

THE FUTURE OF AFRICA'S PASTORAL MILLIONS--
AN EPIDEMIOLOGIST'S VIEW

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Bob Dyar was a personal friend and a friend of our epidemiology program at Davis, so I feel deeply and especially honored to have been asked to present the inaugural lectures in this series and I want particularly to welcome today from the East Coast Bob's sister.

For some of you without medical backgrounds, let me say that epidemiology is simply the study of diseases in populations. A unique feature of our program at Davis has been that, while emphasizing quantitative aspects of epidemiology, it has not neglected biological approaches especially apropos to the study of ecologically complex infections, nor field-based, intelligence approaches to disease occurrence as adjuncts to practice.

What I shall speak about this afternoon draws partially upon advances in that third intelligence facet of epidemiology for considerably broader applications than veterinary or human medical practice, namely new ideas for sustainable development among Africa's tens of millions of pastoralists. The other origin of these proposals is the historic closeness worldwide of veterinary practitioners to rural people *where they actually live*. Almost everywhere in the world, their veterinarian still remains for a rural family the most highly educated person likely to cross its threshold.

Pastoralists are people who maintain grazing or browsing livestock and pastoralism is prominent in the majority of countries worldwide the United Nations has classified as "Least Developed" (so-called LDCs or the Third World's Third World). The largest number of LDCs are in Africa. Overall, more than 134 million people live in these poorest African countries.

There are two main types of pastoralists, sedentary and migratory. My experiences had been solely with the sedentary variety until I joined the faculties of medicine and public health of the American University of Beirut in the mid-1950s. There I developed a

research program on hydatid disease, the most prevalent of serious infections especially afflicting pastoral peoples worldwide. The parasite which causes it grows like a cancer within the body of people, sheep, cattle and other animals who become infected if they swallow the parasite's eggs shed in the feces of infected dogs.

Those studies soon afforded me opportunities under the aegis of the World Health Organization-- which continued for four decades-- to interact intensively with migratory pastoralists worldwide. In countries as far afield as Iceland, Cyprus, New Zealand and Uruguay hydatid disease has been considered by national public health authorities to be their major human health problem. My first encounter with African pastoralism per se was in 1956, then in 1961 I had the opportunity to work for a year in East Africa, during which I began interactions with the southern Sudan's more than two million pastoral Dinka and Kenya's less numerous Maasai and Turkana. I demonstrated then that the Turkana of northwestern Kenya were more commonly infected with the hydatid parasite than were any other people in the world.

While the Turkana are nomads, the Dinka and Maasai are transhumants, the difference being that transhumants have home bases to which they return for portions of each year while nomads are constantly on the move. Some transhumants also practice crop agriculture at these permanent settlements. Such migratory peoples predominate throughout broad expanses of sub-Saharan Africa, including its Sahelian and Sudanic belts and much of its east coast. Besides peoples I've mentioned, they include Arabs, Berbers, Tuaregs, Fulani, Galla, Somalis, Nuer, Mandari, Tutsi, Tswana, Swazi and dozens of other livestock-keeping tribes extending as far south as Natal's Zulu. Together, they number between 30 and 50 million, thus at least half as numerous as Frenchmen and twice as many as Australians. The Sudan has the world's largest pastoral population. Most of their present territories are inhospitable arid and semi-arid lands comprising 74 percent of West Africa, 70 percent of East Africa and 54 percent of southern Africa. In most of this enormous area there are no practically realizable land use alternatives capable of supporting present populations.

Major disasters have become commonplace among many of these peoples, but it was the severe several year drought in the West African Sahel in the 1970s that first brought their plight to the world's notice. That was followed by a succession of major droughts in Ethiopia and currently tragic situations in Somalia and the southern Sudan, as highly publicized examples. Evanescent television and other world press coverage have prompted sudden and temporary outpourings of emergency aid: "These are the children of the world ..." campaign etc. But they also give totally distorted views of these societies' normal existence within the ecologically marginal areas to which more and more of them are confined.

In recent years, civil wars have immensely complicated these natural calamities with which Africa's pastoralists usually cope amazingly well. In a number of countries ruling tribes since independence have been traditional enemies of its pastoralists, as in Rwanda, and animosities between them, or amongst groups of empowered and unempowered pastoralists, have resulted in complete breakdowns of their economies. Such total disasters have been encouraged enormously by rising militarism throughout the continent, a product of big power rivalry during the Cold War. The totally excessive arming of most African states with modern weapons has made it easy for military despots to seize and retain power and the United States and other countries most involved in this arms traffic are now reaping what they have sown, as in Somalia where rival pastoral clans now man competing segments of a totally disintegrated national army armed to the teeth first by the Russians and then by us.

I'll touch now upon some important characteristics of African pastoralism vis-à-vis possibilities for development. Africans today own more livestock per capita than do the people of any other continent and cattle are by far their most important species. In actual numbers, sub-Saharan Africa has about 163 million cattle versus 145 million goats, 124 million sheep and 13 million camels. But in the much more realistically comparable terms of Tropical Livestock Units (TLUs), which take into account weight differences among these species, cattle represent 114 million TLUs, as compared to only 15 million

TLUs for goats, 12 million for sheep and 13 million for camels. Cattle's subsistence function alone is almost without parallel elsewhere and their products comprise the bulk of the diet of many pastoral groups (e.g., among the Turkana milk, meat and blood of their animals supply 76% of their total food energy). It now requires six or more cattle per pastoralist to satisfy this purely subsistence purpose.

Beyond such, cattle occupy a paramount position in the lives of many of these peoples to an extent almost incomprehensible to outsiders. This widespread form of African pastoralism, described as "cattle complex" or "cattle culture", poses significant development questions that extend far beyond all purely material aspects. That is, cattle pastoralism is totally fused with almost all social, religious and other cultural aspects of life to such extents that its unconsidered modification can have disruptive effects as severe as cultural genocide amongst large, long established communities.

Aggrey Ayuen Majok, a Dinka and Ph.D. holder in epidemiology from UCD with whom I am currently writing a book on pastoral development in Africa, put it this way: "the Dinka's love for cattle is a strongly emotional thing which extends beyond ... likening to a Northerner's love for a ... favorite dog ... [and] the esthetic qualities of cattle that make them simply wonderful to look at ... [and] to which the Dinka ... respond in verse and song.... [C]attle convey a warm sense of total well-being ... namely that all is well and they can look out confidently upon what the world offers them." It is a Fulani saying that "When my wife dies I am sad, but when my cow dies I cry."

Dinka also make it clear that an inviolable three-way covenant has existed from the time of creation among themselves, cattle and a Spiritual Force in the sky. In this covenant, each has duties to the others which have ensured their joint survival and well-being from the beginning. The noted British anthropologist E. E. Evans-Pritchard has written about the southern Sudan's Nuer: "... the only labour in which they delight is the care of cattle ..., cattle and their kin-owners are symbiotic ..., [they] tend to define all social processes and relationships in terms of cattle. Their social idiom is a bovine idiom ..., *cherchez la*

vache is the best advice that can be given to those whose duty is to understand [Nuer] behaviour". Many African pastoralists will willingly die to protect their cattle. Thus, cattle's food importance is only the tip of the iceberg as to their overall importance within African pastoral societies.

This cattle culture is bulwarked by elaborate procedures whereby for a variety of reasons cattle are exchanged in traditional forms of commerce, many of them cementing important marriage and other social contracts. The most important thing to note is that cattle are not to most African pastoralists a source of wealth, but wealth itself. They, not money, are most pastoralists' "capital" and, parenthetically, we should note that modern financial terms like "pecuniary" and "impecunious" derive from the Latin *pecus* for cattle, just as the etymology of "capital" in a financial sense, literally "head", is "head of cattle". So much for some of our own more remote pastoral origins.

A word now about the importance of animal diseases in the lives of these peoples as explanation of why veterinary services play such an unusually pivotal role in African economy. Besides little and unpredictable rainfall, the major risks African pastoralists have faced historically have been epidemic livestock diseases. I'll illustrate this by referring to rinderpest, a viral infection of cattle whose historic consequences globally have been matched only by plague and malaria. Rinderpest swept through Africa within a few years after it was introduced from Asia with the Italian army invading Ethiopia at the close of the last century. Individual Ethiopian families lost as many as 12,000 cattle and 90% of its total cattle population perished, including most of its draft cattle, an event which triggered a major famine described in the words of one contemporary Ethiopian as "a scourge sent by God ...". A French missionary noted that "everywhere I meet walking skeletons" and another traveler that "it seems a cemetery" with the population driven to "eating of traditionally forbidden food, the abandonment of children ..., self-enslavement, suicide, murder and cannibalism." In tying himself to a plow in place of the fallen oxen, the Emperor Menelik wept and cried out "Oh! how my country has fallen in ruins! My people are finished."

Elsewhere throughout Africa the same. Only an estimated 5% of Maasai cattle survived and some 2/3rds of all Maasai themselves perished. One observer noted how cattle and human carcasses were so numerous "the vultures had forgotten how to fly." Lord Lugard, heading British forces invading Kenya wrote that such "powerful and warlike ... pastoral tribes [had] their pride ... humbled and our progress [in conquest was] facilitated by this awful [rinderpest] visitation. The advent of the white man had else not been so peaceful." In southern Africa also, where rinderpest's toll was well over 3 million cattle, a British official in Zululand wrote that this "destruction of African cattle gave the colony a most favorable opportunity for delimiting African lands which had thus been vacated" to the extent that, in neighboring Zimbabwe such continuing expropriations had resulted by 1930 in about one million African pastoralists being restricted to just under 30 million acres, while 40 million acres, including the best range lands, were in the hands of a mere 50,100 white settlers. To which another white South African added: "the ravages of rinderpest, although reducing the native to poverty, has not been without beneficial results, and the native has now learned humility to those to whom he is subordinate, and also the lesson that by work only can he live, and having learnt to work he is now a happy and contented man, instead of the discontented, idolent, lazy and besotten being he was *when the numerous cattle he possessed provided his every want.*"

Rinderpest is far from being the only economically disruptive livestock disease on the African continent. Hence the very prominent historical role governmental veterinary services have always played there. Berkeley political scientist and African specialist, David Leonard, in explaining his choice of veterinary services delivery in Africa as a major research theme noted: "I have not selected veterinary medicine randomly from among the professions. It is ... an important and ... particularly interesting case in its own right. Animal health, obviously, is one of several inputs to a livestock production system. As such it attracts only modest attention in most developed economies. The picture in sub-Saharan Africa is quite different. [... W]ithin [African] agriculture livestock represent about half of the value of production, particularly if we include the contribution of animal traction. Livestock has the kind of critical importance for African economies

that steel might have for an industrialized one. [A]nimal health services are the most important *purchased* input in most African livestock systems.... Animal health services thus loom large within a sector that is itself of great importance within the economy of Africa." More than 60 years ago Julian Huxley, one of Britain's leading scientists and founding Director-General of UNESCO, put it this way: "... the prosperity and indeed habitability of enormous areas [of Africa] hangs upon [the veterinarian's] success or failure in research and research along the broadest biological and medical lines." I shall suggest in a moment some of the development possibilities inherent today in what Leonard and Huxley are saying.

So much as general background. We need now consider what has been attempted so far with respect to development within Africa's vast pastoral areas. I say attempted because virtually all past efforts conceived and supported by outside developers, frequently on considerable scale, have proven costly failures. The reasons are severalfold. Most important have been strongly held beliefs until very recently amongst almost all project funders in a fundamental irrationality of African pastoralists-- behavior destructive to themselves and their environments. Such beliefs and their consequences resulted partially from American anthropologist Melville Herskovits' conclusion almost 70 years ago-- in the atypical aftermath of the great African rinderpest pandemic-- that African pastoralists are concerned totally with cattle numbers, not at all with cattle quality. Added to that view was a seemingly logical theoretical proposition by Garrett Hardin-- namely, an inevitable "tragedy of the commons", a destruction of natural resources, which Hardin believed occurred whenever pastoralists who own their own herds utilize water and pasture resources in common. It is very difficult, of course, to explain how African pastoralism can have supported such sizable populations under extreme environmental conditions for literally millenia if these dire consequences were in fact inevitable, but few seemed to have been bothered very much by that obvious fact. Such a dim view, and concomitant beliefs that either Africa's pastoralists must be settled into sedentary agricultural pursuits or their livestock management system changed drastically have dominated development approaches until now, efforts that have accomplished

virtually nothing. Despite that, until very recently little seemed to have been learned, and few questions asked, from such repeated failures.

Elinor Ostrom, an American political scientist influenced by proponents of the "New Institutional" school of economics and by the research methods of field biologists, noted that social scientists who have most uncritically accepted as immutable fact these dire "tragedy of the commons" outcomes predicted by Hardin have usually been strong advocates of an "only one possible solution" (i.e., private ownership of both animals and land, as Hardin preferred) *or* another "only possible solution" (for broader communal ownership of both, namely, state ownership). *Both* of those advocacies, she pointed out, are based more upon economic theories intertwined with opposing political ideologies than upon carefully gathered empirical evidence from a variety of actual commons circumstances. Ostrom then demonstrated that tragedy has not, in fact, been an invariable historic outcome of commons situations and that local rules for workable solutions have been developed by many peoples which, furthermore, are neither all privatization nor all public ownership. And, she argued, such "rules in use" are an essential component of institutions and profoundly effect incentives consumers, providers and producers face.

Other proponents of the "new institutional economics", as well as some anthropologists, had previously pointed up the need within *all* Third World development situations to carefully examine *existing and especially indigenous* institutions to see what in them would favor or thwart seemingly positive changes being considered. That had scarcely ever been done within pastoral Africa. Outsiders believed they already knew what was wrong there and how to remedy it. Over a decade ago economist Stephen Sandford noted disapprovingly that most pastoral development schemes "have looked very much like attempts to copy the [North] American or Australian models of pastoral development," and he pointed out some things that are often wrong with those uncritically applied models (e.g., "both the American and Australian pastoral sectors have been characterized during their brief existence by considerable environmental damage and economic

instability") and further that "any sensible development policy will strive not only to provide better material standards of living for the pastoralists and to ensure that the pastoral areas supply some of the commodities of the nation as a whole, but also to conserve ... traditional desirable social features or to replace them by an adequate substitute."

UCD's Tu Jarvis, with Erickson, was the first economist to closely examine these predictions of disaster within pastoral Africa. Through an historical analysis of data from Zimbabwe on livestock ownership, husbandry practices and land use, they raised serious questions about Hardin's seductive metaphor in so far as Zimbabwe's pastoralists were concerned. During that 90 year period of records, they concluded that, *despite expropriations for European settler use of large areas of the best of the African pastoralists' range lands*, "surprisingly, there is little or no evidence of either [overgrazing or range degradation] in the data analyzed."

In the meantime, numbers of ecologists, anthropologists and veterinarians have provided further evidence from field investigations in different parts of Africa to substantiate more generally a growing belief that African pastoralists, in fact, practice highly effective opportunistic systems of risk reduction and rapid adaptation to new circumstances, systems which are not irrational, as previously presumed, and surely require no replacement or major overhaul. As one example, Coughenour and associates concluded that the Turkana "have ... directed solar energy through a food web so effectively as to permit maintenance of a relatively high density and biomass of humans on marginal ... landscapes". They noted further that "our findings do not support causal relations between pastoral biology and environmental degradation. [... Moreover,] excessive herd sizes were not encountered."

That is, under such conditions of very high risk, a variety of opportunistic mechanisms have been developed and employed by African pastoralists to protect their livestock wealth, hence their livelihoods and survival. These include dividing the herd in separate

places and continually reducing or apportioning risks through elaborate systems of social obligations through which animals are lent or exchanged. For the same reasons they also keep multiple species of animals. In times of drought, they tend to keep to known drought-resistant habitats, temporarily deplete livestock numbers, or, in recent years in some places, settle temporarily into relief camps.

One primary conclusion reached by a committee chaired by UCD's Bill Pritchard which recently surveyed the state of animal agriculture overall in Africa was that, "With traditional grazing practices, the productivity of the grassland of ... [sub-Saharan Africa's arid] zone [is] at least comparable to the productivity of comparable rangelands in North America and Australia." Thus technical approaches long promoted with no success mostly by American and Australian range specialists, based largely upon permanently reducing African pastoralists' stocking rates to the carrying capacities of rangelands during the *worst* rainfall years-- and the most promoted overall development strategy of settlement-- are now believed by more and more observers, ourselves included, to be totally unnecessary, in fact often counterproductive in the extreme. Moreover, it surely has been clearly proven that such drastic approaches will never be accepted voluntarily by pastoralists themselves. To persist in their pursuit after forty years of failures, as some would still do, is, I believe, to subject Africa's pastoral millions to futures resembling those of America's and Australia's native peoples during the past hundred and fifty or more years of their existence.

Let me sketch a typical example of things that have been repeatedly attempted until now at considerable cost with the purported aim of development. Before the great rinderpest pandemic individuals of the Wagogo tribe of Tanzania possessed up to 10,000 cattle, but since then someone with 100 cattle or more is considered a rich man. According to Kjekhus, this breaking of "the economic backbone of many of the most prosperous and advanced communities ... initiated the breakdown of a long-established ecological balance". Survivors among these transhumant Wagogo were forced by such catastrophic circumstances into increasing resort to plant agriculture. Then, during the 1970s, under

the influence of foreign advisors, the government of Tanzania attempted complete settlement of this traditionally migratory tribe, an effort which backfired totally. That is, increasing the areas for arable farming reduced the available grazing areas close to the Wagogo's seasonal home bases. In addition, rather than the increased cash income from sales of augmented crops going to improve the general material well-being (in Northern terms) of the pastoralist families involved, as the outside developers expected, much of it was invested instead in *additional cattle*-- Wagogo oral traditions still vividly recalling those pre-rinderpest days when they had been a much more wealthy tribe. The unanticipated result of this settlement attempt was a larger herd and smaller grazing area! Wagogo cattle nutrition and health both deteriorated as a consequence and their *formerly maintained stocking balances* were upset causing overgrazing and soil erosion with flash flooding. Thus, a system of traditional opportunistic responses was replaced by a *more* ecologically unbalanced situation with which the Wagogo had had no prior experience. Many close observers now believe that most real evidence of desertification caused by overgrazing in Africa is precisely that about wells drilled by outsiders attempting to force settlement of pastoralists.

A common feature of many similarly unsuccessful settlement attempts has been that there has been no or insufficient anthropological or similar expertise enlisted. This Wagogo failure reflected the further lack of sufficient local historical inquiry, no understanding that the practice of *some minimal cultivation* among certain pastoral peoples today may be *fairly recent* and may have been the previously *forced consequence* of the still well-remembered rinderpest disaster. Most importantly in these and other regards, pastoralists themselves were not sufficiently involved either in planning or execution phases of what would drastically effect their futures.

In light of this long record of failures, I can but agree with Ostrom that "[r]elying on metaphors as the foundation for policy advice can lead to results substantially different from those presumed to be likely". An arrogance has been manifested here that, in my view, has had almost no precedent elsewhere. Assumptions have often been made by

outsiders "who knew best" which never could have been made by anyone even minimally conversant with the extant anthropological literature on African pastoralists. Particularly lacking was any true understanding of the idea-- of the historic or current bases of-- "cattle as wealth" in relation to a Northern monetary alternative.

To summarize past efforts, the pastoral development strategies promoted by outsiders until now have been (1) sedentarization, that attempted radical transformation of social systems, (2) modernization, that ignored social systems and, to far lesser extents, (3) cooperativization, that attempted to reinforce existing social systems. According to Albert Sollod, these categories represent more than development strategies; they are also the ideological camps of politicians, technicians and social scientists, respectively. While either settling pastoralists or introducing totally different husbandry systems have overwhelmingly predominated over attempts to study and strengthen existing social systems, some recent efforts toward the latter still are not being honest with pastoralists. Thus, Sollod noted that the two strategies of cooperation and settlement have recently been advocated by some funding agencies in combination, but that, although "cooperativization became the rhetorical call, ... sedentarization [... remained] the goal."

Moreover, it is not possible to see how some of the main rural development thrusts of the past among sedentary farmers, such as information-providing mechanisms like agricultural extension-- pursued independently of efforts to provide basic amenities-- can succeed in meeting the most crucial immediate needs of Africa's nomadic and transhumant peoples. *And, it is unquestionably beyond the financial ability of any African country for each existing sector of government to provide its own mobile outreach to the extent required to begin to meet some of pastoralists' most basic needs.*

This overall record of pastoral development failures in Africa supports generally the conclusion of Sandford that "there are few, if any, universally valid prescriptions which can be applied to all pastoral situations." After over 30 years of observation and study opportunities, it is my view that these few universal prescriptions within Africa are (1)

the need for outsiders involved to understand traditional pastoral institutions and practices, (2) active pastoralist participation at all stages of development efforts and (3) locally-based actions. Many other experienced persons would now concur with these three. But Aggrey Majok and I would add a critical fourth universal prescription for Africa, a key implementing one absent in all previous thinking, namely a veterinary services *facilitating* vehicle for mobile outreach and practical interventions in ways I shall illustrate.

Unlike almost all prior efforts which focused almost exclusively upon the productivity in terms of meat of pastoralists' livestock, or upon alternative uses for their rangelands, we make such things secondary in the shorter term to the overall wellbeing of these migratory peoples. And, while our proposals prominently embrace cooperation, its aims are quite different from many present advocacies, in that we would not only attempt to reinforce existing pastoral mechanisms for decision-making, commons governance and the like, but attempt also to realize much greater local cooperation among concerned branches of government and among pastoralists, government and the variety of Northern-funded and other NGOs which work in many parts of Africa.

Furthermore, while we have concluded that past failures in African pastoral development are due in large part to insufficient knowledge on the parts of outsiders involved of specific pastoral societies and their local bases in man-animal-land relationships, a less considered reason is that African pastoralists are members of "fused" societies in which different areas of life and knowledge are not conceptually compartmentalized artificially into the academic disciplines and the like in which disciplinarians from the North (economists, public administrators, veterinarians, public health workers, agriculturalists and others) are so totally accustomed to conceiving them. For example, we northerners consider animal husbandry, religion and healing as completely separate realms of thought and activity, but to many African pastoralists, such realms are so intertwined as to be a single entity. That is, pastoralists themselves tend to view life and the world about them holistically (*as they really are*). They do not suffer from the "fallacy of misplaced

concreteness" that economist Herman Daly, with theologian John Cobb, so forcefully urge northern disciplinarians working in their little compartments to attempt to liberate themselves from in the interests of maximizing mankind's sustainable future overall.

Because of all of the above, pastoralists remain the African population segment least served by any type of governmentally-provided amenities and they lack also many elements of civil society commonplace amongst many other peoples. In fact, there have been only two facets of attempted development among them that have met with pastoralists' own approval. Only these have achieved some successes in improving pastoralists' actual circumstances. One has been the provision of water sources, the other the provision of preventive and therapeutic veterinary services. When UC Davis epidemiologist Tom Carlton went to Somalia recently on a three person aid team requested by a local regional self-help group in the north of that country, the American agency facilitating that visit by three experts in human health, water resources and veterinary medicine considered the relative importance of these three fields to be in the order I just listed them. However, the team discovered immediately that to the Somali self-help organization and to the other Somali pastoralists they met, their relative importance was definitely veterinary first, water second and human health last. So much for assumptions across wide cultural divides.

There are important differences to note between these past efforts to supply water and veterinary services to pastoralists. Because pastoralist settlement goals have been paramount to many facilitating agencies, "spending money on new water supplies," became in Stephen Sandford's words "the easiest form of pastoral development" in Africa and "in many pastoral development programmes ... different aid agencies actively compete with each other for opportunities to scatter new water points around ... without any clear conception of what is there already or why they are adding to it." And, because objectives of donors and recipients vis-à-vis these new watering sources frequently have been diametrically opposed, the results in many instances have been disappointing to outside development agents and pastoralists alike. While rain catchment and retention

methods have often proven valuable and sustainable, well-drilling programs, a mostly one-shot effort, often have not. The limitations of many of these well-drilling projects have been conspicuous. In particular, maintenance of handpumps has usually been absent or minimal. For example, in the area of northeastern Kenya grazed by Somali pastoralists, only 25% of boreholes drilled between 1969 and 1976 were still functioning at the end of that period. Our plan suggests solutions to those problems through an existing veterinary implementing vehicle.

Relevant both to their own inherent importance-- and especially to our new pastoral development paradigm-- veterinary services delivery to pastoralists has been generally more successful, although much of it in the past has, as Sollod pointed out, been a "modernization" approach which completely ignored pastoralists' social systems and possibilities of working through them. In fact he suggests that veterinary medicine in Africa has often assumed a *prima donna* role totally divorced from other development efforts and that too few veterinarians have yet taken to heart Julian Huxley's admonition in 1931 that "to be a good veterinary officer [in Africa] ... you must be a first class biologist and you must be a knowledgeable and sympathetic anthropologist as well." Despite such weaknesses, veterinary services throughout Africa are organized as a rural network with physical facilities extending to the district town level, then further *mobile* outreach to migratory pastoralists. That grassroots characteristic of veterinary services is not only unique among governmental sectors within Africa, but has been an historic veterinary approach worldwide. Moreover, it is one absolutely mandated for Africa by continent-wide cattle vaccination programs of the Organization of African Unity (OAU) for eradication of rinderpest and contagious bovine pleuropneumonia, campaigns which are currently the highest priority veterinary programs on the continent.

In contrast, primary human health care, including childhood immunizations, remains a basic amenity completely beyond the reach of all but a few pastoralists who must travel long distances on foot to even the most remote of village medical dispensaries. For example, in the Southern Region of the Sudan, which is largely pastoral, 37% of all

human health personnel-- including 85% of physicians and 100% of pharmacists-- serve town dwellers exclusively though these townspeople comprise only an estimated 4% of the population. Such facts prompted the British anthropologist, Jean Buxton, to write 20 years ago that "[In the southern Sudan it is] animals rather than humans who benefit most from any scientific medical treatment. Herders who have themselves never visited a government dressing station, still less a hospital bring their cattle for inoculation." In order to illustrate features and expectations of our new pastoral development paradigm, I shall return to some remedies for those contrasting medical and veterinary outcomes in a moment.

First we must note that, while most past development initiatives-- and some of the suppositions underlying them-- are being increasingly discredited, very little has been suggested about *how to affordably implement* even the relatively few alternative development proposals so far advanced. These proposals include "studying carefully, then 'fine tuning' local [traditional husbandry and range management] practices" and the basing of other mostly unstated development proposals upon long-term monitoring of such things as weather, feed and water sources and soil erosion, plus livestock movements, productivity, mortality and morbidity. Those are all good ideas, but such general proposals not only have lacked so far much specific development content from the pastoralists' standpoint but, of equal importance, any practical delivery approach to affordably implement them under present financial constraints. How, for example, would the networks be created and operated even to monitor these various characteristics of environment that might be desirable and who would man them? As I have suggested, only the veterinary sector has developed the outreach capacity to actually reach pastoralists periodically at their grassroots level of existence and the cadre of personnel to at least minimally man it. Bill Pritchard noted similarly in the report of his animal agriculture review committee that: "With few exceptions government services for pastoral peoples [in Africa] are not well developed and are usually confined to animal health."

It is not especially surprising, therefore, that it has been two veterinary groups, one from Tufts University working under Albert Sollod within West Africa, and a German group working in East Africa under UCD epidemiology Ph.D. Karl Zessin, that have extricated themselves partially from single sector approaches of the past and have come up with better proposals for practical pastoral development. The first combines some basic livestock nutrition and disease surveillance with observations of particular pastoralist groups' husbandry and coping strategies, both coupled with weather monitoring. It was believed that such information would permit organization of more rational preventive and palliative measures to confront unusual drought conditions. The second approach demonstrated the value for broader planning efforts-- *and for services delivery*-- of a much more state-of-the-art epidemiological intelligence system, one that possessed analytical capabilities both in epidemiology and animal health and production economics. Were they combined, those two approaches could provide important parts of what could be realizable in pastoral Africa through infrastructural reforms in veterinary services delivery in keeping with a global movement to base veterinary programs upon improved disease intelligence. The development proposals we make incorporate most of those ideas and emphasize another move toward decentralized local development initiatives. But they go considerably farther in proposing ways to affordably begin right now to implement these and more.

Our paradigm's first aim, therefore, is to *immediately* improve in some very basic ways the lots in life of many of Africa's pastoralists in manners they would desire and approve. Our proposals' secondary aims are to make other infrastructural improvements in the interests of development. They also suggest how to begin to pay for them not solely through outside assistance, but through pastoralists' greater sharing of responsibilities not only for carrying out, but financing development features which will clearly and directly benefit them.

Thus, one of the features of our pastoral development proposals is decentralization of much decision-making and program implementation, a measure long advocated for

Africa generally by UCD political scientist and African specialist Don Rothchild. In their recent book about range production aspects of African pastoral economies, Behnke and Scoones also suggest more "limited but focused [development] interventions [than in the past] [, with] less rather than more centralized regulation". However, those authors have visualized relatively little in terms of practical implementation of specific forms of intervention among pastoralists. In our plan, the identification of refinements of existing practices and further interventions result from a type of augmented two-way communications with pastoralists (and their environments) for which a mechanism now exists at least rudimentarily only within veterinary services, and which could be vastly improved with additional efforts, particularly in the longer run through badly needed reforms of African veterinary education. The process of training veterinarians in Africa until now has been based far too much upon inappropriate northern models. Thus, we would use decentralization to more effectively involve pastoralists in some immediate improvements in their lives.

In key aspects, our plan is based upon initiation and encouragement of intersectoral cooperation (IC), collaborative efforts among *local* branches of different sectors of government, most importantly and uniquely cooperation to provide some basic needed but currently absent amenities. This would be achieved by using the programs of veterinary science-- functioning through the single pastoral outreach network that now exists-- as the *stem* upon which to graft information-providing and direct services from additional governmental sectors. Furthermore, because veterinary services provide the skills and information now most desired and accepted by pastoralists, they already enjoy rapport with and the respect of these diffuse communities. Those major advantages can also be shared by them with other cooperating sectors.

In the past, the *general* idea of intersectoral cooperation has been intuitively attractive to development planners, legislators, funding agencies and others. However, despite the fact that IC makes economic, political, logistic, scientific and social good sense, it seems usually to have engendered little enthusiasm or support as an overall adjunct to services

delivery at *ministerial* levels of conventional governmental services. From my experiences with intersectoral efforts, I believe that such ministerial reluctance usually reflects inter-professional jealousies in protecting traditional "territorial imperatives"-- their turfs-- plus questions of budgetary and other equity, accountability and awards of credit or blame for successes or failures. Be that as it may, current necessity demands IC's serious promotion in pastoral areas. The situation in pastoral Africa is now so critical that I believe its problems could only conceivably be overcome at all by commonsense sharing of some local capacities and resources among sectors. Such *locally instituted* IC is probably the sole workable approach to migratory peoples-- where just reaching them for any purpose is by far the most difficult and costly proposition. Of great importance, too, is that IC is totally consistent with pastoralists' own ways of looking at things and of functioning. For, as Sandford pointed out, pastoralists' own institutions are generally as multi-purpose as is our plan. Thus the currently high unit cost of pastoral visits *for limited veterinary purposes only* could be reduced substantially by accomplishing much more with each difficult visit, by "piggy-backing" other programs upon them.

Important to note too is that veterinary medicine per se has always been a *multi-objective field*. Thus, the idea of IC is far from being unprecedented in veterinary-related programs elsewhere. On the contrary. Other human needs than food supply have always defined important veterinary objectives. Most prominent have been improvements in human health. Similarly, veterinary programs have first demonstrated practical advances in understanding and influencing the reproductive process in people as well as animals. Other veterinary efforts help to conserve or improve environmental quality or to promote humane values. One consequence of these multiple historic orientations is that the modern veterinary profession has already had extensive practical intersectoral experiences, as reflected for example, in the statement in a joint WHO/FAO publication that "the dual purpose of veterinary work in human health and nutrition and in agricultural economy ... explains the interest of both WHO and FAO ...". On the other hand, veterinary team visits to pastoralists in Africa *today*, despite their difficulty and cost, remain almost entirely single purpose, namely vaccinations against one or two

diseases. Our approach would considerably extend those purposes not only for veterinary aims themselves but for general development.

As mentioned, pastoralists' own coping strategies are highly opportunistic, as is also the local actions approach we advocate. Furthermore, our approach to IC is as a two-way *quid pro quo* effort, thus removing one of the commonest reasons for past failures to institute some IC measures. And the last special reason our plan has good chances for success is that epidemiological surveillance improvements to the diagnostic capacities of veterinary services that could support its maximum applications, are fully consistent with and supportive of increasingly recognized and recommended priorities for veterinary services *globally*, not just in Africa.

Let me now conclude this by first illustrating from some of our experiences within the southern Sudan specific possibilities which can be implemented under our development paradigm. In 1974 the World Health Assembly, the legislative body of WHO, adopted an Expanded Programme of Immunization (or EPI) as a key program in primary health care globally. It was hoped to immunize the world's children against several readily preventable diseases: tuberculosis, polio, measles, diphtheria, tetanus and whooping cough. But years prior to that EPI initiative, other mass governmental immunization programs in Africa had already been launched as multi-country efforts designed to protect the enormous cattle wealth of Africa by ridding that continent of rinderpest and contagious bovine pleuropneumonia. A second but completely overlooked result of these veterinary initiatives, which is of special consequence to EPI, is their realization of the major educational goal of convincing millions of cattle-culture pastoralists in Africa that immunization per se is a desirable thing. These veterinary programs, which remain unfamiliar to many public health personnel, resemble others which have successfully eliminated these and other economically disruptive livestock infections from a number of other countries and so far have realized considerable success in some African countries but little in others. These failures-- and recrudescences in some countries initially successful-- can be laid principally to insufficient epidemiological intelligence, absence

of enough locally-generated resources and other infrastructural deficiencies. IC is one way to lessen such problems which public health and other service sectors also share in equal measure.

One of the greatest technical difficulties in establishing and maintaining childhood immunization programs-- as well as similar veterinary programs-- involve properly functioning cold chains, that is, the means to keep heat-labile vaccines under adequate refrigeration from their points of manufacture to their administration in the field. Although a new high-tech heat-stable vaccine in the case of rinderpest has been developed by UCD virologist Tilahun Yilma and is now being field-tested, this coldchain problem will persist in the field for some time for many important diseases. In Ghana, for example, public health workers noted that "a general appraisal of the [EPI] situation ... showed that vaccination was not being achieved on a wide scale because of failings in the cold chain at most of the stations, especially those in the [rural] northern parts of the country."

Twelve years ago the WHO Expert Committee on Zoonoses, on which I serve, recommended joint operation by public health and veterinary services of such difficult-to-maintain vaccination cold chains in poor countries worldwide. Yet, to my knowledge, the only deliberate efforts to initiate this new and laudable form of IC have taken place in the southern Sudan. Beginning in 1984 an existing provincial veterinary cold depot in Wau, capital town of Bahr el Ghazal Province, began to be shared routinely with the provincial medical department. From that foundation of locally-instigated voluntary one-directional IC on the part of the veterinary services, my son, who was then UNICEF's program officer for health in the southern Sudan, and I negotiated between these two provincial departments an agreement to make such cooperation permanent and to broadly extend it for multiple purposes.

The *key* to that UNICEF-brokered agreement was that *equally* valuable benefits from cooperation would henceforth accrue to both departments' programs. By such innovative

planning, which included joint use of certain field personnel and of additional facilities, as well as of existing veterinary educational extension to pastoralists, EPI also could begin to reach beyond the provincial capital to the smaller district towns of the pastoral southern Sudan and then on to the grassroots "cattle camp" level where most people actually lived.

In other words, in return for existing and extended veterinary cooperation in maintaining viable vaccines-- and in reaching this pastoral population already desirous of cattle immunization-- the EPI program would offer reciprocal assistance to the less well-financed veterinary services in several practical ways at little additional cost to itself: (1) use of a regular UNICEF plane service for transport of veterinary vaccines from Khartoum to Wau, (2) maintenance services for laid-up veterinary 4-wheel drive vehicles in another UNICEF-supported repair shop run by the provincial water project and (3) repairs and assistance in maintenance of veterinary department district-level kerosene deep freezers (which would also be shared by EPI thenceforth). EPI-supplied equipment, including generators, would "back-up" existing veterinary cold-chain equipment at all levels. In each instance this proffered reciprocity helped the veterinary department beyond some impasses to the successful conclusion of its own program, for example that it had just before that lost 35,000 doses of rinderpest vaccine for lack of a replacement wick for the kerosene-powered deep freeze in a district veterinary office. That was the typical kind of "for want of a nail ... the kingdom was lost" situation far too frequently encountered in Africa.

Though this first IC effort 10 years ago was interrupted in its complete implementation by resumption of the Sudanese civil war in the Wau area, information on this intersectoral initiative was disseminated country-wide by UNICEF and fuller implementation took place among Mandari pastoralists north of the southern Sudanese regional capital of Juba. That joint medical/veterinary vaccination IC was assisted by a local self-help organization ACCOMPLISH. It followed simultaneous outbreaks of measles and rinderpest in the Mandari's Terekeka District in late 1986. Those efforts

succeeded in containing both epidemics and demonstrated dramatically to the Mandari that *human* vaccination was as desirable as that for their cattle.

Although war then intervened in that district also, vaccination IC among Mandari continued at other sites. An evaluation of that effort was carried out by my son for UNICEF during the summer of 1989. Over 50 per cent of Mandari children had been *fully* immunized with EPI vaccines, a figure exceeding considerably the Sudanese national average for the *urban* plus rural populations reached by EPI *during the entire life of that program*. At the same time 58 per cent of Mandari cattle were immunized against both rinderpest and CBPP, again considerably exceeding the overall level of success previously realized for cattle vaccination throughout the whole Sudanese Southern Region.

Such practical IC among very difficult-to-serve pastoralists depends upon developing a sense of mutual trust between different sectors in government. That was realized in this case through built-in assurances that the interests of neither party would suffer and that both would share fully in the benefits of cooperation. Such trust can be fostered by (1) creating a local IC management structure that fully protects the programs of each party, including the necessary degrees of accountability, while allowing for enough independence in decision-making to ensure uninterrupted implementation of each program's aims; (2) sharing of knowledge about each other's overall programs (their goals, methods of operation and constraints); (3) open-mindedness about the fullest range of cooperation possibilities between different branches of government, which sometimes use identical methods and identically trained personnel to pursue parallel aims, and, most important, (4) relaxation of rigid notions of professional "territorial sovereignty" and other man-made barriers to cross-professional consultation and sharing

In the 1982 WHO/FAO Expert Committee on Zoonoses report, we also recommended that combined medical/veterinary diagnostic laboratories be set up. That recommendation was consistent with others made by several WHO and other

international advisory committess on public health laboratory services during the last 30 years purely for scientific reasons. In that connection, more public awareness is required that some of the world's premier national medical laboratories, like the Pasteur Institute of Paris and the NIH and CDC in the United States, long have enjoyed veterinary inputs of consequence. Illustrative of this existing cross-professional relationship is the fact that our current veterinary dean, Fred Murphy, directed the CDC's world-renowned infectious diseases center before coming to Davis. This IC suggestion was pursued by one of our graduate students who explored further such prospects locally and described in detail the set-up and operation in Mexico of one of the relatively few combined medical/veterinary diagnostic laboratories yet established. Within Africa this is an especially critical need and another overwhelmingly attractive IC possibility which could be realized at all governmental levels. For, as in some ad hoc cold-chain cooperation, some diagnostic laboratory cooperation already is being *opportunistically* pursued locally in various places of absolute necessity, but without official recognition or encouragement. For example, in the Sudanese regional capital of Juba the veterinary laboratory was already running diagnostic tests for the regional hospital and for the University of Juba's health service. Similar help was being given by a veterinary laboratory at the administrative center of Beletwheyne in central Somalia to its regional hospital which lacked any laboratory capacities at all. But, such diagnostic cooperation should extend in *both* directions and demands official promotion in many countries as a logical intersectoral venture in dual interests not only of economy but of higher scientific standards of service.

In Bahr al Ghazal province of the southern Sudan, it was also agreed to develop reciprocal local IC between the veterinary service and the provincial water project, namely that in return for the water project's underused vehicle repair shop also maintaining the veterinary service's 4-wheel drive vehicles, veterinary field teams would examine wells and pumps and report breakdowns to the water project, or even undertake minor pump repairs themselves. The medical and veterinary sectors would also aid the water sector with water sanitation extension efforts.

It appears now that the future of most of Africa's tens of millions of extensive pastoralists is a dismal one. Those who survive present inattention, continuing expropriations of their traditional territories, attempts to settle them or similar blunders destructive of their cultures and abilities to cope under severe circumstances, may thereby subject them to fates similar to Japan's Ainu, Australia's aborigines and the western hemisphere's native peoples. If these hardy and resolute peoples are not to be crushed by temptations and other unrelenting pressures from alien cultures and if nothing more on their behalf is attempted, their only survival mechanism may be to become crippled anthropological exhibits well-to-do foreign tourists come to gaze upon for amusement. Such demeaning commercialization is already taking place among some of Africa's more accessible pastoral peoples like the Kenya Maasai.

Or some commonsense can begin to cut through the maze of sectoral, professional and disciplinary barriers to creative solutions which surmount the tendencies of each to jealously guard their own territories, their own turfs. Here is a wonderful opportunity for social scientists and active humanists especially to join hands with such custodians of technical knowledge and skills as ourselves, in encouraging and rewarding successful local efforts whose aims are to stretch scarce talents and other resources to their maximums under circumstances of dire necessity. Arthur Koestler once wrote that "Every creative act in science, art or religion involves a new innocence of perception liberated from the cataract of accepted beliefs." Now, in my view, is surely the moment for political scientists, economists and public administrators concerned with Africa's future to overcome any opacities of vision-- cast out any moles of Northern precedent-- that could blind them to new or untried possibilities and, by helping facilitate their success, offer some promise of a more hopeful future for Africa's pastoral millions.