

Input Supply System and Services for Market-oriented Livestock Production in Ethiopia

Azage Tegegne, Berhanu Gebremedhin and Dirk Hoekstra
IPMS Project, ILRI, P. O. Box 5689, Addis Ababa, Ethiopia

Abstract

Livestock production in Ethiopia has, for long, remained subsistence with limited market-orientation and poor institutional support. Farmers and pastoralists produce and keep animals for various valid reasons, with little market-orientation. However, producing for the market requires re-orientation of the production system and development of a knowledge based and responsive institutional support services. Institutional support services of extension, research, input supply, rural finance and marketing are key areas of intervention that can play a central role in the transformation of subsistence mode of production into market orientation. Livestock production systems in Ethiopia can be broadly categorized into crop-livestock mixed systems, pastoral and agro-pastoral system, urban and peri-urban production systems. The demand for institutional support services for livestock development in these production systems vary significantly. The way extension system is structured in Ethiopia may not be in the best interest of farmers and pastoralists and lacks the responsive capacity to the demands for livestock services. In fact, most often livestock development issues are left to development projects and NGOs that have limited scope, coverage and duration. The major inputs for livestock development include animal genetic resources, feeds and forages, veterinary drugs, vaccines, machinery equipment and utensils as well as knowledge. The experience so far has been the supply of improved (exotic?) animal genetic resources for dairy development, sheep production (meat and wool), improved poultry (broiler and egg production), supply of bee colonies, provision of forage seeds and planting material, dairy goats, provision of processing equipment and utensil (dairy, apiculture), drug supply and vaccination services. Most of these activities have been mainly supplied by the government or government sponsored projects. Limited credit facilities to support livestock asset accumulation and development have been provided by microfinance institutions, food security projects, small-scale micro enterprises and NGOs. The contribution of the private sector in livestock input has been limited to supplies of veterinary drugs and services, roughage and concentrate feeds, and processing equipment and utensils. Recent trends show that there is an encouraging move to involve the private sector in input supplies such as production of beehives. Due to the recent increase demand for live animals and animal products in the domestic and export markets, there has been a renewed interest to promote market-oriented livestock production. As a result, a lot of interventions are happening to engage farmers and pastoralists in a more market-oriented livestock production in areas where the resources offer the opportunities. For example, a lot of activities are happening in apiculture production, small ruminants breeding and fattening, cattle fattening, poultry production and dairy production. Institutions such as microfinance, small-scale and micro enterprises, NGOs, women's affairs office are involved in these activities with limited engagement of the Office of Agriculture and Rural Development at Woreda levels. The demand for input supply, particularly for improved animal genetic resources has increased substantially with poor response of the supply side. There is a gap in coordination of efforts and in basing livestock development interventions on scientific knowledge with the value chain in mind. The extension system has to be re-oriented to be able to respond to the increasing demand for improved and market-oriented livestock development if farmers, pastoralists and the private commercial producers are to benefit themselves and contribute to the development of the national economy.

1. Introduction

Ethiopia has an approximated land area of about 1.1 million km² and an estimated human population of over 77 million, growing at a rate of 3% per annum. About 85% of the population lives in rural areas and practices subsistence agriculture and livestock production. Livestock production is an integral part of the country's agricultural production system. The country, with its extreme variations in agro-climatic conditions, possesses one of the largest and the most diverse plant and animal genetic resources in the world. Agriculture accounts for 45 percent of GDP and 85 percent of export earnings, and the sector employs about 85% of the population. A recent study by IFPRI (2006) indicates that the livestock sector contributes an estimated 16 percent to the total GDP and over 40 percent to the agricultural GDP. As an essential component of the overall farming systems, livestock serve as a source of draught power for the rural farming population, supplies farm families with milk, meat, manure, serves as source of cash income, and plays significantly in the social and cultural values of the society. In pastoral areas, the livelihood of the population depends on livestock. Despite the importance of livestock to the farming and pastoral populations and to the national economy at large, the sector has remained underdeveloped and underutilized.

Over the years, lack of market-orientation of the livestock sector has shadowed and demeaned the role it can play in contributing to the national economy. The comparative advantages of the unique genetic resources, the agro-ecology they live in and the associated production systems have not been exploited appropriately and adequately. The share of government investment in livestock research, education and extension services and other development activities has been relatively minimal. Large extensive areas with pastoral and agro-pastoral production systems have been largely ignored and marginalized. The visibility of these areas has been reduced through replacement with crop production and expansion of large scale commercial farms without due consideration to the livestock sector. Livestock producing areas have been viewed through the lens of cereal crops production and most often labeled as '*food insecure, marginal, moisture stressed or low potential*' areas, despite the huge, yet unexploited, livestock resources they carry. As a result, most livestock development efforts in the sector have been left to projects that are either location specific, species specific or breed specific and have failed to be sustainable as most activities have focused on natural resources (rangeland, livestock, construction of physical structure, etc) than on sustainable livelihoods development of the people who live in these areas and own the livestock resources.

Recent trends, however, indicate that there is adequate government recognition of the huge and yet untapped potential of the sector and has renewed effort to develop and elevate its contributions in both domestic and export markets. The public sector has now realized this trend and encouraging changes in approaches and methods to develop the sector are happening. However, the performance of the sector has been limited due to lack of adequate experience and knowledge, poor input supply system, weak input/output marketing system, limited support services and other technical and socio-economic considerations. The major technical constraints are shortage and fluctuation in quality and quantity of feed, poor genetic resource base for production traits, poor management practices, diseases, poor market infrastructure and policy and institutional arrangements. Most inputs have been supplied by the government and there is a tendency to continue to do so. This paper presents the resource base, development efforts so far and examines the processes and problems encountered in livestock input supply system. Information collected from various secondary sources and from a Participatory Rural Appraisal (PRA) from eight Woredas (Fogera and Metema in Amhara; Ada'a and Mieso in Oromiya; Dale and Alaba in the SNNPR and Atsbi and Alamata in Tigray) is used and presented. These Woredas are Pilot Learning Woredas (PLWs) for the Improving Productivity and Market Success (IPMS) of Ethiopian Farmers Project.

2. The Livestock Resource Base

Ethiopia has the largest livestock population in Africa. It is estimated at around 35 million tropical livestock units (TLU), which includes 30 million heads of cattle, 42 million heads of sheep and goats, about 7 million equines, one million camels, over 53 million chicken, 10 million bee colonies, and 40 thousand ton annual harvestable fish. Cattle play the most important role in the farming economy followed by sheep and goats. The livestock population is primarily of the indigenous type and not adequately characterized and documented.

Cattle found in Ethiopia are mostly Zebu. The main cattle “breeds”/populations identified and characterized so far include the Boran, Fogera, Horo, Sheko (Gimira), Abigar (Nuer), and the Afar. These main cattle “breeds”/populations are indigenous to specific regions of Ethiopia. The Fogera and Horo, well known for their milk, are reared around lake Tana and Eastern Wellega regions, respectively. The Boran, a renowned beef “breed”/population, is found in the southern and eastern parts of the country, while the Gimira and Abigar “breeds”/populations, which are considered to have tolerance to high tsetse challenge, are found in the south-west. European breeds, especially Friesian and Jersey, have been imported for many years and crossed with the indigenous cattle breeds.

Some seven sheep and about twelve goat “breeds”/populations have been identified so far in Ethiopia. However, only few of these have been studied and characterized to some extent. These include the Horro, Menz, Afar, Arsi and Black-Head Ogaden Sheep, and the Afar, Long and Short eared Somali and the Hareghe Highland goats. Few exotic breeds of sheep and goats have been introduced into the country for crossbreeding. Among these, the Awassi, Dorper, Hampshire and Corriedale sheep have been used for meat and wool in the highlands, while the Anglo-Nubian, Sanan, Toggonburg, are preferred for milk and meat production in the lower altitude of the mixed farming systems. With regard to poultry, the indigenous birds comprise over 99%, while the remaining 1% includes improved exotic chickens (such as White leghorn, Rhode Island Red and Bovan), imported by various bodies and their crosses with native birds.

3. Development Efforts

To overcome the development constraints and realize the benefits from the huge but untapped livestock resource, efforts have been made in various aspects to develop the livestock sector. These are presented as follows.

3.1 National livestock development strategy

Realizing the major development constraints of the livestock sub-sector, a National ruminant Livestock Development Strategy has been prepared, within the overall policy objective of livestock sub-sector to develop and utilize the available resources and increase its contribution to the social and economic development of the country (MoA, 1996, 1997). Components of strategy are include a) *feeds and nutrition* with the major objectives to increase supply and quality of feed and improve ruminant nutrition; b) *animal health* with the main objectives to control and ultimately eradicate economically important ruminant livestock diseases; ensure only healthy and wholesome foods of animal origin reach the market and are placed in the hands of consumers; meet international animal health standards and requirements; and restrict tsetse fly advance into new areas and suppress the existing fly population in active fly dispersal areas and thereby reduce losses from trypanosomiasis; c) *animal breeding* with the main objective to improve milk and meat production through breeding with the view to achieve self-sufficiency in the short term and surplus for export in the long term; and d) *livestock marketing* with the objective to improve the efficiency of the livestock and livestock products marketing. Currently, a study to develop a national livestock development master plan is under way.

3.2 Livestock development projects

Various livestock development projects have been prepared and have been/are being carried out to minimize/overcome the development constraints of the sub-sector. The major ones include: the First, Second and Third Rangeland Development projects, Arsi rural development unit (ARDU), Wolayita Rural Development Unit (WADU), Fourth Livestock Development Project (FLDP), Pan African Rinderpest Campaign (PARC), Pan African Control of Epizootics (PACE), Farming in Tsetse Controlled Areas (FITCA), Small-holder Dairy Development Project (SDDP) and National Livestock Development Project (NLDP). Currently, new livestock development projects are underway with support from various sources. These include the Integrated Livestock Development Project (ILDP) in North Gondar, supported by Austrian Government, various USAID supported projects such as the Ethiopian Dairy Development Project led by Land O' Lakes, the Ethiopian Livestock Marketing and Sanitary and Phytosanitary Project led by Texas A and M University, the Ethiopian Sheep and Goat Development project and Ethiopian Skins and Hides project. In addition, the Pastoralist Livelihood project (PLI) supported by the World Bank, SNV supported by the Netherlands government and many other are operational. There are also a number of development projects that have livestock component being implemented by various national and international NGOs.

3.3 Livestock development packages

In line with the recent approach of agricultural extension, which is a package approach, four different livestock development packages have been prepared and employed in the different agro-ecological zones of the country as applicable. These packages are: milk production improvement through introduction of exotic blood; meat production improvement using indigenous animals; egg production improvement through introduction of exotic blood; and honey production improvement using traditional and improved hives and improved management.

4. General Livestock Inputs and Services in Ethiopia

The most common livestock inputs and services in Ethiopia are animal health, breed improvement, feed resources development, research, extension services and development, finance and marketing. The components and manner of provision of inputs and services to livestock producers vary from region to region depending on their circumstances.

4.1 Breed improvement programs

Ethiopia does not have livestock development policy and specific breeding policies. Livestock development is planned and implemented on the basis of the overall government policy in the agricultural sector, and based on the National Livestock Development Strategy and Program. Currently, a project to develop a livestock development master plan is underway.

The indigenous livestock “breeds”/populations of Ethiopia have the capacity to cope with the harsh environmental conditions of the country. They often have special adaptive traits for disease resistance, heat tolerance and ability to utilise poor quality feed which they have acquired through natural selection over hundreds of generations. They therefore need relatively less environmental modification to achieve increased productivity. On the other hand, the temperate livestock breeds, although they have the genetic capacity for higher production, their performance under the existing environment is not that attractive and they are often not viable. The focus of breed improvement in Ethiopia so far has been through crossbreeding of the local stock with exotic breed. In line with this, different initiatives have been made to promote crossbreeding scheme. These include: Establishment of National Artificial Insemination Centre

(NAIC); establishment of cattle, sheep and poultry breed improvement and multiplication centers, with the major aim to distribute improved animals to smallholders.

4.1.1 Cattle Improvement

There are some government operated cattle multiplication and improvement centers in different parts of the country. These centers also have an element of conserving identified cattle “breeds”/populations in their own environment. These centers are Borana breed improvement and multiplication centre in Oromia Region, and Fogera breed improvement and multiplication centre in Amhara Region. There was a plan to establish similar centres for Begait cattle in Tigray, for Abigar breed in Gambella and for Horro breed in Oromia.

A recent study by Ababu *et al.*, (2006) designed to determine heifer production efficiency at the Abernossa ranch,, used sale value, cull value and annual operation cost including labor cost (salary). They found out that on average only 65% of the female calves born reached puberty; and the average efficiency of getting heifers in-calf to the third month of pregnancy was only 61.4 %. Out of the in-calf heifers, 95% could be distributed. Overall, about 38% of the female calves born could be distributed as in-calf heifers to smallholder farmers. Comparison of operation cost with the value from sale of crossbred heifers and culled animal showed that crossbred heifer production was at lower cost recovery. Taking into account the actual number of cows, their calving rate and observed calf viability, the projected heifer production efficiency was found to be 42.8%. This index assumes that all cows present in the ranch are fertile and used for crossbred heifer production and this is nearly triple (14.6%) of the observed heifer production and the sale during the period 1994 to 2000. The effective heifer distribution efficiency was only 14.6% (269 heifers sold). Late age at first calving, prolonged days open, long calving intervals and high mortality were responsible for the low returns. High mortality and high rate of culling of females substantially reduced the number of heifers available for distribution. The major problems associated with the ranch are that the focus is only on crossbreeding and the Boran improvement program has been terminated, frequent change in management and little attention given to its objectives, it has become the victim of the AI system, poor data collection scheme and lack of timely and proper data analysis, poor understanding of the genetic value of the herd and poor and variable management with limited financial outlay, poor staffing and other resource allocation.

The national artificial insemination service mainly focuses on cattle, to boost milk production, and uses exotic and local semen as appropriate. Exotic semen includes Friesian and Jersey, while the indigenous include Fogera, Horro, Borana and Barca (Begait). There has been semen importation as required. Having recognized the importance of AI in dairy development, the government embarked on the technology at a wider scale and established the National Artificial Insemination Centre (NAIC) at Kaliti in 1981. The centre was initially designed to accommodate 25-30 bulls at a time. Office, laboratory, AI technicians’ Training Center and other facilities were constructed. Bulls donated by Cuban Government (25 Holstein and 10 Brahman) and importation of 44,800 doses of Friesian and 2,000 doses of Jersey semen were source of semen used for frozen semen technology (Getachew Felleke and Gashaw Gedda, 2001). The centre operates a semen processing laboratory and liquid nitrogen processing plants. To date, semen collection was based on exotic and indigenous as well as crosses of these breeds namely Friesian, Jersey, Brahman, Borana, Barka, Fogera, Horro, Sheko and crosses of 50% and 75% Holstein-Friesian and indigenous bulls. From the total semen produced the major share is from Friesian (75.3%) followed by Jersey (10.5%). NAIC is now the only centre that produces semen in the country. On average about 120,000 doses of frozen semen and 40,000 to 50,000 litres of liquid nitrogen are produced annually at Kaliti. The center keeps about 40 bulls for semen production. The total number of inseminations undertaken annually does not exceed 40,000 and about 50% of these

inseminations are undertaken in and around Addis Ababa and Arsi where relatively large concentrations of crossbred dairy animals are available.

In order to improve the animal genetic improvement efforts of NAIC, the NLDP has provided substantial support to upgrading the Kaliti centre, procured a bull dam farm at Holetta, provided funding for purchase and installation of about 10 liquid nitrogen plants in strategically selected locations across the country and provided substantial support for training of AI technicians and to improve field AI operations.

A recent study by Mohammed (2003) analyzed production and reproduction data collected from 1981 to 2002 at Holetta, Selale and Stella dairy farms to examine if bull dam recruitment procedure for AI among local Holstein Friesian herds does lead to genetic progress. The trend in 305 days milk yield using the 1982 base population (Figure 1) phenotypic and genetic trends showed that the main determinant in phenotypic performance was the environmental deviation component. As a result, environmental influence and management situation in the time period explain the decline in phenotype from 1990 to 1993 and the slight improvement from 1994 to 1998. Annual genetic average regressed against calving year showed positive trend (Figure 2). The author speculated that the slight recovery after 1994 compared to the base population might be due to imported germ line from Israeli and the adopted bull dam selection procedure practiced by the NAIC in addition to improvements in environmental conditions. He concluded that it was apparent (Figure 2), from the absence of significant annual trend with linear equation of $y = -4029 + 2.016x$, that no sustained improvement in the phenotype had been achieved in the 21 years of the study period. The efficiency and effectiveness of AI bull recruitment, semen production and quality, field AI operations have been evaluated under the NLDP project. Some of the major problems of the system include AI operation has remained under government as the sole provider of this service so far, lack of recording scheme focusing on AI, but not on genetic improvement, lack of selection criteria for bulls, some data collection but no proper and timely analysis to benefit genetic progress, lack of pedigree information to technicians and consumers, and problems with efficiency and effectiveness of AI technicians.

Figure 1 Phenotypic, genotype and environmental deviation against the base population in 1982

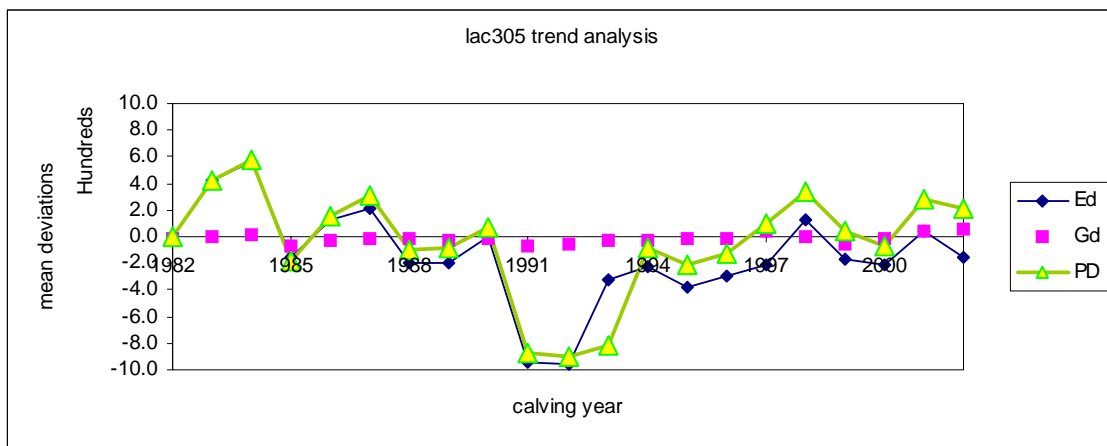
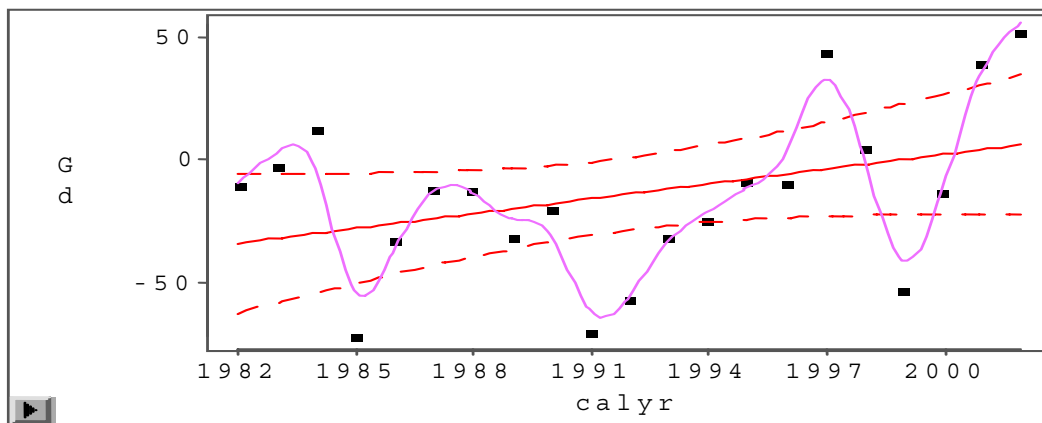


Figure 2. Regression of genetic annual average deviation on calving year



4.2.1 Sheep and goat improvement and multiplication centres

These are located at Debre Berhan and Amed Guya centers in the Amhara Region, which concentrate on the improvement of the Menz sheep. The Horro sheep breeding centre in the Oromiya Region, which was established recently with the aim to address the Horro “breed”/population predominantly found in the Western part of the country is not operational due to technical reason. But there is a plan to establish a centre of the same. Two other recently established sheep breeding centers are the Kokosa and Jijiga centers. While Kokosa focuses on the highland Arise-Bale sheep, the Jijiga centre will focus on the improvement of the lowland Wanke (Black-Head Ogaden) sheep. The primary aim of the sheep breed improvement program is to increase production of mutton, which commands a premium price on both the domestic and export markets. Wool production, though less important than meat, has a valuable role to play in sheep development, especially where it’s production is associated with peasant level handicraft industries. Apart from limited experiences of Farm Africa in crossbreeding of local goats with exotic dairy goats for improved milk production in the Haraghe highlands and the SNNPR, there has been no organized goat improvement program. The major limitations in the sheep improvement program in Ethiopia include:

- Improvement program through crossbreeding has been limited to Menz sheep only – Debre Berhan wool factory, conducive temperate environment in Debre Berhan area
- There has been no comprehensive local sheep improvement program – Washera, Bonga, Black Head Somlai, Afar, Arsi-Bale, Abergellie, etc. breeds
- There is no adequate information on meat, milk production and on reproduction, housing, feeding, disease control methods for different breeds of small ruminants in the country.

4.2.2 Poultry breeding and multiplication centers

There are 11 poultry breeding and multiplication centers located at Mekelle, Adigrat (Tigray), Andassa, combolcha (Amhara), Nazereth/Adama, Adelle, Bedelle, Nekempt (Oromiya), Awassa (SNNPR), Dire Dawa and Harar that mainly focus on Rhode Island Red breed. Unlike the cattle and sheep breeding program for genetic improvement, the poultry breeding program favours distribution of pure exotic breeds than crosses. The overall objective of the poultry breeding program is genetic improvement for egg and meat production through the provision of improved breeding cockerels, pullets, chicks and fertile hatching eggs.

Generally, however, like elsewhere in the tropics, crossbreeding schemes between exotic and indigenous breeds resulted in limited improvement in productive traits and even less improvement in fitness traits. Crossbreds are hardier than pure exotics due to adaptive traits inherited from their local parents but they still require substantial feed and veterinary inputs to survive and maintain reasonable productivity in the existing environment. Therefore, the importance of setting up a breeding program with emphasis on appropriate local breeds in each ecological zone should be well recognized.

- There has been no activity on improving or promoting local chicken and there has been no attempt to improve egg collection, storage and marketing from local chicken
- Focus has been on exotic breeds - broiler, egg or dual-purpose breeds
- Genetic material supply has been from government multiplication centers
- There has been limited capacity, no parent stock development, disease threats, vaccine limitation, no sustainable feed supply system
- There is restricted distribution to farmers – eg. five pullets and one cock, or cock distribution to communities and lacked proper targeting
- Improved breed distribution has not been accompanied by organized input supply and marketing system

4.2 Animal health services

In general, animal health inputs and services in Ethiopia include:

- Preventive services and vaccinations
- Education/extension including public health education
- Regulatory services to control occurrence of new diseases
- Clinical services which includes diagnosis and treatment of sick animals
- Supply of livestock drugs
- Meat inspection services at abattoirs.
- Public health in relation to zoonotic and food-borne disease control, hygiene, food and feed safety and the environment

In Ethiopia, the government is the major animal health service provider. There is also limited involvement of the private sector and NGOs in the provision of drugs and animal health services. A few years back, there have been attempts to promote privatized veterinary services, but has not effectively materialized. Due to the nature and variability of livestock production system in Ethiopia, some animal health services have public good characteristics. The widespread nature of killer diseases, limitations in accessibility, cross-border animal movement and drug supplies, lack of adequate infrastructure and the presence of incomplete markets contribute to market failure in the provision of animal health services. This situation is not different from many African countries (deHaan, and Bekure, 1991; Smith, 2001)

In Ethiopia, public sector involvement and support has often been associated with disease surveillance, eradication campaigns, vaccine production, drug and vaccine quality control, quarantine, and food hygiene and inspection measures. Eradication and control programs of killer diseases call for national and international efforts, and surveillance and control measures often require national coverage including remote and inaccessible areas. However, the public sector has been limited by lack of adequate resources to deliver the services. Shortage of manpower (quantity and quality), lack of transport, availability of drugs and other supplies, poor information, communication and reporting systems, and limited finances are some of the reasons frequently raised by the professionals in the field. The major complaint and dissatisfaction of livestock keepers is unavailability of professionals, lack of communication, unavailability or

shortage of drugs, poor diagnostics capability and lack of confidence in the quality of the service. Public or private service provisions could include diagnostic services, vaccination, vector control, and treatment. However, private sector animal health service provision is limited in Ethiopia due to a number of factors. These include lack of capital, willingness of livestock keepers to pay, affordability of drugs and services, poor accessibility, high transportation costs, alternative cheap supplies of drugs from illegal markets, NGO and public sector provision of drugs and services at subsidized rates, and isolated herds.

Other public health services such as zoonotic and food-borne disease control, hygiene, food and feed safety and environmental control are often very weak and at best are limited to major urban centers. Farmers tend not to report risk factors on the farm due to deterrent costs of treatments or scare of some serious zoonotic diseases such as brucellosis or tuberculosis that may result in slaughtering of animals without compensation. Furthermore, given the poor communication and transport system, and lack of appreciation of timely information, reporting could be costly, ineffective and inadequate. In urban areas meat inspection is undertaken in abattoirs and is the responsibility of the Ministry of Agriculture and Rural Development. However, the administrative responsibility is Public Health Department or Municipality. In Ethiopia, it is also common to slaughter for home-consumption, without undergoing any inspection.

In commercial farming such as large dairy farms and intensive poultry production systems, extension and (veterinary) public health services are more likely to be delivered privately without extensive public intervention. Smallholder dairy producers often form cooperatives and often provide farm inputs and animal health services. For example, the Ada'a dairy cooperative in Debre Zeit provides animal health and milk quality control services.

4.3 Feed and Water Resources Development

Although a number of projects were involved in feed and water resources development in both crop-livestock and pastoral systems, the recent ones include the fourth livestock development project, the smallholder dairy development project (SDDP), and the national livestock development project (NLDP). Activities included improvements in natural pastures and crop residue utilization, feed conservation practices, introduction of improved forages using different strategies. Introduction of improved forages was facilitated through these projects and used government nurseries for multiplication and seed production. However, the successes of these projects in developing a market-oriented livestock production system that responds to adoption of feeds technologies remains to be determined. Recent trends however, indicate that there is a renewed interest to introduced improved forages for feed production and natural resources management in various parts of the country. According to Dr. Jean Hanson (personal communication), requests by regional governments, NGOs and the private sector for forage seeds and cuttings from ILRI's forage germplasm collections has increased over the last five years (Figures 3 to 5). The total amount of sales of forage seeds from the year 2001 to 2005 increased by a factor of 3.5. Over the last five years, the highest demand for forage seeds included *Avena sativa* (1620 kg), *Lablab purpureus* (665 kg), *Vicia dasycarpa* (350 kg), *Trifolium quartinianum* (180 kg), and *Vigna unguiculata* (100 kg). Similarly, sales of Napier grass increased from 580 in 2000 to about 1.5 million cuttings in 2005. These figures should be taken with caution as they relate only to requests to ILRI and additional materials could have been supplied from other sources. In addition, apart from increasing trends in requests, data on use of these materials under farm conditions are not available. Data regarding other feeds improvement operations including efforts on natural pasture improvements in various parts of the country are not available. In addition, the involvement of the private sector in forage feed production has been limited as the market at farmers level for these resources has not yet been developed.

Although the government of Ethiopia has put tremendous effort in water harvesting systems and technologies, the extent of benefits to the development of the livestock sector needs careful assessment.

Total Seed Distribution by Year (Ethiopia)

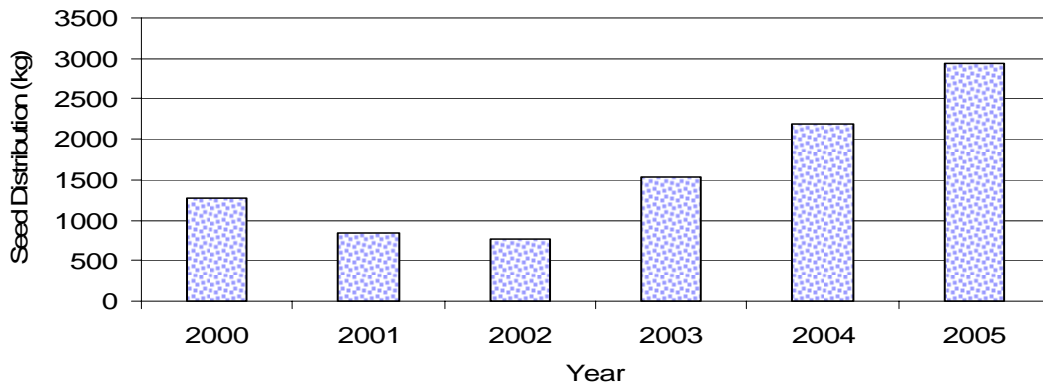


Figure 3 Total amount of forages seeds sold by ILRI to various governmental and non-governmental bodies from 2000 to 2005

Napier grass cuttings distribution by year (Ethiopia)

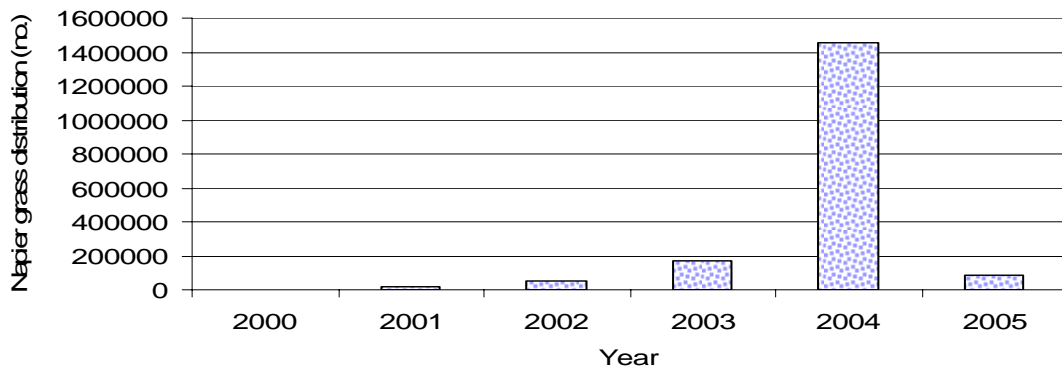


Figure 4 Total number of cuttings of Napier grass sold by ILRI to various governmental and non-governmental bodies from 2000 to 2005.

Total Seed Distribution by Species & Year (Ethiopia)

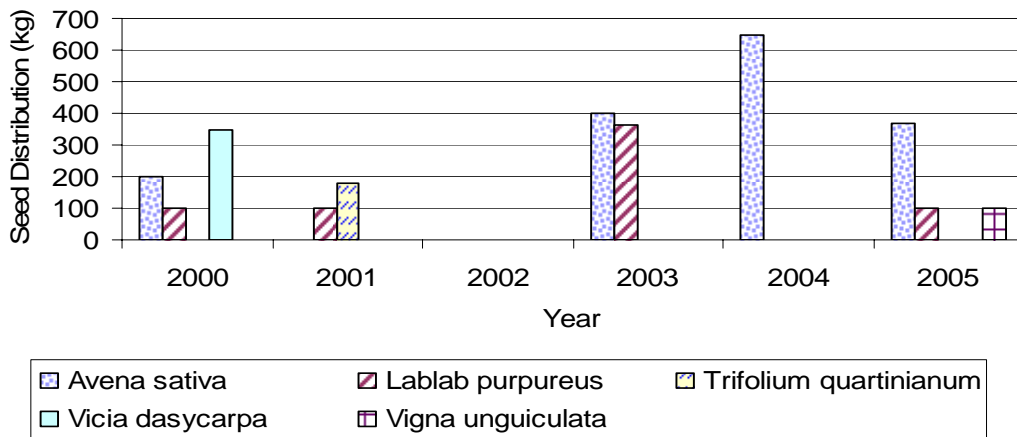


Figure 5 Amount of the top five forage seeds sold by ILRI from 2000 to 2005

5. Extension and Development

In many developed countries, extension services have been significantly reduced or eliminated. In developing countries, however, extension services by the public sector continue to be more dominant, and Ethiopia is no exception. As shown in the various sections above, extension service for in the livestock sector has been more of input supply services. In the recent past, various organizations were put in place to play regulatory role and to ensure adequate and timely supply of crop inputs. These included the National Seed Agency and the National Fertilizer Agency – which were later merged to form the National Agricultural Inputs Authority, Agricultural Inputs Supply Corporation, Ethiopian Seed Enterprise, etc. All these organizations mainly dealt with crop (cereal) inputs, mainly fertilizer and improved seeds and never included livestock input supplies. The MoARD (2005) developed a strategy document which deals with input and output marketing and implementation mechanisms. The document clearly states the need for increased privatization of input supply and rural finance, while recognizing the role of the government.

The MoARD Extension and TVETs Department is organized into three extension teams - moisture reliable, moisture stressed and pastoralist teams. Although livestock is considered as part of the extension activity, most of the focus still revolves around cereal crops production. The major input supply system in the extension department of the MoARD focus on extension packages which are the regular, minimum and household packages. These packages are funded by the government. The minimum and regular packages mainly involve crop production and protection activities such as the use of improved seeds, inorganic fertilizers, agricultural chemicals and soil and water management practices. The household package provides opportunities for farmers to choose from a menu of extension packages which include livestock technologies such as improved poultry breeds, improved dairy cows, improved beehives, fattening. For inputs involving extension packages, the Woreda OoARD is involved in the operation and the procedure includes estimation of farmers needs, production or procurement of inputs and delivery of inputs. For the estimation inputs, DAs are involved and is more or less similar in all the regions. Estimates of inputs in each PA is collected and passed on to the input supply desk or cooperatives desk at the Woreda OoARD which compiles estimates and passes on to the Region for central production or purchase. The Regions arrange the supplies through companies or organizations which either purchase or produce the inputs. These inputs finally are distributed to farmers on credit basis. The major livestock inputs still handled by the OoARD purchase and delivery of small ruminant (breeding and fattening), cattle (fattening, drought), improved poultry (eggs and meat), improved beehives and improved dairy animals on credit basis and AI and veterinary services and drugs mostly on cash basis at subsidized rates. In addition to the OoARD, a number of other institutions such as NGOs, women's affairs office, microfinance institutions, small-scale and micro-enterprise provide financial support for livestock development activities independent of the OoARD.

The procedure for the procurement of animals from local markets (mainly small ruminants, beef cattle) included in the extension package involves a committee composed of staff from the OoARD, PA leaders and a number of representatives from woreda level government offices. The effectiveness of this procedure and the impact of the intervention in improving market-oriented livestock production is subject to research. The main source of supply of improved dairy animals has been the government ranches that have very limited capacity and have not been able to meet the demand. The supply of improved beehives appears to be higher than the demand and lacks an integrated approach. Parallel activities in availability of auxiliary equipment such as queen excluder, smokers, veil; bee forage development, bee colony or queen rearing activity, availability of bees wax are essential for the success of the operation. One of the critical factors that derives apiculture development is availability of adequate quantities and quality of

bee forages. As it stands now, the sole supply of boxes of improved bee hives will not enhance apiculture development and may even result in mere replacement of traditional beehives.

In line with this government strategy, efforts in improving agricultural inputs at Woreda level are just emerging and some encouraging innovations are happening. In the livestock sector, the involvement of the private sector in beehive manufacturing is a good example. In Woredas like Ada'a, animal health services, drug and feed supplies, and artificial insemination services are taken up by a dairy cooperative, in Alaba Woreda, nursery and forage seed production and marketing is being taken up by the private sector. Production of day old chicks and pullets for distribution to smallholder framers is also being out sourced to private companies such as ELFORA and Genesis Farms. However, most livestock extension and development activities could be characterized as follows:

- Livestock development issues have been left to donor funded projects and limited to species of convenience.
- Recently, food security and safetynet programs, rural finance and micro and small scale enterprises are getting involved in livestock development based on credit. However, there is need to coordinate activities with technical support from the OoARD.
- Some livestock resources such as apiculture, fisheries, sericulture were marginalized with major thrust on ruminants.
- Livestock development activities lacked comprehensive market chain approach with limited linkages with rural finance, marketing, quality control, etc systems.
- The currently organizational set-up and resource allocation (human and material) at Federal, Regional and Woreda levels do not allow sufficient and adequate flexibility to respond to the demands of livestock keepers in different production systems.

6. Research

As it is the case in many developing countries, provision of research outputs in Ethiopia has been by the public sector, despite the budgetary constraints. Research services include generation of information and knowledge in plant and animal genetic material, balanced rations, drugs, vaccines, machinery and equipment Technological change generated by research and development plays a pivotal role in promoting agricultural growth and development. Although there are some limited research is undertaken by the private sector and NGOs in Ethiopia, the core scientific activity has remained in the public sector. In countries like Ethiopia, the private sector will not invest in agricultural research due to the uncertainty associated with outputs and returns to investment, the fact that it requires expensive scientific equipment and the need for having multidisciplinary teams and the difficulty of appropriating the benefits. Therefore, public investment in agricultural research in developing counties should be considered as a springboard to economic development.

Studies based on appraisals of investments in agricultural research indicate high payoff investment opportunities. The mean Internal Rate of Return (IRR) was found to be 49% for 375 appraisals of applied research projects. For livestock specific research, rates of return also appear high, if lower than for crop research. Analysis of returns to agricultural research in South Africa, showed that, in the absence of research, livestock production would have fallen due to losses from animal disease. When this effect is taken into account, the estimated rate of return on livestock research is increased from initial estimates of 0-5% to 35% for animal health research and 18-27% for other animal research (Townsend and Thirtle, 2001).

In Ethiopia, livestock research in the national research system has focused on genetic improvement studies for dairy production, beef production, sheep and goat production and

improvement, feed resources development, animal nutrition, animal health, animal power, poultry production, fisheries and aquaculture, and apiculture. Thesis research outputs conducted by a number DVM and post-graduate students in various universities are also valuable sources of information and knowledge. In addition, the country has benefited from the research outputs of ILRI in various aspects of livestock production. However, most of this dearth of scientific information is not available in an organized and useful manner to livestock keepers and is not easily accessible. It has also been argued that the uptake of these technologies and knowledge by the smallholder farmers is far from satisfactory. The reasons for this lack of or poor adoption of technologies require carefully study and analysis.

7. Credit and Insurance for Livestock

Providing credit/loans for the purchase of livestock, feed, and health services and insurance against the loss of valuable productive assets play an important role in encouraging new investments in the sector and also in coping with difficult problems such as drought and disease. In Ethiopia, where financial and insurance services are not well developed, the provision of loans/credit/micro-credit and insurance for animal loss are non existent. Some NGOs have attempted such an intervention with very little or no success.

In Ethiopia, the sources of financing for livestock development generally engage government owned banks, private banks, micro-finance organizations or NGOs. Microfinance institutions (Dedebit in Tigray; ACSI in Amhara; OCSI in Oromiya; Omo Microfinance and Sidama Microfinance in the SNNPR) provide credit for livestock development. However, their interest rates vary and have upper limits on credit access which in most cases do not encourage larger investments in the livestock sector. The involvement of commercial banks is limited and most often they provide credit in situations where the government provides incentives for special agricultural development activities or are supported with guarantee funds against loss of animals or low repayment conditions. These sources of financing, generally involving subsidized, low-interest credit, tend not to allow smallholders to borrow money unless they are organized in groups or through cooperative arrangements. Although the public sector often considers investments in the livestock sector as a high risk, some microfinance and NGO credit schemes have become successful through the application of appropriate approaches and methodologies. For example, according to FAO (1992) the Grameen Bank in Bangladesh extends its credits to about 40-50% of landless farmers to acquire and raise livestock. In India similar practice, particularly to women livestock keepers, has also been successful.

In countries like Ethiopia, the risk associated with livestock production due to recurrent drought and disease outbreaks, and recently flood that incur high social and economic disasters, communities have established coping mechanisms for households through traditional livestock insurance mechanisms by contributing breeding animals to affected households. In crop farming communities, crop failures due to drought, diseases and insect pests or other disasters have been compensated through food and cash aid. In communities where livelihoods are based on livestock, responses to losses of livestock and livelihoods as a result of natural calamities have been through provision of food aid to the affected people. Support to such communities seldom considered feed aid and compensation to losses of livestock. However, due to recent disease outbreaks such as mad cow disease and avian influenza in many parts of the world, and the implications thereof to individual farmer, to local, national or regional economies, attention is being shifted to considering the large economic and financial costs to producers and national economy. However, the guidelines and mechanisms for implementation of livestock insurance have to be developed taking the varying production systems and the species of animals involved. Lessons from countries such as India, Nepal, Thailand, Indonesia, Malaysia and the Philippines that successfully implemented livestock insurance schemes through public and private banks FAO (1992) are important to consider in developing such a scheme in Ethiopia.

8. Livestock Marketing

Marketing of livestock and livestock products is an important activity all over the country. Farmers sale livestock and livestock products to cover household cash expenses and to purchase crop inputs. Live animals are marketed through traditional marketing routes (channels) developed over the years. Livestock passes from primary markets (collection centers) to secondary and tertiary markets to reach the consumer. Cross-border exports are also common in the southeastern, southern and northwestern parts of the country. Marketing of livestock products such as milk, egg, hide and skin is also considerably high. Fresh milk and egg is directly sold after meeting family needs at farm level though production is carried out at subsistence level. Surplus production and supply is usually higher in urban areas due to market orientation and urbanization, which creates better demand for products.

In Ethiopia, government arrangements in livestock marketing activities have taken various organizational forms. The Livestock and Meat Board was the first one established to develop livestock production and marketing in the country. A number of other development projects also dealt with livestock marketing issues over the years. The most recent one was the Livestock Marketing Authority (LMA) which took national responsibility for the promotion of livestock marketing until it was dissolved in 2004. Currently, livestock marketing is organized under the Agricultural Marketing and Inputs Sector of the MoARD.

In many countries, livestock marketing services include provision of market information, quality control and grading of meat or milk, operation of auction markets, facilitation of marketing systems themselves, provision of marketing and processing facilities, and transport of livestock or of raw milk. Marketing systems have been generally administered by organizations such as marketing boards, co-operatives or a combination of both.

In Ethiopia, the marketing of livestock and livestock products is underdeveloped. The major problems are the traditional management systems which is not market oriented, underdeveloped marketing systems and poor infrastructure, poor financial facility, and presence of cross-border trade. In addition, the marketing system, major actors and characteristics is not adequately known. Experiences from other countries indicate that direct government intervention in livestock markets has achieved some success For example, The Botswana Meat Commission (BMC), has established and maintained favourable export markets for local beef, and has stimulated an off-take rate for cattle, much higher than on similar range grazing conditions in other parts of Africa. India's 'Operation Flood', has been successfully moved the country to be self-sufficient in milk and to become the largest single milk producer in the world. On the other hand, large government projects aimed at promoting market off-take from pastoral systems, by providing stock routes, watering points, holding grounds and marketing have been criticized for not bringing sustainable development and for not benefiting smallholders. In general most argue that direct state involvement in the provision of marketing and processing services has had little success in promoting development of the livestock sector and favour liberalized markets. In Ethiopia, in order to develop the market in line with the Government's livestock policy objectives, the structure of livestock and livestock products marketing system and the roles of the public and the private sector need to be studied.

9. Major problems in input supply and services

- Lack of market-orientation of the production system
- Lack of focus on individual or community capacity development
- Fragmented livestock development operations that are project based, location specific, and species specific, lack of value chain approach
- Lack of selection and genetic improvement programs for indigenous breeds

- Limited crossbreeding with exotic animals for dairy and sheep
- Limited capacity of government ranches and multiplication centers for the supply of improved animals
- Inefficient and ineffective AI services
- Distribution of improved breeds or technologies in isolation from other associated inputs and services
- Focus on number (output) than on outcome and impact
- Limitation on number of improved genetic resources distribution per household
- Lack of targeting of development locations and households
- Feed resources confined in government nurseries; limited activity in introduction of improved forages and no targeted activity to develop bee forages
- Almost no inputs and development activities on natural pasture
- Reasonable vaccination coverage of ruminants and poultry, and limited activity in the supply of veterinary drugs (both gov't and private)
- Limited credit facility for livestock development – high interest rates, upper limits for credit not allowing farmers, focus on short term activities such as fattening that have short re-payment schedule; no livestock insurance system
- Illegally cross boarder trade and importation of veterinary drugs
- Poor post-harvest handling limited processing capacity and capability and supply of equipment and utensils
- No quality control and standards and certification system
- Limited handling, processing, labeling, storage, transport facility
- Limited private sector involvement and poor organization of farmers for input supply
- Poor marketing and infrastructure, limited knowledge of the marketing operations and lack of market information system
- Disorderly private sector/cooperative participation
- Limited capacity of the research and extension system
- Limited flexibility for innovative input supply and provision of services
- Non-inclusive approach to agricultural production and marketing

10. Possible interventions to improve input supply and services

- Increase skilled man power, conduct focused training
- Increase supply of improved local and exotic genotypes through private and community based animal genetic improvement program for targeted intervention
- Improve animal health services and supply of drugs and diagnostics, encourage private health technicians and drugs vendors; consider paravets to provide animal health services and supply drugs
- Develop community based forage seed /seedling production system
- Engage micro finance institutions to provide credit and insurance for livestock development
- Establish linkages/joint planning (microfinance/women/OoARD)
- Develop feed resources (feed market, seed/seedling production)
- Improve handling, storage and transportation facilities
- Involve the private sector and cooperatives in input supply, improve efficiency, organize local processors and traders
- Introduce standards and implement quality control
- Re-defining the role of the public sector
- Coordination – public-private, traders, input supplier, transports, abattoirs, NGO, Research, development, etc

- Value chain approach – move from production focus to embrace the production to consumption
- Develop, implement and monitor quality and standards for both input and outputs
- Regulatory role
- Capacity development and training
- Market linkage and promotion

11. Conclusion

Although Ethiopia ranks first in Africa and 10th in the world in its livestock population, the livestock sector has remained underdeveloped and its potential has not been efficiently and effectively utilized. The sector is an essential component of the over-all farming system, being a major source of: traction power, organic fertilizer, cash income, and food. The contribution of livestock to the national effort to ensure food self-sufficiency both at the national and household level is significant. The large human population the country owns and its proximity to potential export markets offer great opportunities for development of the sector. Despite the huge livestock resource and the important role of livestock in agriculture, livestock resource of the country is characterized by low productivity and production levels. Average yields per animal slaughtered or milked are estimated to be 105 kg of beef, 10 kg of mutton and 213 kg of cow milk. Egg production from indigenous poultry is between 40 to 60, with an average egg weight of 45g. Livestock production and growth rates are very small and lag behind the human population growth. The resulting is a decline in per capita consumption of livestock products. At present the per capita consumption of milk, meat, egg, fish and honey is estimated at 19 liters, 8 kg, 1.23, 0.25 kg and 0.29 kg, respectively, putting Ethiopia the least even from its neighbouring countries. Based on these estimates, the annual per capita consumption of meat is 43% below the African average of 14 kg. To reach this standard, we need additional output of 378,000 tones which makes present annual requirement 508,778 tones. Further additional annual increment of 3% (15,263 tones) is expected to meet demand from the growing population. Our milk deficit is even worse than for meat. Our annual per capita consumption of 20 liters is 49% below the African average. We need an incremental output of 1,146,600 tones to reach this minimum average plus 69,946 tones per year for the growing population.

In general, the constraints for livestock development can be broadly categorized into environmental, technical, infrastructure, institutional and policy. The major technical constraints are under-nutrition and malnutrition, high prevalence of diseases, poor genetic resource management and poor market infrastructure. To ensure sustainable development of the sector, considerable efforts are being made and more than ever before and the Government has attached significant importance to the sector. However, it has to be understood that livestock development programs are expensive, have long gestation period, which require strong and continuous commitment and collaboration from stakeholders at all levels. Improved technological applications, efficient and effective input supply system, better management, capital, etc. are required on the supply side. The development of market infrastructure and market institution is also very important for inducing efficiency and incentives for market participants on the value chain. The marketing system should operate efficiently to ensure that the consumer gets what it wants and the producer gets the reforms needed to continue production. The Middle East countries are our traditional partners for meat and livestock exports and our exports to these countries has been increasing. Given their high income and the consumer preferences for our products and our proximity to these countries, there is high possibility to boast export. New markets in Africa and Asia should also be explored and considered for export.

This paper assessed the Ethiopian livestock resources, the potential for development and the current input supply system and services provision. The impacts of the current system have to be

assessed on the performance of the livestock sectors in terms of how well the inputs and services are performing. In such an evaluation, performance indicators such as herd productivity, the incidence of animal diseases, food safety concerns, meat and milk production and marketing and incomes of poor farmers should be included. The inputs and services required to benefit livestock producers may change over time depending on new and emerging markets. The provision of these specific inputs and services either publicly or privately should be examined in order to improve the functioning of the sector. Other key public services, such as education, and development roads, water supplies, and telecommunications can benefit not only livestock keepers, but the whole rural community. Access to land, labour and input markets for genetic resources, drugs and animal health, feeds, equipment and utensils and technical advice are also important for specialized livestock production systems. The current market pressure for livestock and livestock products will create opportunities for livestock keepers and this will affect the provision of inputs and services to the livestock sector in Ethiopia. In countries like Ethiopia, although there is recognition that the government must still participate in the provision of inputs and services to the livestock sector, alternative modalities for specific production systems should be further opened up to be more inclusive.

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