



Low-Cost, Locally-Produced Thresher Webinar Questions and Answers | July 25, 2018 Dr. Kerry Clark

Q: What is the impetus for the challenge? What is the real challenge that soybean farmers face that made you realize that threshing was a key bottleneck?

A: There were a couple things. One was that we were told by people in Ghana (where we were working) that locally produced soybean is not a top choice among buyers. They prefer imports because the local produced soybean can be full of rocks or sand from being threshed on the ground via stick beating. Threshing by stick beating can reduce the quality of the product so that it isn't as desirable to buyers. The only way to get that to improve is to improve your threshing methods. Additionally, stick beating can be very laborious.

Also, if people know they have a big harvest waiting for them at the end of the growing season, they are less likely to increase their production. Anything that helps people be more efficient and more productive will help raise incomes and improve food security. I know myself from being a soybean breeder here in Missouri – you can always plant more than you can harvest, so anything you can do to help harvest will most likely help production for smallholder farmers.

We were also seeing some cost share programs in Ghana where they were importing threshers. The imported threshers were running around \$8,000. So even though it was a 30-70 cost share, most of the farmers couldn't even afford the 30% on the cost share because the thresher itself was so expensive.

I've met several blacksmiths and I've seen their capabilities, and realized that their major limiting factors are quality materials and financial capability. One of the issues we do see is that if we have a farmer or service provider that would like bank financing for the thresher, the bank won't let them pay up front for the thresher. They'll pay when they get the product. However, the fabricator needs some money to buy the materials so he can build the thresher, so this method of financing can be difficult to manage for those interested in buying a thresher.

Financing is still an issue but I think it's one that we're getting closer to solving. Aside from those two impediments (low quality as a result of stick beating and issues with financing), most of the barriers are surmountable. If we can get local production, we can increase job creation around agricultural mechanization in these countries.



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Q: Are producers able to put down money and purchase the thresher and where do you see it being mostly individuals or more of a community level or farm group level?

A: We've seen it go a few ways in Ghana, however I do not think this is affordable to your typical smallholder farmer by yourself. We do work with an NGO in Ghana that does cost share, and has a 30-70 cost share. They work with women to enable them to buy the thresher with the cost share. They can put the money earned with the thresher towards buy more threshers or they can loan it to someone else looking to buy a thresher. Cost shares can be really vital even just getting this technology out there to start with, and just getting it in people's hands so they can start making money with it. Thresher service provision can actually be extremely lucrative for the people who own the threshers.

We have scaled the thresher training towards a service provider business. This would be somebody who is capable of getting some financing or who maybe is working through village finance (money from the community to have a thresher available to the village). Where the service provider makes a profit from using the thresher, he or she pays that money back to the original investor. We also have another group in Ghana of nucleus farmers. These individuals work with smaller farmers and they aggregate their services, and the nucleus farmers are usually able to get bank financing to purchase the thresher.

Basically, funders can provide cost share that helps get the technology out there, and as people become aware of it, the demand will increase, the supply will increase and the costs can come down. However, if we can't get it out there, it's going to be harder to become successful. Smaller farmers will need cost share, and the larger farmers or others with more capital will need more financing opportunities. We are seeing that works successfully in Ghana - people are finding ways to get the threshers.

Q: Is the design available and how you can access it? Is it bundled with the training? How does that work?

A: Contact me (Kerry Clark, clarkk@missouri.edu). We're doing a training in Malawi in December, which I would invite interested people to contact me if you would like to come and see it. That is in conjunction with Compatible Technology International and CNC Fabrication in Lilongwe.

The way the training works is if you buy the package training, SIL will bring the trainers, we set up in a community location that has welding plants, maybe a technical college or something similar, we locate fabricators with high capability or who already have experience with agricultural equipment. We bring them in, we teach them how to read the designs, we build a thresher together, we work with them on every aspect, from reading the designs to quality control to starting a business to working with customers and everything necessary for a well-functioning thresher.



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(Continued from previous page) Like I said, the price of that depends on the cost of moving the trainers there, how many people you want to train (we do provide them with their travel, their lodging and their meals) and we also have to pay the facility charge and we also provide all the equipment. This can be anywhere from \$10,000-\$25,000 to put on a training. If you feel that you have a lot of these things already taken care off, I'm happy to work with you to see what the options could be there.

Q: What is the kg/hour output of the thresher? What are some of the constraints on its capacity?

A: I didn't actually put those numbers in my talk because I found during field testing that the size of the soybeans made a huge difference. If you had large soybeans you would have double the capacity as measured by kilograms, but basically what we found was that the constraint is how fast you can feed the crop into the machine. That means someone has to pick it up and take it to the machine operator, and he or she has to put it in the machine. That is what limits the speed – not the machine itself but the human feeding into the machine.

Q: Are you concerned about the uniformity of production once the fabricators are trained? How do you ensure ongoing quality assurance?

A: That was one of the things we figured out after we ran the first training – not everyone has the same quality. We are doing a training in August on just quality assurance and production efficiency. We're going to work with fabricators to make patterns and forms, and then basically everyone would have the same pattern and form, so then you get consistency from model to model and fabricator to fabricator.

It would be ideal if something were to become a certified product within a country, so when we go to Malawi with CTI, that will be something we work towards there and in the future of this program. This will ensure that we get the fabricators doing something that the government agencies can examine and say yes this is safe and it works.

Q: Will the design documents be published online and be publicly available? Is that open source?

A: It is open source and I think once the program starts to take off more and we see how people utilize it, then we'll just make it available at the click of a mouse. For now, I just want people to contact me (Kerry Clark, clarkk@missouri.edu). I will work with you and I will be more than happy to give you the plans but I would like to work with you and be able to follow up with you and see what kind of back-up you were able to give your fabricators and where the program went, and I want to be able to give you tips for success a little bit. Keeping in contact about how your program goes is also critical to maintaining quality.



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Q: How do you deal with the logistics of delivering the technology to farmers in remote areas? Do you do it yourself, liaise with service providers, etc.? How does that work?

A: What we will be doing is training the trainers, so the first person in that line is the fabricator themselves, because they shouldn't be letting any machine go out the door without making sure the customer knows how to use it. That's going to take some effort and time on their part, but it's going to mean they have a better and successful business in the long run. So, the fabricator then trains the end user. We will train NGO's and extension agents, so that as extension agents come to a village and see a thresher broken down, they can give that owner some ideas on what they need to do.

Mostly, the fabricator is the central pivot point of the thresher. We will also have a warranty program, so the fabricators will provide warranties for their craftsmanship. We will be working with them on how to manage customer follow up so that they don't take up all your time and resources but also how to make sure that what you've sold keeps working. If we're to be sustainable and to build capacity, it needs to be in the hands of the commercial providers, whether that be the fabricator or the service providers. We are also looking at holding trainings in the future on how the service providers might interact with the fabricators and the end users, as the market and demand for the threshers grow. There's also an operation and maintenance manual that goes with the thresher for the end users.

Q: Can you integrate the thresher with tractor power? What is the next stage of that moving forward?

A: One of the interesting things is that IFPRI (USAID-funded economic unit for international development) conducted a large study on tractor power in Ghana, and found that tractor service providers only become profitable when they include threshing services. Some of them do that now but only with maize. This thresher, instead of using the diesel motor - you can make it even cheaper by putting a tractor power take off on it. Based on this study, it would go hand in hand with the services that the tractor power providers are already offering, and it would allow them to expand their business and become more profitable. This multi-crop thresher also expands those offerings to crops other than maize, like soybeans.

There's definitely a link and an opportunity between the threshers and the tractors, including the Oggun tractor that SIL is partnering with for production in Africa, but we also wanted to make it clear that if you have the model with the diesel engine on it, you don't have to have a tractor to use this thresher. In many cases, the tractors are also not available year-round, and they might only be in the area for land preparation.



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(Continued from previous page): In Ghana, we are working with a company called Motor King, which makes motorcycles that have a cargo bed on the back, and there's a certain Motor King model that has sprockets and a flywheel underneath it, and you can actually run a thresher from it. We have two designers that are now working in Ghana with Motor King to design a thresher that can run off some other power source other than a tractor or an engine. We hope to see these threshers get assimilated and linked with all kinds of other technologies.

Q: When the designs become available in August, will there be a list of lessons learned particularly on making the threshers efficient?

A: Yes. Probably the biggest lesson learned so far is that a thresher that uses suction for chaff removal gives far superior results than one that uses a blower across the seed. The suction machine has much lower seed loss and gives off very little dust. Building the suction chamber is a little bit challenging and will be more difficult for untrained fabricators than those who actually get to make a model while in a supervised training course. Our trainer is the designer, who has fabricated and field tested over 100 threshers.

Q: In addition to the manuals for training will there be videos that other people can watch as part of the training?

A: Yes, these videos will be made available on our website. soybeaninnovationlab.illinois.edu

Q: What about seed breakage on the machine?

A: I have not used it on beans below 10% moisture but above 10% there hasn't been a problem. The two major causes of seed breakage are low moisture and a threshing drum that turns too fast. The pulley ratio on this thresher has been well investigated so that the threshing drum speed is not so high that it damages the seed.

That is for soybean, corn and rice. A more fragile seed like cowpea might have more breakage. The designer believes that this machine could also shell groundnut without breaking them. He sells a dedicated groundnut sheller that has a very similar design to the multi-crop thresher.

Q: How are you promoting the thresher so farmers and partners know about it? Do you have a promotion program that includes social media? Are the central governments involved?

A: We publicize it in our newsletter and we hired a media crew in Ghana and got it on TV. We have also attended two large agricultural fairs. Now that we have nailed down our final design and will soon have the fabrication manual out, we will start working more on getting the word out and will talk to the Ministry of Agriculture in Ghana.



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Q: Is there going to be comparison in output between the locally fabricated threshers and those that are imported from elsewhere such as those from China for example?

A: There are so many different models and sizes of imported threshers out there that I wouldn't know what to test it against. Most of the ones I see in Ghana that are imported from China are rice threshers and can't do maize. I haven't seen a single imported multi-crop thresher. Most threshers in Africa now are either for rice or maize. If the sieve/concave is designed for maize, it should still thresh soybean but it would likely be very full of chaff. We have removable, interchangeable concaves on our multi-crop thresher for maize and soybean/rice.

To make a comparison I would have to find an import with the exact same power output. The beauty of our thresher is that it does multiple crops. For its size class, it should be able to compete with any import for capacity. Our designer also has larger sizes than the one we are offering so if people outside of Ghana want a larger design, we can help you with that. But he makes threshers for a living so he's not willing to give all his designs out for free in the same country that he lives in.

Q: Is it possible to use it by solar energy?

A: We would need to have more information about the solar energy source and its load capacity to answer that question. If this is something you would like to discuss please contact me (Kerry Clark, clarkk@missouri.edu).

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