

# Tracking Gains to Small-Hold Farmers from Reducing Post-harvest Losses

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## Abstract

While measurement of on-going operations is an important means by which managers quantify progress, the nature of small-hold farming can constrain the extent of measurement which is economically viable. However, decisions need to be made to implement improved practices that can reduce loss and improve farmer well-being. Information and analysis needs to be employed to effectively track progress from reducing post-harvest loss. An approach is described here which can provide decision relevant information in a cost effective and robust manner.

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## Measure to manage

A widely-held precept of modern management, attributed to both Peter Drucker and W. Edwards Deming, can be summarized as, **“You Can’t Manage What You Don’t Measure!”** Numerous systems to improve performance, such as Total Quality Management, Six Sigma, and Just-in-Time supply, rely upon sophisticated, continual measurement of on-going operations to drive progress. Implicit in these relationships is the necessity that the cost of measurement be less than the benefits achievable from employing the resulting data.

Having grown up on a small farm in Iowa, I’ve reflected on the process by which my parents made decisions to improve efficiency, often resulting in reduced post-harvest loss. While we continually sought to understand loss and its sources, actual measurement of on-going operations was too expensive in terms of the time and material required. The picture below, of a group of researchers counting the soybeans left on the ground after harvest, illustrates the time intensity of physical measurement in agriculture. Further, the small scale of our farm (and that of small-hold farmers in developing countries today) results in relatively high per unit (hectares or kilograms) costs.



Researchers assessing harvest losses  
Moto Grosso, Brazil  
Photo courtesy Dr. Marvin Paulsen

In some parts of food supply chains, measurement systems exist to monitor on-going operations, for example, within food processing plants. In those settings, expanding the focus to include post-harvest losses, often is economically feasible. However, on small-hold farms and in those parts of the food chain near the farm, measurement systems tend not to exist. Having to establish appropriate systems increases the cost of physical measurement.

Because of the high cost of physical measurement, surveys based upon recollection of loss often are used to attempt to quantify loss. A conversation I had with a small-hold rice farmer in Bihar a few years ago demonstrated to me the difficulty in relying upon recall surveys. The farmer and I were standing near a very large stack of bundles of unthreshed rice. He reported that considerable loss would occur because of rodents and spoilage before the grain could be threshed. I asked, "How much of your grain will be lost?" He replied, "I don't know".

The farmer didn't know the total amount of rice that was contained in the stacks of grain. Therefore, how could he know how much was lost? Rather than provide me a number that he thought I might want to hear, I appreciated his honest and direct answer.

## **Analysis to track gains**

It turns out, however, that assessing levels of post-harvest loss is not the only setting where continual, comprehensive measurement is not feasible. For example, estimates of the extent and nature of poverty are important factors affecting policy in developing countries. Continually and comprehensively quantifying poverty across populations would be a time and resource intensive undertaking. Attempting to do so would be quite costly.

Because policy makers need to understand the changing nature of poverty, methods have been developed which provide useful and cost-effective means to track poverty. In general terms a three step process is employed:

1. Careful research is done to identify the valid and quantifiable indicators of poverty. An example indicator could be the number meals the family consumes in a week.
2. Large scale, representative, survey research is conducted. Such surveys, for example, could quantify the distribution of families in terms of the number of meals consumed weekly.
3. The sources of information in 1) and 2) are then combined to provide credible estimates of poverty. An important attribute of this approach is that estimates can be enhanced as additional survey information is obtained or as research provides improved poverty indicators.

I believe the framework just described is applicable as we attempt to understand post-harvest loss and, just as importantly, to track the gains from interventions aimed to reduce loss. Again a three step approach could:

- A. Conduct careful research relating levels of loss to the alternative post-harvest practices employed. The picture below, of women hand threshing rice shows one such practice. Use of mechanical threshers and combines are alternative practices often employed.
  - a. The various post-harvest practices available are analogous to the poverty indicators noted previously.

- b. The two pictures in this note are purposely included to stress that research on actual loss is difficult and requires careful attention to detail.
- B. Large scale surveys focused on quantifying the practices actually employed by farmers can be conducted to document their extent of use. Because these surveys would focus on what farmers actually do, recall-based responses are likely to be provided with minimal error.
- C. Again, the sources of information in A) and B) then can be combined to provide credible estimates of losses. To assess the effects of interventions aiming to reduce loss, surveys conducted over time would provide documentation of changes in the level of practices employed and therefore track changes in loss.



Women hand threshing rice

To this point, the discussion has focused on measurement of physical loss. However, it is important to note that physical losses are only one component of the economic effects of excessive levels of post-harvest loss. Two key economic parameters associated with post-harvest loss are quality levels and the timing of sale of the farmer's product.

The quality of the farmer's output often is highly related to the practices employed on the farm and in transport of the product to market. For example, hand cut rice often is left for several days to dry in the field. The combined effect of heat in the day and dew overnight can reduce the desirability of the grain, therefore resulting in economic discounts at the market. Research efforts, such as noted in A) above, can assess the relationships between practices and quality to provide data needed to estimate economic losses because of quality deficiencies.

Further, if small-hold farmers don't have capabilities to adequately store or condition their output, they often suffer severe economic penalties by having to sell at harvest when market prices are typically at their lowest. For staple crops, this penalty is multiplied when the farm family has to purchase the same product several months after harvest when prices are high.

Lack of access to appropriate post-harvest practices leads to substantial economic losses from both the effect of reduced quality and inappropriate market timing. In tracking the gains from reducing post-harvest loss, the effects of those parameters must be assessed, as well as the

effect of physical losses of agricultural output. The framework described in this note can accommodate both of these factors.