
Synthesis of constraints to livestock research and development and recommendations

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Introduction

The group was asked to prepare a synthesis of the workshop by reading the papers, listening to the oral presentations and discussions in the plenary. The group held three meetings to formulate this report which covers the major constraints to improving livestock production systems in the subregion and a set of recommendations for follow-up action. The background information and the recommendations were adopted by the plenary session.

Background information

African countries are experiencing high population growth rates of above 3.0% per annum. However, these increases in population are not matched by food production. For example, most African countries were self-sufficient in livestock products until the mid-1970s, but since then meat and milk imports have risen dramatically in many countries. Projections of supply and demand for livestock products indicate substantial deficits by the end of the century. It is against this background of increasing deficits in livestock products in Africa that the Workshop on the Future of Livestock Industries in East and Southern Africa was conceived. The major objectives of the workshop were to:

- characterise the positive and negative trends and technologies of the livestock industries in the subregion
- review recent cases of livestock research and development programmes in the subregion
- identify and analyse the factors contributing to failures and the successes of selected livestock research and development programmes
- identify opportunities for small-scale farmers to produce more food and marketable livestock products and to provide options to governments and donors on investments in livestock research and development
- focus on high priority researchable issues (biological and socio-economic) which can be undertaken by the International Livestock Centre for Africa (ILCA), the International Laboratory for Research on Animal Diseases (ILRAD) and national agricultural research systems (NARS).

The east and southern region comprises the countries that form the Preferential Trade Area (PTA) and the Southern African Development Co-ordination Conference (SADCC) organisations.

Changing agricultural systems in the region

In the arid and semi-arid areas of Africa, pastoralism is still the dominant activity while in the subhumid, highlands and humid areas both livestock keeping and arable farming are practiced. Population increase in the latter ecozones is putting a lot of pressure on the stability of the agricultural systems. Traditionally, agropastoralists set aside areas for arable cropping and communal grazing areas. Fallowing was also a common practice allowing the restoration of soil fertility. However, with increasing human populations there is a corresponding rise in the demand for basic staples besides other food requirements. In order to meet the demand, farmers in sub-Saharan Africa have steadily expanded arable cropping areas at the expense of grazing and fallow lands. There are several examples of the reduction of large ruminant populations (in Rwanda and Burundi) as farmers have given up cattle rearing due to lack of grazing land.

The population pressure is generally high in the high potential areas; a typical scenario is characterised by intensive cropping (cash and food crops), scarcity of grazing land, high dependency on crop residues as feed for ruminants and the disappearance of special areas. Further, as land is limited, farmers use labour-intensive methods and high input systems (fertiliser, manure, herbicides, mechanisation improved seed, insecticides etc). For the same reasons, farmers

adopt the confinement of animals (stalls, sheds or tethering) and utilise improved strains of cattle/small ruminants to increase productivity and obtain economic returns.

In all case studies on smallholder dairy, it was reported that farmers plant high yielding forages especially *Pennisetums* and Guatemala grass, feed crop residues and harness manure. In general the emerging small-scale agricultural production systems in East and southern Africa are non-specialised, integrated crop-livestock systems. In the case studies reported, introduction of improved livestock technologies resulted in the increase of overall farm productivity and commercialisation became common. In the livestock/crop systems there are many interactions which are complementary and/or competitive. The following is a list of areas of interaction:

Livestock supporting crop production

- Farmyard manure: Enriches and improves soil productivity. Many examples were given in the case studies;
- Farm power: Cattle provide farm power enhancing labour productivity, timeliness of operations, expanding crop land and improve crop yields (food and income);
- Inputs: Livestock products are sold to generate income which is used to purchase inputs (fertiliser, labour etc) for crop production;
- Removal of farm waste: Livestock feed on crop residues *in situ* which would otherwise have to be removed using human labour. Livestock converts the waste into edible products of milk and meat;
- Collateral: Livestock have a value and can be used as collateral for loans for crop production; and
- Market outlets: Livestock keepers purchase cereals and other foods from croppers.

Crop production supporting livestock production

- Feed: Crop residues provide feed for livestock especially in the dry seasons;
- Inputs: Crops are sold to raise income for the purchase of inputs (acaricides, feed, drugs, foundation stock etc); and
- Market outlet: Arable cash crop farmers provide a market for livestock products such as milk and meat.

Competition between crops and livestock in integrated farming

- Land: In densely populated areas land is scarce and farmers have to make difficult choices on the allocation of land. Farmers allocate land in accordance to food needs and economic benefits. In some case studies small-scale dairy is more profitable than crop production and vice versa, but entering in and out of a livestock enterprise is not easy due to infrastructure;
- Labour: In view of land scarcity, labour-intensive systems of production have been adopted in crop production (tillage, weeding and harvesting) and livestock production (forage production and stall-feeding). Labour requirements for crops have definite peaks as opposed to those of livestock. Labour shortage was cited as one of the constraints in smallholder production systems;
- Funds for purchase of inputs are required by both. Investment in livestock is long-term in contrast to seasonal in crops. In the majority of cases farmers cannot afford to purchase the foundation dairy crossbreds;
- Policy: African government policies are generally biased towards crop production to solve short-term problems, e.g. food shortages. Governments develop infrastructure such as roads for tea and coffee development schemes but no similar infrastructure is developed for livestock development; and
- Water: Off-season production of crops and forages needs water for irrigation.

Complementary contributions of crops and livestock to the welfare of the farmers

- Food: Both crops and livestock complement one another in providing a balanced diet. However, there is a general lack of information on the specific contribution and impact of livestock on human nutrition. In the case studies there were statements on positive impact on human nutrition;
- Income: Generally incomes from crops are seasonal while those from livestock are more evenly distributed throughout the year. Farmers prefer a regular source of income. In addition, livestock are treated as savings accounts. Farmers producing both crops and livestock are relatively well to do in the subregion. In two case studies (Burundi and Kenya) on integrated livestock/crop systems specific information on the economic returns showed dramatic enhancement through the use or sale of farmyard manure for crop production. In other case studies on the manure components was not included in the economic analysis. In the case studies smallholder dairying is viewed by farmers as a commercial enterprise and is probably the driving force;
- Barter trade: In specialised agriculture, the crop and livestock products are bartered in the markets,

therefore mutually benefiting both livestock keepers and arable croppers. In the case studies both informal and formal marketing channels were reported but specific information on market options is generally lacking;

- Employment: Both crops and livestock provide employment at household level and at times hired labour is used - as the level of farm activities (e.g. tillage, weeding, stall feeding and gardening) increase the demand for labour also increases. Therefore this creates employment opportunities in the rural areas and the benefits of agricultural transformation go beyond the household. Hired labour is justified in viable enterprises only. Economic viability depends on the agricultural production potential of the area and appropriateness of the technologies applied;
- Buffering: Livestock systems can go through difficult times of drought and economic hardships and therefore livestock stabilise the agricultural systems; and
- Credit worthiness: Banks accept land and livestock as collateral for loans. Farmers in the subregion are less likely to put up land as collateral and therefore livestock is an important asset.

The size of the smallholder/peri-urban dairy is relatively small in the respective countries with the exception of Kenya where the bulk of marketed milk is produced by smallholders and the demand is largely met by local production. Kenya has a dairy herd of nearly 3 million head of cattle about 1.35 million of which produce 1448 tonnes of milk annually. In Zimbabwe the national dairy herd is significant and meets the local market demand but is largely in the hands of the large commercial farmers. In the case studies the shortage of improved dairy foundation stock was repeatedly mentioned as a major constraint to expansion of the sector. In order to meet this demand there is a need for sustained long-term support to breeders in form of services and advice.

Livestock production systems

The major livestock production systems discussed in the workshop papers can be grouped into: a) traditional and b) small-scale commercial production systems. The traditional systems include the pastoral (range), agro-pastoral and mixed crop-livestock systems. The commercial production systems comprise the extensive, semi-intensive, ranching, beef fattening and intensive dairy production systems (smallholder and peri-urban dairy production). The bulk of the rural population is in the traditional sector of mixed crop-livestock production systems and, to a lesser extent, the small scale/peri-urban dairy which is emerging as a commercial activity. The emergence of smallholder dairy appears to be market driven. Therefore, commercialisation seems to offer opportunities for future increased milk, meat, farm power and manure utilisation. In the medium and high potential areas the mixed crop-livestock production system is rapidly adopting small-scale dairying as a commercial activity and therefore relevant technologies are in demand and are being adopted. However, this transformation is not matched with appropriate technologies which are able to ensure sustainability and environmental integrity and transformation becomes frustrated by inadequate support services and marketing setbacks.

The workshop therefore agreed to focus the future of research, development and extension in an integrated livestock-crop-tree system with the main target being the smallholder/ peri-urban dairy system without ignoring sustainability and environmental integrity support services, delivery of inputs and market outlets. The workshop also felt that focusing was the most cost effective way of utilising the limited available manpower and resources.

Smallholder/peri-urban dairy production systems

From the case studies the following are the common characteristics of the system under review: declining land/population ratio and hence high population pressure; emerging labour intensive crop/livestock production systems as a result of declining land/population ratio; and a growing market within the production areas or adjoining urban centres offering opportunities to farmers. A number of constraints were also common across the region.

Major constraints

The main manageable constraints in the small scale/peri-urban dairy were broadly categorised under four main groups:

- inadequate nutrition
- animal health
- low genetic potential for milk production in the indigenous types and unstable crossbred genotype population
- skills in intensive dairy production
- socio-economic.

It was noted that the identified constraints are similar to the ones in the Winrock International Report on the Assessment of Animal Agriculture in sub-Saharan Africa in which the consultants singled out feed requirements, animal health, genotype, farming system and policies as the major constraints to increased livestock production and productivity.

Specific constraints

From the synthesis of the papers it was agreed to single out what appeared to be the specific constraints under each of

the main constraints.

Nutrition. The workshop identified inadequate nutrition as a major constraint to production. The grazing areas are declining due to expanding arable cropping which forces farmers to adopt a cut-and-carry system which is labour-intensive. However, the workshop felt that there are opportunities for increasing forage production through the use of improved varieties, agronomic practices and introduction of browse (multi-purpose trees). Further, opportunities exist to improve the availability of feeds throughout the year and efficiency of utilisation of feeds through conservation of forages and crop residues. The development of appropriate feed packages based on locally available forages, browse, crop residues and processing by-products will also go a long way in improving the efficiency of utilisation.

Animal health. The workshop noted that livestock diseases are a major constraint to the development and improvement of the livestock industry in the region. Vector-borne diseases, particularly trypanosomiasis (transmitted by tsetse flies) and tick-borne diseases (especially theileriosis and heartwater) seriously limit livestock production in the region. East Coast fever (ECF), a form of theileriosis caused by the parasite *Theileria parva* and heartwater were singled out as the most important diseases for eastern and southern Africa, respectively. Trypanosomiasis appeared to be the second most important disease of livestock in the region.

Several papers highlighted the limitations and the unsustainability of the current control methods based on the use of acaricides and other chemicals and they reported encouraging research developments in the use of vaccines for the control of ECF and heartwater.

Breeding. The attributes and weaknesses of the indigenous animals, purebred exotics and crossbreds were reported in the ease studies. In order to enable the purebred exotics to exhibit this genetic potential they need an optimum environment (feeding, management, health and climatic conditions) which cannot be attained on small farms. Crossbreeding improves milk production and many countries in the region have embarked on this. Crossbreds are suitable for smallholders. However, farmers face difficulties in adopting breeding plans for F1 or F2 crosses due to the anticipated segregation.

It was also felt that inadequate characterisation of indigenous breeds for disease resistance and suitability to their respective environment has not been fully documented and there exist lost opportunities.

In the majority of the ease studies it was pointed out that insufficiency of foundation and replacement stock is a major constraint to the development and expansion of the smallholder dairy. Low reproductive rates (low calving rates and long calving intervals) in the sector is caused by missed heat detection, poor or non-existent artificial insemination (AI) delivery services and brucellosis where bull centres are used. High mortality rates of calves also retards the raising of replacement stock.

Skills. While the exotic breeds have a high potential for milk production, they are susceptible to endemic diseases in the tropics and they need large quantities of feeds on a continuous basis to sustain high milk yields. Therefore farmers need to be trained in disease control, management, feed production and utilisation. The benefits of training farmers was mentioned in all ease studies.

Socio-economic. A number of issues perceived to be hampering the development of the smallholder dairy industry in the region were raised under this section. These include unfavourable pricing policies, lack of alternative market opportunities, lack of capital, poor infrastructure, lack of output processing technologies, weak institutional research extension-farmer linkages and inadequate training at all levels. These issues act as disincentives to farmers. The lack of an interdisciplinary holistic approach to livestock development programmes and projects in the region was also noted. The following are important areas for the future:

- inclusion of socio-economic and environmental impact assessments in livestock development programmes and projects
- economic analysis of pricing policies, marketing and processing opportunities in livestock development programmes and projects
- providing options for assisting farmers to take up dairy and through credit schemes, exchange of indigenous stock with improved or in-trust schemes
- evaluation of the possibilities of using alternative institutional mechanisms and the roles of farmers' organisations, governmental institutions and non-governmental organisations (NGOs) in providing services (advisory, AI etc) and inputs such as feeds and veterinary drugs
- strengthening of research-extension-farmer linkages and training and administrative inclination be involved. These institutions were identified to be NARS, NGOs, SACCAR, ILCA, ILRAD, ICRAF, ICRISAT, CIMMYT, IITA etc.

Long-term nature of livestock programmes

Livestock research and development take time; short-term and erratic financial and technical support cannot therefore be effective in bringing about change; e.g. multiplication of cattle takes a long time due to the long generation interval. Long-term commitment on the part of African governments and donors is essential.

Monitoring

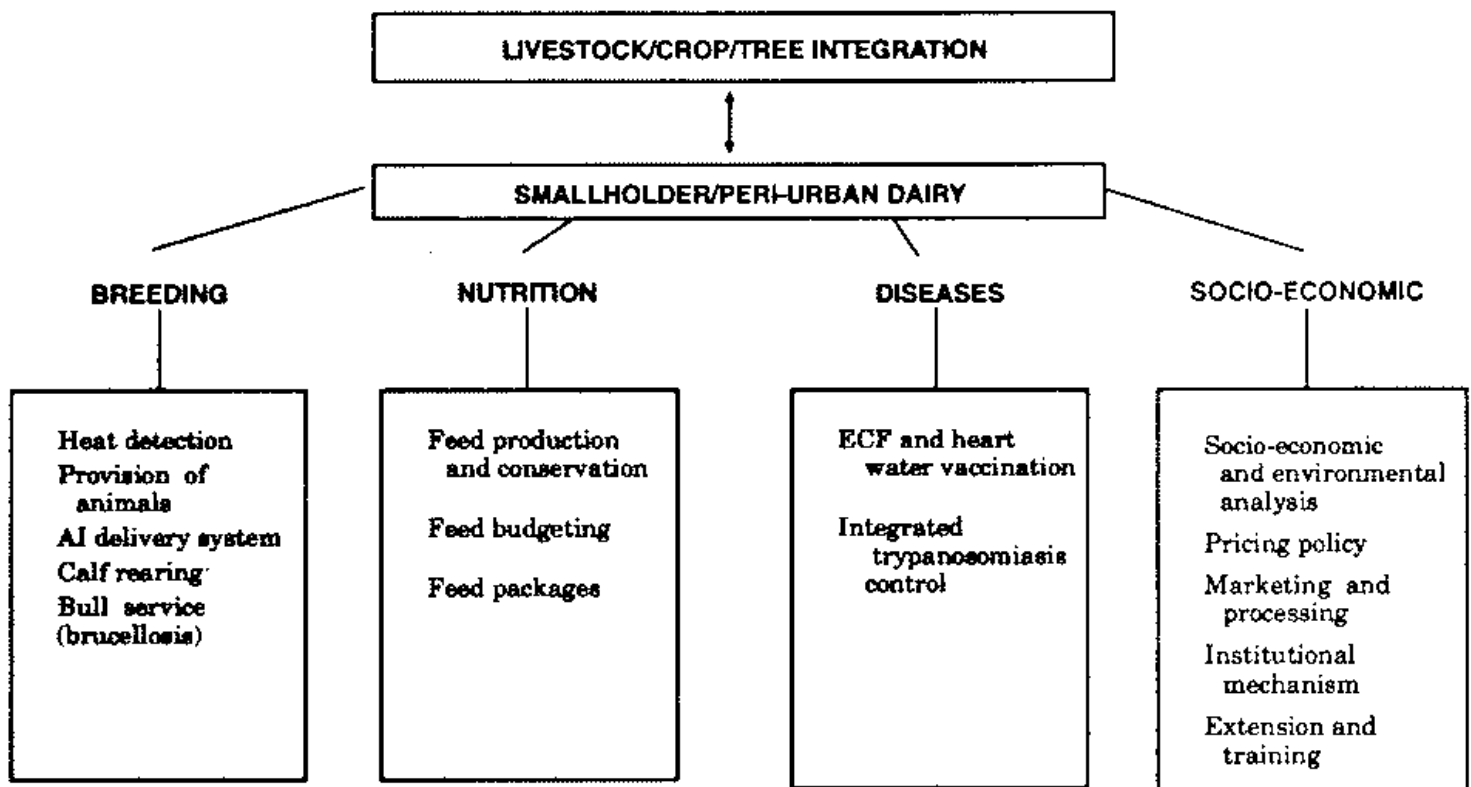
It was recommended that livestock development programmes and projects should include a monitoring component to assess and evaluate the socio-economic nutrition and environmental impact under the often dynamic circumstances in the region to ensure their sustainability.

Programme development

The workshop recommended that scientists' efforts in research and extension efforts be pooled together and focus on a targeted programme aimed at solving the above constraints so as to eventually demonstrate some impact. The following prerequisites were considered important for such a programme:

- Realising the magnitude of the problems that constrain livestock production, it was agreed that attention should focus only on the specific constraints that were noted in the workshop. The priority areas are summarised in Figure 1.
- Since there is a definite limitation of resources, the workshop agreed to focus attention on a holistic approach aimed at livestock-crop-tree integrated systems with emphasis on solving the problems (identified above) of the smallholder/peri-urban dairy producer. Dairying here refers to both cattle and goats (Figure 1).

Figure 1. Priority areas for future research and development on smallholder/peri urban dairy.



Implementation strategy

The workshop recommended that priority be given to the review, evaluation and application of available technologies in the region and to conducting adaptive and applied research to develop unavailable technologies and also refine the existing ones. It was further recommended that national agricultural research and development institutions (e.g. research institutes, universities, government ministries and NGOs) should strengthen collaboration and cooperation amongst themselves and between them and the international agricultural research centres (e.g. ILCA, ILRAD, ICRAF and CIMMYT), international development organisations (e.g. FAO and ODA) and regional organisations (SACCAR and PTA) operating in the region.

Follow-up action

It was recommended that the workshop convener should:

- Produce the proceedings of the workshop, including the synthesis and recommendations, and circulate them widely in the region.

- Initiate the development of specific programmes and projects for the development and improvement of the livestock industry in the eastern and southern Africa region.
-