Case 2

Maggots - Nature's Nurses

reduce waste, promote health and generate 500,000 jobs within a decade

This article introduces the maggot farming on offal as one of the 100 innovations that shape The Blue Economy, which is known as ZERI's philosophy in action. This article is of part of a broad effort by the author and the designer of the Blue Economy to stimulate open source entrepreneurship, competitiveness and employment. For more information about the origin of ZERI <www.zeri.org>

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The Market

One estimate puts the amount of slaughterhouse waste around the world at 200 million tons. The average weight of animal waste per European resident is approximately 150 kg per citizen per year putting the continent's share at 60 million tons. For each animal we eat, approximately 50 percent ends up as waste. This has created a little known billion dollar industry which converts carcasses, blood, brains and offal into recycled meat, bone meal and animal fat.

As demand for animal feed increases to keep pace with humanity's growing appetite for it, turning animal waste into animal feed has kept supply in balance. Demand for meat and feed in developing countries is skyrocketing. India is turning into one of the world's largest livestock holdings requiring 37 million tons of animal feed annually. Local abattoirs claim that 17 million tons could be supplied from their own waste. Grazing land is scarce and overgrazing causes soil erosion. The supply of hay, corn and soy can't keep up with demand, thus animal waste has become an option. What few realize is that dairy cows and pigs which are natural herbivores are unwittingly turned into carnivores. The scare around mad-cow disease forced many governments to prohibit

this practice and most animal waste is therefore simply incinerated at high temperature, converting waste from cows to kilowatts.

Another piece of data to keep before us when considering the innovation described below is that the cost of wound treatment for a leg ulcer is approximately $ 2,000 per patient. However in the case of a diabetic suffering from a foot ulcer the cost is estimated at $ 30,000. A gel treatment with antibiotics on average takes 72 days. This increases the time a patient spends in a hospital bed. Unsuccessful treatment of ulcers leads to amputation, requiring life long social and medical care exacerbating the demand on government budgets which are already under considerable pressure.

The Innovation

Father Godfrey Nzamujo initiated in 1986 the Songhia Center in Porto Novo, the capital city of Benin. The Nigeria-born priest established a food production center cascading nutrients and energy following the Chinese traditional farming model known as integrated biosystems (IBS). Over the years Father Nzamujo converted whatever is considered waste from one process into a value added input for another. Waste plant biomass is a substrate for mushrooms, waste water is converted into biogas, leftovers from food processing is feed for animals and the slaughter house waste is used to farm maggots.

Flies create an unhealthy environment. Offal like any decomposing waste attracts flies. Father Nzamujo turned this challenge into an opportunity, creating “a fly hotel” where all offal is carefully spread over hundreds of small square open containers with nets blocking birds out. The flies lay eggs and produce up to one ton of maggots each week. The maggots, rich in protein, are harvested and served as feed for fish and quails. The process generates low cost protein and concentrates all flies into one area while eliminating a major nuisance for the farm.

In parallel Professor Stephen Britland built his career at Bradford University (UK) around the study of the health benefits of maggots. The use of maggots for wound care has been practiced by the Mayas and the Aboriginal tribes. Napoleon’s physician observed during his Egyptian exploit that soldiers whose wounds had become colonized with maggots experienced lower morbidity than others. Professor Britland has demonstrated that instead of applying live maggots, as proposed by the Welsh company Zoobiotics, enzymes extracted from the maggots’ saliva could do the same job without causing the patient discomfort.

Professor Britland went on to create with partners Advanced Gel Technologies, combining innovations in gel research with the active ingredients from maggots. The present hypothesis is that the maggot enzymes not only cleanse the wounds, but

produce an electro-magnetic environment that stimulates cell growth. Research undertaken by Professor Nicky Cullum, a specialist in wound care, confirmed the efficiency of maggot treatment in the British Medical Journal in March 2009. Maggot treated wounds clear in 14 days, five time faster than those treated with antibiotics.

The First Cash Flow

Father Nzamujo reduced the cost for fish feed thanks to the massive production of maggots. However, the greatest financial benefit is obtained from the quails which produce eggs that are in high demand in Europe. The export of eggs from free range and naturally fed quails generates substantial revenue. However, when exposed to the production system of Father Nzamujo, Professor Britland quickly understood that the cost of production of maggot enzymes in Benin is only a fraction of their production cost in the UK. The extraction of enzymes is easy - simply submerge the maggots in salt water and all active ingredients are excreted. The live maggots can then be fed to fish and birds. While there are issues to be resolved around the sterilization of this biologically active compound, the volume from Benin permits a broad market entry at considerably lower costs.

The Opportunity

Maggot nurses are of interest not only to the 800 medical centers in the US and UK that offer such wound treatment since the Food and Drug Administrations in Europe and America approved the procedure in 2005. The biggest opportunity is likely in Africa itself. While we are well aware of the havoc generated by AIDS, malaria and iodine deficiency, what few know is that millions of Africans are marginalized in society due to ill-treated wounds. At the same time, millions of Africans are exposed to unhygienic living conditions in and around abattoirs.

If all of the waste from abattoirs were used to produce maggots for wound care, fish and bird feed, then the 3,000 recognized slaughterhouses could generate an additional 500,000 jobs, while manufacturing local treatments, reducing the cost of wound care, and limiting the social marginalization caused by lack of health services. In 2012, AgriProtein, headed by David Drew has replicated the business model in Cape Town in collaboration with Stellenbosch University and initiated the commercial sale of protein. A new industry is taking shape.

Gunter Pauli is the author of the Report to the Club of Rome: “Blue Economy: 100 Innovations - 10 years - 100 million jobs” published in 35 languages worldwide.

For further background on the 100 cases: www.TheBlueEconomy.org