End starvation by improving the efficiency of African agriculture

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EIR: As many as 250 million of 400 million people in black Africa face starvation over the coming year. Beyond the logistical problems of delivering emergency aid to these people, how would you set up an American-style land-grant agricultural-extension system in Africa to transplant our method of generating more advanced agricultural technologies to that continent?

Davis: Setting up an extension-type agricultural service involves training individuals who have knowledge of agriculture to work more closely with local African farmers to phase in new technologies which improve the efficiency of agricultural production. Setting up meaningful liaison for information transfer from the United States to African countries involves setting up sister-institution collaboration between centers of agricultural research and training on each continent.

First one would work with existing African governments to get an overview of what agricultural institutions already exist, what is in place and what needs to be added. Then, one would set up collaboration between sister institutions, with several institutions in the United States providing faculty and sending their faculty on extended leave to teach and conduct research in expanding centers for research and training in Africa. For example, Kenya has a college of veterinary medicine; years ago faculty had grants to travel to work in an international veterinary research center over there.

One needs at the same time to provide financial resources for effective teaching, so that the equipment is available to develop adequate laboratory facilities. A good animal-disease control lab has reasonably sophisticated equipment; setting one up costs from one half to one million dollars, just in equipment.

EIR: Couldn't corporations be given tax credits to donate such equipment in the interest of humanity, or a grant system be established in which grant money were matched dollar-for-dollar by corporation money?

Davis: There needs to be a mechanism to service equipment, initially by flying in service representatives, but at the same time training local people to take over servicing and troubleshooting. Yes, several such mechanisms have been used in the past to draw companies into programs in countries. It is also crucial to obtain the right equipment, which will function in tropical areas and service well in remote, outlying areas, as well as to get local people trained to service and use this equipment.

One needs flexibility in grants for service training. Many assistance programs, even for countries as close as Mexico, train researchers, but then they go back to nothing: no equipment or facilities to function on the level they have been trained. They then either become administrators or are nonfunctional due to lack of equipment and resources. With the exchange of researchers and faculty from one country to another, there must be necessary labs in place in developing countries.

EIR: How long would it take to establish a modern, growing center for agricultural education and research working off an already existing, small veterinary teaching facility in an Africa country?

Davis: If faculty could be provided from the United States to stay in various African countries to train existing African faculty and new faculty, it would take roughly 10 years to create a self-sustaining research and teaching sister institution. The first several years, one is still assessing what needs to be brought together, what sort of research problems need to be tackled and teaching capacities expanded to generate a successful, self-sustaining institution. At the same time, the first five years will be needed to build research and teaching facilities, designing them, constructing them, and equipping them. No matter how fast you wish to see this take place, how much you try to speed up this timetable, it actually ends up taking almost five years to realize.

Simultaneously, we already have in place in the United States the potential to take Africans on short-term training here for one to several years during the building phase. This upgrading of their level of education intimately ties them into the most advanced research phases of the overall program.

They help build it, come over here to expand their capacity to carry out research in the long-term back in their country, and are sent back to their home country for short leaves during this period of training in the United States to see how things are growing in the new agricultural center and to keep their nationalism alive.

It is important that the new sister institution is designed to become self-sustaining within 10 years, so that by that time the government of the African nation will assume full responsibility for the program. It may be necessary for the United States to give an extension in financial support for a short time beyond that, but the funding must be brought down with time. This always presents problems for the government of the developing country involved, but agriculture is one of the most important components of any program for the industrial development of any nation.

EIR: During this period of development of an agricultural research facility in Africa, how much would the efficiency of production increase, say in the first 5 years, the building phase, and in the first 10 years as the agricultural center reaches a phase of self-sufficiency?

Davis: There are many problems that must be tackled to increase the efficiency of agricultural production in Africa. If you take care of just, say, the worst disease problem affecting productivity, other disease problems will expand as the first problem is brought under control. However, if you work in parallel on all the major problems simultaneously, you would see visible progress over the first three to five years. In that 10-year period, the country would experience a several-hundred to thousand percent increase in the efficiency of production. Beyond that period, you are adding precision to the approach that is necessary to eliminate all these major problems, and beginning to deal with totally new problems as they occur.

EIR: What kinds of major problems would be tackled in this initial 10-year period?

Davis: Significant gains in productivity could be achieved just on the simple level of agricultural extension services: teaching African farmers agricultural husbandry. This involves how to handle forage, handling of animals, more effective crop management, looking at soils to test to determine how much fertilizer of what sort is needed, what are the best crops to use, and the most effective rotation to avoid compacting of soil and similar problems. This level could involve a Peace-Corps-type extension service, but utilizing people trained in good agricultural schools, over here or over there, who are given additional training to supplement agricultural-school training.

Simultaneously, vaccination campaigns, to deal with diseases like render pest for which vaccines already exist, but significant productivity losses currently exist, should also be undertaken on this level.

On the research level, programs for creating effective vaccines for major cattle and human disease problems in Africa must be expanded both in the laboratories in the United States, and in the field: the growing sister institutions on site. Trypanosomiasis, sleeping sickness, is a major human and livestock disease which prevents roughly one-third of Africa from growing livestock. This disease is transmitted by the tsetse fly, which is difficult to eliminate in vast sections of Africa. An effective vaccine against typanosomiasis would result in opening up millions of acres for agricultural production, a tremendous leap in productivity in areas where as things stand now, the majority of the livestock die and the population is debilitated.

Simultaneously, research must create vaccines against ricketsial diseases. These are biological agents that are in between viruses and bacteria; they act more like bacteria that have lost crucial enzymes which the cells of the infected host animal provide. In Africa, anaplasmosis, a world-wide ricketsial disease, and heartwater cause considerable losses in livestock productivity. The most advanced vaccination research today, that of taking the infective agent's genetic material apart to find which sub-unit is the most effective for the creation of vaccine immunity, will be tremendously useful in creating vaccines against these diseases.

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Also simultaneously, the protozoan diseases, like babesiosis, must be researched to develop effective vaccines.

Plus, some of the agricultural diseases that exist in the United States, such as hoof-and-mouth disease and blue tongue in sheep have many variants and no totally effective vaccines. The hoof-and-mouth virus has 60 known sub-varieties in South America, blue tongue has at least 21 known sub-varieties. This presents a problem like that experienced in the development of the polio vaccine for humans. Once it was

discovered that the many sub-varieties of the polio virus all belong to three main sub-types, it was possible to create a vaccine against these three main sub-types of polio which would give effective immunity against all known sub-varieties of the polio virus. The earliest efforts at developing a polio vaccine failed primarily due to the fact that they protected only against one of the main sub-types of polio.

EIR: How long would this research take, to begin to develop effective vaccines against these major diseases which cripple agricultural productivity in tropical areas like Africa?
Davis: That depends of the level of funding for this sort of research, and the rate at which diagnostic labs and resources were developed in the field, in the new agricultural centers in developing countries. If we had adequate resources, we could improve the efficiency of production dramatically over a five-year period. This would be going on in parallel. We are doing the research right now over here, at an inadequately funded level. Under an adequate increase in funding, you could have the vaccines against these major diseases in Africa ready to go by the time the new agricultural centers were built over there.

EIR: The same problem exists in the research currently being done on creating a malaria vaccine, which would create a major increase in agricultural productivity in Africa and Asia just by eliminating a major debilitating human disease. But what other levels of agricultural research must be simultaneously geared up?
Davis: A longer-term goal involves research work on improvement of breeding stock, bringing new genetic material into areas like Africa and Asia to upgrade the genetic stock of their animals, which although less productive than our livestock, are better equipped to withstand tropical diseases and local climatic conditions. I am working on the genetic mapping of specific traits of cattle, so that it would be possible to analyze all the desired breeding traits by a blood test which analyzes genetic material in the cow's white blood cells. This would enable breeders to know, when a calf is born, by a simple blood test, whether this calf has inherited the desired genetic traits and should be kept for breeding herds, or whether the calf should be culled at some marketable point. Right now breeders must wait five years for that calf to mature before they can begin to see whether it carries the desired breeding traits. With adequate funding, an intensive research program in the United States could develop this technology to a useable point in the next five years.

We would use such a technology in combination with superovulation and embryo transfer to dramatically increase the rate at which prime breeding stock can be propagated to increase the productivity efficiency of the ordinary farmer's herds. Existing superovulation and embryo transfer enable us already to increase that rate of transfer of superior genetic breeding into Old MacDonald's herd 20 times faster than by existing classical methods. Combined with this new research, the rate would go to close to 100 times faster than existing classical methods of breeding.

Thus, by the time the new agricultural centers were built in Africa, we could bring in, at a very rapid rate, very drastic changes in the genetically linked productivity of African breeding stock. This involves not just genetically linked disease resistance, but genetically linked factors such as weight gain, the metabolic ability to more effectively convert forage into weight. It also involves the rate at which the animal converts forage into meat, muscular weight, as opposed to fat weight; this too can be selected for.

Once we tackle various major disease problems in African herds, we will be able to phase in the use of growth hormone to dramatically improve the production of meat or milk in an animal even before we have time to introduce better breeding stock. Just released research shows that growth hormone can increase the production of milk in the ordinary dairy cow by 30% or more. Growth hormone is a natural drug, but it still has to be approved for commercial use after research is done showing what, if any, effects the use of growth hormone in cattle has on their immunity to various diseases. We expect the use of growth hormone to be phased into U.S. domestic cattle and dairy production in the next few years, with dramatic increases in productivity at that time.

Once disease control is in place in Africa, growth hormone could mean overnight dramatic increases in cattle and dairy production.

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EIR: What major centers of agricultural research are there in the United States that would be involved in helping to establish sister institutions in Africa or Asia?
Davis: The Cornell Veterinary School in New York, the University of Minnesota Twin Cities College of Veterinary

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Medicine and Animal Sciences section, the University of Wisconsin-Madison Animal Sciences and Veterinary School, the University of Florida College of Veterinary Medicine, the University of California-Davis School of Veterinary Medicine, the University of Colorado-Boulder School of Veterinary Medicine, Washington State University at Pullman School of Veterinary Medicine, the University of Illinois-Urbana new Animal Sciences Unit.

EIR: This is mainly for the animal husbandry side of agriculture, and doesn't include crop research at places like Texas A&M?
Davis: Yes.

EIR: You would expand what already exists in Kenya as an international center to train people from other African countries. But how about in West Africa?
Davis: I am less familiar with West Africa, but Nigeria has facilities, and a very good educational base, even if those facilities are currently in a state of disrepair.

EIR: How about Southeast Asia, particularly Thailand and India?
Davis: India, as things currently stand, just doesn't have the resources to look into animal diseases, but they have all the trained personnel. A certain amount of liaison with India already exists through the U.S. Department of Agriculture, the National Institute of Health, and the National Science Foundation exchange scholarships. They have institutions, a college of veterinary medicine and animal sciences. A tremendous amount could be done in a very short time because of the level of training that already exists untapped there. I would create an international agricultural research center in India and use it to train nationals from all over Southeast Asia.