The complex picture of on-farm loss

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ABSTRACT: Losses at the farm level are among the least understood aspects of food loss and waste throughout the value chain. Estimates differ greatly. Depending on the crop, geographic region and infrastructure available, drivers behind on-farm losses differ greatly as well, as do the solutions necessary to address these losses. This complexity makes it difficult to identify just where to apply interventions to reduce food loss at the farm level. This presentation seeks to examine what is known about on-farm losses, identify major gaps in knowledge, and propose steps forward to help demystify the nature of food loss at the production level. A special emphasis is placed on quantification and measurement of food loss, since the lack of data available around this issue is a major barrier to understanding the best approaches for reducing food loss. The focus then shifts to solutions to food loss, which will be further highlighted through case studies being offered by the next speakers in this session.

Keywords: on-farm losses, on-farm storage, market access, food-loss data

The World Resources Institute, where I work, is a global research organisation whose mission is to move society to live in ways that protect Earth's environment and its capacity to provide for current and future generations. We work on a number of topics as part of our food program. One of these is the complex picture of on-farm loss. In that program we examine how people currently 'segment' the food supply chain when talking about food loss and waste, and how people define harvest – 'the production stage' – the theme of this first session of today's conference. Our group looks at what happens during and immediately after harvesting on the farm. 'Harvesting' is most commonly defined as the time when the crop is ready for harvest, or when the animal is ready for slaughter.

There are ambiguities around definitions and I shall touch on those a little later. However, I think it is excellent that this entire session is focusing on on-farm loss. In my experience in the food loss and waste 'world', the farm itself is often neglected as a research priority or research area, especially in places like the United States, Australia and Europe. In these developed regions the research tends to focus more on the distribution and marketing and consumption aspects.

Dr Brooks has already shown you Figure 1, which comes from a paper about reducing food loss and waste which my group published a few years ago. As Dr Brooks mentioned, its broad message is that in places like North America, Oceania and Europe much more food waste occurs at the consumption end of the chain, while in places like sub-Saharan Africa much more loss and waste happen at the production and storage end.

This is an edited transcript of the presentation, with some of the powerpoint slides shown.

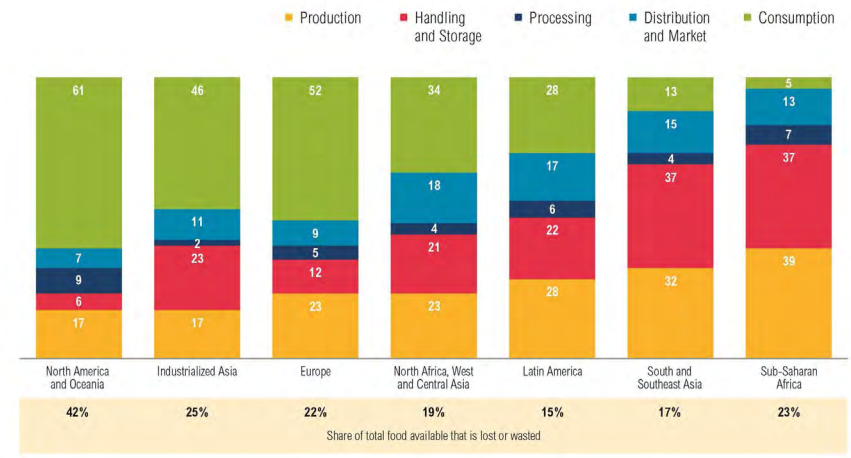

Figure 1. Losses at production are more prevalent in developing regions, while food waste at consumption is more prevalent in developed regions (% of kcal lost and wasted).
Source: World Resources Institute (based on FAO 2011).
Numbers may not sum to 100 because of rounding

You will notice that the losses at production, which are shown as yellow bars, are still quite significant even in places like North America and Oceania. Loss at that stage is still about 20% of the total food loss and waste that is occurring. You can see that losses in storage also vary quite a bit. Nevertheless, the production losses are significant wherever you are in the world, and that is why it is important to address this topic today in its own session.

Another reason is that the farm level is where you can most affect the lives of smallholders and their livelihoods by addressing on-farm solutions at that point. And finally, what happens at the farm can affect what happens 'downstream', further on along the food system.

When we talk about food loss and waste, we segment our discussions into five categories (Figure 2). If a tomato goes bad in your fridge, that is a consumption waste. However, things that happened at the farm level could have affected the shelf life of that tomato. There are many interconnections in the system which can be lost when we just discuss the issues in rigid categories.

Challenges in addressing on-farm losses of food

I shall now give a quick overview of the challenges that are unique to addressing on-farm loss, and they are all inter-related.

There is the extremely context-dependent nature of on-farm loss. Farming looks very different from region to region, country to country, town to town, climate to climate, even from individual farm to individual farm. Therefore, when you are trying to come up with solutions that will tackle on-farm loss in a big way, it is difficult to find the one-size-fits-all no-regrets solutions that will be applicable in a wide variety of contexts.

Figure 2. Five categories used in discussing food loss and waste along the entire value chain. *Source*: World Resources Institute (based on FAO 2011).

As well, there is the difficulty of adapting new technologies and practices, and this is not unique to the food loss and waste world. It is difficult to propagate new technologies and new techniques out amongst farmers, maybe because of cost, maybe because it difficulties reaching them, or maybe because materials involved in the technologies are unavailable in certain parts of the world.

Another challenge is the dispersed nature of farms and farm loss. It is happening at the smallholder level, and that means you have to reach all these individual farmers. That is more difficult than working on, say, supermarket waste where you can interact with large retailers who often will then be able to institute policies that are much more wide-ranging. That is quite a contrast to trying to institute changes at the farm level.

And finally, we lack really good data around on-farm loss and around food loss and waste in general. Although the chart in Figure 1 looks very official and as if the numbers are solid, actually those are only extremely broad estimates based on the best numbers that we have available at the moment. Knowing that a lot of production is lost in sub-Saharan Africa does not help in establishing a program specifically around the types of crops and types of livestock that need to be addressed. You need to know what those more specific hotspots are.

Possible interventions

Figure 3 lists six possible high-level interventions. These are just some ways in which we can address on-farm loss, and certainly not exhaustive. The next three speakers will present specific case studies.

Facilitating new markets for 'unmarketable crops'. You have probably heard about 'ugly' fruit and vegetables, where food items that do not meet certain standards of cosmetic quality end up being rejected for the market. Although it is perfectly good food, perfectly nutritious, healthy and available for

Figure 3. Possible high-level interventions to help reduce on-farm loss.

consumption, it does not get to market because it does not meet a particular standard. However, you can facilitate donation of that food, for example, and that is a fairly common practice in the United States. There is a practice called 'gleaning', where volunteers go to a farm and retrieve all the food that was not harvested. Maybe the apples in the orchard were too small. Then that food gets donated to people who need it.

Here is another innovative example. Where I live, in Washington, D.C., there is a service available now where I can buy a box of 'ugly' fruit and vegetables delivered to my door. They are items that farmers were not able to sell to the market. Now 'start-up' businesses are working directly with farmers to get that food to people who want it. To be a consumer of a service like this I still need to be aware of these programs and motivated enough to take them on.

Some supermarkets, such as Walmart, have started selling 'ugly' fruit and vegetables at lower cost than other fruit and vegetables, and they are finding that these fruits and vegetables are selling faster than so-called 'normal' food.

Adjusting quality standards for crops. While similar to the previous examples this intervention is more at government policy level. For example, the European Union might have a policy that 'a banana must have a specific curvature to it, and be of this length, or you cannot sell it'. It is true that this is something that happens. A policy like that means perfectly good food does not get into the market because it does not meet a very specific standard.

Improving market access. This intervention includes actions such as building roads that allow farmers to take their crop to market. You can reduce losses on the farm but if your storage facilities are inadequate, or if the crop must be immediately used or sold quickly after harvest, it will still end up as food waste – just at a different stage in the value chain.

Figure 4. (left) Organisations involved in the Food Loss & Waste Protocol; (right) the *Food Loss and Waste Accounting and Reporting Standard*.

We can also add 'market fairness' as a part of market access, recalling the question after Dr Brooks's talk which pointed out that if farmers are not getting the price they deserve for their produce, that situation can also lead to increased levels of food loss.

Increasing agricultural extension services. Many people at this conference are familiar with the concept of increasing agricultural extension, and you are probably quite passionate about it. This is how farmers can become educated on new technologies, on best practices that can reduce losses at the farm level, and on harvesting and storage techniques.

For **improving harvesting and on-farm storage**, establishing a cold chain is an important intervention. There are regions that currently do not have access to a cold chain, throughout the food supply chain. It is not clear to what extent this is the situation, nor who pays for putting in a cold chain and for the sorts of investment required for that infrastructure. And then what is the trade-off between the reductions in food loss that we get from that investment and the additional resource cost that comes as a result of making those investments in greenhouse gases and energy?

Improved data – an area that I work on quite closely. Once you know what is happening in a specific farm or in a country, in terms of the crops that are being wasted, and the reasons for that, and what happens to that material, then you can really start to target interventions towards those hotspots. That effort is called 'The Food Loss & Waste Protocol'.

At the World Resources Institute we have worked with a number of organisations on developing the Food Loss &Waste Protocol (Figure 4), and many people at this conference have contributed to the protocol's development.

The protocol is an effort to develop a global standard for how we define, measure and report on food loss and waste. We need it because, in so many cases, food waste might mean to me something entirely different from what you mean when you talk about food waste. You might be referring to landfill. I might mean anything that was intended for human consumption but ended up being fodder for livestock or an anaerobic digester. That is food waste, to my mind, but for you it might be just landfill. I might say I waste 30% of my food, and you might say you waste 10% of your food: I am thinking you are doing so much better than me – and actually, we may not even be talking about the same thing!

The Food Loss & Waste Protocol is a set of common definitions and practices for how to define, measure and report on food loss and waste. It was released in June 2016, and is being widely taken up. It can be used by corporations and by countries and by anyone who is undertaking a study where they are interested in reducing their food loss and their food waste.

There is also a *Food Loss and Waste Accounting and Reporting Standard* (FLW Protocol 2016) (Figure 4).

Do contact me. My email address is at the World Resources Institute (WRI) website, www.flwprotocol.org/. The WRI is on Twitter (@WRIFood).

References

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Brian Lipinski is a research associate with the Food Program at the World Resources Institute (WRI). During his time at WRI he has worked extensively on the topic of food loss and waste, having served as the lead author on the paper 'Reducing Food Loss and Waste' (reference above). That paper then led to the development of the Food Loss & Waste Protocol, a multi-stakeholder effort to develop the global accounting and reporting standard for quantifying food and associated inedible parts removed from the food supply chain. This work will enable a wide range of entities – countries, companies and other organisations – to account for and report in a credible, practical and internationally consistent manner how much food loss and waste is created, and identify where it occurs, enabling the targeting of efforts to reduce it. Brian also serves as part of the secretariat for Champions 12.3, a unique coalition of executives from governments, businesses, international organisations, research institutions, and civil society dedicated to inspiring ambition, mobilising action, and accelerating progress toward reducing food loss and waste. He holds a Master of Science degree from the University of Michigan, School of Natural Resources, and resides in Washington, D.C.