

# Scaling the use of cassava peels as quality livestock feed in Africa



## Expected impact

Transforming fresh cassava peels into high quality, safe and hygienic livestock feed has been demonstrated as technically feasible and economically competitive against existing equivalents. Over the five-year period of the project, the impact of improving the transformation process and scaling up the use of cassava peel-based feeds in Africa, include:

- Producing at least three million tonnes of high quality feed;
- Eliminating of 10 million tonnes annually, or 20% of potential cassava peels pollutants, from the environment;
- Creating 100,000 new jobs—80% for women;
- Establishing a new component of the cassava value chain conservatively worth USD450 million, and given multiplier effect of cheaper agricultural inputs, African economies stand to benefit by up to USD900 million; and
- enabling of the private sector to independently drive increased uptake of related technologies and product uses.

## Background

Livestock production—accounting for more than 70% of agricultural land use globally—is expected to more than double in the next 40 years to meet rapidly rising demand for livestock products, especially in developing countries. Given the fixed land supply and the need to reduce human-livestock competition for food-feed grains, developing alternative and sustainable feed sources to boost livestock production is essential. With the steady increase in cassava production, averaging 3% per annum since 1995 in Africa and Nigeria, animal feed generated from cassava peels holds

enormous potential. Due to its affordability, ease of storage and resilience to climate change, this growth rate is expected to continue, bringing annual production in Africa and Nigeria to approximately 350 million and 150 million tonnes.

Yet 98% of Nigeria's cassava peels annually are wasted due to constraints associated with drying and concerns about safety of use, particularly hydrocyanide and mycotoxins-related food poisoning. Drying peels outside, practically impossible during the rainy season, takes two-three days otherwise. Consequently, peels are left to rot in heaps or set on fire—both polluting the nearby air, soil and groundwater and wasting a potential feed resource.

In 2015, CGIAR scientists developed low-tech ways of transforming wet cassava peels into high quality, safe and hygienic feed ingredients within eight hours, producing one tonne of high quality cassava peel (HQCP) mash from three tonnes of wet peels. Thus, Africa's and Nigeria's estimated 50 million and 14 million tonnes of cassava peel waste per year could generate at least 15 million and 4 million tonnes of HQCP, substantially addressing shortfalls in the supply of animal feed and creating a USD 2 billion a year industry on the continent. Of course, safe and hygienic processing standards will need to be promoted among processors and users to allay safety, storability and other concerns. Over a five-year period, related research and development activities are expected to facilitate about 20% of the sector's potential transformation, so that further scaling can rely on private, and not donor, funding.

*Mechanized sieve for separating mash into fine and coarse fractions.*



1. Technical options enhancing feeding regimes, and improving the quality and supply of cassava-peel products.
2. A clear, practical and convincing body of data and knowledge on the economic feasibility/ competitiveness of HQCP mashes vis-à-vis other available feed ingredients.
3. Organization models for collective action among small-scale processors and rural households facilitating take up of innovative production practices.
4. Protocols, and business development guidelines and plans, enabling investment at varying scales in various enterprise prototypes related to processing and marketing HQCP products.
5. Detailed and geo-referenced country- and district-level maps identifying sources of cassava peels, and information on daily volumes processed, to guide investors establishing HQCP-production facilities.

Other outputs will include the provision of support to relevant ministries in developing pro-HQCP policies, including tax relief for feed manufacturers using HQCP mashes in rations; and publications in peer-reviewed journals, presentations at scientific and business fora, seminars, etc.

*Accumulation of peels left at an unofficial dump.*



## Project objectives

The key objective of this project is to enhance and scale up the technical processing of cassava peel into high quality, hygienic and safe livestock feed meeting industry and farmer demand, specifically to:

- i. Further improve the nutrient quality and availability of cassava peel products and associated feeding recommendations;
- ii. Provide additional income to cassava producers and processors;
- iii. Reduce environmental hazard from cassava peel production;
- iv. Increase availability and reduce the cost of feed for ruminants and monogastrics; and
- v. Increase employment opportunities in HQCP value chains.

## Project outputs

The principal research questions include the optimization of nutritional quality, storage practices and feed safety, and of the production process. Researchers will examine the most appropriate production scale and organizational models, e.g. efficiently organizing the use of inputs and final products given that cassava peels are frequently found over vast areas of land. They will examine all investment opportunities available, including the smallest viable business size, and how the most disadvantaged can benefit equitably from participation in the sector. Trials will also be conducted to identify the best quality/ cost-effective ratio for HQCP-based feed. Project outputs will include the development of:

*Attempts to eliminate cassava peels by burning them.*



## Beneficiaries and impact

The project targets millions of cassava-producing and -processing households in Africa, three and one million respectively in Nigeria alone, 80% women. Buying cassava peels at more than USD15/t and selling mash at USD150/t, new entrepreneurs stand to make a considerable profit and remain competitive vis-à-vis maize products, for which HQCP mash is a viable substitute. At USD15/t, primary producers and processors stand to gain as much as USD210 million annually, generating 40 million workdays of new employment in Nigeria and 150 million in Africa as a whole. Transforming 20% of the sector's potential will generate at least 25,000 new jobs in Nigeria and 100,000 in Africa after five years, 80% for women. Depending on the end product and volume of production, a range of business sizes are expected to be active in this area.

Cassava waste, generated as a by-product of garri processing, would be processed into high quality livestock feed, benefiting producers, workers, entrepreneurs and consumers. In Nigeria alone, three million cassava producers would benefit from the sale of cassava peels and undersized roots, as well as increased investment in the sector. Garri producers and their employees stand to benefit from the sale of the waste, both

financially and in terms of a cleaner working environment. The nascent processing sector would attract investment, creating businesses and jobs throughout the economy. Feed millers would be able to buy cheaper ingredients, potentially growing their businesses and market share. Livestock producers would have access to better and cheaper feed, reducing operating costs and potentially boosting the quality and quantity of animal source foods produced. In addition to the additional supply of grain available for human consumption, consumers would benefit from the availability of cheaper and better animal source foods, improving health outcomes, particularly the cognitive health of children.

Other impacts over the five-year period include the:

1. Production of at least three million tonnes of high quality feed, or  $6.3 \times 10^9$  Kcal ME, annually;
2. Elimination of 10 million tonnes annually, or 20% of potential cassava peels pollutants, from the environment;
3. Creation of 100,000 new jobs—80% for women;
4. Establishment of a new component of the cassava value chain conservatively worth USD450 million, and given multiplier effect of cheaper agricultural inputs, African economies stand to benefit by up to USD900 million; and
5. Enabling of the private sector to independently drive increased uptake of related technologies and product uses.

*Peels processed into high quality mash*



## Project implementation

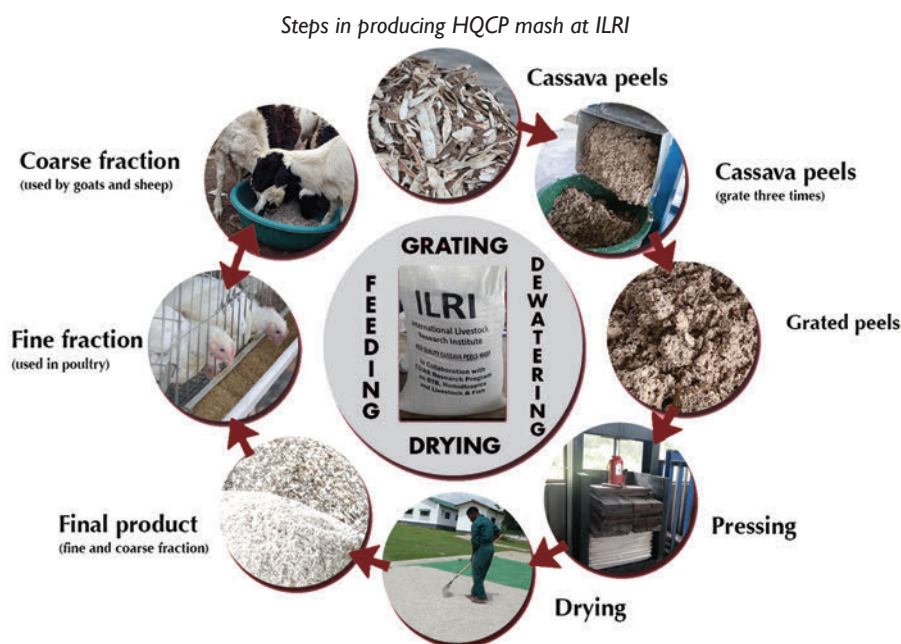
The proposed project requires high quality science in the disciplines of agricultural (process) engineering, cassava breeding, animal nutrition, business development and management, financing and economics. It also requires the leadership of a renowned knowledge broker, with a network of partners able to bring their strengths and experience in moving research outputs to development outcomes. The research leading to the development of HQCP products—upon which this proposal builds—is a collaborative effort involving CGIAR scientists from International Livestock Research Institute (ILRI), International Institute of Tropical Agriculture (IITA) and International Potato Center (CIP) and is supported by CGIAR Research Programs (CRPs) on Root Tubers and Bananas (RTB), Humidtropics, and Livestock and Fish (L&F). Working closely with private sector partners, ILRI is leading the effort to develop and improve innovative technologies for processing cassava peels into high quality livestock feeds. These implementation arrangements have so far been successful and will be adopted for the proposed project.

## Proposed locations

The Democratic Republic of the Congo, Nigeria, Tanzania and Uganda, responsible for at least 40% of Africa's annual cassava production, have been selected as the proposed project sites. The research is being led by ILRI Ibadan, in collaboration with IITA and the Humidtropics, L&F and RTB CRPs; each of which is present in at least one of the four countries. ILRI and IITA Nigeria will serve as the hub for coordinating, evaluating and fine-tuning the project activities.

**Project budget and duration:** USD25 million over five years.

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