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2013

INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

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The International Livestock Research Institute (ILRI) works with partners worldwide to enhance the roles livestock play in pathways out of poverty, principally in sub-Saharan Africa and Asia. The products of these research partnerships help poor people keep their farm animals alive and productive, increase and sustain their livestock and farm productivity, find profitable markets for their animal products, and reduce their risk of livestock-related diseases. ILRI has its headquarters in Nairobi, Kenya, a principal campus in Addis Ababa, Ethiopia, and offices in other countries of East, West and southern Africa and East, South and Southeast Asia.

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CGIAR is a global partnership that unites organizations engaged in research for a food-secure future. CGIAR research is dedicated to reducing rural poverty, increasing food security, improving human health and nutrition, and ensuring more sustainable management of natural resources. It is carried out by 15 centres that are members of the CGIAR Consortium. It conducts research in close collaboration with hundreds of partner organizations, including national and regional research institutes, civil society organizations, academia and the private sector.

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January 2013

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Why livestock matter

Although big, the challenge of increasing global food supplies by as much as 70% in the next 40 years is not insurmountable.

What's needed in addition to novel approaches to increasing food production are better uses of an array of low- to high-tech solutions, some already available, others needing refinement or a rethink, for meeting the needs of the world's vast army of smallholder farmers.

Livestock are central to the global agricultural sector and their importance only increases as societies develop. Globally, the most important agricultural commodity is cow's milk, followed by rice, cattle meat, pig meat, chicken, wheat and eggs. In developing countries, rice is the number one commodity, followed by indigenous cattle meat and cow's milk.

Most of the developing-world's farms are 'mixed systems', with crop growing mixed with livestock raising. Understanding the complex interactions between all the major components of these smallholder mixed systems is essential for the design of any strategy for agricultural development.

Livestock is the fastest-growing part of developing-world agriculture. It's the 'demand-pull' that can drive small-scale agricultural systems—the motor that brings in cash to smallholder mixed crop-and-livestock farmers. While cereals sustain the family, farm animals are the family's source of cash.

Due to population growth and other 'drivers', the developing world's livestock systems are changing fast and in big ways. Science can help the world's poorer livestock keepers make better use of the big changes and new trends.

In addition to addressing the three traditional pillars of livestock research—livestock health (veterinary science), breeds (livestock genetics) and feeds (forage genetics), ILRI is working with partners to take holistic and innovation system approaches to livestock development.



February 2013

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Reducing the vulnerability of dryland pastoralism

The increasing frequency and severity of drought and other climate shocks in the developing world's great drylands threaten the livelihoods of hundreds of millions of poor food producers, driving many into chronic poverty. Although livestock are among the most important assets to poor households in the drylands, and their loss often traps families in long-lasting poverty, little systematic research has focused on interventions to support development of dryland pastoral systems.

Excluding Antarctica, rangelands make up about 70% of the Earth's surface and Africa's arid and semi-arid lands, which are used predominately for extensive livestock grazing, comprise nearly half of the continent's land mass. Most of the Horn of Africa gravely afflicted by drought in 2011 is made up of the drier drylands (0–300 mm of rainfall a year), where livestock production dominates livelihoods.

Despite the recurring specter of drought and famine in the Horn of Africa, pastoral herding usually works well over the longer term, with nomadic farming, for example, about 20% more productive than ranching in terms of annual calf and milk production. The pastoral livestock sector is not only productive and critical to food security but also an optimal way to manage and maintain drylands and the livelihoods of those who live off them.

Livestock enterprises are not only a major source of income for people living in and off drylands, but also provide up to 50% of the agricultural gross domestic product of African countries and much of the meat and milk consumed in these countries: 90% of the meat consumed in East Africa, for example, comes from pastoral herds. Rangelands are productive—and potentially very productive. They are good filters of water, support much of the world's remaining wildlife diversity and sequester carbon. Governments and donors looking for long-term solutions to drought-induced food insecurity should bear in mind that across much of the world's vast drylands, herding rather than cropping is the only viable and sustainable form of food production possible.

Despite the productivity, and the great productive potential, of the world's drylands, pastoralism is often still criticized as a backward mode of production that keeps people in poverty, degrades land and diminishes wildlife. Such views have tended to favour government policies that attempt to change viable pastoral production systems into inappropriate ranching or settled agriculture schemes.

Expert opinion agrees that the best way to tap into the potential of the drylands is to build on the foundation of their livestock economies rather than ignoring them or seeking to replace them. This will demand more judicious land-use policies, better roads, functioning livestock markets, and better access by pastoral communities to information and services, among other developments. Promising livestock options for dryland herders include support for migratory herding, pastoral insurance and payments for environmental services.



March 2013

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Smallholder livestock farming is a mainstay of the poor

Livestock production employs more than 1.3 billion people and livestock keeping is a mainstay of the livelihoods of some 600 million poor farmers in the developing world.

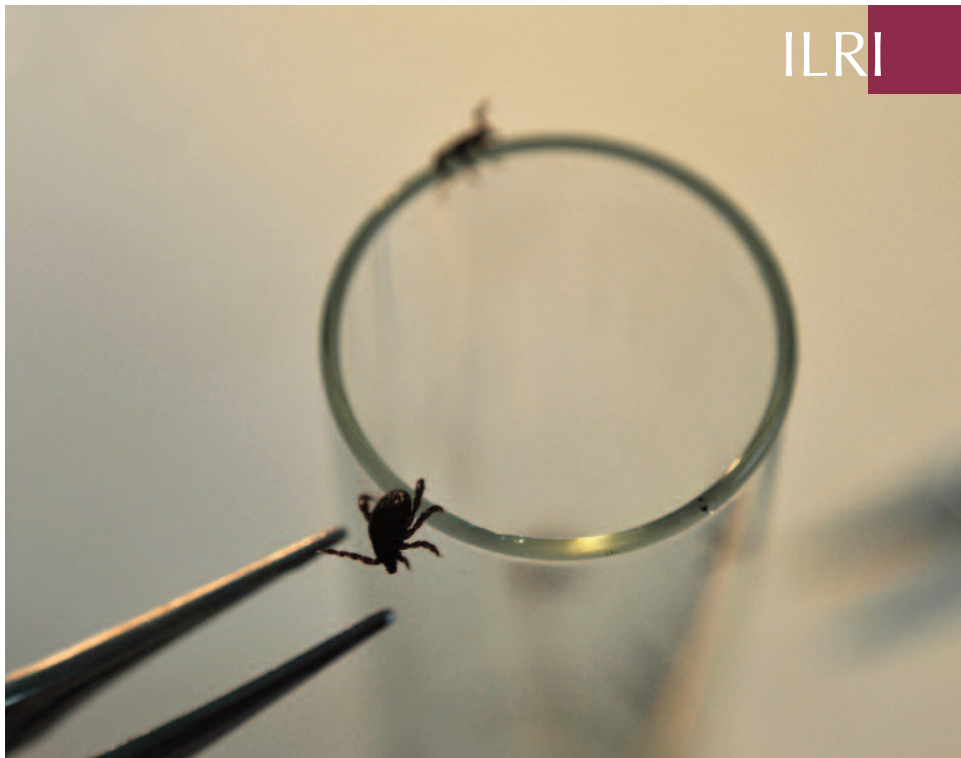
Increasing demand for meat, milk and eggs in poor countries, particularly in India, China and other emerging economies, is driving economic growth.

Making smallholder dairy production more competitive is a powerful tool for reducing poverty, raising nutrition levels and improving the livelihoods of rural people in many developing countries. Rising milk demand, which is growing by about 15 million tonnes per year in developing countries, provides a chance for small-scale dairy farmers to raise their milk production, increase the nutritional status of their households and create jobs.

About 150 million small-scale dairy farming households (750 million people) are engaged in milk production globally, with most of them in developing countries. Over ten years ago, India surpassed the United States as the biggest dairy producer in the world, and by far most of its dairy is produced by smallholders. Pro-poor dairy policy change in Kenya—where nearly 800,000 smallholder households depend on dairying for their livelihoods and some 350,000 people depend on jobs in milk collection, transportation, processing and sales—has greatly helped small-scale milk producers and vendors make their (unpasteurized) milk safer and more affordable by the poor while making a bigger profit for themselves, with the benefits adding up to more than USD33 million every year.

Rising demand for meat and dairy products in South Asia will require an additional 150–200 million cattle and 40% more pigs and poultry. The market for milk, meat and staple foods within Africa is estimated to be USD150 billion a year, far exceeding Africa's market for internationally traded crops such as coffee, tea and flowers. Most of the milk, meat and food staples consumed in the developing world are produced by small-scale mixed crop-and-livestock farmers.

These small 'mixed-system' farms, which integrate livestock keeping with crop growing, can be models of efficient food production, with cattle and buffalo providing the draft power and manure needed to till the land and nourish the soils, for example, and crop wastes providing supplementary feed for the farm animals.



April 2013

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Improving lives and livelihoods through improved livestock health

Livestock offer powerful pathways out of poverty for an estimated 750 million poor farmers in South Asia and Africa in addition to providing food, nutritional and economic security. Most poor farmers relying on livestock for their livelihoods could gain additional benefits from helping to meet the dramatic and on-going increases in demand for animal-source foods that is occurring in developing countries, particularly India, China and other emerging economies. While many constraints impede the development of livestock agriculture in poor nations, the three key biological inputs for increasing livestock productivity remain what are known as the ‘three pillars of animal production’: improved livestock feed, genetics and health.

ILRI focuses on health, specifically on those diseases that reduce animal productivity or kill livestock outright as well as animal diseases transmitted to people. In many developing countries, livestock diseases regularly kill as much as 25% of young animals alone. When disease outbreaks reach epidemic or pandemic proportions, typically by striking naïve animal populations or by exposing animals to new variants of existing pathogens, mortality rates can reach 100%. In addition to these costs, trans-boundary livestock diseases can prevent or abruptly stop international trade in animals and their products, devastating livestock-based economies and severely contracting the capacity of poor nations to meet regional demand for meat, milk and eggs. Furthermore, some 60% of human diseases originate in animals, with many of the human illnesses caused due to contamination of foods by pathogens associated with livestock. The better control of pathogens of livestock and the livestock and human diseases they cause are high priorities.

While vaccines remain the most cost-effective medical and veterinary interventions for controlling disease, opportunities also exist for improving animal health by improving existing veterinary services and access by poor livestock keepers to those services, increasing awareness in poor communities and policymaking circles of disease and food safety issues and implementing bio-security and control measures to reduce livestock disease risks.



May 2013

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Making the most of feed resources

ILRI works with partners to help smallholder farmers in sub-Saharan Africa and South and Southeast Asia intensify their farm production and lift themselves out of poverty

Small-scale mixed crop-and-livestock farming is the backbone of agricultural economies throughout the developing world. Remarkably, these smallholder farming systems provide 70% of the world's meat and 90% of the world's milk. The smallholder farmers themselves are entering an era of new opportunities and challenges, with change occurring at unprecedented rates due largely to the developing world's rising human population, urbanization and household incomes. These trends are greatly increasing demand in developing countries for milk, meat and eggs. Hundreds of millions of crop-livestock farmers could make use of this on-going Livestock Revolution to raise their living standards by intensifying their farm production to produce more animals or animal foods for the growing livestock markets.

What stops many of them from doing so is extreme poverty. Subsistence farmers in developing countries lack basic resources and capacities, including those needed to adapt to the new opportunities presented by the Livestock Revolution. One of the first constraints they face in increasing their livestock production is lack of feed for their animals. Most of these farmers subsist on tiny plots of land, which are often degraded or located in marginal areas, while any common lands around their farms on which they might graze their ruminant animals are shrinking. What's needed are new ways for these farmers to exploit their natural resources more efficiently so that those resources can support higher levels of livestock production without being further degraded.

Smallholder farmers also need new options that will help level the playing field so that they can compete with bigger players in livestock markets. They need ways to access appropriate markets for livestock feeds and products. They need new options that will encourage and allow them to respond to changing circumstances resulting from globalization, such as increasing fluctuations in the price of livestock, livestock products and livestock feeds and potential reductions in feed supplies due to more land being put to production of biofuels. They need information and support to adapt to the local impacts of climate change, such as drying or wetter climates, more erratic rainfall, and increased flooding. And they need cost-effective ways to reduce the amount of methane gas their ruminant animals produce, which account for a significant amount of the world's greenhouse gas emissions that are causing global warming.



June 2013

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Why animals matter to human health and nutrition

Human, livestock and environmental health are inextricably linked. Sixty-one per cent of all diseases are ‘zoonotic’—that is, transmissible between animals and humans. Such zoonoses include common food-borne illnesses as well as fatal infections with rabies and anthrax. Many of our important current human diseases, such as HIV-AIDS, measles and smallpox, were originally diseases of animals that ‘jumped species’ when people changed their ways of farming and keeping animals.

Unprecedented levels of globalization, urbanization, animal production and environmental degradation are driving new epidemics of infectious diseases, both familiar and new. One new disease is emerging every four months, and 75% of these new diseases originate in animals. But besides creating such big risks to human health, animals, especially livestock, also provide big benefits to people, including food, fibre, fuels and raw materials.

Livestock farming systems cover one-quarter of the global land, livestock value chains employ 1.3 billion people and at least 600 million of the world’s poor depend directly on livestock for their livelihoods. Consumption of even modest amounts of milk, eggs, fish and meat is a good way to manage the ‘hidden hunger’, or micro-nutrient deficiency, that impairs the health and lowers the capacity of some 1.2 billion people. Regarding human health and nutrition, livestock in poor countries represent two mixed messages.

First, rapidly developing countries—with their rich biodiversity, booming human populations, evolving agri-food systems and high animal densities—are hot spots for emerging infectious diseases. At the same time, neglected human populations in these and some of the least developing countries continue to suffer from neglected diseases that are easily managed.

Second, animal-source foods are excellent sources of nutrients for people—and for pathogens. Most diarrhoea, for example, which remains a major cause of sickness and death in poor countries, is due to contaminated food. With both the harms and goods at the intersection of livestock and human health being enormous and complex, research is helping to maximize the health benefits and minimize the health risks of animal agriculture for people.



July 2013

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Harnessing biotechnology for African agriculture and health

Modern biological technologies have allowed us to resolve problems that seemed intractable only a decade ago. The recent eradication of the great rinderpest cattle plague—which devastated Africa’s domesticated and wild ruminant populations, and the pastoral societies that relied on them, at the turn of the 19th century—is but the latest example.

These technologies are largely underpinned by advances in molecular biology, and the ‘gene revolution’ that it has spawned, which have increased by orders of magnitude our ability to understand fundamental biological processes. For example, our new ability to understand how pathogens interact with their animal-human hosts, and how to combine genes from different organisms (as in the production of biosynthetic recombinant insulin) to give us safe, cheap and durable bio-medical solutions, has already translated into an enhanced ability to prevent, treat and diagnose a variety of infectious diseases.

In agriculture, modern biotechnologies have given us new crop varieties that tolerate pests and diseases and foods that are more nutritious and that store better. Advances in molecular genetics and bioinformatics have led to the identification of genes, or genetic markers associated with genes, that control traits of interest in crops and livestock, such as the research breakthrough of an ILRI-led consortium last year in identifying the genes controlling resistance to the wasting disease trypanosomosis in Africa’s native, ancient and disease-resistant cattle breeds. Marker-assisted selection, in which genes controlling traits of agronomic importance are selected from various sources and purposefully ‘introgressed’ in another species, is an example of the power of new technologies that combine conventional genetic methods with the latest molecular biology techniques.

But most opportunities to employ the new biosciences in tackling Africa’s major agricultural problems—whether they be plagues of pests and diseases, recurrent droughts and floods, extreme and erratic climates, low-yielding crop and animal farming, or inefficient and/or unhealthy agricultural markets—remain untapped.



August 2013

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Extensive mixed crop-and-livestock farmers can feed the growing world

Governments and researchers are mistaken to continue looking to high-potential farmlands and single-commodity farming systems as the answer to alleviating world hunger. The authors of a 2010 CGIAR and partner study agree with many others today that we need to bring our focus back to small-scale farming. But the study's authors go further, distinguishing the kind of small-scale farmer on which we should focus. We must change our agricultural investment priorities and paradigms, they say, to embrace not only the high-potential intensively farmed lands of the past, many of which have already reached their peak capacity, but also the relatively extensive mixed crop-and-livestock lands.

It is these mixed farms that, more than the traditional breadbaskets and rice bowls of the past, will feed the growing world over the next few decades. The group of farmers mixing crops with livestock on 'in between' lands—often located between high-potential farmlands and low potential rangelands—are the heavyweights in global food security. The thousand million farmers practicing modest mixed crop-and-livestock agriculture in poor countries resemble to a degree the small family farms in rich countries that have become so fashionable in recent years among those wanting to reform wasteful and dangerous industrial food systems. It is the developing world's one billion mixed family farmers tending rice paddies or cultivating maize and beans while raising a few chickens and pigs, a herd of goats or a cow or two on relatively extensive and rain-fed lands who feed most of the world's poor people today.

This same vast and till-now neglected group of mixed food producers is likely to play the biggest role in global food security over the next several decades, as world population grows and peaks (at 9 billion or so) with the addition of another 3 billion people.

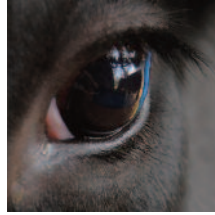
Mixed extensive farmers make up the biggest, poorest and most environmentally sustainable agricultural system in the world. It's time we invested heavily in this particular kind of farming system. Here is where there remain the biggest yield gaps. Here is where research and development work can make the biggest difference.

What this 'extensive agricultural frontier' needs are basic forms of infrastructure and services. With these at hand, the world's extensive mixed farmers will be in good position to scale up their food production to meet the growing future needs.



September 2013

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Urban agriculture and zoonoses

Global urbanization

For the first time in history, more than half the world's population lives in urban areas and over 90% of urbanization is taking place in the developing world. The urban population is expected to double from 3.3 billion in 2007 to 6.4 billion in 2050.

Along with urbanization is the urbanization of poverty and food insecurity.

- The proportion of the global poor living in cities is expected to increase from 30% in 2000 to 50% by 2035.
- One-third of urban dwellers, about one billion people, live in slums without access to adequate food, water or sanitation.

Urbanization in Africa

Between 1960 and 2010, Africa's urban population grew from 53 million to 400 million. By 2030, the number of Africans living in towns and cities will increase by a further 345 million. In sub-Saharan Africa, the urban population will double, to almost 600 million.

Today, about 40% of the African population lives in urban areas. Over next four decades, Africa's urban population is likely to triple in size. In many cities of sub-Saharan Africa, slums account for three-quarters of urban residents. Most urban poor have to rely on the informal sector and unstable occasional work jobs for their survival. In Africa, where food purchases make up 60–80% of total household expenditure, volatile food prices greatly affect the ability of the urban poor to put food on the table.

Growth of urban agriculture

In cities in developing countries, urban agriculture is part of the fabric of life. An estimated 800 million people globally are engaged in urban agriculture. Food production in cities contributes 15–20% of the world's food. The commercial peri-urban production of livestock is an extremely fast-growing sector, representing 34% of total meat production and nearly 70% of egg production worldwide.

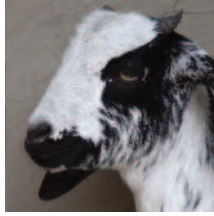
Urban food producers reduce their expenses, generate income and improve their nutrition and health. Urban agriculture creates jobs and provides fresh food for local consumers.

But increasing numbers of livestock in increasingly crowded cities also raises the risk of disease. Around 60% of all infectious human diseases are shared with animals, and of the new and emerging diseases, 75% are 'zoonotic', that is, they come from animals.



October 2013

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Protecting breeds for people

Livestock are ubiquitous in the developing world. The ‘big five’—cattle, sheep, goats, poultry and pigs—as well as 9 other popular farm animals and 26 or so more specialized species are raised by more than half a billion people either on pastoral rangelands by nomadic herders, or on mixed farms by smallholders who raise crops along with livestock, or in peri-urban areas by people who raise a few animals in their backyards. All of these small-scale livestock enterprises matter to developing-country governments because livestock account for some 30 per cent of their agricultural gross domestic product, a figure expected to rise to 40 per cent by the year 2030.

The diverse livestock production systems, like most crop production systems, are changing in response to globalization, urbanization, environmental degradation, climate change and science and technology. But the fastest changes are occurring within the livestock systems. That's because the developing world's rising human populations and household incomes are causing demand for milk, meat, eggs and other livestock foods to soar. As one would expect, livestock markets are growing and changing to serve that growing demand. What's less appreciated are the changes being wrought by many of the billion-plus small-scale livestock keepers and sellers of the developing world who are changing the way they do business to help meet that growing demand. The rate of change within the livestock sector is so rapid that many local populations of livestock developed by small-scale farmers over millennia no longer have time to evolve adaptations to their new circumstances or the new needs of their owners. They are simply dying out, and at unprecedented and accelerating rates.

The Food and Agriculture Organization of the United Nations estimates that on average a breed disappears every month and that 20 per cent of our uniquely adapted breeds of domestic animals are at risk of extinction. Over the last 150 years, farmers in industrialized countries supplanted their indigenous farm animals with a few high-producing breeds of a few species (chickens, pigs, cattle) suited to highly intensified production systems. The result is that 70 per cent of the world's known livestock genetic diversity now resides on small farms and in remote regions of developing countries. With all the challenges facing developing countries and their one billion people living on less than a dollar a day, the question arises as to what immediate practical and cost-effective steps could be taken to preserve the wealth of their livestock genetic diversity. From a research viewpoint, it's clear that if we're going to manage the world's remaining livestock genetic resources well, we'll have to characterize the remaining populations to decide which are worth saving and why, we'll have to find ways of broadening use of those populations deemed useful, and we'll have to conserve the most important livestock genetic diversity for possible future use—by poor and rich farmers alike.



November 2013

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Hundreds of millions of small-scale food producers are on a collision course with climate change

Livestock development in poor countries will face increasingly stiff regulations for operating in a carbon-constrained economy.

The United Nations Food and Agriculture Organization estimated in 2006 that global livestock contributes up to 18% of global greenhouse gas emissions, mainly from land use change (carbon dioxide), enteric fermentation from ruminants (methane) and manure management (nitrous oxide).

To help the world's 600 million livestock keepers not only increase their livestock production but do so efficiently and sustainably will require continuing advances in the three traditional pillars of livestock development: breeding, feeding and health.

And much more.

A 4-degree warmer world could plausibly be reached by 2070 or even 2060. This will mean average temperature rises of a massive 15°C in the Arctic, and 3–8°C in the world's most populated areas.

Agriculture is highly sensitive even to a 2-degree scenario; a 4-degree world is beyond our knowledge and experience.

Livestock and agricultural researchers foresee profound effects. Ensembles of models suggest for Africa average yield drops of 19% for maize and 47% for beans, and much more frequent crop failures. And a massive 1.2 million sq km may be forced to flip from typical mixed farms, raising both crops and livestock, into pure rangeland.

Disaster looms for parts of Africa and India if chronic food insecurity converges with crop-wilting weather. Latin America is also vulnerable.

A 4-degree world calls for not just increasing the resilience of food production systems, but for creating completely new ways of farming and consuming.

But while many of us may find factory farming objectionable, we must not conflate industrial grain-fed livestock systems of rich producers with the family farming and herding practices of hundreds of millions of poor producers, most of whom still maintain their animals not on grain but on pasture grass and crop wastes.

For people living in absolute poverty and chronic hunger, the solution is not to rid the world of livestock, but rather to find ways to farm animals more efficiently and profitably, as well as sustainably.



ILRI

December 2013

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ILRI vision and mission

ILRI envisions a world where all people have access to enough food and livelihood options to fulfill their potential.

ILRI's mission is to improve food and nutritional security and to reduce poverty in developing countries through research for efficient, safe and sustainable use of livestock—ensuring *better lives through livestock*.