Grains aren’t really food until they’ve been processed into palatable form. In the case of sorghum and millet — two important cereal crops for millions of people living in the world’s semi-arid regions — the outside layer or hull of the kernels is usually removed before the grain is eaten. This gives the grain, or the flour made from it, a more acceptable texture when cooked.

The labour involved in this daily “dehulling” chore is monotonous drudgery for the women and children who do it. The grain is first soaked in water, then pounded by hand using a mortar and pestle. In Botswana, it takes about four hours a day to dehull enough sorghum for a family of five.

In 1981, sorghum and millet accounted for 28 percent of Africa’s cereal production. Despite their important position in the continent’s food system, they still represent only a small fraction of the cereals bought and distributed by official grain marketing agencies.

In some countries, sorghum and millet are still viewed as “poor people’s food.” Grown and eaten mainly by rural farmers, they are of little commercial interest to big urban-based milling enterprises.

In recent years, consumer tastes in Africa have begun to shift. Even though sorghum and millet stand up well to drought and can therefore enhance a country’s food security, Africans are showing a growing preference for rice, wheat, and prepackaged maize meal — no-fuss status foods, often imported.

In the early 1970s, IDRC began funding a series of research projects on the mechanical dehulling of sorghum and millet. The idea was to find a way around the “post-production bottlenecks” that was gobbling up so much of rural women’s time and relegate millers and sorghum to the status of second-class foods.

It was evident that efforts to breed better varieties of these crops would be wasted unless post-harvest processing techniques were updated.

In the mid-1970s the Botswana Agricultural Development and Research Institute (BADARI) entered the picture. BADARI, which later became the Botswana Agriculture Research Institute (BARI), was already well aware of the ‘dehulling-by-drudgery’ phenomenon and there was an interest in finding a more efficient way to dehull grains.

BADARI’s research, however, was limited to a modified mechanical dehuller that handled small batches of grain up to 5 kilograms.

It is in Botswana, though, that the dehuller has undergone the most sophisticated development, not simply as a discrete piece of hardware but as a complete food processing system, including machine design, manufacture, testing, training, consumer surveys, information dissemination, and public policy. Some aspects of this evolution were planned from the start; others, though natural offshoots, were unexpected.

Last year, the organization in Botswana that developed the system, Rural Industries Promotions, won the first International Prize in Development Technology. The competition for the award was organized by the International Centre for People’s Development in Genoa, Italy.

The Botswana experience is a complicated story, complete with the internal conflicts to be expected when a major component of a country’s food delivery system is radically altered. Above all, it is a story of intricate collaboration, over many years, between various government departments and agencies, technical innovators, mill owners, consumers, IDRC, and several other organizations.

In 1977, the Rural Industries Innovation Centre (RIIC) entered the picture. RIIC, which is an arm of Rural Industries Promotions, a private, nonprofit development company in Botswana, was already well aware of the ‘dehulling-by-drudgery’ phenomenon and therefore went to work adapting the PRL dehuller to rural needs. It added a trap door so...
that grain could be removed from the machine at any time. Thus, customers with small batches could have their grain dehulled on the spot and keep separate from other people's.

True to its name, RIIC is a rural operation, based in the large village of Kanye on the edge of the Kalahari Desert in Botswana. In the Centre's workshops and offices, engineers and technicians prepare diagrams, build models, manufacture parts, and experiment with new materials. A variety of technologies are under development here: animal-drawn water pumps, windpumps, solar desalinators, farm carts and trailers, biogas plants. And, of course, dehullers. At the same time, young Batswana are being trained in breadmaking, carpentry, tanning, metalworking, milling, and other trades.

As a backdrop to this daily bustle is the continuous hum of the dehuller and hammer mill run by RIIC as a commercial venture to defray operational costs. Local women bring in 10 kilograms of their sorghum at a time to be dehulled and ground into flour for a small fee. The mill can also handle large shipments of sorghum.

With IDRC and other funding, the PRL dehuller went through a relatively quick metamorphosis at RIIC. In addition to modifying the machine to handle either small batches or a continuous flow of grain, the engineers strengthened, lightened, and simplified it. For example, a small platform for holding a container under the grain outlet proved to be unnecessary and was therefore eliminated. This not only cut production costs and manufacturing time, but made it easier to create the dehullers for transport.

The machine's appearance was also spruced up, a problem of leaking bran corrected, and the bearing housing improved. An operator's manual was also produced in English and Setswana and RIIC was able to provide the necessary performance information to help entrepreneurs get credit to set up sorghum mills.

In the past few years, two major developments have been the transfer of the manufacturing technology to the private sector and the appearance of an export market. Two local companies now build dehullers under the guidance of RIIC, which continues to be responsible for marketing and servicing. RIIC also exports dehullers to about 10 other African countries including, ironically, South Africa which is normally the supplier in its trade with poorer neighbours.

By 1986, 25 small-scale mills (each comprising an engine, one or more dehullers, and a hammer mill) were in operation throughout Botswana, providing about 200 jobs. A small-scale sorghum milling industry is thus now in place, covering the populous eastern region. It even has its own national association to share information and to look after its interests, especially in regard to government pricing and grain supply policies.

Although the industry is well established, factors such as government policies, the 1981–85 drought, and competition from wealthy mill owners who are well supplied with grain have changed its complexion, clouding the prospects for small rural service mills. The dehuller–mill package was originally conceived by RIIC fundamentally as a rural service operation, that is, catering to farmers with small batches of homogenous grain. A number of mills, however, now operate as commercial factories, handling bulk loads of several tonnes, and the three largest operations now control about two-thirds of the sorghum flour market.

On the brighter side, sorghum has been given a more secure home market in Botswana and many rural women no longer have to spend tedious hours dehulling by hand. According to Rural Industries Promotions' 1986 Report, a substantial proportion of that time-saving "is put into new productive activities". Perhaps as important has been the creation of a pool of indigenous knowledge and technical expertise.

The success of the dehuller in Botswana has not gone unnoticed in the rest of Africa. RIIC has helped to train researchers from Kenya, Malawi, Senegal, Tanzania, Uganda, and Zimbabwe in the initial stages of their dehuller-adaptation work.

In Zimbabwe, the local branch of an African nongovernment organization known as ENDA has launched a four-year nation-wide project to develop and disseminate dehuller technology in that country. It is being conducted in cooperation with the Ministry of Agriculture. Preparatory work was supported by IDRC.

The project goals are to ensure that local metalworking companies are able to build the dehullers, to have 40 milling systems installed throughout the country, and to set up a credit system so that operators can buy equipment. The four-year project will receive more than $3.5 million from the Canadian International Development Agency.

The Botswana experience, as well as lessons learned by another Zimbabwean nongovernment organization from an earlier mill installation, pointed out the importance of matching the dehuller's size to local population patterns and demand. In Zimbabwe, where the rural population is more dispersed than in Botswana, ENDAl investigations made it clear that a relatively small dehuller would be needed. ENDA therefore lengthened the barrel of the PRL mini-dehuller and added a trap door to handle small batches. The result is a locally made machine smaller than the RIIC model but larger than the one used in the Gambia. It is currently being tested in five locations and IDRC is optimistic about the future of the technology in Zimbabwe's food system.

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