incentive structure to better target PVA maize’s market deficiencies (see graphic below).



To address the disconnect between supply and demand, AgResults added an incentive for seed companies to produce and market PVA maize seed to farmers through distributor networks to increase the supply of PVA maize available to millers. AgResults designed a sliding-scale sales threshold structure to incentivize seed companies over two sales periods between June 2016 and May 2018. These companies are eligible to receive prize payouts for every metric ton of PVA maize seed sold over the initial threshold. This incentive structure provides increased incentive payments based upon the volume of seed sold, making the PVA maize market for seed companies more attractive relative to their other seed sales options.

AgResults also redesigned the miller prize thresholds to overcome demand challenges of introducing a new product with little awareness. The revised prize structure offers lower sales thresholds that increase payments based upon a single firm’s incremental sales achieved each year and not based upon a collective threshold. The structure also allows additional millers to join across all three years of the Project, with payouts differing based on a miller’s year of participation in the Project (see above).

In Zambia, AgResults employs a sliding scale threshold to determine prizes, which include: 1) an initial payment based on the sales threshold reached, and 2) an additional per-unit payment for each metric ton of seed or meal sold above the thresholds. Participating companies must reach an initial threshold to qualify for a prize.

## Initial Response to the Zambia Project Redesign

AgResults relaunched the redesigned Zambia Biofortified Maize Project in December 2016, and the new design was well received by government officials, seed companies, millers, and other actors. To date, two seed companies have joined the Project and have responded well to the incentive, with potential to receive prizes in October 2017. Both companies surpassed the initial threshold and reported sales of more than 430 MT as of April 2017. The crop of the 2017 season is estimated to be in excess of 43,000 MT, making PVA maize a significant part of overall maize supply in Zambia. Increased PVA maize seed sales



Buyers examine PVA maize seed at an agriculture expo in Lusaka.

should bring the overall availability of PVA maize seed to 960MT for the 2017/ 2018 planting season, more than enough seed to produce sufficient PVA maize for millers to hit the redesigned sales thresholds.

At present, eight millers have joined the Project: four joined under the original design and four after the re-launch of the Project, with the potential for two additional millers to join in the coming months. While none of the millers have yet reached the initial sales threshold, AgResults expects higher sales in the coming sales period due to the increased availability of PVA maize as well as governmental endorsement of the benefits of PVA maize. More importantly, millers are more proactively participating in the Project, with one vertically integrating its supply to increase PVA maize availability.

In addition to the increased activity from both the seed companies and millers, the government has signalled its support of PVA maize by announcing that it will include PVA maize in the FRA purchase program and have PVA maize available in its depots in 2018, providing an additional and accessible outlet from which to source PVA maize.

Initial results are promising and show that the redesign of the Zambia Project may result in greater participation and energy from millers to achieve the proposed sales targets.

## Conclusion: Lessons Learned through the Zambia Project's First Two Years

The Zambia Project suffered from limited initial planning and groundtruthing prior to its launch. The Project was a legacy design that pushed AgResults to launch prematurely and was subject to the aforementioned challenges. The Zambia Biofortified Maize Project provides a variety of lessons, many of which AgResults learned because of the rigid programming at its onset. As the lessons presented in the recommendations box show, a more thorough initial design process, coupled with the ongoing flexibility to monitor and adjust based on updated assumptions are essential to give an agricultural pay-for-results mechanism every chance to succeed.

## Lessons Learned and Recommendations

- **It is difficult to use a pay-for-results mechanism to address both supply and demand issues at once:** The initial Zambia Project design made assumptions about demand that were off target and caused AgResults to attempt small “push” interventions to jumpstart demand. Later, the supply-side assumptions also forced another push to increase supply. Once AgResults accepted that the supply and demand-sides of the design were too great to address through previous smaller interventions, it redesigned incentives and the private sector responded immediately.
  - **Recommendation:** When implementing a pay-for-results mechanism, donors should focus on addressing evident problems for a market failure in either supply or demand. It is not reasonable to assume that the pay-for-results mechanism can address all the issues at hand. Once the issues are identified, there may still be unforeseen constraints or unviable incentives. Donors feel comfortable knowing they have the flexibility to allow for adjustments to that initial design and ongoing implementation – based on ongoing feedback loops. This feedback and adjustment can take the form of floating the design to a select number of competitors to receive feedback or to begin smaller scale implementation and adjust based on initial response (akin to human-centered design).
- **Policy and politics will be a factor in any key commodity-focused pay-for-results mechanism:** Because maize is the staple food crop in Zambia, it is subject to constant interference for political gain. Challenges to the Project have included promotion of white maize at the expense of PVA, as well as a maize export ban that has increased uncertainty in the PVA maize value chain.
  - **Recommendation:** If a pay-for-results mechanism focuses on a staple commodity, donors should groundtruth key assumptions through political economy and value chain analyses. Donors should also regularly update those assumptions during implementation to be able to adjust the mechanism based on unforeseen political developments or position the Project outside the sphere of influence of these developments where possible.

## About AgResults

AgResults is a \$147 million collaborative initiative between the governments of Australia, Canada, the United Kingdom, the United States, and the Bill & Melinda Gates Foundation to incentivize the private sector to overcome market barriers and develop solutions to food security and agricultural challenges that disproportionately affect people living in poverty. The initiative designs and implements agriculture-focused prize competitions, also referred to as pay-for-results or pull mechanisms, which are innovative development finance programs that engage the private sector to work towards a defined goal to receive a monetary award.

## About AgResults Lessons Learned Series

One of the primary objectives of AgResults is to better understand how well pay-for-results prize competitions work to overcome market failures in agricultural development. The lessons learned series explores AgResults’ experience designing and implementing agriculture-focused pay-for-results prize competitions, with the goal of providing key lessons and recommendations that development practitioners should take into account when designing similar programs.



AgResults is a Partnership Between:

