Journal of Poverty, Investment and Development
ISSN 2422-846X An International Peer-reviewed Journal
Vol.41, 2018

Inputs and Services Delivery Constraints in Pastoralist and Agro- Pastoralist Systems of Ethiopia

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Abstract
Key elements of pastoral system are opportunistic management of the rangelands and mobility of the herds.This enables pastoralists to make use of natural resources, water and fodder, the availability of which varies so widely in time and space. The conventionally the core rural services demanded include research, extension and information services, Education and training. Rural financing and insurance and market promotion. Technical support services i.e. all activities related to the provision of the technical and social infrastructure (e.g. transport, supply of fuel and spare parts, planning of resettlement schemes. The average consumption of inputs and productivity dry land system is much less than mixed crop livestock highland systems. However, according to the reports in some riverine and in new settlement areas there is steady growth in consumption of agricultural inputs in last decades. The study indicated that the responsiveness existing animal health service delivery by both public sectors and private vendors was generally unsatisfactory in terms of its accessibility and availability, affordability, and quality measures. Specially, issue of accessibility, quality and effective regular service delivery is insufficient.

Introduction

Overview of Pastoral and Ago-pastoral systems vs service delivery

Pastoralists use dry land natural resources sustainably where other land-use systems cannot thrive. Key elements of this production system are opportunistic management of the rangelands and mobility of the herds. This enables pastoralists to make use of natural resources, water and fodder, the availability of which varies so widely in time and space. The pastoralists migrate long distances. Their movements is planned and managed by the indigenous institutions. They have developed adaptive mechanism to the hostile environment. Pastoralists' herds consist of different species, each with its own feeding and water requirements. The herd composition differs according to the climate, vegetation and soil type of the range. The composition can also be adjusted when range conditions change or new areas with different vegetation are occupied. There are major differences among pastoralist groups: some are more mobile while others are more sedentary. A central strategy of pastoralists is herd maximization. This is their best mechanism to deal with unreliable, varying availability of natural resources.

Crop farming is becoming increasingly popular in pastoral system with many agro-pastoralists growing crops yields vary enormously from year to year, and crops frequently fail. The rainfall, soils, weed infestation and pest incidence vary greatly from place to place. For the Agro-pastoralists it is extremely difficult to plan ahead, and cropping is very risky. Although in most areas crops have to be grown under rain fed conditions, different traditional forms of water harvesting and flood irrigation are used, as are modern irrigation techniques. They also grow crops, using many different practices. In the driest areas, they harvest water practice flood-recession agriculture along major rivers, and use small-scale irrigation. The risks of environmental damage are generally larger under crop farming than under pastoral conditions. Water is the principal limiting factor. The low, unreliable rainfall means that often very little moisture is available for plant growth. The rains may start on time but then stop again, killing seedlings. Or the rains may be late, making the season too short for sustainable growth during the crucial phase of flowering. Recurrent droughts cause frequent crop failures. Agro-pastoralists respond by using various ways to conserve rainfall and store it in the root zone. Soils show great variations in fertility, depth, texture and structure. Most are infertile and low in organic matter and available nutrients.

Agro-pastoralists are more settled pastoralists with permanent crop fields close to their homesteads. But the difference between pastoralists and agro-pastoralists is not clear-cut. Agro-pastoralists keep large herds. Crop failures are regular, and the herds enable them to survive. Growing crops is mainly the women's task. Any surplus from cropping is invested in livestock. Usually, agro-pastoralists cultivate those dry lands with better moisture conditions, often the valley bottoms, which are the dry-season grazing areas for pastoralists.

Methodology

The study was conducted within 21woredas of Ethiopian Somali, Afar, Oromia, and SNNPR. Their distribution per each region was (*8 woredas in Somali, 5 woredas in Afar, 5 woredas in Oromia and the remaining 3 woredas in SNNPR*). Correspondingly, in order to ensure a broad representation of livelihood zones in each sample woredas the team in consultation with pertinent woreda offices and regional/zonal and woreda PDO officers were *purposely* identify and select 2 kebeles each from pastoral and agro-pastoral KAs

In the assessment process, a combination of p*articipatory or interactive* techniques/methods and tools has been employed to collect *qualitative*. Collected data were organized and analysed using standard techniques.

As criteria, knowledgable or conversant participants who believed to be familiar with the subject of study and socio-economic characteristics of the selected woredas and sample kebeles were selected and represented at qualitative methods (FGD & KII). Community leaders & elders, female household heads, representatives of youth and experts from woreda PDO and MST, DAs, CAHWs, vet and para-vet personnel, input suppliers, traders etc., and partners' organizations were acknowledged and represented to participate in FGD, KII and other interactive PRA tools.

Qualitative Data Analysis: Data analysis be managed and organized systematically throughout the data collection process to allow timely processing and attention will be given to standard procedures and tools for data collection and processing. During qualitative assessments, the team were used systematic categorization, summarization and interpretation of qualitative data to get meaningful information from the assessment. In some cases descriptive statistics such as averages, percentages and maximum and minimum in the form of summary tables used to establish meaningful relationship between various indicators.

Quantitative Data Analysis: In the process of quantitative data analysis team were made final checking, cleaning and organizing the questionnaires for coding and entry. Data organizers and encoders were employed to complete a computer based data entry process. The data entry system was developed for household survey questionnaires using CSPro software, which is easy to use and power full in controlling data entry errors. After the data entry was completed, the data set was cleaned with STATA and imported to Statistical package for Social Science (SPSS) for analysis. Then data was tabulated and summarized using descriptive analysis to calculate frequencies, means, indices, scores and proportions or percentages using SPSS. Further, data cleaning was made using SPSS by identifying outliers and missing values of variables by looking into frequency distributions. Tabular, graphical and other relevant presentations of results can be used.

Results and Discussion

Input delivery services

The conventionally the core rural services demanded include research, extension and information services, Education and training. Rural financing and insurance and market promotion. Input delivery services for plant production (e.g. seed, fertilizer, pesticides, irrigation water, and machines/tools). Input for livestock production (e.g. genetic material, forage, veterinary products, drinking water, machines/tools); Regulatory services often provided by governments (e.g. land use and administration, certification of seeds and bio-products, quality control of agricultural products, regulations of water rights etc.) Technical support services i.e. all activities related to the provision of the technical and social infrastructure (e.g. transport, supply of fuel and spare parts, planning of resettlement schemes etc.)

The average consumption of inputs and productivity dry land system is much less than mixed crop livestock highland systems. However, according to the reports in some riverine and settlement areas of Afar and E.Somali region there is steady growth in consumption of agricultural inputs in last decades. It is clear that modern input use is higher among Agro-pastoralists than pastoralist.

About 20% of the Agro-pastoralists are using fertilizer, improved seed, pesticides, farming tools, fodder seeds, breeding stock and animal health drugs and vaccine in the year 2015 in Afar and E. Somali regions in 2015. The critical input for livestock and pastoralist such as fodder seeds, breeding stocks, health drugs and vaccine are not sufficiently supplied. In Afar region was the supply of agricultural inputs such as fertilize and improved seed free of charge. In some cases of Ethiopian Somali Region, in a newly settlement kebeles there were better extension service provision in terms of information provision and , inputs delivery (seeds, fertilizer, agro-chemicals, etc) in the cropping season of 2015.

Access to credit is one way of improving pastoralist and Agro-pastoralists' access to input use and new production technology. It has been indicated that adopters of the improved technology received more loan than non-adopters. Thus, it is expected that access to credit can increase the use of input and probability of adopting improved technologies. Cooperatives, MFI, Saving and Credit Associations are formal sources of credit. However, access to these institutions varies among Woredas and regions but in general the coverage is very low especially for pastoralist. Very few pastoralists than Agro-pastoralists get access credit for input use.

Responsiveness of the extension service

Government extension service is the major source of agricultural knowledge and information, in addition to few non-governmental organizations. According to a study almost all pastoralists (92%) do not accessed of extension service of what so ever, while 46 % the Agro-pastoralists have accessed extension services. Responsiveness of the extension service is operationally defined as the ability of the extension service to respond to the agro-pastoralists and pastoralists needs. This includes technical support of technologies related to crop production, livestock production and management (livestock production management, modern honey production, fattening and feed production and preservation etc), and natural resource conservation and management. The better the responsiveness of the extension service will solve the agro-pastoralists and pastoralists problems. Such situations

enhance the agro-pastoralists and pastoralists to utilize the delivered information.

Based on the study, for the higher proportion of the pastoralists' the current extension service did not give technical support based on their needs. This is especially true in livestock related technology. While agro-pastoralists got support related to crop production from extension service but the responses to their need were slow. In general, the current extension system has poorly responsive and has poor linkage with the pastoralists' community. At same time the current extension system limited capacity to fulfill the needs and interest of agro-pastoralists and pastoralists. As result most of the agro-pastoralists and pastoralists are dependent on the previously introduced knowledge and their traditional knowledge.

Responsiveness of the animal health service

The study indicated that the responsiveness existing animal health service delivery by both public sectors and private vendors was generally unsatisfactory in terms of its accessibility and availability, affordability, and quality measures. Specially, issue of accessibility, quality and effective regular service delivery is insufficient. According to researchers' field observation and respondents' personal remark concerning quality and reliability of drugs, a considerable number of veterinary drugs are being administered without veterinary personnel's prescription and inspection mostly because of remoteness of clinics/health posts or non-availability of adequate services in existing clinics. Vaccination coverage mostly deficient and significant proportions of livestock were left out without being vaccinated because of the mismatch between the number of health personnel and the livestock population as well as the amount of vaccine and livestock population. Pastoralists were not also happy with the frequency of vaccination. It was once in two years and in a rare case once in a year. The same was true with other services like getting diagnosis and antibiotics from the AHA, AHT as well as CAHWS were difficult. Mostly the amount of the drug supply was not sufficient and the number of health personnel was not balanced with the livestock population.

Constraints of Pastoral and Agro-pastoral Extension service delivery Service

From the PRA exercises and key informant interviews the constraints of the extension systems was identified and classified as the inherent characteristics of extension system, physical, biological, technical, socio-economic, and institutional in nature.

1. **Inherent characteristics of the extension system**

Extension and advisory services are facing particular problems in the dry lands. Government extension services are generally weak, or do not exist in remote areas. Population densities are low, forcing extension officers to cover huge areas. Extension workers are reluctant to live and work in remote areas. And many extension messages are poorly adapted to dry land pastoralists conditions. Pastoralists are mobile, and many agro-pastoralists also spend much of the time away from home. This makes it difficult for the existing extension service to plan activities, and pastoralists are not able to participate in the extension programs. The unpredictable environment makes both pastoralism and especially crop farming risky. Producers cannot afford to take any more risks, so prefer to stick with tried-and-tested practices. Technology demonstrations fail because of drought or other problems.

2. **Environmental constraints**

The constraints associated with the fitness technologies and input available to the physical environment in pastoral and Agro-pastoral areas. These include variability of rain in terms of amount and distribution irregularity. High potential evapo-transpiration, soil erosion and reduction in soils fertility. The Micro-variability in soils and rainfall distribution patterns make agricultural technology needs site-specific.

3. **Adoption of New Technology and techniques related constraints**

The available technologies and techniques fit to agropastoral and intensive production system than the pastoral extensive livestock production system. New technologies and techniques are crop oriented than for livestock. Any New technologies to be introduced to the system must fit to local household objectives ' markedly risk minimizing and food self-sufficiency.

4. **Institutional constraints:**

Institutional constraints as comprises of marketing system and policy constraints. There is limited access and availability of some important technologies and access to inputs is limited by lack of infrastructure (roads, markets) and high transportation costs. Apart from infrastructure, input market access is also limited by inefficiencies among input suppliers and poor logistic arrangements, inadequate cooperatives and stronger Agro-pastoral and pastoralists ' associations which can lobby effectively for better prices and other producer incentives.

5. **Limited Collaboration and linkages of Research and Extension**

Several key areas of relevant pastoral research have limited capacity; budgetary allocation remains a big challenge for the regional research institutes in pastoral area. Despite the fact that all research stations have various types of laboratories; still there are limited infrastructure in pastoral areas. Biasness of technologies towards some specific areas has been pointed out by key informants, that some of the commodities enjoy more technology generation than others. This was found to be the case for crops more than livestock. And within the cereals, maize has been the main beneficiary of research support. Livestock had limited number of developed technologies despite being

considered important in pastoral areas.

6. Weak Extension Delivery Services

Effective extension delivery is a key to ensure technology transfer and advisory service to Agro pastoralists and pastoralists leading to high levels of technology adoption which in turn will lead to improving productivity. The key informants from Woreda and research stations identified the major constraints which negatively affect effective delivery of extension services. These constraints are summarized as: transport problems at both Kebele, and woreda levels which affects supervision, support and monitoring of field activities: Poor state of frontline staff residence houses which negatively affects staff motivation leading to higher staff turn-over, Low motivation staff in terms of training plan for junior staff to upgrade their skills: lack of proper succession plan for employees they remain at the same position for a long time without being promoted, insufficient capacities in junior staff since most of them never go for refresher courses, too many ad hoc programs, affecting the implementation of core extension activities.

7. Infrastructure and administrative Challenges of Pastoral training centers (PTCs)

PTC activities are undertaken under shade and in some places even there is no shade**.** Those PTCs which are existing physically are constrained by land shortage to implement demonstration, lack of teaching materials and guidelines and manuals. Administrative actions are needed to overcome such gaps. The PTC management committee leader is usually kebele chair person. The turnover of the chair person is affecting the performance of committees, indicated need concern for sustainability.

8. Climate change not well addressed

Strong extension service delivery can't be realized without due consideration to climate change. Pastoral and Agro-pastoral areas are increasingly sensitive to location specific climate change realities; and these need to be well captured and addressed. Climate smart extension package including water harvesting and irrigation technologies could be a priority area to deal with the challenges posed by climate change.

Constraints in Public Animal Health Services Delivery

1. **Shortage of qualified staff**: Animal health and veterinary services are presently not accessible to the vast majority livestock owners in pastoral areas of Ethiopia. As already mentioned considering the huge number of livestock population and the distribution and variety of animal diseases there is a shortage of qualified staff. Whilst comparing the ratio of qualified staff to the TLU it is beneficial in indicating that inadequacy of staff, and the lack of proper utilization of existing ones should be given the highest consideration. On the other hand absence of adequate training and capacity building for existing veterinary staffs including absence of clear responsibilities of staff with various qualifications.
2. **Financial constraints and logistic problems**: these problems were found to be deep-rooted sources of limitation for responding fully and immediately to different disease outbreaks reported. There is no integrated and appropriate diseases prevention and control system. Animal health service, besides to the purchase of drugs and other veterinary equipment it demands huge operational budget. However, there is severe budget limitation at woreda level to undertake timely and proper veterinary services with meager supplies of drugs and vaccines. This according to the respondents is because of inadequate budgetary allocation to veterinary service delivery.
3. **Poor law enforcement and contro**l of illegal drug circulation and poor quality and substandard drugs on black markets (smuggled across the border) of the country illegally. There is clear guideline and rules to be implemented as ethical practices to minimize and control this prohibited activities in pastoral areas.
4. **The low level of incentives to encourage individuals into the veterinary service** – basic pay and related allowances and reduction in hardship allowance in many of arid and desert areas which discourage the beneficiaries,
5. **Shortage of laboratory facilities**, including reagents and materials in all health service institutions including the health post, clinics, laboratories in livestock research centers.
6. **Lack of equipment and treatment materials**: the construction of AHPs in pastoral areas is unquestionable for it gives better working condition for animal health and other staffs. But, it has to equip with cold chains, drugs, treatment materials and office furniture's, and staff residence. The availability of a reliable cold chain is important for the effective implementation of vaccination program and treatments; unless the vaccines involved can be stored in ambient temperatures it could be deteriorated.
7. **Very weak trans-boundary animal diseases (TADs) control and reporting:** Movement across the border was a challenge for implementation of prevention and control of diseases across the neighboring countries both in quantity and quality, by national and international scale. Lack of continuous updating of epizootic information has negatively impact on the country's livestock production and marketing/ export trade. In this case, the involvement of the country in the international markets is limited because standards governing trade in livestock commodities insist that animal products be derived from areas which are free from certain animal diseases. In general the present disease prevention in cross-border areas could not be successful since there is

lack of coordinated measures between countries to monitor and manage outbreaks of animal diseases.

8. **Disorganized and ad hoc livestock health operations** in pastoral areas discouraged adequate service provision and development. This is due to lack of dependable data on the distribution of vaccines and drugs to assess the demand for veterinary input across the rangelands in pastoral areas.
9. Improper drugs handling and management: In pastoral and agro-pastoral woredas of the region veterinary drugs are usually stored just like anything in the office and homes. Veterinary drugs handling and management problems, illegal drug smuggling and marketing, drug misuse and abuse were some of the issues raised by the key informants.
10. **The Increasing of Drug resistance Animal Diseases:** Animal disease remains one of the principal causes of poor livestock performance, leading to an ever-increasing gap between the supply of, and the demand for, livestock products. One of the most important conditions for controlling livestock diseases is if and only if livestock owners can afford to cover the cost of treatments. Cost of treatment is therefore, an important determinant of the usefulness of veterinary drugs. However, the majority of those raising stock in rural areas especially are far from the site of veterinary stations, and those who have access to veterinary services may not be able to afford to pay for them. Additionally, reduced government funding for animal disease control is likely to influence the incidence of some serious drug resistance livestock diseases.
11. **Absence of Strategy on Ethno-veterinary promotion:** Little attention is given to utilize the ethno-veterinary knowledge that exists in pastoral areas of Ethiopia. Its complementary role with modern veterinary medicine has not been given due attention.
12. **Inappropriate (not pastoral friendly) animal health service**: The pastoral community has no stable life as it move from place to place following its animal in search of feed and water. This condition makes the fixed animal health service of highland style very difficult and ineffective in control and prevention of livestock diseases in pastoral areas of Ethiopia. Besides, since the human population tends to be small and mobile, there are difficulties in reaching them since they travel much in search of water and grazing resources.

Recommendations

- The Pastoral extension service in addition to all others must have a component of some sort of mobility so it could reach to people who have moved with the livestock to some distances from the main family settlement. The pastoralists who moved with livestock should be trained and to access other advisory services. Facilitators should be trained from among the community which will take the responsibility of supporting the DAs in providing mobile extension services to herders on move. A guideline for mobile pastoral extension needs to be developed at federal and regional levels considering the specific needs of the locality.
- Supply of timely and sufficient credit with the reach of the community in need facilitating technology adoption and utilization and enhancing insurance for livestock and crop production.
- Provision of credit/loans for the purchase of livestock, feed, and health services and insurance against the loss of valuable productive assets at time of difficulties such as drought and disease to encourage new investments in technologies and adoption.
- The PTC should be organized based on local specific needs. In pastoralists areas the PTC should follow a special standard guideline prepared for mobile pastoralists. The status and operational standard of PTC needs to be improved in terms of the physical and operational, financial institutional, the training and learning capacity with the minuimum standards indicated above.
- Increase the number of FTC as per the minimum requirement to match to the size and population of Pastoralist and Agro-pastoralists as well as local livelihoods and needs.
  The number and specialization of DAs and Woreda SMS needs to match to the size and population of Pastoralist and Agro-pastoralists as well as local livelihoods and needs.
- Additional assignment of DAs by kebele administration increases work load therefore, the DAs need to be allowed to focus on the extension activity
- Utilizing the available technologies ready for scaling up: A lot of technologies are either on shelf or used in other places it needs to be synthesized in the local condition and utilize them
- Advocating for pastoral oriented decentralized and demand-driven extension service. This is mainly done to respond to the growing demands from the Pastoralist and Agro-pastoralists.
- Targeting on marginalized groups and women. The extension service delivery needs to focus on special approaches to reach women, drop out pastoralists, youth, landless, and other marginalized groups.
- Improving the capacity of DAs and Woreda Subject matter specialists (SMS) in important areas of competency helping them in understanding problems analysis in pastoral and agropastoral areas. These include social and problem solving skills, soft skills and entrepreneurship.
- Empowering the local governance on extension services involving a broad set of pastoralist/ Agro

pastoralist stakeholders (including women, pastoralists, and so on) in the general implementation and decisions making on extension service.

- Improving Livestock extension services: The livestock sector is found to be weak in developing and implementing its own appropriate package. Therefore the livestock extension for both pastoral and agro-pastoral system needs to develop with appropriate extension methods.
- Improving the incentive and benefit systems with clear career path specifically for those working in pastoral and high risk areas.
- Strengthening linkages throughout the system including linkages between extension actors within such as between DA and Subject matter specialists (SMS), Woreda and region and Region to federal level most importantly between the federal institutions such as Ministry of Agriculture and Natural Resources and Ministry of Livestock and Fisheries. Similarly in regional institutional arrangement needs to be reformed. Specifically, the linkage between extension and research needs to be improved
- Currently, the Community-based Animal Health Program is the successful way of delivering animal health services in pastoral and remote areas of the country. It is because of private veterinary service is limited to towns and profitable areas, governments are unable to continue funding many goods and services, the public sector is not always efficient or effective provider of goods and services and should instead focus on policy formulation and regulation, communities had always managed their own livelihoods and natural resource base, the failure of top down approaches and the success of participatory and community based approaches.
- The pastoral community has no stable life as it wanders from place to place following its animal in search of feed and water. This condition makes the fixed animal health service of highland style very difficult and ineffective in control and prevention of livestock diseases in pastoral areas of Ethiopia. Therefore, promoting fully fledged mobile veterinary clinic with all required facilities and services supported by national policy and budget is a timely solution to control and prevent the livestock diseases and to improve the livelihood of the pastoral community. This Mobile veterinary clinic should be led by professional animal health technician who have better knowledge background to CAHWs. They are expected to provide quality services with more diverse health services compare to CAHWs.
- The trend in the participation of the private sector in the delivery of veterinary services is occurring at an increasing rate compare to old days. However, most of the participants are geared towards opening and operating drugs shops and importation of veterinary pharmaceuticals, while clinical or diagnostic services are very minimal and are operative in and around big cities where there are commercial livestock farms and peri-urban areas. Hence, encouraging the private sector to participate in clinical and diagnostic services will create a competitive environment which helps in providing veterinary service of good quality.
- Research works and community services done by different bodies and institutions in the region are not communicated and not disseminated well to the concerned bodies. Moreover, it is not done in an organized way in which there is a redundancy, not demand driven and not problem solving. Therefore, there is a need to monitor studies done on the pastoral areas and giving community service works in an organized and sustainable way in recognition of regional governmental bodies.
- Research works and investigations done so far should be collected in all directions concerning animal health and veterinary services and evaluating their recommendations. The regional government and other governmental and nongovernmental organizations and collaborative institutions should be linked to give support and monitoring the progress and be responsible to get the outputs. Community service programs of every institution found in the region should be in line with regional government priority areas and should be demand driven. Both the research works and community services will be successful in supporting the animal health and veterinary services delivery system if they can be done in an organized and collaborative way.
- Thus, there is strong need for close interaction between pastoral communities, extension professionals and researchers in diagnosing problems together and working out location-specific recommendations emphasizing participation education rather than prescription and joint actions in the field. Accepted to be more knowledge intensive, these new recommendations will require greater skills both to develop and to apply. The linkage between research-extension and pastoral communities should not limit itself only to the Federal level, but it should go beyond that to all regions and district of the pastoral areas. The entry of interaction should not limit itself only to the crop production aspects; however it should strongly go beyond that to include livestock and natural resources technologies, and even the issue of livestock marketing concerns. In line with the intention to develop location-specific interventions to research-extension and pastoral communities interface at all levels include from district to national level will be supported.

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