Cassava Chip Processing in Ghana: Participatory Postharvest Research and Technology Transfer in Response to New Market Opportunities

Andrew Westby and Stephanie Gallat

STEPHANIE GALLAT

Postharvest systems are highly complex in nature because of the interaction of technical, social and economic constraints faced by small-scale farmers. The use of an appropriate and effective postharvest research and development approach is the key to ensuring that post-harvest research and technology transfer activities have impact on poor people. At the Natural Resources Institute, working in collaboration with a number of national programs in Sub-Saharan Africa, we have seen an evolution of our approach from one that was very scientist-orientated (termed hypothesis testing) to one that is participatory in nature. We believe that by involving beneficiaries at all stages of the project cycle—from problem/opportunity assessment to testing and adaptation of new technology—the chances of achieving a positive impact on livelihoods are improved.

This paper describes the use of a "systems" approach to the development of a processing system to meet an identified market opportunity. The processing of cassava chips for the domestic animal feed market in Ghana is used as an example of the application of this approach. The "systems" approach brings together a variety of tools including needs assessment and market analysis, and requires the involvement of all key stakeholders in the system.

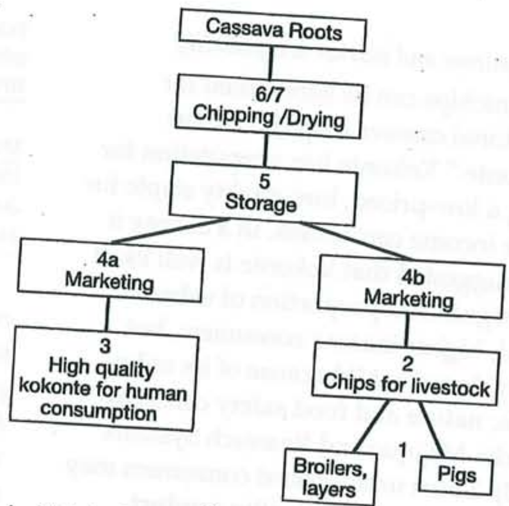
The "Systems" Approach

As opposed to the "hypothesis testing" approach which is based upon understanding how biological systems work and then applying the results of research to have an impact, the "systems" approach takes an integrated view of the post-harvest system from production to consumption. Using a multidisciplinary approach, the systems approach also recognizes the social, economic and technical factors that influence farmers' decision making and capacity for adopting new technologies.

The "systems" analysis approach

Andrew Westby and **Stephanie Gallat** work at the Natural Resources Institute, United Kingdom. This publication is an output from a research project funded by the United Kingdom Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID.

Fourthly, studies were undertaken to understand and develop various parts of the chain from producer to consumer (systems analysis). The experimental work focused on the production of spaghetti-shaped chips called "minichips." The investigations were undertaken in the order agreed in the stakeholder consultations. The chain from the field to the consumer is shown in Figure 1. The studies undertaken are also indicated in Fig. 1 and summarized in the following sections.



1. Market-price competitiveness
2. Fitness for use: on-farm participatory trials
3. Consumer and market acceptability
4a. Marketing for human use
4b. Marketing for livestock use
5. Storage
6. On-farm participatory development of technology
7. Availability of credit

Figure 1. Cassava chip production system and studies undertaken.

1. Market-price competitiveness compared with maize for animal feed

Following the needs assessment study, an initial rapid assessment was made of the potential market for cassava in the poultry feed sector (Barton et al. 1996). It was estimated that assuming a potential 50% replacement of maize in the diet there was a potential demand for 58,000 tonnes of cassava.

The technology selected involved chipping cassava into small spaghetti like pieces that could be dried quickly to produce a good quality product. The system was based upon a chipping machine developed by the International Institute of Tropical Agriculture in Nigeria (Jeon and Halos-Kim 1991) and imported into Ghana by an NGO. A range of prices for minichips was established (Collinson 1997) based on the costs of production and using the same rates of return to labor as those for cassava chips produced for export. This gave a range of prices from ¢121 and ¢137/kg assuming real interest rates of 0 and 15% respectively. This price is higher than for chips produced for export (¢90/kg) reflecting the increase in labor required. When compared with the price of maize on an equivalent basis (same protein content) cassava would have been competitive for 13 out of 24 months in the 1995/96 period at ¢121/kg. Chip production is seasonal and optimum drying conditions occur in January - March when maize prices are high.

2. Fitness for use: on-farm trials

In a workshop with stakeholders in the livestock sector, a major issue was fitness or suitability of cassava for use as animal feed. On-farm broiler, layer and pig trials were undertaken using cassava as a partial replacement for maize. Diets were reformulated to account for the lower protein content of cassava and comparisons of performance were made with farmers' own diets. Pigs came to market weight (60 kg) in 7 months on the cassava based diet compared with one year (or more) on the conventional diets (Fleischer 1998). Poultry showed no significant loss in performance with 20% cassava in diets (Osei et al. 1998).

were decreasing lending to the agricultural sector and, therefore, an increased reliance on the informal sector was anticipated. There was evidence of lending to groups, but little evidence that it was always successful. Individual entrepreneurs were often excluded from credit.

Stakeholder Participation

In the example given above, stakeholders participated in the process at three levels. During the needs assessment study initial contact was made with farmers. The adaptive research and technology transfer program was initiated on the basis of farmers' needs. The majority of the research work was done in collaboration with end-users. The chipping/drying system was adapted in collaboration with end-users to meet the quality requirements of the industry. The "fitness for use" trials were carried out on-farm with active participation of groups of farmers and the commercial feed compounding companies.

In addition to undertaking the research work on-farm with people who would use the technology, a series of workshops brought together all stakeholders in the post-harvest chain to report results and decide on issues such as next priorities. Work on the development of cassava chips and studies into the fitness for use of the chips was only initiated following stakeholder workshops.

Benefits of the Approach

The systems approach ensures a close interface with beneficiaries because of its participatory and multi-disciplinary nature. It makes technology transfer a part of the research and development process and is faster than some alternatives. In addition, the systems approach makes allowance for the fact that not all constraints within a system are technical in nature. On the other hand, the approach is dependent on a process approach where the final technology or product is not always predictable. Also, the results can be location specific and expectations can be raised if the process is not followed through to an end point.

Approaches that encourage researchers to work more closely with beneficiaries are clearly going to be more likely to achieve impact; the systems analysis, market orientation and needs assessment are tools to achieving this. There is still, however, the need to still draw out and make more widely available the generic issues from these interventions. This may mean particular issues might have to be thoroughly and rigorously investigated (an integration of adaptive and strategic research). It has also to be recognized that the best approach with certain problems may be to come back to more basic research in the laboratory that can later be fed into adaptive research. Such strategic research is essential for the development of new methods and techniques.

Conclusions

It is important to recognize that postharvest research and technology transfer involves people and it cannot be wholly conducted in a laboratory or on a research station. It is proposed in this paper that strategies and tools such as needs assessment and on-farm research are needed to assist scientists to interact with their clients. The complex nature of postharvest systems demands that interventions are not only technically appropriate, but also are economically viable and fit within the social and cultural circumstances of those who are going to use them. This means that a multi-disciplinary approach is required to ensure that postharvest research and technology transfer interventions have an impact.

Thesis, J. and Grady, H. 1991. *Participatory rapid appraisal for community development.* IIED/Save the Children Federation, London.

Westby, A. 1999. *Getting to the roots (and tubers) of development.* Inaugural professorial lecture. Greenwich University Press, Greenwich, U.K.

Westby, A., Kleih, U., Hall, A., Bockett, G., Crentsil, D., Ndunguru, G., Graffham, A., Gogoe, S., Hector, D. Nahdy, S. and Gallat, S. 1998. Improving the impact of post-harvest research and development on root and tuber crops: The needs assessment approach. *Tropical Agriculture* 75:143-146.