

INSECTS AS FOOD AND FEEDS

By

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Food and nutrition insecurity remain a major challenge in sub-Saharan Africa due to especially limited access to proteins. Protein is often the most expensive ingredient in human food and animal feeds. Insects have been identified to be an inexpensive alternative source of animal protein for food and feeds due to their nutritional value and efficiency in food conversion. However, the development of insect technology for food and feed is hampered by limited capacity in research, training, outreach and technology development and transfer.

Jaramogi Oginga Odinga University of Science and Technology (JOOUST) has established the *Africa Center of Excellence in Sustainable Use of Insects as Food and Feeds (INSEFOODS)* with funding from the World Bank. INSEFOODS is one of the 24 competitively selected centers at universities in eastern and southern Africa under the World Bank's *Eastern and Southern Africa Higher Education Centers of Excellence Project II (ACE II)*. The development objective of the ACE II is to strengthen selected eastern and southern African higher education institutions to deliver quality post-graduate education and build collaborative research capacity in the regional priority areas.

The overall objective of INSEFOODS is to achieve long-term food and nutritional security by using insects as a cost-effective, reliable and sustainable source of protein and other nutrients for food and feeds. To achieve this objective, INSEFOODS' strategy is to develop and offer high quality regional and internationally accredited masters, doctoral and short courses programs in food security with insects for food and feeds as the entry point. The educational programs will involve teaching, research, product development and commercialization, and student and staff exchanges in different disciplines related to insects as food and feeds across Africa. The Centre has developed a Masters and Doctoral programs in Food Security and Sustainable Development.

The programmes are currently undergoing accreditation by the Kenya's Commission for University Education (CUE). Upon CUE accreditation in due course, students will be recruited regionally across Africa into the programmes.

Throughout Africa and even in other parts of the world, insects are eaten by humans and animals such as poultry and fish. They are known to have rich quantity and quality of proteins which are harvested from nature at minimal cost. Research at JOOUST over the past several years has shown that certain insects can be domesticated and produced in commercially viable quantities for food, while others can be produced from urban organic waste for feeds thus enabling recycling with huge environmentally friendly results. INSEFOODS offers an opportunity for scaling up and out the research and training initiatives at JOOUST to a regional level through establishing partnerships at local, regional and international levels with both public and private sector institutions and industry.

Unlike the conventional sources of protein such as bovine, poultry and fish, insects have a higher feed conversion ratio converting most of their feed into edible protein. Insects can be used directly as food or ground into flour to fortify other foods. Insect flour can be used as ingredient to make products such as biscuits, cakes, porridge and chapatti.

Insects have a high protein content of over 60g/100g dry weight basis. This is higher than that of soybean (by 40 percent dry weight basis) and beef (by 36 percent dry matter basis), which are among the common conventional sources of proteins. The high protein content can be used to solve the Protein-Energy-Malnutrition (PEM), a condition that is evident in children suffering from kwashiorkor and marasmus in much of Sub-Saharan Africa. Such children appear wasted and stunted.

Apart from protein, insects are a rich source of fats, especially the polyunsaturated fatty acids, which have many health benefits, and minerals such as iron and zinc. These minerals are very important in children's growth and development.

There are other advantages of rearing insects. Climate change has resulted into unpredictable weather patterns. Farmers are no longer able to predict rainfall patterns and as a result the productivity of traditional crops such as maize, millet, sorghum and beans has gone down. However, rearing insects is independent of climate change. Farmers are able to rear them throughout the year and thus their production and profitability is sustained.

One of the contributors of climate change is increased emissions of greenhouse gasses. Compared to insects, cattle produce more than 300 times more greenhouse gasses than insects per kilogram of body mass gained.

The amount of water that is required for the growth of insects is relatively low compared to other animals that are reared. In addition, only a small size of land is required to rear insects. The cost

of production for insects is very low and affordable by smallholder farmers because they feed on materials that are cheap and readily available within the environment. Insect production therefore presents a viable alternative farming enterprise.

Despite their high nutritional and economic benefits, insects have not been fully exploited for food and nutritional security. Many communities have not embraced insect rearing. Some view insect consumption with disgust and as a primitive practice. Both technical and socioeconomic research and development is required in order to fully exploit the huge potential of insects for food and nutrition security.

The INSEFOODS' budget for World Bank funding is USD 6 million over a five year period starting May 2016. The World Bank funding will cover activities such as the development and offering of curricular for masters, doctoral and short courses programs in food and nutrition security, rehabilitation and upgrading of teaching and learning facilities, rehabilitation and equipping of research laboratories, provision of limited research grants and scholarships, support for student and staff exchanges, support for regional and international partnerships and collaboration, and support for administrative and coordination activities. The Center is expected to mobilize and generate additional resources to cover additional needs and sustain its activities especially beyond the World Bank funding.

A key feature of INSEFOODS is that it regional and gender responsive in nature in student admissions and staff exchanges for teaching, research and outreach. To attract regional students and staff, INSEFOODS is establishing well equipped laboratories and lecture halls as well as comfortable and safe graduate student study and hostel facilities.