Editorial

Food policy research is often regarded as having just two main strands: food production and food distribution. This reflects policy responsibility which, in ldcs, is commonly divided between ministries of agriculture responsible for food production to the point of harvest, and ministries of food responsible for public sector food trade and controlled distribution. Yet falling between these is the post-harvest system which, for ldc staples, contributes a substantial share to total crop value. For city-consumed cereals the value added in post-harvest handling and processing is usually over a half of the total crop value. These post-harvest operations typically include transportation, threshing and winnowing, drying, milling and storage and—even in poor peasant farming—usually represent at least a quarter of the total costs of food production, whether time or money is used to estimate value.

Agricultural growth and the increasing share of marketed produce in total food production encourages the commercialisation of post-harvest activities—particularly threshing, drying, storage and milling. However, whilst the increased volume of output introduces some economies of scale, profitable investment in new post-harvest technology requires cost-reducing technical innovation. The volume of (raw) output is fixed by pre-harvest practices so, unlike changes in crop cultivation methods, yield increases are not possible *unless* there are oportunities to increase output by the reduction of food losses at the post-harvest stage. In fact, current estimates of world post-harvest losses through quantitative and qualitative deterioration are generally at least 10-20 per cent, and with estimates of world food shortages well below ten per cent, post-harvest loss prevention programmes have an immediate appeal. This potential opportunity to solve world food problems—particularly as other options were more speculative—became widely recognised during the 1970s and was exploited by politicians (eg Kissinger's policy initiative to the UN Assembly in 1975) although others (eg the FAO as early as 1947) had long advocated placing more emphasis on post-harvest technology.

The fear of food losses thus generated a major research and development initiative which, since the mid 1970s, has led to substantial interest in the role of post-harvest technology in reducing hunger. The assumption behind this has usually been that increased food *availability* through loss prevention and increased food *consumption* by the hungry are synonymous. Further, since the very concept of food loss is a complex multidisciplinary one and potential opportunities for loss reduction are many-sided, a wide spectrum of, often unrelated, research was opened up, informed by this basic assumption. This created difficult and critical issues of research co-ordination. The gaps in articulation between engineers and economists are well known, but similar problems arise between bio-chemists and entomologists, between nutritionists and cereal toxicologists.

These problems aside, the existence of substantial food losses was accepted without question, and this has heavily biased R and D in two ways. First, a single-minded concern with loss reduction has led to a neglect of the costs resulting from proposed technical changes. This has involved a failure to demonstrate rigorously the economic viability of proposed innovations—a task requiring a detailed knowledge of the possible alternative uses of assets in order to assess their true opportunity cost; in the absence of fieldwork this knowledge has not always been available. The acceptability of alternative threshing techniques varies, for example, according to the proposed final use of straw (feed, fuel or building material) and a financial analysis that ignored the value of the threshing by-product in its different uses would distort the original farm-level investment decision. Similarly, the displacement of labour will be variously valued according to whether it is hired or family, male or female, peak or slack season, local or migrant labour, and the benefits from labour saving will vary correspondingly. At the farm-level these costs are every bit as relevant as the value of food grain saved through technical change.

Secondly, there is substantial recent evidence to show that food losses are frequently rather low in farm-level post-harvest practices, especially for traditional cereal crops at traditional yield levels. Total physical losses of 20 per cent and above now appear to be wildly exaggerated 'guesstimates' of the loss reduction potential, at least for traditional cereal staples, though for root crops and other more perishable staples, as Coursey describes, this is not the case. Therefore, the widespread emphasis on loss reduction is misplaced and has created a need for more selective intervention (because losses in one operation—such as threshing or drying—may be negligible), for more attention to cost

reduction (cheap improvements in technique rather than costly modern substitutes) and for more careful reflection on the linkages between this area of technology policy and policy concerns other than physical food availability. Some areas which have begun to receive attention in discussion of post-harvest technology include rural employment, particularly women's employment, income distribution, improved farming systems and indigenous technical knowledge.

A second major influence on the nature of post-harvest R and D—and indeed one of the reasons for its recent prominence—has been the impact of the Green Revolution. Greatly increased yields—for wheat particularly, but also for rice and maize—have increased the risk of losses in traditional post-harvest systems constrained that are by threshing capacity and transport facilities. The changed seasonality of production, causing wet-season harvesting problems, and the increased cropping intensity, reducing the availability of fixed resources for any one season, have made the post-harvest system more vulnerable to loss. However, this has had most impact on the marketing system rather than at farm level, for doubling production has resulted in increases as high as tenfold in the quantity marketed.

Looking at post-harvest technical change in this broader context of agricultural growth suggests a number of emphases: for example, if we consider the expanding marketed surplus, critical questions relate to the optimum storage capacity and its optimum location, to quality control and to public stock management. Amongst these questions, investment decisions on storage and processing facilities have become crucial here because of the role of international agri-business. One of the most significant coalitions in the area of post-harvest technology policy has been between manufacturers of modern food processing equipment and departments of food responsible particularly for feeding (often politically volatile) urban populations. International capital has been directly involved on an even wider scale in crop processing than it has in crop production—though vertical integration throughout the chain of production and processing is common. Whilst there are case studies of the effects of this financial and technical dependence during agricultural growth they remain relatively under-researched because the emphasis in R and D has again been directed to prevention of food loss as a priority, almost regardless of the implications for other policy objectives.

The articles in this issue of the *Bulletin* are concerned with various problematic aspects of post-harvest technology policy relating to these two main influences—the over-emphasis on food loss and the impact of agricultural growth. Their collective thrust is to justify and draw attention to emphases within post-harvest R and D other than food loss prevention in traditional farm-level systems. Through evidence from India and Bangladesh on the low level of food losses in traditional rice storage and processing (Tyagi, Harriss and Kelly, Greeley) they establish the inappropriateness of R and D directed solely towards food loss reduction. Indeed, the evidence from Bangladesh shows that technical change occurring in threshing and in milling actually increases food losses, albeit marginally. Other farm-level studies[1], including evidence from Indonesia, Korea, Malaysia, Nepal, the Philippines and Zambia provide further evidence that cereal losses are often small in percentage terms. However, even small increases in food availability—from improved storage, for example, at the end of the storage season when food prices are high, immediately before the next harvest—can be of major benefit to farm households that would otherwise have to borrow at usurious rates or make distress sales of assets. The implication of low food losses therefore is not to ignore technical innovation but to select carefully. Farm-level post-harvest R and D has to identify innovations that are cost-effective both privately and socially, and clearly if losses are low in traditional systems then the costs of loss prevention must also be low.

It was not entirely coincidental, therefore, that development of improved farm-level post-harvest equipment has been a major area of activity for the proponents of 'appropriate' technology. Improved drying, threshing and, especially, storage methods have been the subject of much R and D emphasizing use of local skills, raw material and labour. The biggest difficulty has been in achieving replicability—and the history of extension of 'appropriate' technology arising from these R and D programmes is one of pilot schemes and no subsequent expansion. But, in S. Asia at least, the 'appropriateness' of a technique is partly dependent upon its relative labour intensity, and this has drawn attention to the employment implications of technical change.

Two studies in this collection illustrate the significance of the employment implications. In the case of rice storage in South India where the levels of losses are low (below five per cent) but can be reduced still more by technical change, the choice of storage technique is shown by Tyagi to be a major influence on rural employment levels—especially for the manufacturers of traditional storage structures whose livelihoods are frequently dependent upon demand for traditional storage structures. The Bangladesh study argues that the displacement of female wage—as opposed to family—labour from employment in rice husking is the most important consequence of the technical

[1]For a list see Greeley, M., 1982, 'Pinpointing post-harvest losses', *CERES*, no 85 (vol 15 no 1).

change because it is only women from the poorest rural households who are forced to seek wage labour employment. Agricultural modernisation in Bangladesh is thus reducing the opportunities for female wage employment, yet paradoxically, the pattern of rural 'development' involves a process of economic polarisation which is creating more and more landless families dependent in part on female wage labour. Bangladesh was the last South Asian country to begin this transition from farm-level processing through to large-scale commercial rice processing and is still at an early stage. There are strong arguments (Harriss and Kelly) for limiting the transition to intermediate techniques rather than continuing through to the more sophisticated modern rice mills. But the restriction of intermediate techniques (the huller mill) in favour of continuing farm-level processing—sometimes argued for in defence of women's jobs—can only consign female wage labour to arduous tasks of extremely low productivity. Since millers, traders, farmers and farmers' wives all benefit from the change in technique, a cost-effectiveness exercise would have to employ very marked income distribution weights before such a policy was 'socially' desirable; the alternative approach is to organise women's programmes that develop income-generating activities for these poorest households at higher levels of labour productivity.

Whilst alternatives that try to spread the benefits of modernising technical change are almost always relevant, it is not very often that they are developed within post-harvest R and D programmes. The nature of career structures, professional and departmental specialisation, the planning of R and D and of post-harvest investment all serve to heighten the narrow focus on food availability. As this South Asian evidence shows, proposed innovations emerging from such R and D may have very little effect on gross food availability but hold severe consequences for the food intake of the poorest households. The perverse consequence of reducing food loss may be that hungry people become hungrier.

The need for post-harvest R and D to be integrated into farming systems research (Maxwell) and to utilise indigenous technical knowledge (Coursey) provides further alternative perspectives to the usual focus on food loss, and draws particular attention to some of the effects of agricultural growth upon the post-harvest system. Similarly, Lipton's article takes a wider perspective in suggesting possible new roles for farm-level storage in public foodstock management. Whilst Coursey correctly points out the higher risks of loss associated with root crops, the concern of all the contributors is much broader than food loss, and seeks to identify future research priorities from fresh perspectives on the impact of post-harvest technical change.

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