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Not by Bread Alone: The Next Food Revolution

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CARLOS SERÉ

Summary

Livestock contribute to the livelihoods of 70% of the world's poor, including farmers, traders and labourers. The next food revolution will dramatically expand production and consumption of animal products in the developing world. This revolution, however, also threatens the livelihoods of these poor livestock keepers. Public international research can mitigate this threat and thus contribute to addressing broad developmental goals of sustainable poverty reduction, food security and enhanced livelihoods.

The 'livestock revolution' can provide tremendous opportunities to relieve poverty and hunger worldwide, and could increase the ability of millions of poor people to move out of a subsistence existence and to join the market

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economy. But the competitive advantages of the smallholder farmer may be lost to large-scale commercial producers, should public international research not place these concerns high on the world agenda. This shift in competitive advantage is associated with a range of forces driving change, including population growth, globalisation, and growing concerns with zoonoses and food safety.

This paper discusses the impact of this livestock revolution on smallholder systems and the capacity of these systems to contribute to social and economic development. It then examines the role public research can play in enhancing the competitiveness of smallholders by addressing the technical, institutional and policy issues that put them at a disadvantage.

Finally, the paper explores the funding position for such global public goods research, showing how benefits of such research will accrue to developed countries as well as to developing nations, thus supporting the rationale for North-South cooperation in this endeavour.

Introduction

It is a privilege for me to present an overview of the livestock revolution and its implications for international development. I will do that mainly from the perspective of the CGIAR — the Consultative Group for International Agricultural Research — but I will also mention specifically Australia's relationship with this revolution. Before doing that I would like, on behalf of the CGIAR, to render tribute to the late Derek Tribe, a key player in general for the CGIAR but particularly for ILCA, the International Livestock Centre for Af-

rica, one of the predecessors of ILRI.² Derek Tribe was part of the team that conceived and set up this international institute that addresses livestock issues, and he was a member of its initial board of directors.

The ‘livestock revolution’, of which I write, is basically a *demand* revolution — a dramatic increase in the demand for animal products. Both the Minister for Foreign Affairs, the Hon. Alexander Downer, and the Chairman of the ATSE Crawford Fund³, the Hon. Tim Fischer, have raised this point. I will quickly describe what the demand is about and discuss briefly both the opportunities and the hazards that this development poses. I will discuss what interventions from an international perspective can address some of the issues, and then I will briefly touch on Australia’s unique role.

The increasing demand for livestock products

The demand for livestock products is predicted to double in the next 20 years, particularly in Asia. Why? A principal cause is simply the increase in the world’s population, especially in developing countries. In 2050 it is predicted that out of the eight billion people in this world, six billion will be in the developing world. That is where the population is growing, and it will continue to grow particularly rapidly in Asia, where we expect 50% of that additional growth. Poverty is particularly important in relation to population. It is calculated and widely cited that 1.2 billion people are living on a cash income of less than a dollar a day. Three-quarters of these people live in rural areas. ILRI has been mapping where the poor are, where the livestock is, and what the systems are under which the poor manage their livestock. Our estimates are that the livelihood of about 600 million of the people who earn an average of less than a dollar a day cash income depends significantly on livestock. In South and South-East Asia alone, some 260 million fit into this category — several times the population of Australia. These numbers are huge.

Urbanisation is an important phenomenon, taking place rapidly around the world. By 2050 half of the world’s population will probably live in urban areas. In Latin America, this urbanisation process is

already well advanced. It is happening at full speed in Africa and Asia. Although today, in 2003, less than 30% of the population of Africa and Asia is urban, by 2050 we expect the proportion to rise to over 50%. As people move into the city, their diet changes significantly. They move away from starchy staples into vegetables, oils and — very importantly — livestock products, when they can afford them.

At the same time, again particularly in Asia, family and individual income has grown. The newly industrialised ‘tiger’ countries have undergone dramatic economic growth. The forecast is that this economic growth will continue, although the rate will probably not be as rapid as in the past. The factors of population growth, urbanisation and economic growth together add up to this striking increase in the demand for livestock products.

Estimates indicate that in the developing world the demand for meat and milk will double in the next 20 years. In the developed world the increase in various livestock products will be only about 10–20%. The surge of productivity to meet the demand, therefore, will happen in the developing world, with implications that are still to unfold. The process will largely be a domestic one, with huge increases in domestic demand and production. But international trade will also increase significantly, chiefly from developed countries to developing countries. Concurrently, the demand for feed grains will increase as systems of raising livestock, particularly swine and poultry, become more intensive.

Livestock as a resource for the poor

Livestock plays an important role in poor households and in the societies in which they live. Livestock is a key source of income for the poor, especially the rural poor. In most developing countries, 25–30% of the agricultural gross domestic product, the GDP, is related to livestock. In some of the poorer ones, the ratio is much higher. Thus livestock products are definitely an important source of income today, and an increasingly important asset for the poor. Overall we expect this ratio to increase significantly.

Minister Downer spoke frequently about the bank account. Very few poor people have a bank account. The only account they have is a few animals, which are their source of cash. Livestock is a mobile asset which people can move in times of

² Professor Tribe, who died earlier in 2003, was the founding Executive Director of the ATSE Crawford Fund.

³ ATSE — Australian Academy of Technological Sciences and Engineering

emergency, such as conflict, if they must leave their homestead. It is a buffer against periodic drought and hunger. Milk and eggs in particular can provide a small but steady cash income, which for these poor people is critical.

I want to summarise this with a statement that comes out of a poverty study that the Asian Development Bank undertook in Laos. It nicely captures the value of animals in cultures that rely heavily on them and in which there is no government social security system. The sale of one buffalo can buy rice to feed a family of four or five for a whole year. So the farm family can survive one bad harvest, then get a new chance. The sale of that buffalo can pay hospital bills and save lives. The most striking comment was the strategically important one that in many villages the male household heads said they would rather be allowed to die than be forced to sell the buffalo; they would rather leave it for the future of their family. Another pertinent comment in that report was that when doctors came into the villages, people first wanted to talk about the health of their animals, then about their own problems.

Market opportunities

Let us now look at dimensions of the livestock revolution and what it implies. What are some of the hazards if this process is not well managed? I repeat, for emphasis, this is a demand-led process. It is a revolution caused not by new science but by market demand. We in research institutes can respond in various ways. But the market will respond, whether we do or not. Production will increase. Our point of entry into this whole discussion is: in terms of the social and economic impact, what options do we have to influence the process for the benefit of the poor? This is a huge opportunity. This increase in demand is going to put an enormous stress on production, distribution and marketing, environmental issues, and issues of human and livestock health and of human welfare. Different ways of meeting the demand will have drastically different consequences.

I will consider briefly the effect the increased demand will have on production chains, and particularly about access the poor have to markets. This issue of market access is central to ILRI's strategy, and is high on the global agenda. It is a focus of attention of a number of research and development organisations. We recognise that lowering the present barriers to market access for agricultural products is crucial in our efforts to help the poor im-

prove their conditions. ILRI and IFPRI — the International Food Policy Research Institute of the CGIAR — are starting a new market access programme specifically to work on this issue.

We expect trade to increase significantly and get dramatically larger in volume. Trade chains, however, are becoming ever more complex. The requirements that are being imposed for standardisation and food safety and in a number of other areas make it increasingly difficult for smallholders to participate. Poor roads, other inadequate infrastructure, and low market prices all discourage the smallholder. If nothing is done, the risk is great that large commercial enterprises situated close to cities will take over. They will likely operate under poorly regulated conditions, with serious environmental consequences. The opportunity to involve smallholders will have been lost as production and marketing expand, with the result that many will be pushed out and move into the slums. They will still keep poultry or goats or pigs but under very different conditions, frequently detrimental to the welfare of both people and animals. This revolution will pose a serious environmental and social threat if it excludes the poor through our failing to address the issue.

Environment and health

Environmental degradation affects not only the poor but also societies at large. We are seeing industrialised systems of livestock raising in developing countries that have drastically increased air and water pollution. At the same time, these industrial systems are squeezing out the smallholders and poor livestock keepers. There is also an important loss of bio-diversity in the process. This type of industrialisation often affects the poor particularly, because they cannot avoid the problems it causes, such as having to live in the fringe areas of industrial zones, where rent is cheap because the land is degraded and the air polluted.

Human health and animal health are both intrinsically affected by the livestock revolution. Rapidly developing large-scale intensive rearing of livestock in developing countries has increased the risk of diseases, and public interventions are needed to minimise these risks. As the livestock industry exports and imports many more of its products, the risk of spreading disease increases, as has been borne out by the outbreak of BSE⁴ in Europe. The

⁴ Bovine spongiform encephalitis, or mad-cow disease

risk of diseases jumping from animal species to humans especially increases in the slums, where poor people often live intimately with animals. These risks are important worldwide but they particularly affect poor livestock keepers, who do not have the cash to pay for services to keep themselves healthy and to protect their animals.

Opportunities

Such problems will worsen if we simply let the livestock revolution take its course. From an international perspective we see that as this revolution evolves, there are a number of points at which we can influence that course more favourably for the poor. These opportunities exist in a market that is large, dynamic and involves many actors at many levels. For example, people who are poor but familiar with handling and raising livestock can provide the industry with vital labour.

It is not necessary, nor even desirable, for countries developing today to follow the same path towards development as did the developed world. Previously, as countries developed, people moving into cities readily found employment as industrialisation was taking place on a large scale. Simultaneously, the number of people required to work in the livestock industry was greatly reduced because mechanisation had taken over many jobs. Contemporary thinking is that by bolstering and developing agricultural production beyond subsistence levels, it will be possible for agriculture to support more of the population on the land. People not able to sustain themselves on the land are drifting into cities. But people now migrating into cities have little prospect of employment and thus are forced into slums without jobs, at an enormous cost to society. We need to take such potential dangers into account as we work out our strategies.

So what should we do? What can research contribute?

Research on policy, technologies and innovations

Research can influence policies in a number of ways. Here are examples of how specific technologies, policies and institutions can help in pro-poor development.

In Kenya, smallholder dairying has become an economic success story. Farmers with only a small patch of land can keep a cow by zero grazing it —

bringing it all its feed where there is no pasture. Dairying becomes a family enterprise, and even the children help, such as by bicycling the extra litres of milk to the neighbourhood market for sale. Cash from this milk helps pay school fees and provides for other needs of the family.

This example brings up a policy issue. The conventional Western approach, as found in many developing countries, is to enforce *pasteurisation*. But about 85% of the milk in Kenya, India and other developing countries is sold raw. This means that people selling raw milk are acting illegally. But they continue selling their raw milk, and the practice goes on without quality control. In general, people buying raw milk traditionally boil it before consuming it. Thus the medical risk implications of poor people consuming raw milk are considerably reduced. On the supply side, enforcing pasteurisation implies a loss of jobs, going from a system where, for example in Kenya, three people make their living distributing 100 litres of milk. In large-scale, capital-intensive pasteurisation plants, the amount of labour (and the number of jobs) needed to handle large quantities of milk is much less.

If ILRI and its partners aim to work towards revising such policies we first must understand the cost and benefit to different groups in society. In this case, for example, we are not advocating abandoning pasteurisation: rather we are proposing options. Especially in urban areas, pasteurised milk should be an option, not a requirement. Consumers with higher incomes, and particularly those in the city who are more remote from production sources, should be able to purchase pasteurised milk. But the poor should not be penalised, either as consumers or as suppliers, by a regulation demanding pasteurisation. Policy-makers need to understand these situations.

Another issue relates more to trade, but similarly its risks must be understood. This is the matter of allowable levels of *aflatoxins*, an issue presently under discussion with the European Union. The discussion is whether the requirement for permissible levels of aflatoxins needs to be tightened. Statistically the proposed new standard would reduce risk by 1.4 deaths per billion (from 2.3 to 0.9). But implementing this stiffer regulation would mean that Africa would lose about USD 670 million or 64% of its total exports in dried fruits, cereals and nuts. Is the trade-off warranted?

These examples highlight that trade-offs must be made, and they can be extremely difficult. We urge

that more research be done to analyse how risks are presently assessed. Economic analysis of these risks must play an important part in negotiating policy.

Technological innovations

Technological advances and innovations indicate what can be done, such as in producing and using vaccines, controlling parasites, and developing local feed sources.

East coast fever is a disease that kills roughly a million head of cattle annually in eastern and southern Africa. It particularly affects the livestock of smallholders whose animals are in areas where tick control by conventional dipping is poor. A range of partners from the developed world is working to develop a vaccine against the disease. ILRI is working in coordination with the Institute for Genomic Research (TIGR) in Maryland, the University of Victoria in British Columbia, the Ludwig Cancer Institute in Belgium and the Kenya Agricultural Research Institute. Also included is the private sector, which is prepared to invest in genomic-based vaccines. The plan is to develop a vaccine to a point where the private sector will take over. Such an endeavour initially requires a high level of research and investment. The vaccine being sought will be low in cost, easy to use and thermo-stable so that it does not require a cold chain when delivering it to farmers. The commercial sector cannot afford to undertake such intensive and lengthy development to treat a disease that affects only a small animal population. But if the research community assumes this part of the risk, the commercial sector will be ready and able to take over its manufacture and distribution. In this way, we can influence the whole process of improving the health of livestock for the smallholder.

Intestinal nematodes in small ruminants are a global problem. In Australia alone I'm told they cost the industry over \$700 million Australian a year. Interestingly, some of the studies we have undertaken to determine priorities for disease treatment show that for the poor in developing countries, these parasites pose a more critical problem than foot-and-mouth disease. Again we turn to genomics to help us out. There are breeds or lines of sheep in Australia, Africa and Asia that are resistant to intestinal nematodes. We are working in Africa with Red Maasai sheep. We are now locating the critical genes and next will use them to improve breeds. This is an area where the stakes are

important for both developed and developing countries.

Food, feed crops and forages. The production systems of subsistence farmers are basically mixed systems. Although farmers grow cereals and grain legumes for human consumption, they harvest and use the whole plant. The stover, or stalk, becomes animal feed. Genetic improvement has hitherto concentrated on increasing cereal yields but has not looked at stovers, which could also be improved to give greater biomass without affecting grain yield. We are working to identify markers or traits that are important for improving feed quality. We are working with institutes in the CGIAR system that are involved in the crop side of this feed improvement. They are identifying improved varieties, getting them into breeding programmes, moving them through the commercial distribution of seed and getting them out to farmers. We aim to complement that effort with improved forages. The first step is to look at the huge diversity of varieties that already exist, to classify and characterise them, identify where opportunities for improvement lie, and integrate those improvements into farming systems.

The way we do research has changed greatly. Approaches now being developed are much more interactive, much more participatory. Farmers come into the research and development system at an earlier point. Australians and CIAT (the International Centre for Tropical Agriculture) particularly have been working in this area, and have had important successes in Asia.

Institutions play a critical part in this process. We now understand that it is essential to give the poor a voice in designing development interventions, to make sure that they have a say in decisions affecting them. Particularly from the perspective of the livestock industry, institutions are extremely important for achieving economies of scale by bringing producers together, negotiating, getting various groups to implement standards, and so on.

Some institutional innovations show good potential in working for the poor. As Minister Downer mentioned, India is presently the world's largest dairy producer. Operation Flood is the Indian scheme by which about 10 million small-scale milk producers, producing as little as a couple of litres each, have been integrated into the market. An important point is that many landless people are involved. Thus the livestock product milk enables the landless poor to participate. We talk about small-scale farmers, but we frequently forget that many of the poor are

landless. As many of these landless poor are women — women constitute about 70% of the poorest of the poor — involving them has been an important element in this operation.

Pro-poor innovation systems

Another issue has been how we get new ideas and technologies to poor people. Trying to do so has been expensive, and traditional extension systems have failed. Quite a bit of thinking is going on about how one organises and gets communities involved in sharing knowledge. The farmer field-school approach, which is well developed in Asia, is now being tested as a way to disseminate information about livestock innovations. The technique brings groups together around a common interest such as breeding pigs or rearing small ruminants. The farmers request information about a particular topic or technology. They can be explicit about their concerns and what they want a technology to accomplish for them. The farmers themselves may initiate the research and they help shape the innovation.

Another interesting development is the successful Australian Landcare system. This important contribution brings smallholders together to address common property issues, particularly in managing their natural resources and their environment. It can be adapted to other cultural settings, and I understand it is gradually expanding into the South-East Asian region and on into the world.

There are institutions that address policy and those that address technology. They have the potential to move development along a path that is beneficial for the poor who rely on livestock for what little income they have. This, however, requires a targeted public effort. It will not happen by default. Many of the issues are international, are complex and require a wide range of skills — indicating that collaboration must transcend institutional and national boundaries.

Australia's role

Let me now briefly touch on Australia and its relationship with the livestock revolution. The relationship is unique. Agriculture in the northern part of Australia is tropical. The country has conducted intensive research in tropical agriculture, as it has in a number of other sectors. Australia is a successful livestock producer. Particularly important is the fact that researchers are interested in understanding

tropical animal disease both inside and outside Australia, because these livestock keepers have the same problems. Researchers are motivated to understand what is going on, and they can use the knowledge they gain in other tropical situations. This knowledge is an extremely valuable asset in international activities. Australia has first-hand tropical experience that puts researchers in a more advantageous position than, for example, those working in Nordic countries, when dealing with livestock in the tropics.

I certainly subscribe to Derek Tribe's philosophy of 'doing well by doing good'. Preceding contributors have strongly emphasised that concept. The potential this philosophy indicates is enormous. I want to mention a few of the possibilities that I see.

Australia has been playing a vital role in carrying out international livestock research, and more broadly, international agricultural research. Australia has developed interesting institutional innovations in managing research, such as CRCs — the Cooperative Research Centres Program — which build links between industry, universities and research agencies to achieve world-class research and innovation. It is attractive to consider how such innovations can play a more international role. In international negotiations, Australia has an important role. Because it is closer than other developed countries to developing countries in South-East Asia, it is sensitive to the broad implications of pro-poor development. It understands that the WTO Doha Round⁵ is about development and that one has to look beyond trade flows in specific commodities. Australia has valuable experience and assets to offer that reach out beyond trade exports. As Australia is a model of successful tropical agriculture, opportunities will present themselves in areas such as training and consulting, with possibilities of sharing and passing on expertise that will benefit the entire region.

What lies ahead? Proactively addressing and harnessing the livestock revolution has the enormous potential to develop a much broader economic base in South-East Asia. That has ramifications for the entire economy, as other contributors point out, but not only that — it has other ramifications including security in the region. For Australia, this enlightened self-interest will lead to expanding markets as regional trading partners grow and flourish. These

⁵ World Trade Organization ministerial meeting, held in Doha, Qatar, November 2001

markets are complex, involving a range of products for both low-income and high-income consumers. We talk about meat and milk, but we are in fact trading a wide range of livestock products. It is not a one-way, either/or matter; a much broader network is developing. This linked network of trade relations and other relationships will be seen not only as driving the trade in livestock commodities.

In the future Australia's role will probably be to build the livestock industry in the developing world, providing knowledge, services, genetic resources and training.

Roles inexorably change over time, and one needs an open attitude to see beyond short-term trade opportunities and envision a wider view, with greater benefit for more people.

I would like to conclude by quoting from Admiral Chris Barrie, who spoke from this same podium three years ago. He said, 'In affluent societies we take ready access to food and water for granted, but in their absence people are driven to do whatever it takes to get them'⁶.

Poverty is often considered a key factor that has contributed to recent events of regional insecurity. Livestock research, development and training hold fantastic opportunities to improve the lives of these poor, help them step out of poverty, and thus bring broader benefits for all.

⁶ Crawford Fund (2000). *Food, Water and War: Security in a World of Conflict*. Record of a conference conducted by the Crawford Fund for International Agricultural Research, Parliament House, Canberra, 15 August 2000. ACIAR Monograph No. 173, 114 pp.