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Improving livestock marketing
and intra-regional trade in West Africa:
Determining appropriate economic incentives
and policy framework

ILRI
— —
LIVESTOCK RESEARCH

International Livestock Research Institute

Improving livestock marketing and intra-regional trade in West Africa: Determining appropriate economic incentives and policy framework



T.O. Williams, B. Spycher and I. Okike

ILRI

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LIST OF ABBREVIATIONS AND ACRONYMS

ADB	African Development Bank
FCFA	Franc Communauté Financiere Africaine (In 2001, US\$ 1 ≈ FCFA 550)
CFC	Common Fund for Commodities
CILSS	Comité Permanent Inter-Etats de Lutte contre la Sechéresse dans le Sahel
CLUSA	Cooperative League of the United States of America
CNC	Cadre National de Concertation
COBAS	Cooperative de Commerce de Bétail de Sikasso
ECOWAS	Economic Community of West African States
EU	European Union
FERAP	Projet de Fluidification des Echanges et de Rapprochement des Politiques Agro-alimentaires
ILRI	International Livestock Research Institute
NTB	Non-Tariff Barriers
ODC	Other Duty Charges
OMBEVI	Office Malien de Bétail-Viande
PAPA	Programme de Amelioration de Production Animale
SSA	Sub-Saharan Africa
UEMOA/WAEMU	Union Économique et Monétaire de l'Afrique de l'Ouest / West African Economic and Monetary Union
UNACEB	Union Nationale des Associations de Commerçants et Exportateurs de Bétail du Burkina

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The analysis and conclusions in this report represent the views of the authors and should not be attributed to ILRI, CFC, CILSS and all the individuals mentioned here. The authors bear responsibility for any remaining errors in the report.

Timothy O. Williams

Sub-Project Manager and Co-ordinator of Component 2

EXECUTIVE SUMMARY

Livestock are the highest valued agricultural commodity in intra-regional trade in West Africa. Livestock trade historically links the Sahelian countries (e.g. Burkina Faso, Mali and Niger) in the arid and semi-arid parts of the region as exporters of livestock to the humid coastal countries in the south (e.g. Côte d'Ivoire, Ghana and Nigeria) as net importers. It is a thriving intra-regional trade in live animals in which the value of traded cattle increased in real value terms from US\$ 13 million in 1970 to US\$ 150 million in 2000; the cattle population in the region has grown from 29 million in 1970 to 47 million in 2000. Within the period, three major factors influenced the pattern of livestock marketing and trade in West Africa. Firstly, the severe droughts of the late 1960s, early 1970s and early 1980s disrupted the flow of animals from the Sahel to the coastal countries. For example, cattle population declined in Burkina Faso, Mali and Niger from 0.47, 0.95, and 0.97 head per capita, respectively, in 1970 to 0.41, 0.62, and 0.52 head per capita in 1975. This opened up the regional markets to substantial extra-regional imports of frozen meat from Argentina and the European Union. The second factor was the inappropriate macro-economic and sectoral policies pursued by countries in the region. These included currency overvaluation, price controls, restraints on private sector involvement in processing, and an array of tariff and non-tariff barriers that provided disincentives to intra-regional trade. Inappropriate macro-economic policies, through their impact on income levels and distribution, also seriously affected the livestock sector. The rapid declines in incomes of importing countries caused falls in meat demand. In the two major importing countries, Côte d'Ivoire and Nigeria, consumption fell from 12.2 and 8.4 kg per capita in 1990s to 11.0 and 4.2 kg, respectively, by 2000. The third negative factor was the availability in the West African coastal markets of subsidised imports of meat and dairy products from the European Union. The price ratio between Sahelian beef and imports from Europe rose from about 0.5 in the early 1980s to 2.0 by the end of the decade as import prices for European Union beef fell by about 29 percent. Consequently, livestock exports from Sahelian countries to coastal countries, particularly to Côte d'Ivoire, dropped significantly and imports of frozen beef from countries outside the region, mainly from the European Union increased three-fold from a low of 16 percent in the mid 1970s to 44 percent by the end of 1980.

However, beginning in the mid-1980s most countries in West Africa implemented macro-economic stabilisation and structural adjustment programmes, including currency devaluation, abolition of commodity marketing boards, lifting controls on livestock markets and reducing trade taxes. These changes initially altered the structure of incentives mainly in the form of pricing (making Sahelian beef more competitive in coastal countries) and promoted expansion of intra-regional trade in livestock. At the same time, the sharp decline in intervention stocks enabled the European Union to reduce subsidies on beef exports to West Africa by as much as one-third between 1993 and 1995. However, recent increases in meat imports indicate that the situation is dynamic and countries in the region need to establish policies that take into account changes in terms of trade and, supply and demand. In this regard, Côte d'Ivoire introduced an import tax (compensatory duties) on European beef to cushion the effects of subsidies by EU on domestic economy.

Most of the livestock are produced by smallholder pastoralists and farmers and marketed by private entrepreneurs operating a marketing chain involving collection, regrouping and terminal markets. Although the marketing chain is well-known, the economic and institutional barriers to livestock marketing are often underrated at considerable cost to livestock sector development and with negative impact on the welfare of the large

population of smallholder producers and others who depend on the livestock sector for their livelihoods. For example, it is estimated (this study) that transportation and handling costs for cross-border livestock trade are three times higher than costs for equivalent transfers within West African countries as well as compared to trans-Atlantic shipments. Lack of credit to livestock traders and risks and disappearances associated with cross-border livestock trade raised marketing margins by up to US\$ 11.9 million per annum (for cattle exports from Burkina Faso and Mali alone, in 2001) compared to domestic livestock trade. Inadequate and uncoordinated livestock market information systems to empower producers with knowledge of buyers' preferences also take a high toll on the economy. In this case, producers are denied the premium attracted by high grade finishing while the incremental beef that could have accrued from greater attention being paid to breeding and finishing is lost. It is shown that these latter losses could amount to more than US\$ 50 million annually for export cattle trade alone. The potential, therefore, exists for improving rural livelihoods and economic development by overcoming economic and institutional barriers thereby promoting well functioning markets and intra-regional trade.

The project

To provide a context within which infrastructural, institutional and policy constraints can be reduced to enable smallholder producers benefit more from their production activities, Comité Permanent Inter-Etats de Lutte contre la Sechèresse dan le Sahel (CILSS) and the International Livestock Research Institute (ILRI) jointly approached the Common Fund for Commodities in 1998 to finance a project aimed at improving livestock marketing and intra-regional trade in West Africa. The project was initiated in 1999 with two components, a market infrastructure development component handled by CILSS and a policy research component handled by ILRI. Other partners involved in this project include national and local-level organisations such as the Union Nationale des Associations de Commerçants et Exportateur de Bétail du Burkina (UNACEB), Cooperative de Commerce de Bétail du Sikasso (COBAS) and Livestock Traders Associations in Ghana and Nigeria. At the national level, the study involved six countries namely; Burkina Faso, Mali and Niger as examples of livestock exporting countries and Côte d'Ivoire, Ghana and Nigeria as net importers of livestock.

Project objectives and expected outputs

The overall objective of the policy research component of the project was to analyse the economic, institutional and policy constraints to livestock marketing and trade to provide a basis for new policy interventions to improve market efficiency and intra-regional livestock trade. The specific objectives are to:

- assess the economic and institutional problems in livestock marketing, using three frontier markets as case studies, to identify the sources and magnitudes of inefficiencies and measures to reduce them;
- identify the sectoral and trade policy constraints to intra-regional livestock trade and determine policy strategies to reduce their negative effects; and
- develop an appropriate framework to streamline livestock trade policies among participating countries and to disseminate policy results to decision makers.

The major outputs expected from the study are a comprehensive report and a set of policy briefs designed to communicate to decision-makers, in clear terms, the policy changes needed to improve livestock marketing and trade in West Africa. The comprehensive report is expected to have three major components as follows:

- i. The sources and magnitudes of inefficiencies in livestock marketing, possible solutions for eliminating or reducing these inefficiencies, and procedures for implementing the identified solutions;
- ii. Outlines of the sectoral and trade policy constraints to intra-regional trade; the magnitude of the impacts of identified policy constraints on intra-regional trade; and alternative policy options to reduce the negative impacts of policy constraints and promote expansion of intra-regional trade; and
- iii. A conceptual and tested framework to streamline and co-ordinate trade policies among participating countries.

Methodology

To address components i and ii above, ILRI conducted a study that spanned a two-year period and involved a) weekly surveys of transactions in three major frontier livestock markets—Sikasso (Mali), and Bittou and Niangoloko (Burkina Faso); b) two detailed surveys of livestock traders operating in the above markets; and c) interviews and interactions with policy makers and market association groups. A wide range of methods and tools including partial budgets, market integration and price determination models were deployed for data analysis to assess the workings of markets, factors influencing prices, extents and effects of variations in livestock flows and prices on producers, traders and intra-regional trade. The costs and benefits of livestock trading were estimated and the study highlighted the constraints and opportunities for improving cross-border livestock trade as a basis for enhancing the livelihoods of livestock producers and market agents.

Addressing component iii above required a somewhat different approach. Although there are similarities in the livestock sector policies of the countries included in this project, there are also important variations. Such variations arise partly because livestock sector objectives differ across countries and partly because some of the countries are livestock exporters, while others are importers. Nonetheless, to promote expansion of intra-regional trade in livestock, there is the need to streamline and co-ordinate livestock trade-related policies to cut down on administrative impediments and to ensure that policies within the region are mutually reinforcing, rather than antagonistic. To this end, ILRI organised a regional workshop on ‘Policy options for the improvement of regional livestock trade in West Africa’ in Niamey, Niger from 4–6 May 1999. That workshop brought together about 25 participants including policy advisers, livestock traders and policy analysts from the six countries involved in the study. Participants in that workshop gave an overview of current national policies pertaining to livestock marketing and cross-border trade, determined the manner in which these policies inhibit or promote intra-regional trade in livestock, identified options for eliminating policy constraints and improving livestock trade and finally determined which of the identified options required research and prioritised the identified research themes.

The outcome of that workshop was compiled as workshop proceedings (Williams 1999b) and also summarised into a policy brief (see Brief 1).

Findings of the study

The findings of the study show that smallholder livestock producers and farmers, traders and market associations are all affected by a number of economic and institutional constraints that could be addressed through implementing improved economic and trade policies. Some of the constraints affected traders more than producers, while in other

cases, the reverse was true. Also, the nature of the policy constraints varied from country to country. To this extent, a thematic presentation of the highlights of the findings rather than by stakeholder grouping or country-by-country is followed in this executive summary.

The findings of the study can be summarised under four main headings namely: i) livestock market operations; ii) livestock pricing; iii) costs and returns to livestock marketing and trade; and iv) livestock policy reforms in participating countries.

Livestock market operations

Main livestock marketing channels

Livestock trade in West Africa is based on live animals. As such, the major value-added activity of collectors, intermediaries, market associations, small and big traders, and other participants in the livestock marketing channel is to facilitate the transfer of live animals from one location or owner to the other. In the domestic segment (within the Sahelian producing countries), this mostly involves trekking trade animals from farm gates and collection markets to major frontier markets by smaller traders who are less endowed financially. The cross-border segment mostly entails trucking animals from frontier livestock markets to terminal markets by big livestock traders who are capable of sponsoring at least a truckload of about 35 cattle at a time. Each of such trips costs from 4 million FCFA (US\$ 7300) to 5 million FCFA (US\$ 9100). This comparatively high capital outlay required to operate in the cross-border segment poses an entry barrier to smaller livestock traders and lowers the level of competitive behaviour in this segment. As will be seen later, the various itineraries in the export segment are characteristically constrained by high transportation and handling costs, complicated by official and unofficial taxes, and other transactions costs.

Domestic and cross-border livestock marketing channels in the study countries were found to be simple and uncomplicated though they varied slightly from one location to another. The Sikasso case presented the simplest and least sophisticated of the marketing channels with a high proportion of livestock directly exchanged between producers and export traders while the Niangoloko market case presented the most complex case. In this case, the marketing chain is longest (with a high number of intermediaries) and some traded animals pass through collection markets and others through frontier markets before the final exchange with the export trader.

Out of the 7404 cattle transactions recorded in Sikasso frontier market during the study period, 3919 or 52.9 percent were purchased by export traders directly from farm gates, while 3418 or 46.2 percent passed through collection markets. In contrast to the situation in Sikasso, the 1012 cattle purchased for export in Bittou were bought from the frontier market only. In this case, the contact between livestock producers and export traders occurred not at the farm gate but at the frontier market where they (producers) brought 722 cattle or 40.4 percent of the 1785 recorded cattle transactions. The livestock marketing channels around Niangoloko were found to be different from those of Sikasso and Bittou in that all 2230 traded cattle passed through collection markets where 891 were sold to export traders and the rest taken to the frontier market. At the frontier market, export traders purchased another 399 cattle. A point of similarity between Niangoloko and Bittou is that collectors continued to play very prominent roles in the marketing chain up to and including the frontier market where they bought and resold

58.6 percent of the cattle that reached the frontier market compared to only 3 percent in the case of Sikasso.

Even in the case of Niangoloko where the marketing chain is long, this is only in terms of the number of market players involved because the principal value-added activity remained the transfer of animal from the farm gate to the terminal markets. There was a notable absence of processors (except local butchers) in the marketing channels studied, particularly the cross-border segment. This points to a potential opportunity that could be explored as a means of adding value to intra-regional livestock trade and creating additional employment in the livestock sector. Increasing value-added processing appears to be constrained mainly by lack of investment incentives to enable private entrepreneurs to establish the necessary infrastructure and obtain training to meet international standards for meat processing.

Structure-Conduct-Performance of livestock markets

Livestock marketing channels in the study countries are partitioned into domestic and cross-border segments. Private entrepreneurs operating through a marketing chain involving collection, regrouping and terminal markets carry out the trade in live animals. While all traders (small-, medium- and large-scale) participated in the domestic segment of the marketing chain, only large-scale traders were involved in the export segment reflecting the huge initial capital investment involved in the export trade. The capital investment of small-scale traders ranged from 460 thousand FCFA (US\$ 835) to 1.5 million FCFA (US\$ 2730) while large-scale traders invested between 2.6 million FCFA (US\$ 4732) and 7.7 million FCFA (US\$ 14 thousand) in the business. Monetary outlays for medium-scale traders lie between that of small- and large-scale traders. The above-mentioned sums, according to traders' own estimates, enabled small-scale traders to purchase 6–8 cattle, medium-scale traders 11–16 cattle, and large-scale traders 25 to 37 cattle, during each trip. This average number of cattle purchased by large-scale export traders does not readily reveal the important fact that they often buy animals in multiples of about 35, the number to make up a truckload of cattle. Road transportation by truck is the most important mode of transporting trade cattle across-borders in West Africa.

Inadequate own-capital and limited access to credit serve as market entry barriers to small traders who were unable to gain access into cross-border livestock trade. This suggests that making credit readily available to livestock traders will decrease the level of market concentration in the cross-border segment and lower overall marketing costs.

The markets encountered in this study are similar to other markets for live animals in other parts of sub-Saharan Africa. Typically, information on market prices, sources, demand and objective standards for selling and buying animals are not available. Moreover, the search for animals with qualities that appeal to the buyer, the negotiations, payment and transfer of ownership are costly (time consuming) and there are many cases of failed transactions because the transactions costs are so high—exceeding the expected benefit—that no exchange takes place. In addition to the constraints already mentioned, traders identified cumbersome formalities, exorbitant fees and taxes (both legal and illegal) collected along the trade routes, lack of well-demarcated cattle corridors for trekking animals to frontier markets, occasional shortage of trucks for moving animals to terminal markets, a system of selling on credit—particularly to butchers, and lack of market information, as some of the factors impeding efficient functioning of markets.

When transactions costs are high, market institutions (e.g. brokers, market associations, social networks) emerge to lower costs and enable exchange to take place. Local-level market associations (e.g. COBAS in Mali) and other institutions at the national level (e.g. UNACEB in Burkina Faso) have emerged in recent years to facilitate livestock trade and lower marketing costs. These market associations are most highly appreciated by their members for their involvement in arranging transport, credit, and administering the markets. Organising transport reduces the traders search time for trucks, offers them more time for bargaining, and lowers costs that could have been incurred in feeding and caring for the animals if their shipment were otherwise to be delayed. UNACEB played an important role in obtaining credit from a bank for on-lending to its members. More than 90 percent of UNCEB members joined primarily to have access to the credit facility. Secondary to having access to credit facilities, 50 percent joined for solidarity, 19 percent to have access to market information, and 16 percent to be able to control or fix livestock prices.

Individual brokers and agents have similarly found a place in the market chain to provide services in response to opportunities created by lack of standardisation and the highly personalised nature of livestock trade in West Africa. They act as go-between and earn, from the buyer, a uniform fee of 500 FCFA per head of cattle that they successfully negotiate its transfer from the seller to the buyer. In addition to individual brokers, organised brokers e.g. *societes de convoyage* (conveyance companies) emerged ostensibly to lower illegal road taxation and facilitate cross-border movement of trade animals. The conveyance fee (*frais de convoyage*), which was however not charged on the Bittou to Accra route, amounted to an average of 2850 FCFA (US\$ 5.7) and 2500 FCFA (US\$ 5.0) per head of cattle transferred from frontier livestock markets in Sikasso and Niangoloko to Abidjan. These illegal activities of *societes de convoyage* and those of law enforcement along the road raise livestock marketing costs and lower the competitiveness of Sahelian beef in coastal countries.

A very positive and commendable source of strength of the livestock marketing system was that there were no regulations compelling producers to sell or buy from particular markets (farm gate, collection or frontier) or through particular participants (e.g. the small itinerant trader, agent, broker or big export trader). As a result, the volume of livestock flows through the various channels mainly reflected attempts by smallholder producers to get the most for their animals and competitive efforts on the part of traders to secure the best possible deals. This suggests that farmers who sell most of their animals at the farm gate as in Sikasso, for example, do so as a strategy to avoid the high transport, handling and transactions costs that would otherwise be involved in selling at the frontier market. This contrasts sharply with Bittou where farmers themselves take a large proportion of their animals directly to the frontier market. The reason is that the villages of origin of the animals sold are usually within only two days' trekking distance to the frontier market and this eliminated high transportation (trucking) costs and makes it possible for many more producers than elsewhere in this study, to participate directly near the consumption end of the production-to-consumption marketing chain.

Livestock pricing

Livestock pricing is characteristically highly personalised and is not based on formal, pre-established standards. This typical spot market pricing system compelled traders to travel long distances to transact business at higher costs than would have been necessary in a standardised pricing/marketing system.

Effects of season on flows and prices of livestock

Two distinctly marked periods of sale of animals were observed: i) October–March, the off-peak period, which coincides with dry season and ii) April–September, the peak period, which roughly coincides with the rainy season and an abundance of range feed resources. It was observed that more animals were available for sale and prices offered for them were higher during the peak sales period than in the off-peak period. During the off-peak compared to peak sales period, average cattle prices per kg live weight were 321 FCFA and 367 FCFA in Niangoloko, 379 FCFA and 415 FCFA in Bittou, and 377 FCFA and 379 FCFA in Sikasso. Overall average cattle prices per kg live weight were 350 FCFA during the off-season and 378 FCFA during the peak sales season. The results for export sheep and goats showed similar trends to those of cattle although goats attracted higher prices than sheep except during *Tabaski*¹ when sheep prices were much higher.

Effects of season on the marketing margins of livestock traders

The seasonal variation in livestock flows and prices affected traders' profits. It appeared that traders made higher profits in the peak period than in the off-peak season. For example, it was found that marketing margin per head of cattle dropped from an average of 8400 to 5000 FCFA in Niangoloko and from an average of 7400 to 5600 FCFA in Bittou for the peak and off-peak seasons respectively.

Thus, the peak season is one occasion when both livestock producers and traders benefited by doing business. This benefit can be expanded improving livestock production conditions especially the availability of good quality feeds during the dry, off-peak season to enable the production of suitable livestock for the markets on a year-round basis.

Market integration

The results presented in the report relating to the movement and transmission of livestock price between different locations (market integration) applies to only Bittou and Niangoloko case studies which had sufficient number of weighed cattle to enable this type of analysis. The comparison of cattle prices over time in Bittou and Niangoloko markets and their respective supply markets showed that livestock prices tended to move in the same direction in the short run for pairs of frontier and supply markets. In other words, cattle markets were integrated at least in the short-run. However, pairwise Granger causality tests using the same set of data—to pinpoint the price-determining market—showed that prices in the frontier markets did not respond to changes in farmers' supply (Bittou) or only weakly (Niangoloko). As explained earlier, for the Bittou case, export traders bought all their animals from the frontier market without moving into the hinterland. As a result, the link between the farm gate, collection market and frontier market is broken and, therefore, there is no price transmission as such between the farm gate and the frontier market. This explains the lack of price response in the case of Bittou. On the other hand, in the case of Niangoloko, export traders sourced 69 percent of their cattle from collection markets and the rest from the frontier market. This movement of export traders further afield could account for the demand and supply price responses recorded for the Niangoloko livestock marketing channel. Taken together, the analyses suggest that prices are dictated by export traders especially in the case of Bittou where all exports cattle were purchased at the frontier market unlike Niangoloko where export traders made the bulk of their purchases from upstream collection markets and farm gates.

¹ *Tabaski* is the local name for the *Eid el Kabir* Moslem festival.

Taken together, the results show only short run market integration and weak responses to demand and supply shocks in the marketing channels of the Bittou and Niangoloko markets, suggesting the existence of price inefficiency due to weak price transmission. This points to the need to put in place effective livestock market information systems in the study area as a policy option for improving livestock pricing and livestock market efficiency.

Livestock characteristics and price relationships

In spite of the constraints related to the lack of standardisation, buyers were willing to pay a premium for heavily built, castrated zebu cattle in excellent body condition. However, smallholder producers are not yet taking advantage of this opportunity as only about 10 percent of the cattle traded were rated as being in excellent body condition even though the results of this and other recent studies in the region show that efforts to finish animals properly and present them in excellent condition would benefit producers, the economy and the environment. This study shows that raising cattle to excellent body condition before marketing them will increase marketed beef by 34 percent from the same number of animals. The value of the incremental production will increase the value of cattle export trade by nearly 40 percent. As such, the value of cattle trade in 2001 could have been as much as US\$ 208 million instead of US\$ 150 million for that year. Increasing production without necessarily increasing cattle population should have invaluable ecological benefits in terms of prevented land degradation. Also, improving animal body condition through fattening schemes, for example, will have positive impacts on the welfare of producers and traders as well as consumers who get premium quality meat for their money.

Information on market structure, marketing channels, seasonal variations, flows and prices of livestock were summarised for policy makers in Brief 2.

Costs and benefits of livestock trade

Partial budget analyses were conducted for six livestock trade and marketing itineraries, three each for the domestic and cross-border segments. The three domestic livestock trade routes are Niéna to Sikasso (Mali), Tenkodogo to Bittou (Burkina Faso) and Djefoula to Niangoloko (Burkina Faso) which individually supplied the highest proportion of traded livestock to the respective frontier markets. For cross-border livestock trade, Sikasso to Abidjan, Niangoloko to Abidjan, and Bittou to Accra were investigated.

The results show that producers received about 66%, 70%, and 65 percent of the final market price for the Niéna–Sikasso–Abidjan, Tenkodogo–Bittou–Accra, and Djefoula–Niangoloko–Port Bouet itineraries, respectively. On the average, producers received 88 thousand FCFA for cattle of 250 kg live weight. The share of the final price received by the producers in the above case studies compare well with those of earlier studies conducted in Mali, Burkina Faso, Togo, Côte d'Ivoire and Ghana between 1980 and 1991, which ranged from 68 percent to 70 percent of the final price of the animal. This provides evidence that remuneration to producers has not improved in the last two decades.

The livestock production system in the Sahelian countries, which is based mostly on pastoral systems, makes it possible for beef to be produced at a globally competitive price of US\$ 1,500 per tonne compared to US\$ 2,500 and US\$ 3,100 per tonne for United States

of America and the European Union (2001 prices)². However, in addition to the negative effect of subsidies on non-African chilled meat landing along the coast, the above competitive edge of Sahelian beef in coastal markets is considerably eroded by the costs of transportation and handling. Livestock trading budgets for different itineraries within the Sahel and between the Sahel and the coast show that transportation and handling are the largest cost component and account for 40 percent to 61 percent of all marketing costs (excluding the purchase price) of cattle, especially for the cross-border segment. Transportation and handling costs for a truckload of 35 cattle transferred from the Sahel to the coast averaged 477,800 FCFA for this study. These transfer costs consist of i) cost of hiring a truck (44%), ii) convoyage fees (17%), iii) drovers' wages, loading and off-loading of animals (16%), iv) market association fees (8%), v) illegal road taxation (10%), and trader's travel and other expenses (5%).

From another point of view, these transportation and handling costs amount to 122,133 FCFA (US\$ 222) for transferring the equivalent of a tonne of beef from the Sahel to the coast and are 250 percent higher than the US\$ 80 required to ship the equivalent from Europe to West Africa.

In the domestic segment, the same transfer of one tonne of beef from Niéna to Sikasso (Mali) cost 8750 FCFA; Tenkodogo to Bittou (Burkina Faso), 4375 FCFA; and 15,313 FCFA from Djefoula to Niangoloko (Burkina Faso). Average domestic transfer costs for cattle are equivalent to 54 FCFA per tonne per km.

For cross-border transfers, the costs varied from 91,500 FCFA per tonne for Bittou to Accra, 121,375 FCFA per tonne for Niangoloko to Abidjan, to 125,088 FCFA per tonne for Sikasso to Abidjan. These costs of cross-border transportation and handling are equivalent to an average of 129 FCFA per tonne per km or 230 percent of the cost of domestic transfer.

Domestic transportation and handling costs appear considerably lower than cross-border trade simply because trekking is the dominant mode of transfer of livestock from the collection markets and farm gates to the frontier markets and as such the bulk of the expenditure on this item is towards paying drovers. On the other hand, cross-border transportation requires trucking or use of rail cars and these increase costs substantially. The costs of cross-border transportation and handling remain high for many reasons including: shortage of trucks, high fuel taxes, illegal road taxation, activities of conveyance companies (*societes de convoyage*), handling costs, and inadequate or deteriorating road infrastructure. Eliminating illegal checkpoints, conveyance companies, and fuel taxes will lower the cost of shipment by 37 percent or 5,250 FCFA per head of cattle from 13,650 FCFA. These actions alone would bring cross-border transportation and handling costs to comparable levels with the domestic segment. This will enhance the competitiveness of Sahelian beef along the coast. This issue of the high cost of transportation and handling costs was summarised, in clear terms, for policy makers in Brief No. 3.

The future of trekking as an option for transporting animals from farm gate to the frontier market will depend on developing and maintaining stock routes, especially as human population density increases and crop cultivation expands and limits available space for trekking and watering livestock *en route* to destination markets.

² In 2001, the global price of beef was quoted as US\$ 1,900 per tonne (World Bank 2001).

For the small and medium livestock traders that operate the domestic segment, their trading margin ranged from 2.7 percent for Tenkodogo to Bittou trips to 5.5 percent for the Niéna to Sikasso itinerary. By comparison, and using the highest trading margin scenario for domestic traders, i.e. 5.5 percent and the lowest trading margin scenario for export traders from this study, i.e. 11.6 percent, it is seen that export traders make at least twice the trading margins of domestic traders. Comparison with previous studies also reveals that export traders' margins tripled from 4.8 percent for the Kati to Abidjan case study in 1979 to 14.3 percent in the current Sikasso to Abidjan case study.

There are higher risks (loss of weight, deaths, and other disappearances) associated with export trading than domestic trading; therefore, the higher margins enjoyed by export traders are justified. However, it is also the case that due to financial limitations (given that a trip involving a single truckload of 35 cattle costs from 4–5 million FCFA) competition in the export segment is lower than in the domestic segment providing opportunity for higher rents. The financial cost of the disparity between margins earned by domestic compared to cross-border livestock traders is estimated to be up to US\$ 11.9 million per year for cattle exports from Burkina Faso and Mali alone.

This suggests that making credit readily available particularly to small- and medium-scale livestock traders (lack of credit ranked highest among their identified constraints) and eliminating risks associated with cross-border livestock trade will improve the level of competition in the export segment of the marketing chain and potentially lower livestock marketing costs.

Livestock trade policy reforms in participating countries

As a first step towards addressing component iii of the report (framework to streamline and co-ordinate policies among participating countries), the policy and non-policy barriers to cross-border trade were identified by a cross section of representatives of livestock market associations and policy advisers in the study countries. They are listed below not in any particular order of importance, but the first four bullet points originated from livestock traders while the remaining constraints were voiced by government policy advisers. The constraints included:

- Excessive road blocks and unlawful tax collection at these road blocks;
- High official taxes on export livestock in the form of provisional livestock export certificate, vaccination certificate, health certificate, inter-state waybills, contribution to agricultural sector development etc. (e.g. in Niger and Burkina Faso) and arbitrariness in arriving at the taxation level (e.g. in Côte d'Ivoire);
- Poor state of roads and high cost of transporting animals to markets;
- Inadequate flow of market information—on prices, levels of supply and demand—needed to make informed trade decisions;
- High level of illiteracy among market operators which hinders innovation, awareness and understanding of government policies;
- Lack of formal and binding trade contracts between market operators; and
- The dominant practice of trade in live animals with almost total neglect of value-addition through processing and trade in meat products.

Having listed the major impediments to cross-border livestock trade as seen by some of the actors directly involved in the trade, it is equally pertinent to look at the trade policy

reforms that have been undertaken in the study countries from a normative perspective and consider what remains to be done in terms of aligning trade policies across the study countries to promote regional livestock sector growth.

Policy reforms affecting intra-regional livestock trade

Trade policy reforms that have been undertaken in the study countries can be discussed under four rubrics viz: trade liberalisation, trade facilitation, exchange and payments systems, and investment facilitation. In reality, the extent and pace of reforms in the study countries have differed. Much progress has been made in tariff simplification and reduction and this has facilitated the flow of regional trade in livestock, particularly exports from Mali. On the other hand, non-tariff barriers, other duties and charges and illicit taxes continue to pose formidable constraints to regional trade. These constraints reduce incentives and lower the returns to market participants. In terms of trade facilitation, particularly in the area of single customs declaration form and road transit document, Mali and Ghana have made significant improvements. In Mali, for example, since 1991, there has been in existence a one-stop window for regulating customs paper and transport document. In Ghana, there has also been a simplified customs declaration procedures.

In the area of exchange and payments systems and investment facilitation formidable obstacles still exist and governments in the study countries individually and collectively still have a lot to do to improve the economic environment for intra-regional livestock trade. Part of the problem here lies in the different currencies used in the different parts of the region and the problem of inter-convertibility of these currencies. The transhumance nature of extensive livestock production and trade in live animals coupled with the problem of moral hazard make formal credit and insurance schemes unavailable to livestock producers and traders in the region as financial institutions consider the risks involved in livestock production and trade too high to bear. These constraints and the barriers earlier mentioned are the major impediments that policy makers need to eliminate to improve economic benefits and growth of regional livestock trade.

Options for harmonising trade policies to enhance intra-regional livestock trade

In terms of harmonising national policies across study countries to promote intra-regional trade, the foregoing discussion has shown that there are opportunities for realignment of policies in the areas of trade liberalisation, facilitation and exchange and payment systems. In theory, there are established institutions and mechanisms for operating on these issues. One such institution is Union Économique et Monétaire de l'Afrique de l'Ouest (UEMOA) to which four (Burkina Faso, Côte d'Ivoire, Mali and Niger) out of the six countries covered in this study belong. In reality, progress in implementation has lagged behind stated objectives. Nonetheless, UEMOA members in early 2000 adopted a customs union and common external tariff and have harmonised indirect taxation regulations (e.g. value added tax, VAT). This process which has focused so far on macro-economic convergence needs to be extended to sectoral and trade policies influencing intra-regional, including livestock trade. In this context, eliminating tariffs on intra-regional trade within UEMOA is a welcome accomplishment as is introducing a common external tariff for improved products coming into UEMOA member states. At present, tariff rates vary from 0 to 20 percent with meat and live animal imports attracting duties of 20 percent and 5 percent respectively. In the same vein, legislation should be tightened to eliminate illicit taxation.

Given that there are six additional countries (apart from the eight member states in UEMOA) in the larger ECOWAS grouping, two of which are covered in this study, i.e. Ghana and Nigeria, where the UEMOA harmonisation guidelines do not extend, efforts need to be made using the communication channels already established by CILSS to extend the progress that has been achieved in UEMOA to these other countries in order to promote regional livestock trade. Mobilising the political will to move forward the policy harmonisation agenda in the region is a challenge which governments in the region will have to address.

The major findings in this section can be summarised as follows:

- i. Tariffs have been reduced in most of the study countries and similar progress has been made towards tariff structure simplification;
- ii. Eliminating non-tariff barriers (NTB) and illicit taxation have been particularly problematic with no country achieving any significant measure of success with the probable exception of Ghana;
- iii. Pace of progress towards trade liberalisation has been particularly uneven in reducing other duties and charges (ODC). While Côte d'Ivoire, Ghana, Mali and Niger have implemented reduction measures, not much has been achieved in the case of Burkina Faso and Nigeria; and
- iv. Harmonising livestock trade policies within the study countries will need to build on the progress that has been made in UEMOA member states on macro-economic convergence, adopting a customs union and streamlined indirect taxation procedures.

The above regulatory and administrative issues and options for simplifying and harmonising livestock marketing and intra-regional trade were summarised into Brief No. 1. In addition, Brief No. 4 summarises the major findings of the entire study and similarly suggests ways of promoting livestock marketing and intra-regional trade in the central corridor of West Africa.

Major conclusions of the study

- The large number of producers, intermediaries, traders and buyers in the domestic segment of the livestock marketing channel create a near 'perfect' market condition that allows this segment to function reasonably well. Nonetheless, since the co-integration analysis has shown that price transmission was not very good in some cases, better market information systems are needed.
- A premium for animals in excellent body condition is emerging and livestock producers in the study countries could increase their earnings by marketing animals that are in excellent body condition rather than the present practice of selling all grades of animals. Devoting attention to properly finishing the animals before presenting them for sale (e.g. through fattening) would increase the returns to producers, advance production towards achieving exportable surplus and increase the value of livestock trade.
- Cross-border livestock trade is constrained by high transportation and handling costs, high direct, indirect and illicit taxes, and lack of market information. In addition, performance could be improved through the provision of credit facilities to enable aspiring traders overcome market-entry limitations posed by lack of own-capital and

thus increase the number of traders and volume of trade especially in the export segment.

- Progress has been made in policy reforms aimed at liberalising livestock trade in the participating countries but the pace has been uneven and this continues to hamper intra-regional trade.

The findings and conclusions of this study suggest the following **major policy thrusts**:

- i. Strengthening market institutions (e.g. livestock producers' associations, livestock traders' associations, farmers–pastoralists associations) to enable them provide adequate support and services to their members. Such services will include facilitating access to credit by acting as guarantors of bank loans, acting as an advocacy/pressure group to demand for better marketing conditions including eliminating illicit taxation, adjudicating in conflicts between farmers and pastoralists over the use of grazing resources and promoting sustainable resource use of natural resources on which livestock production depends.
- ii. Reducing high transportation and handling costs incurred in cross-border trade and eliminating illicit taxation. Constant maintenance of well-demarcated stock routes will facilitate the movement of animals from the farm gates to the collection markets in a cost-effective way and minimise conflicts between farmers and pastoralists.
- iii. Providing well-functioning market information systems capable of reaching the widely dispersed producer populations with information on buyer preferences, animal prices, livestock supply and demand levels in the region.
- iv. Strengthening the supply side, among other things, through actively supporting producers to engage in fattening schemes aimed at producing livestock in excellent body condition to bolster the emergence of a premium for high grade animals, which will benefit regional trade immediately and pave the way for regional participation in the expanding global red (tender) meat market.

To communicate the above policy thrusts to policy makers in clear terms, four policy briefs (four-page documents in English and French) were developed based on the major findings of the study. Their titles are as follows:

- Brief 1. Regulatory and administrative issues and options for livestock marketing in West Africa;
- Brief 2. Lowering cross-border livestock transportation and handling costs in the central corridor of West Africa;
- Brief 3. Livestock marketing channels, flows and prices in West Africa; and
- Brief 4. Promoting livestock marketing and intra-regional trade in West Africa.

A press run of the briefs of 1,000 copies in English and 1,000 copies in French was made.

CHAPTER ONE

INTRODUCTION

1.1 Project Background

Countries in the Sahelian zone of West Africa, including Burkina Faso, Mali and Niger, have natural conditions—low livestock disease challenge and vast rangelands with good quality pastures—that favour livestock production and these enable them to produce surplus animals, which are exported to coastal countries such as Côte d’Ivoire, Ghana and Nigeria, where average per capita income and demand for animal protein are relatively higher than in the Sahelian zone (per capita income of about US\$ 445 compared to US\$ 282 in the Sahelian countries in 1999) (World Bank 2001). The ensuing trade has historically linked the Sahelian countries in the arid and semi-arid parts (as livestock exporting countries) to the humid coastal countries as net importers. Livestock represent the highest valued agricultural commodity in intra-regional trade and for many of the Sahelian countries, livestock are a major contributor to foreign exchange earnings (Shapiro 1979; Holtzman et al. 1991; Fafchamps and Gavian 1998). Private entrepreneurs operating through domestic and cross-border marketing channels involving collection, regrouping and terminal markets carry out this trade.

In the period between 1970 and 1974, three major events occurred that changed the pattern of livestock trade in West Africa. The first was the severe droughts of the early 1970s, which disrupted the flow of livestock from the Sahel to the coast. The second was the opening up of the regional market to substantial extra-regional imports of frozen meat from Argentina and the European Union (EU) with the result that the import of non-African beef increased by more than 100 times from 142 t in 1974 to 15,032 t in 1976 (Shapiro 1979). For example, for Côte d’Ivoire, from 1967 through 1974, imports of live cattle from Sahelian countries accounted for between 79 and 87 percent of the total beef supply compared to 2 and 6 percent by frozen beef imports. This trend changed dramatically and by 1976 cattle imports accounted for only 46 percent of the total beef supply replaced in part by frozen beef supply which accounted for 38 percent of the total Ivorien beef supply (Staatz 1980).

The third factor was inappropriate macro-economic policies pursued by countries in the region. These included currency overvaluation, price controls, restraints on private sector involvement in processing, and an array of tariff and non-tariff barriers that provided disincentives to intra-regional trade. These constraints reduce the efficiency and welfare gains of trade to market participants.

In addition to the above factors, livestock trade has been constrained by institutional barriers, including lack of access to credit, poor rural infrastructure, lack of well-functioning producers’ organisations and conflicts between farmers and pastoralists over grazing resources. These constraints hinder efficient production and marketing of livestock.

To provide a context within which infrastructural, institutional and policy constraints can be reduced to enable smallholder producers benefit more from their production activities, CILSS and ILRI jointly approached the Common Fund for Commodities (CFC) in 1998 to finance a project aimed at improving livestock marketing and intra-regional trade in West Africa. The project was initiated in 1999 with two components, a market infrastructure development component handled by CILSS and a policy research

component handled by ILRI. Other partners involved in this project include national and local-level organisations such as the Union Nationale des Associations de Commerçants et Exportateurs de Bétail du Burkina (UNACEB), Cooperative de Commerce de Bétail du Sikasso (COBAS) and Livestock Traders' Associations in Ghana and Nigeria.

1.2 Objectives of the Policy Research Component

The overall objective of the policy research component of this project is to analyse the economic, institutional and policy constraints to livestock marketing and trade to provide a basis for policy interventions to improve market efficiency and intra-regional livestock trade. The specific objectives are:

- to assess the economic and institutional problems in livestock marketing, using three frontier markets as case studies, in order to identify the sources and magnitudes of inefficiencies and measures to reduce them;
- to identify the sectoral and trade policy constraints to intra-regional livestock trade and determine policy strategies to reduce their negative effects; and
- to develop an appropriate framework to streamline livestock trade policies among participating countries and to disseminate policy results to decision makers.

This report addresses these objectives by providing answers to certain questions implicit in the objectives. To make for logical presentation, these questions are organised into four broad groups as follows:

- i. Livestock marketing operations: What channels are used for livestock marketing? Who are the participants in these channels? What are their characteristics and how are livestock flows through the channels affected by the behaviour of these participants?
- ii. Price determination in domestic markets: What are the underlying determinants of livestock prices? How do variations in prices affect livestock producers, traders and influence cross-border trade?
- iii. Costs and returns to livestock marketing: What are the costs faced by domestic and cross-border livestock traders? When decomposed, how important is the transactions costs component compared to other physical costs of both domestic and cross-border livestock marketing? Are the returns to various participants in the livestock production and marketing chain commensurate with their functions and roles?
- iv. Opportunities for improving domestic livestock marketing and intra-regional trade. What policy and institutional reforms are needed to enhance livestock marketing and intra-regional trade?

In addressing the questions, comparisons are made within and between countries to identify important similarities and differences.

1.3 Organisation of the Report

The report is in eight chapters. Chapter one begins with the introduction. Chapter two presents an overview of livestock trade in West Africa with particular focus on Burkina Faso, Mali and Niger as exporting countries and Côte d'Ivoire, Ghana and Nigeria as importing countries, using secondary data. Trends in livestock population and trade from 1970 to 2000 are examined, particularly for cattle. The chapter ends with highlights of

policy and non-policy constraints to guide the case studies. Chapter three is devoted to describing the study area, data collection processes and a review of theoretical approaches to market studies³. In chapter four, the operations of the various marketing channels, including the flow of livestock from the farm gate to the frontier markets and the activities of market participants are examined. Factors influencing domestic livestock prices in Burkina Faso and Mali and the extent of seasonal price variations are presented in chapter five. The same chapter analyses the levels of market integration⁴, livestock price efficiency and livestock price determination in domestic (Sahelian) markets. The costs and benefits of domestic and cross-border trade are discussed in chapter six. Chapter seven discusses options for policy harmonisation among the study countries to improve cross-border trade, while a summary of the major findings and conclusions of the study are presented in chapter eight.

Four policy briefs (in English and French) were developed from the findings of the study as follows:

- Brief No. 1. Regulatory and administrative issues and options for livestock marketing in West Africa;
- Brief No. 2. Livestock marketing channels, flows and prices in West Africa;
- Brief No. 3. Lowering cross-border livestock transportation and handling costs in the central corridor of West Africa; and
- Brief No. 4. Promoting livestock marketing and intra-regional trade in West Africa.

A press run of 1,000 copies in English and 1,000 copies in French of the texts of the above briefs were made.

³ The models used for market analysis are presented in Annex I.

⁴ Technical details of the analytical models and results of the market integration exercise are in Annex II.

CHAPTER TWO

AN OVERVIEW OF LIVESTOCK TRADE IN WEST AFRICA

2.1 Trends in livestock production and marketing in West Africa

The West Africa region is rich in livestock resources. In 2000, it produced 46 million heads of cattle out of which the four countries representing the central corridor of livestock trade (Burkina Faso, Mali, Ghana and Côte d'Ivoire) produced 30 percent of the total (Table 2.1). Including Nigeria and Niger, the six countries involved in this project produced 39 million heads of cattle or 83 percent of the West African total. Despite the large numbers of animals there is unsatisfied demand for meat in the major importing countries: Nigeria, Côte d'Ivoire, Ghana, and Senegal (Josserand 1979; Sullivan 1979; Staatz 1980; Holtzman et al. 1991).

Table 2.1: Cattle population in West Africa at five-yearly intervals (1970–1995) and annually from 1995–2000 ('000 head).

COUNTRY	YEAR										
	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999	2000
Benin	566	722	829	912	1,080	1,294	1,350	1,399	1,345	1,438	1,500
Burkina Faso	2,550	2,500	2,760	3,566	3,937	4,346	4,433	4,522	4,612	4,704	4,798
Cape Verde	14	10	11	10	19	19	21	21	22	22	22
Côte d'Ivoire	408	460	666	843	1,108	1,258	1,286	1,316	1,346	1,377	1,409
Gambia	249	285	293	290	327	351	353	356	359	361	364
Ghana	903	898	804	1,132	1,145	1,217	1,248	1,260	1,273	1,288	1,302
Guinea	1,300	1,489	1,500	1,300	1,472	2,202	2,246	2,291	2,337	2,368	2,679
Guinea-Bissau	230	260	290	325	410	453	464	475	487	500	512
Liberia	28	34	39	42	38	36	36	36	36	36	36
Mali	5,310	3,886	5,850	4,899	4,826	5,541	5,708	5,882	6,240	6,428	6,620
Mauritania	1,800	1,103	1,197	1,200	1,350	1,111	1,122	1,353	1,394	1,433	1,476
Niger	4,000	2,508	3,353	1,649	1,711	2,008	2,048	2,089	2,131	2,174	2,217
Nigeria	8,887	10,548	12,108	12,908	13,947	15,405	18,680	19,610	19,700	19,830	19,830
Saint Helena	0.782	0.83	1	1	1	0.673	0.673	0.692	0.692	0.692	0.692
Senegal	2,530	2,318	2,500	2,250	2,465	2,800	2,870	2,898	2,912	2,927	3,073
Sierra Leone	296	318	348	333	333	380	390	400	410	420	420
Togo	194	217	221	228	243	202	217	206	223	275	277
West Africa	29,266	27,556	32,770	31,887	34,412	38,622	42,473	44,115	44,828	45,582	46,536

Source: FAOSTAT—<http://apps.fao.org> accessed in September 2002.

Burkina Faso, Mali and Niger have been defined in this study as the livestock exporting countries in the central corridor of West Africa while Côte d'Ivoire, Ghana and Nigeria are major net importers. Figure 2.1 shows cattle population trends in the individual exporting countries over a 30-year period from 1970 to 2000. There were declines in cattle population due to droughts between 1970 and 1974 and 1982 to 1984 and these declines were sharpest in the case of Niger, which has failed to recover to production levels of the pre-drought period of 1970.

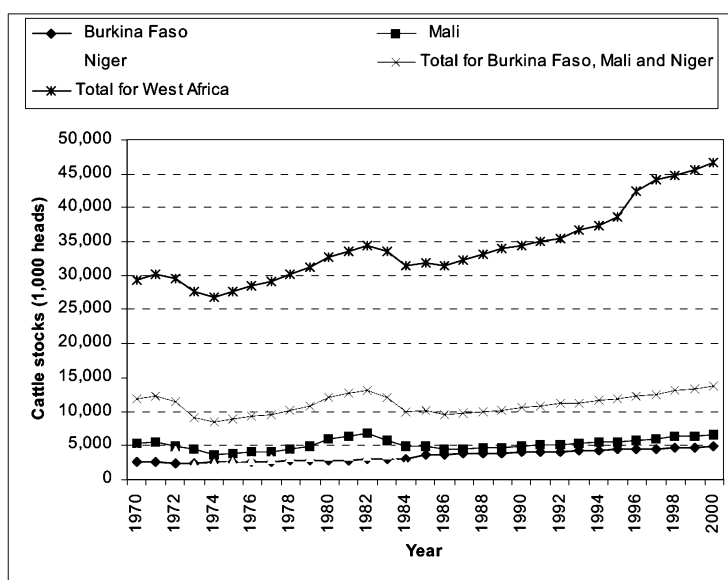


Figure 2.1: Cattle population trends in the individual exporting countries (i.e. Burkina Faso, Mali and Niger) and in West Africa, 1970–2000. (Based on FAOSTAT—<http://apps.fao.org> accessed in September 2002).

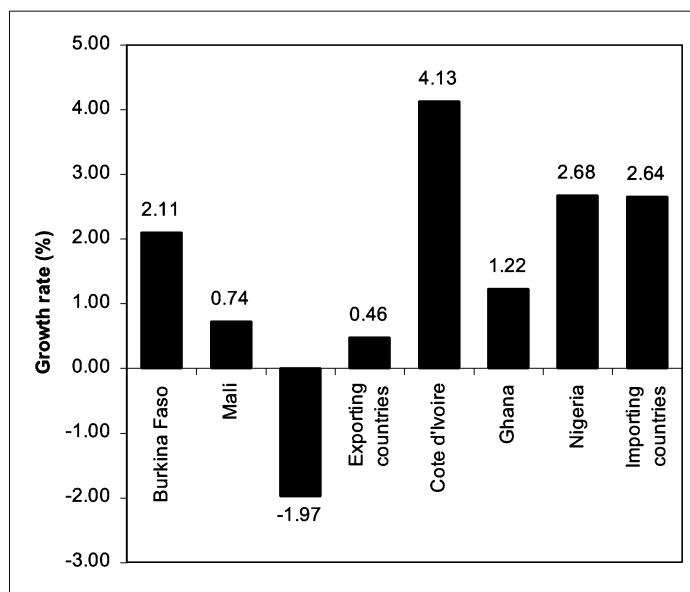


Figure 2.2: Annual growth rate (%) in cattle population in the six study countries from 1970–2000. Source: Authors' calculations based on FAOSTAT—<http://apps.fao.org> accessed in September, 2002.

In spite of the droughts, over the 30-year period, there has been a positive 1.6 percent annual growth rate in cattle population in the six countries considered in this study. In the exporting countries, growth rate remained positive for Burkina Faso (2.11%) and Mali (0.74%) but declined by 1.97% in Niger (Figure 2.2). The overall growth rate for these three exporting

countries during the same period was 0.46 percent compared to a growth of 2.68 percent in the importing countries—Côte d'Ivoire (4.13%), Ghana (1.22%) and Nigeria (2.68%).

The higher growth in cattle population in the importing countries compared to exporting countries and the continuing demand for Sahelian livestock presents an apparent contradiction in terms of the expected direction of flow of livestock trade. This reason for the flow of livestock from the Sahel to the coast is better seen in terms of cattle population per capita for the same periods (Table 2.2).

Table 2.2: Cattle population per capita in West Africa at 5-yearly intervals (1970–1995) and annually from 1995–2000 (head/person).

COUNTRY	YEAR										
	1970	1975	1980	1985	1990	1995	1996	1997	1998	1999	2000
Benin	0.21	0.24	0.24	0.23	0.23	0.24	0.24	0.24	0.23	0.24	0.24
Burkina Faso	0.47	0.41	0.40	0.46	0.44	0.42	0.42	0.41	0.41	0.41	0.40
Cape Verde	0.05	0.03	0.04	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Côte d'Ivoire	0.07	0.07	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Gambia	0.53	0.51	0.45	0.38	0.35	0.31	0.31	0.30	0.29	0.28	0.28
Ghana	0.10	0.09	0.07	0.09	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Guinea	0.33	0.37	0.32	0.24	0.24	0.30	0.30	0.30	0.30	0.30	0.33
Guinea-Bissau	0.39	0.40	0.37	0.36	0.40	0.38	0.38	0.38	0.38	0.38	0.37
Liberia	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01
Mali	0.95	0.62	0.83	0.62	0.53	0.54	0.54	0.54	0.55	0.56	0.56
Mauritania	2.18	1.24	1.24	1.18	1.28	0.99	0.99	1.18	1.20	1.22	1.24
Niger	0.97	0.52	0.60	0.25	0.22	0.22	0.22	0.22	0.21	0.21	0.21
Nigeria	0.19	0.19	0.19	0.17	0.16	0.15	0.18	0.19	0.18	0.18	0.17
Saint Helena	0.16	0.17	0.22	0.17	0.23	0.13	0.13	0.14	0.14	0.14	0.14
Senegal	0.61	0.48	0.45	0.35	0.34	0.34	0.34	0.33	0.33	0.32	0.33
Sierra Leone	0.11	0.11	0.11	0.09	0.08	0.09	0.10	0.10	0.10	0.10	0.10
Togo	0.10	0.10	0.09	0.08	0.07	0.05	0.05	0.05	0.05	0.06	0.06
West Africa	0.30	0.25	0.26	0.22	0.20	0.20	0.21	0.21	0.21	0.21	0.21

Source: FAOSTAT—<http://apps.fao.org> livestock data accessed in September 2002 and human population data accessed in May 2004.

Table 2.2 shows that before the drought, i.e. 1970, Burkina Faso, Mali and Niger (as exporting countries) had 0.47, 0.95 and 0.97 head of cattle per capita with an overall average of 0.78 head per capita compared to 0.07, 0.10 and 0.19 head per capita or an average of 0.16 head per capita for Côte d'Ivoire, Ghana and Nigeria, which are net importers. In other words, in 1970, there was a difference of 0.62 head per capita between importing and exporting countries. The net effects of the drought and population growth have been a decline in cattle head per capita in the exporting countries from 0.78 in 1970 to 0.39 in 2000 and only marginally from 0.16 to 0.15 in importing countries. Thus, even with decline in cattle head per capita in the exporting countries in 2000 compared to 1970, substantial production per capita gaps still exist between the Sahelian countries and the coast. This difference clearly justifies the continued flow of livestock trade from the Sahel to the coast. Figure 2.3 shows the growth rate in cattle heads per capita (percent per annum) for the six countries for the period from 1970 to 2000 as well as for 1990 to 2000. Among the exporting countries, the figure depicts Niger as the hardest hit by the effect of the drought of the early 1970s, while Mali is shown to have recovered considering the period 1990 to 2000.

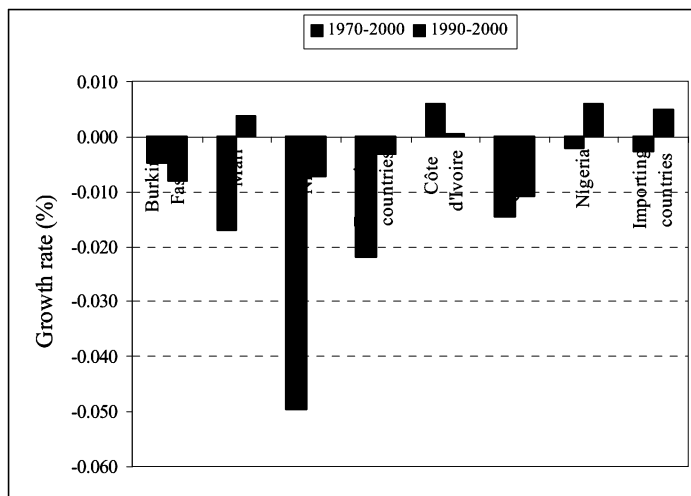


Figure 2.3: Annual growth rate (%) in cattle population per capita in the six study countries from 1970 – 2000. Source: Authors' calculations based on FAOSTAT—<http://apps.fao.org> accessed in September, 2002.

The importing countries, being coastal countries with much higher rainfall did not experience any significant adverse dryness to affect livestock production. For them, growth has been positive and more-or-less steady. Further analysis of the period after the drought of the mid-eighties indicates that cattle numbers in the entire central corridor have increased significantly.

Table 2.3 shows cattle export volumes from Burkina Faso, Mali and Niger. In 1995, when the number of cattle exported (574 thousand) was highest; Burkina Faso, Mali and Niger exported 161 thousand; 222 thousand and 191 thousand cattle, respectively. This was mostly due to the immediate effect of devaluing FCFA in 1994, which restored the competitiveness of Sahelian exports in the coastal countries. In this case, the major incentive for increasing intra-regional livestock trade was price changes. In a study conducted to investigate future prospects and key issues four years after devaluing FCFA, it was shown that in Burkina Faso, Mali and Senegal, the price of beef increased by between 20 and 78 percent over the period 1993–1996 (Yade et al. 1998). Yade et al. (1998) reported that the prices of live animals followed a similar trend with producer prices increasing by 72 percent in Burkina Faso and 86 percent in Mali between 1993 and 1996. Cattle exports declined significantly in all exporting countries thereafter and only recovered in Mali in 2000. It is likely though that there was an underestimating of cattle exports from Niger from 1996 to 2000. According to Kulibaba (1990), there is informal evidence that a high proportion of Niger's exports to Nigeria are unreported and hence unrecorded. Chadian exports to Nigeria are believed to be significant, although they have not been accurately reported for years, even till now. There has not been a major improvement in recording export of live animal by Niger to Nigeria. Moreover, recorded exports of livestock are not suitable proxies for actual exports because of the large proportion of animals exported clandestinely on the hoof (Delgado 1980). In the specific case of Niger and Nigeria, Fafchamps and Gavian (1998) attribute the large proportion of unrecorded to the efforts of the government of Niger to tax and regulate livestock exports and imports, which is circumvented by traders through trekking animals across the border to avoid detection by custom agents.

In addition, the continued devaluation of the currencies of two of the three importing countries (Ghana and Nigeria) has made the exporting countries (Burkina Faso and Mali) to reduce their export level to these countries and divert more of their animals to Côte d'Ivoire (Holtzman et al. 1991). This adaptability of the traditional livestock marketing system is further demonstrated by the fact that, in 1967, Ghana accounted for over half of the declared shipments of cattle exports originating from Mali and Burkina Faso but virtually none in 1977; compared to an increase in the share of Côte d'Ivoire in recorded Malian cattle exports from 40 percent to 70 percent over the same period (Delgado 1980).

Table 2.3: Number of cattle ('000 head) exported from Burkina Faso, Mali and Niger, from 1990 to 2000, partitioned into periods before (1990–1993), immediately after (1994–1997) and post devaluation (1998–2000) of the FCFA.

Country	Before devaluation			Immediately after devaluation				Post devaluation			
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Burkina Faso	89	92	92	102	104	161	100	100	135	132	120
Mali	185	190	204	220	170	222	229	119	108	129	279
Niger	80	110	90	70	0	191	33	21	0	22	34
Total	354	392	386	392	273	574	362	240	243	283	433

Source: FAOSTAT—<http://apps.fao.org> accessed in September 2002.

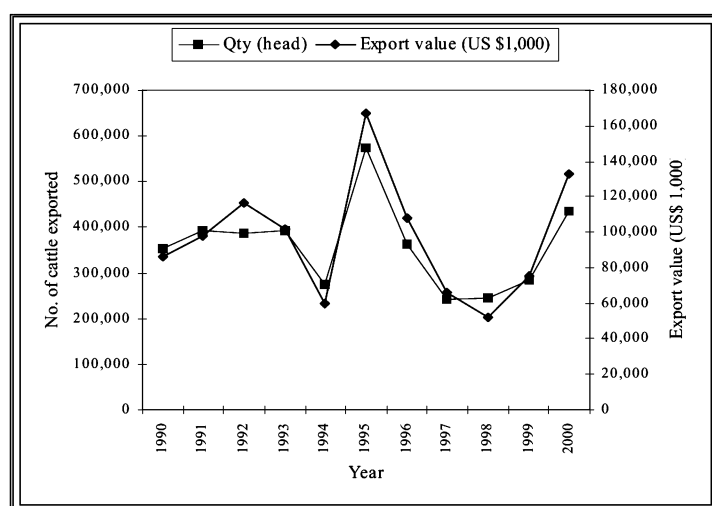


Figure 2.4: Number of cattle reported exported from Burkina Faso, Mali and Niger and their corresponding export values (US\$ × 10³), 1990–2000.

As for the volume of imports, the years 1995 and 2000 were associated with peak levels of export while the years 1994 and 1997 witnessed low volume of cattle export (Figure 2.4). Generally, one observes that the quantity and value of export moved in the same direction in all the years under consideration. That is, during the peak cattle export years, the corresponding values in US dollars were higher and vice versa. Hence, there seem to be a correlation between the price and volume of the cattle exporters. In other words, the

price of cattle might have been responsible for this co-integration of quantity and value of cattle export from Burkina Faso, Mali and Niger.

In terms of regional imports of live animals, Table 2.4 shows that cattle imports into Ghana were negligible in the years before the devaluation of the FCFA in 1994. Overvaluing FCFA *vis-à-vis* the Ghanaian Cedi was mainly responsible for this. The trend changed slightly immediately after the devaluation of the FCFA with Ghana importing 16 thousand cattle in 1996 and up to 71 thousand by 1998 and no recorded export in 2000⁵. Nigeria's imports seemed to have stabilised at about 330 thousand cattle per year during and after devaluation as against an average 228 thousand cattle per year in the years before devaluation of the FCFA. In the case of Nigeria, the devaluation could be seen to have had the net effect of increasing livestock trade between her and the exporting countries. Elsewhere, imports of live animals have stagnated or declined due to competition from cheap meat imports from the EU countries and increased domestic production, particularly in Côte d'Ivoire. Nonetheless, availability of cheap imports mainly from the EU denies export markets to poor Sahelian livestock producers.

Table 2.4: Number of cattle ('000 head) imported into Côte d'Ivoire, Ghana and Nigeria from 1990 to 2000, partitioned into periods before, immediately after and post devaluation of the FCFA.

Country	Before devaluation			Immediately after devaluation				Post devaluation			
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Côte d'Ivoire	93	99	106	102	140	110	131	137	154	141	146
Ghana	0	0	0	0	0	0	16	57	71	56	0
Nigeria	270	365	347	329	330	330	330	330	330	330	350
Total	364	464	453	431	470	440	477	525	555	527	496

Source: FAOSTAT—<http://apps.fao.org> accessed in September 2002.

In monetary terms, the value of cattle trade among West African countries increased steadily in current dollar terms from US\$ 52 million in 1970 to US\$ 197 million in 1995 but declined to US\$ 149 million by 2000.

2.2 Policy and non-policy constraints to livestock trade in West Africa

In spite of the different and numerous regional trade agreements, the level of trade among countries of West Africa is still low compared with total trade volume of the region with other regions of the world. Statistics by the World Bank (1989) showed that regional trade is a mere 6 percent of total official trade in the study countries. Even when informal intra-regional trade is taken into account, regional trade is still a small share of West Africa total trade (Barry et al. 2000). Though different reasons have been provided for this low volume of trade among West African countries, conflicts of interest between countries, or in fact between interest groups have been blamed for creating obstacles to

⁵ The total number of cattle reported to be exported by the exporting countries (Table 2.3) was smaller than the number of cattle reported to be imported by the importing countries (Table 2.4). So, it is most likely that the zero value was as a result of unrecorded livestock traded between Ghana and the exporting countries of West Africa during that period.

the establishment of regional markets (Holtzman et al. 1991). These constraints can be general or specific to the different sectors of the economies of the region. Many studies (e.g. World Bank 1991; Sidahmed 1993; Gue 1998; Barry et al. 2000) have discussed the economic, institutional and policy barriers to regional trade in West Africa.

For the livestock sector specifically, there are important variations in livestock sector policies among the countries of West Africa mainly because some of the countries are livestock exporters (e.g. Burkina Faso, Mali and Niger) while others (e.g. Côte d'Ivoire, Ghana and Nigeria) are net livestock importers (Figure 2.5).

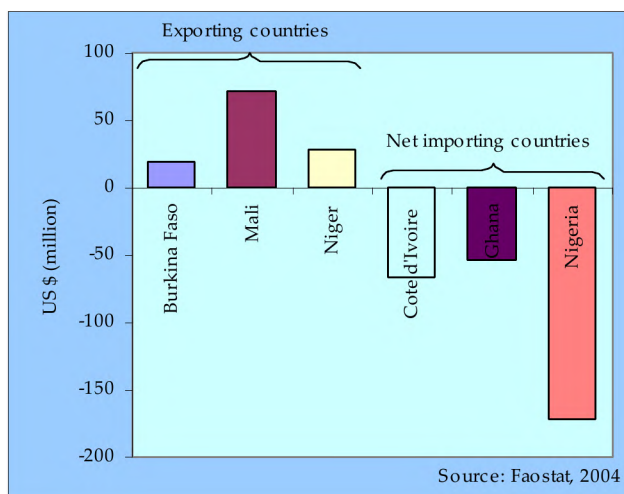


Figure 2.5: Value of net imports of cattle, sheep and goats by study countries in 1999 (US\$ × 10⁶).

For exporting countries, the values of net export of cattle, sheep and goats are positive while it is negative for net importing countries, for example, to the tune of US\$ 171.5 million for Nigeria in 1999 (FAOSTAT 2004). For this reason, the main thrust of livestock policies in exporting countries is towards strengthening livestock marketing and processing and promoting intra-regional trade in livestock while policies of net importing countries protect local livestock producers and undertake livestock development programmes to boost internal production, attain self-sufficiency in livestock products and as a result conserve foreign exchange (see Box 2.1). The above dichotomy of interests partly accounts for lack of harmony in regional livestock sector policies and is also partly responsible for the variation in pace and extent of implementing regional livestock policies in the various countries.

This study relied on a cross-section of livestock sector stakeholders including representatives of livestock market associations and policy advisers in the study countries to identify the most important policy and non-policy barriers to livestock marketing and trade⁶.

⁶ As part of a consultative and participatory process, ILRI organised a workshop on 'Policy options for the improvement of regional livestock trade in West Africa' in Niamey (Niger), 4-6 May 1999. The workshop brought together about 25 participants including policy advisers, livestock traders and policy analysts from Burkina Faso, Côte d'Ivoire, Ghana, Mali, Niger and Nigeria. Each of the countries made two formal presentations, one from a policy maker (representing the public sector) and another from a trader (representing the private sector). Proceedings of this workshop have been published in Williams (1999b) and summarised in Brief No.1.

The major constraints identified by the stakeholders are listed below not in any particular order, but the first four bullet points originated from livestock traders while government policy advisers voiced the remaining constraints. The constraints included:

- Excessive road blocks and unlawful tax collection at these road blocks;
- High official taxes (e.g. in Niger and Burkina Faso) and arbitrariness in arriving at the taxation level (e.g. in Côte d'Ivoire);
- Poor state of roads and high cost of transporting animals to markets;
- Inadequate flow of market information—on prices, levels of supply and demand—needed to make informed trade decisions;
- High level of illiteracy among market operators which hinders innovation, awareness and understanding of government policies;
- Lack of formal and binding trade contracts between market operators; and
- The dominant practice of trade in live animals with almost total neglect of value-addition through processing and trade in meat products.

Box 2.1: Thrusts of livestock sector policies in exporting and net importing countries summarised from workshop presentations	
<u>Exporting countries</u>	<u>Net importing countries</u>
Promoting livestock marketing and processing and intra-regional livestock trade through: <ul style="list-style-type: none"> ▪ Reducing/eliminating export taxes (M, Ng)*; ▪ Simplifying export procedures (B, M, Ng); ▪ Easing road control and administrative bottlenecks (B, M, Ng); ▪ Liberalising trade in livestock products and inputs (B, M); ▪ Privatising and promoting private investment in the livestock sector (B, M); ▪ Better organising market operators (B, Ng); ▪ Improving infrastructure and price information (Ng); ▪ Ban on importing beef and beef products (B). Promoting livestock production through: <ul style="list-style-type: none"> ▪ Establishing development fund (B); ▪ Developing local feed resources/pasture (B, M, Ng); ▪ Promoting crop–livestock integration for sustainable natural resource management (Ng). 	Promoting livestock and meat marketing/import policies through: <ul style="list-style-type: none"> ▪ Facilitating cross-border transportation of trade animals (G); ▪ Import restriction—requiring import permits, livestock health certificates etc. (C, G, Ngr); ▪ Imposing compensatory levies on low quality subsidised chilled beef from the European Union (C); ▪ Livestock trade liberalisation (C, G, Ngr). Promoting livestock production to attain self-sufficiency through: <ul style="list-style-type: none"> ▪ Ruminant genetic improvement programmes (C, G, Ngr); ▪ Developing feed resources (C, G, Ngr); ▪ Privatising animal health delivery and use of community livestock workers (G).
*Country presentations that mentioned policy direction: B = Burkina Faso, C = Côte d'Ivoire, G = Ghana, M = Mali, Ng = Niger and Ngr = Nigeria	

CHAPTER THREE

METHODS

In this chapter, the three frontier livestock markets used as case studies to identify the economic, institutional and policy constraints to livestock marketing and trade are described. An overview of theoretical approaches to market studies is also presented. Particular attention has been paid to studying livestock marketing operations, assessing market integration, identifying factors playing significant roles in price determination in domestic (Sahelian) livestock markets, and appraising costs and returns to domestic and cross-border livestock marketing in West Africa. This influenced the type of data collected and the data collection techniques used.

For data analyses, simple statistical methods were combined with more rigorous econometric models such as Augmented Dickey Fuller (ADF) test statistic to study livestock market co-integration in domestic (Sahelian) markets, pairwise Granger causality tests to analyse for livestock price efficiency and determine price responses to supply and demand shock in domestic markets, Analysis of Covariance (AnCov) model for livestock price determination etc. Technical details regarding the models used in the analyses of the data are presented in Annex I.

3.1 Location and market operations in the three frontier markets

Three frontier markets located at **Sikasso**, **Niangoloko** and **Bittou** were selected as the main sites of investigation and sources of information (Figure 3.1). The **Sikasso** market in southern Mali is a daily livestock market located about 100 km from the border with Côte d'Ivoire.



Figure 3.1: Map showing countries of the central corridor of West Africa and locations of the frontier markets in Sikasso (Mali) and Niangoloko and Bittou (Burkina Faso).

Animals traded in this market are mainly for local slaughter while the bulk of animals meant for export are purchased in villages within the region or in upstream markets and trekked to Sikasso, loaded into trucks and exported to Côte d'Ivoire. This market had no facility for weighing animals at the time of the market surveys.

The livestock market in **Niangoloko** at the border between Burkina Faso and Côte d'Ivoire operates on Saturdays only, although animals may be brought to the market for resale or for export any day of the week. Transactions taking place in the market account for only a small fraction of the cattle passing through the market. Traders buy the bulk of their animals from surrounding villages, but they are obliged to transit through this frontier market before exporting animals, according to the regulations of the local market association. Niangoloko market had weighing scales that worked throughout the survey period except during a 3-week period in August 2000.

Bittou livestock market in the eastern region of Burkina Faso is located at the border between Burkina Faso, Ghana and Togo and is open every third day. As a rule, the market for small ruminants takes place in the morning and that for cattle in the afternoon. Bittou had its weighing facilities at a distance from the main market and this required the movement of animals from the central part of the market through a poorly maintained corridor, which becomes impassable during the rainy season. As a result, weighing animals was generally more difficult in Bittou than in Niangoloko.

3.2 Data collection

Preliminary data collection to establish sampling frames, profiles of market participants (i.e. sellers, buyers and middlemen) and major features of each market started in June 1999, but regular market surveys on a weekly basis commenced in December 1999 and ended in June 2001. In addition to market (transaction) surveys, traders were also surveyed as well as policy makers purposively selected from relevant government ministries (e.g. Animal Resources, Trade, Finance, Transport and Immigration) in each participating country. These government officials were interviewed to determine changes and new directions in government policies, statutory laws and institutional support to livestock marketing and trade. Data from secondary sources (e.g. government publications and national statistical annual yearbooks) were also collected.

3.2.1 Market transactions surveys

Market data collected include information on flow of animals to the three frontier markets, including geographic origin, number, type and prices of animals traded, modes and costs of transportation, arbitrage functions performed by different marketing agents, access to credit etc. For livestock transactions in particular, data were collected on number of animals present on a market day, number of animals sold, price at the point of origin, price at market, weight (directly from weigh scales or indirectly through girth measurements, particularly in Sikasso), sex, age, condition, breed, colour, purpose of purchase (e.g. resale, slaughter, fattening), type of seller (e.g. farmer, trader, breeder) and type of buyer (farmer, trader, restaurateur, butcher). Three questionnaires, one each for cattle, sheep and goats transactions were used. The initial intention was to record all transactions in the markets but this was not possible for a number of reasons:

- i. Animals bought or sold on non-designated market days were not recorded;
- ii. On some market days, large numbers of animals were brought to the market for sale and it was impossible to record every transaction;

- iii. Some traders in Bittou (mainly Ghanaians) deliberately leave the market grounds after their transactions and refused to be interviewed.

In spite of these obstacles, a large proportion of all transactions (sometimes all) on a particular day were recorded. In all, 19,001 transactions involving 11,419 cattle, 3,612 sheep and 3,970 goats were recorded in the three frontier markets with specific breakdowns as follows: Sikasso (7,404 cattle), Niangoloko (2,230 cattle) and Bittou (1,785 cattle, 3,612 sheep, 3,970 goats).

3.2.2 Trader surveys

In addition to market surveys described in the preceding section, periodic surveys were conducted at peak and off-peak seasons of cross-border trade in each frontier market to collect information on volume, costs, taxes, levies, credit, interest rates, transport regulations and enterprise development policies constraining or promoting cross-border livestock trade. Traders' surveys consisted of interviews with both export and domestic traders operating in the markets. To capture seasonal variations, two series of interviews were carried out during different periods of the year—the first was between July and November 2000 while the second spanned March 2001 to June 2001. In the first phase, the same questionnaire was used for all traders regardless of whether they were operating externally or internally. However, they were separated into these two categories for the second series of interviews because experience gained from the first set showed that there existed significant differences between the domestic and cross-border livestock traders operating in each market.

A major strength of this study is the investigation of livestock trade in the region based on two partitions namely i) the domestic segment and ii) the cross-border segment. Previous studies on livestock trade in the central corridor of West Africa (Herman 1979; Josser and Sullivan 1979; Delgado 1980; Herman and Makinen 1980; Staatz 1980; Holtzman et al. 1991) investigated a single continuum from point of purchase to point of sale at a terminal market. As is shown later, the latter approach misses out important differences in levels of market concentration and competition in the domestic segment compared to the cross-border segment.

The questionnaire used in the first series of interviews consisted of three parts. The first part addressed general information such as trading history, trading practices and economic activities other than trading. The second part dealt with the purchase of cattle and transportation to the frontier market, while the third section was focused on issues related to exportation and resale of livestock. While the questionnaires used in the second series of interviews followed more or less the same structure as the one used for the first interviews, based on experience from the first, some of the questions were modified and some new ones added to capture the differences between domestic, cross-border (i.e. export-oriented) as well as non-resident (i.e. external or coming from neighbouring countries) livestock traders operating in each market.

The first series of interviews revealed that during a certain period of the year some traders fattened cattle and sheep for resale. A separate questionnaire was subsequently designed to collect information on this activity. The design of the trader surveys was similar for the three sites, however, some site-specific peculiarities emerged during implementation. For example, while final group interviews were held in Niangoloko and Bittou to clarify some unanswered questions, all attempts to convene similar group interviews in Sikasso failed,

probably as a result of survey fatigue on the part of the traders. Other peculiarities, especially in relation to sampling of the traders are as follows:

In **Sikasso**, a list of members of COBAS (Cooperative de Commerce de Bétail de Sikasso) was used as the sampling frame. The listed traders were classified by trade volume and type of trade (domestic or external) with the help of two key informants. A stratified random sample, consisting of 30 export traders (10 large, 10 medium and 10 small) and 20 domestic traders was drawn for the interview. It later became clear that there were many more traders operating in the market who were not members of COBAS. As a result, the sample was extended to accommodate this new group using the same stratification criteria. Also, when previously selected members of COBAS showed reluctance to continue with the interviews they were substituted with traders drawn from outside COBAS⁷. In the end, 46 export traders operating through the Sikasso frontier livestock market were interviewed.

In **Niangoloko**, a sample of traders was initially selected from a list of members of the local livestock traders association. The actual number of traders operating in the market turned out to be much smaller than the list suggested and did not exceed 40. As a result, there was no need for further sampling. A total enumeration of consenting participants yielded 33 (32 export and 1 domestic) traders. As was the case for Niangoloko, a traders' list was used but the number of traders in Bittou was also modest necessitating no further sampling. The difference, however, was that many non-resident traders operated in Bittou. The bulk of small ruminant exports and a significant part of the cattle export from Bittou were done by Ghanaian traders from Bawku—a Ghanaian town near the border with Burkina Faso. As noted earlier, Ghanaian traders were rather discrete about their business transactions, so only a handful of them consented to be interviewed and this limited the information available on small ruminant export trade.

3.3 Approaches to market study

The performance of a market is influenced by two major factors: i) the structural characteristics of the market, and ii) the competitive behaviour of actors in the market's chain. Understanding how these factors work independently and together can provide a basis for identifying opportunities to be exploited and constraints that need to be removed. Market study involving analysis of competition, efficiency and integration is useful for the formulation of interventions, particularly those aimed at (i) lowering marketing costs, (ii) reducing the tendency for excessive profit making, (iii) supporting producer prices, and (iv) stabilising inter-seasonal price spreads (Bain 1959; North 1989; Staal et al. 1997; Harriss-White 1999).

The study of markets and marketing has remained dynamic and has witnessed a lot of paradigm shifts. Theoretical and applied models of market analysis the Structure, Conduct and Performance (S-C-P) framework (Bain 1959); the Commodity chain or 'filière' approach (Shaffer 1968, 1973, 1980) and Transactions Costs Economics (TCE) approach (Bardhan 1980, 1984; Williamson 1985; North 1989) have been proposed. The existence of a wide range of models suggests that there is hardly any single, truly adequate theoretical framework for studying markets, particularly in developing countries. In effect, in studying livestock markets in West Africa, there is a need to adopt

⁷ Balancing the proportion of COBAS and non-COBAS members drawn in the sample was not a crucial issue because the objective of stratifying the traders, in the first place, was to characterise them according to the volume of trade that they handled. This was an economic issue in which membership of one association or the other had little influence.

useful elements of the old and the new to understand structural and institutional factors constraining and/or promoting livestock marketing. In the following sub-sections, we shall examine briefly the major elements of some of the approaches mentioned above and show how we have applied them in this study.

3.3.1 The Structure, Conduct and Performance (SCP) approach

The structural components of a market include marketing channels, marketed volumes, degree of market concentration and existence or non-existence of market entry barriers. Market conduct refers to the various strategies adopted by participants in buying, selling, and pricing. The SCP approach postulates that as market structure deviates from the paradigm of perfect competition, the degree of competitive conduct will decline and there will be a consequent decrease in output and allocative efficiency, and an increase in prices. This implies that the performance of markets can be assessed based on the level of competition and efficiency in those markets. Structure and conduct can be measured directly while performance is generally assessed indirectly. The quality of results from the direct measurement of the structure and conduct of a market could be enhanced when, for example, as in this study marketing channels have been distinguished spatially and the traders operating within them have been stratified according to the scale of their operation and their roles and functions in the marketing chain. Recognising economic and social differences limit generalisation and speculations about trader behaviour and market structure and can lead to a better understanding of how markets function. For instance, participants in livestock trade in West Africa, and most of SSA (sub-Saharan Africa), operate at different scales. At one end, there are small itinerant traders—usually keen to maintain close social relationships with smallholder livestock producers in their domain of operation—involved in farm and village level collection, while at the other end there are big private entrepreneurs who regroup and export animals. The existence of these strata implies that a certain degree of price collusion could go on within and between strata that, in turn, may affect market entry conditions and result in changes in market structure. Little (1992) in Somalia found that there was less competition among the big livestock traders due to high market concentration, but the reverse was the case for markets dominated by many small livestock traders with low market concentration. At times of adversity, e.g. drought or economic downturn, the smaller traders are better able to exploit their close social and cultural relationships with producers to survive economically.

The SCP framework has been criticised as being too abstract and deterministic. Some of the criticisms are that its price integration and price performance analyses are static and suffer from spatial arbitrariness or are entirely excluded (Harriss-White 1999); its market segmentation concepts with respect to margins and transfer costs are faulty (Barrett 1996); and it does not explain how competition among traders may affect consumer welfare. As a result, the approach fails to explain the causal links between structure, conduct and performance and is, therefore, unable to predict (real) performance from (real) structures and vice versa (Harriss-White 1999). Once these limitations are recognised, the SCP framework still remains the conventional approach for studying market institutions (Magrath 1992; Scarborough and Kydd 1992; Scott 1995). In this study, it provides the building blocks for examining whether marketing margins charged by various actors in the marketing system are consistent with costs and whether the degree of market concentration is low enough (i.e. the number of operators in the markets are high enough) to ensure competition and drive down costs as much as possible.

3.3.2 Commodity chain or Filière approach

The commodity chain approach builds on the SCP framework. It assumes vertical as well as horizontal relationships between firms in evaluating market performance and is more dynamic in following the entire commodity flow from input supplier to the ultimate consumer. At each stage along the commodity chain, the approach permits three types of analysis namely: i) costs and margins, ii) spatial flows (involving places, volumes and directions), and iii) the social relations of trade including the identification of key points of asset concentration (Leplaideur 1992).

Furthermore, the economic, infrastructural and institutional environments in which markets are operating are not taken as given, but are studied in terms of: i) their impacts on market performance, and ii) the constraints and opportunities they offer for markets to contribute to improved economic performance. These constraints and opportunities can be identified through interviews of participants in the commodity chain and government policy makers concerning their subjective evaluations. When the results of these interviews are combined with classical tools for market analysis such as the costs and margins, and spatial flows mentioned above as well as analysis of underlying trends in supply and demand (including their predicted impact on output and product use), then the managerial, institutional, technological and policy constraints to the marketing of the commodity are elucidated.

The Filière approach has been criticised on account of the difficulty usually encountered in defining empirical boundaries of segments in the commodity chain and in distinguishing between exogenous and endogenous factors affecting market exchange. The approach is constrained in scope to individual crops/outputs, but the structure and functioning of commodity chains may vary greatly within a region and between crops. In the context of farming systems in West Africa where varying mixes of crop and livestock enterprises exist, the variation in structure and functioning of commodity chains can be enormous.

In spite of these shortcomings, the commodity chain approach is flexible and is particularly applicable to the study of markets in developing countries. In using this approach, it is important to: i) define a set of activities, which have sufficiently strong links to be described as a system or sub-system, and ii) identify systems or sub-systems which are relevant for policy purposes (Williams 1999).

3.3.3 Transactions costs approach

One of the assumptions for perfect competition⁸ in neoclassical economic theory is perfect information under which it is presumed that traders in each market have perfect knowledge of the situations in all other markets and, as such, inter-market price differentials only reflect transportation and handling costs between concerned markets. Transactions cost economics (TCE), unlike neoclassical economic theory, recognises that

⁸ In economic theory, a market is assumed to be perfectly competitive if (a) there is perfect information and traders in each market have perfect knowledge of the situation in all other markets, (b) there are many buyers and sellers in the market and therefore no single buyer or seller can influence prices, (c) the product is homogenous and buyers regard it equally irrespective of its supply channel, (d) there are no dominant market participants powerful enough to pressurise competitors or engage in unethical marketing practices, (e) there are no entry barriers to the market for both buyers and sellers, (f) there are no artificial restrictions to the movement of resources, and (g) there is no conspiracy among participants to influence prices and alter other marketing decisions (Williamson 1986).

commercial activity does not occur in a frictionless economic environment (Williamson 1986). Costs usually incurred include cost of purchase of product and transactions costs, which can be further subdivided into information (*ex-ante*), negotiation, and monitoring or enforcement (*ex post*) costs (Williamson 1986). According to Staal et al. (1997), transactions costs include, *inter alia*, the costs of searching for a partner with whom to exchange, screening potential trading partners to ascertain their trustworthiness, bargaining with potential trading partners (and, in some cases, officials who can hold up trade) to reach an agreement, transferring the product (typically involving transportation, processing, packaging and security title if necessary), monitoring the agreement to see if conditions are fulfilled, and enforcing (or seeking damages for violation of) the exchange agreement.

In addressing the limitation of the filière approach regarding institutions, transactions costs economists argue that institutions are efficient responses to transactions costs and postulate that institutions emerge due to high assets specificity, high uncertainty, high levels of transactional idiosyncrasy and high levels of opportunism. The theory predicts that transactions costs increase with distance, market concentration, systemic complexity and declining clarity of property rights and that transactions costs decline with relational contracts, with standardising quality and quantity (Marion 1986).

Transactions costs become prohibitive when they are so high as to exceed the expected gains from the activity, in which case no transaction takes place. Prohibitive transaction costs could lead to low percentage commercialisation of domestic production for an activity involving a significant number of producers and which can be imported (Staal et al. 1997). This describes the situation in West Africa where most of the livestock production is in the hands of large number of smallholders who appear to be losing ground to meat imports from outside the region, particularly from the EU. The smallholder nature of livestock production in West Africa has implications for increasing marketing cost because more intermediaries are involved between these smallholder producers (who are widely dispersed in space) and the consumers who are located several kilometres away. In addition, the volumes of cattle handled by these farmers are small, requiring market agents to move round these farmers to collect the few cattle that are to be sold.

Lowering transactions costs would increase traded volumes with economic benefits to both traders and producers while increased volume of livestock trade will promote regional trade and integration.

In many studies, imperfections in marketing systems, which lead to loss of competitiveness and efficiency, have been attributed to high and sometimes prohibitive transactions costs. Even then, there are only a few studies in which detailed empirical evidence is provided on the magnitude and importance of transactions costs (Goetz 1992; Hobbs 1997; Staal et al. 1997). Staal et al. (1997) observed that this may be due to the existence of conceptual and measurement difficulties when transactions costs are high enough to prevent exchange from occurring or due to the differences in the nature of observed transactions costs. For example, a farmer's decision to sell at the farm gate rather than at a more distant market may be influenced by the desire to avoid transactions costs involved in the latter option. On the other hand, the same farmer may decide to go all the way to a distant market because of excessive profits made by intermediary traders—a situation, which lowers return to producers. This study used simultaneous

surveys of livestock traders and policy makers over a period of more than one year to collect transactions data.

Although it is desirable that observed marketing margins are commensurate with marketing services provided or marketing function performed, getting a product such as an animal from its producer (a smallholders) to the final consumer requires more individual transactions due to the small size of each sale relative to what obtains in developed economies where livestock production is done on a large-scale (Fafchamps 1997). This phenomenon increases transactions costs and, consequently, increases the amount paid by the final consumers (sales price). The assessment of market performance should be based on a wide range of considerations in addition to the consistency between costs and marketing margins—this is often viewed as a static assessment. Furthermore, factors affecting price formation and other longer run dynamic issues must be incorporated to see how market forces and policy interventions can create incentives to encourage investment in the marketing system to drive agricultural transformation and productivity growth.

CHAPTER FOUR

LIVESTOCK MARKETING OPERATIONS: CHANNELS, TRADERS' CHARACTERISTICS AND LIVESTOCK FLOWS

The livestock marketing chain in West Africa is fairly well known (Josserand and Sullivan 1979; Shapiro 1979; Ariz-Niro et al. 1980; Delgado 1980; Staatz 1980; Schleich 1986; Koulibaba 1990). This chapter presents the results of an assessment of the livestock marketing channels, the behaviour of market participants, existing market institutions and volume of trade flows of livestock in the various channels supplying Sikasso, Bittou and Niangoloko frontier livestock markets and the terminal markets in Côte d'Ivoire and Ghana.

4.1 Marketing channels

Trade in live animals in the central corridor of West Africa generally starts with the collection of animals from farm gates and village markets (i.e. **primary** or **collection** markets), moving on to **secondary** or **regrouping** markets (at **frontiers** or other markets in fairly big towns) where animals are sorted into different classes based on condition, sex and age and then on to **terminal markets** in the capital cities of the respective countries and/or in the case of the Sahelian exporting countries to the coastal countries such as Côte d'Ivoire, Ghana and Nigeria (Figure 4.1). The figure shows that the farm gate and surrounding villages are at the apex of the channel. At the farm gate, pastoralists and smallholder crop–livestock farmers have three options in selling their animals namely; sell i) to itinerant livestock traders, ii) in collection markets, and iii) directly at the frontier markets. The flow of animals to the collection and frontier markets is not strictly in one direction as farmers also buy animals for breeding, fattening and traction from these markets.

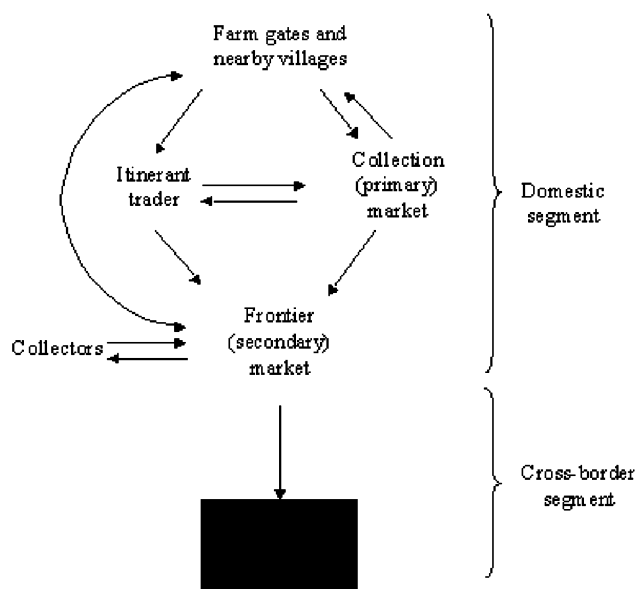


Figure 4.1: Channels of cross-border livestock marketing in the central corridor of West Africa.

Whatever the option used, all export animals in the study countries end up passing through the frontier markets for regrouping and sorting into different grades⁹. Animals purchased directly from the farm gate or collection markets by export traders do not change hands again at the frontier market. As such, the frontier market plays the dual role of providing a point for regrouping animals already purchased upstream as well as a place where buying and selling of animals occur. At the frontier markets, collectors still buy animals with the sole aim of reselling them in the same market and making a profit. Domestic livestock marketing ends at the frontier market. Cross-border trade, for the case studies examined in this report, starts here and involves exporting animals from the frontier markets to terminal in the coastal countries including, Côte d'Ivoire, Ghana and Nigeria.

4.1.1 The role of livestock collection markets

In both the trader and the market surveys, information was collected on the origin of animals sold. In the Sikasso case, 186 points of origin were identified during the survey period. These represent locations where traders bought the cattle that were brought to the frontier market for resale or export. Slightly more than half of the 186 points of origin of animals were located on maps and such places were grouped into 15 collection zones based on proximity to each other and to the frontier market. Most of the zones lie more or less concentrically within a 100-km radius of Sikasso. Just outside this 100-km radius, there were three zones namely: Koumantou, Beleko and Koutiala located to the west, north and north-west of Sikasso respectively. Mopti (about 450 km from Sikasso) was one of the two other more distant zones covering locations in the Niger Delta region in the north-east of Mali (Figure 4.2).

With respect to collection of animals, the more distant zones play only a minor role. An estimated 98 percent of the cattle sold in the Sikasso market, and 62 percent of the animals meant for export came from the following 4 zones, which also fall within the 100 km zone mentioned above:

- Sikasso (the area within a 20-km radius of Sikasso);
- Niéna (a town about 100 km to the west of Sikasso);
- Danderesso (comprising villages in the area north-east of Sikasso up to the frontier with Burkina Faso, with the main village being Danderesso); and
- Burkina Faso (comprising villages in Burkina Faso, just east of the Danderesso collection zone).

Animals that arrived from the Niéna zone were almost entirely bought from the Niéna cattle market, while those from the three other zones were purchased mainly from their surrounding villages.

Figures 4.3 and 4.4 show the relative importance of the various zones in contributing to total number of animals sold in the Sikasso frontier market and those in transit through the market. It should be noted that the data on cattle sold in the market cover transactions made on Wednesdays, the day market surveys were usually conducted in Sikasso. Niéna is an important upstream market for animals resold in Sikasso¹⁰. Animals resold in

⁹ In general, traders sort cattle into five grades according to body conditions. These are i) very lean, ii) lean, iii) good, iv) very good, and v) excellent. It is a subjective exercise. However, through experience traders are able to judge 'meatiness' of the cattle they buy and grade them accordingly.

¹⁰ The Niéna market is open every Sunday. After trekking the animals for two or three days from Niéna, they reach Sikasso and are presented for sale on Wednesday.

Sikasso also originate from Sikasso zone itself and to a lesser extent from the two zones to the north-east of Sikasso, i.e. Danderesso and Burkina Faso.

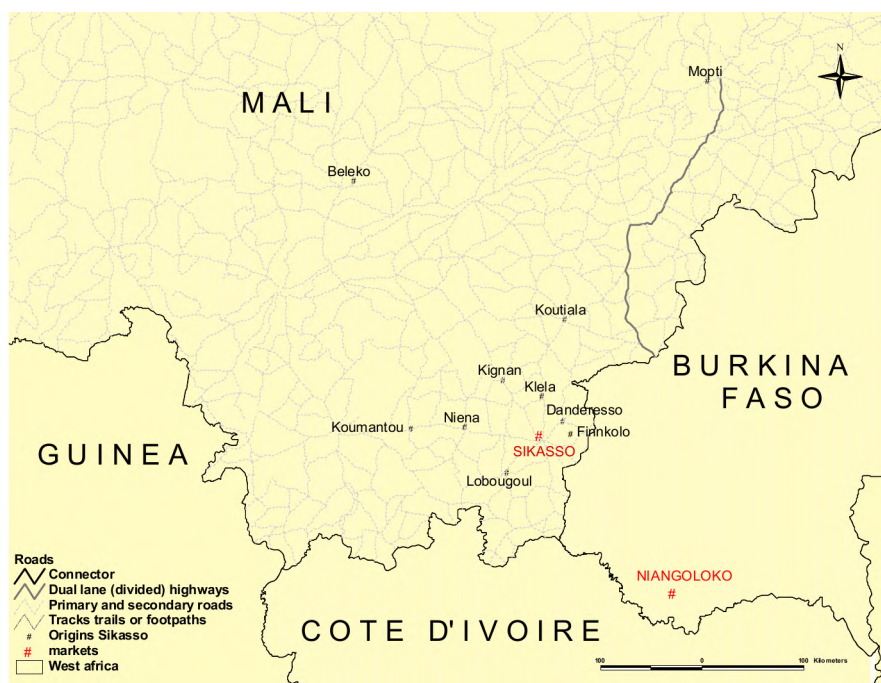


Figure 4.2: Map showing collection zones and villages of origin of cattle traded or transiting through Sikasso frontier livestock market, January 2000–June 2001.

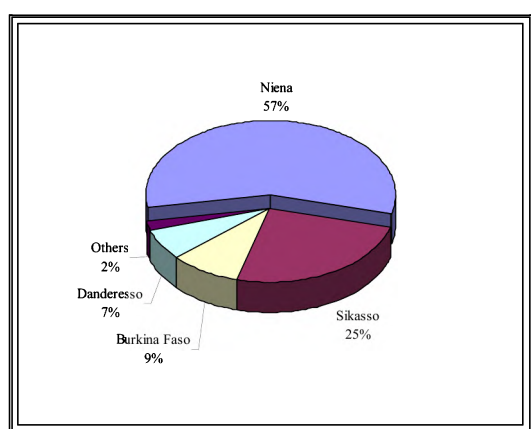


Figure 4.3: Origin of cattle traded on Wednesdays in Sikasso during the survey period.

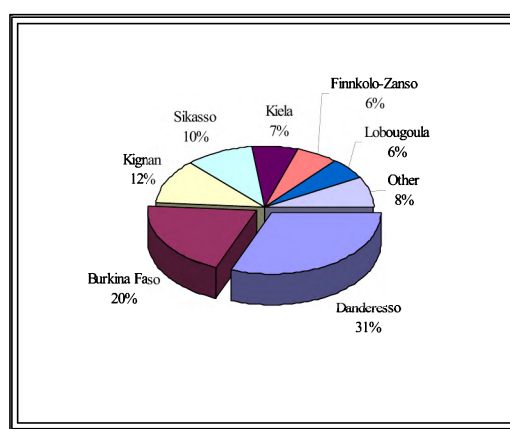


Figure 4.4: Origin of cattle on transit through the Sikasso frontier market to Côte d'Ivoire.

In the case of animals purchased elsewhere and only transiting through the Sikasso frontier market, the most important collection zones are Danderesso and Burkina Faso, which together account for about half of the animals. Other important zones are Kignan and Sikasso (not including the frontier market) followed closely by three outlying zones

namely: Kiéla, Finnkolo-Zanso, and Lobougoula (see Figure 4.2 for their locations on the map). With the exception of Burkina Faso, all these zones lie within a 60-km radius of Sikasso. As mentioned earlier, the bulk of these animals are bought at the farm gate. Except for Sikasso zone and Danderesso village where a significant number of animals were purchased through trader-to-trader interactions, the prevalent mode for collecting animals was through farmer-trader transactions.

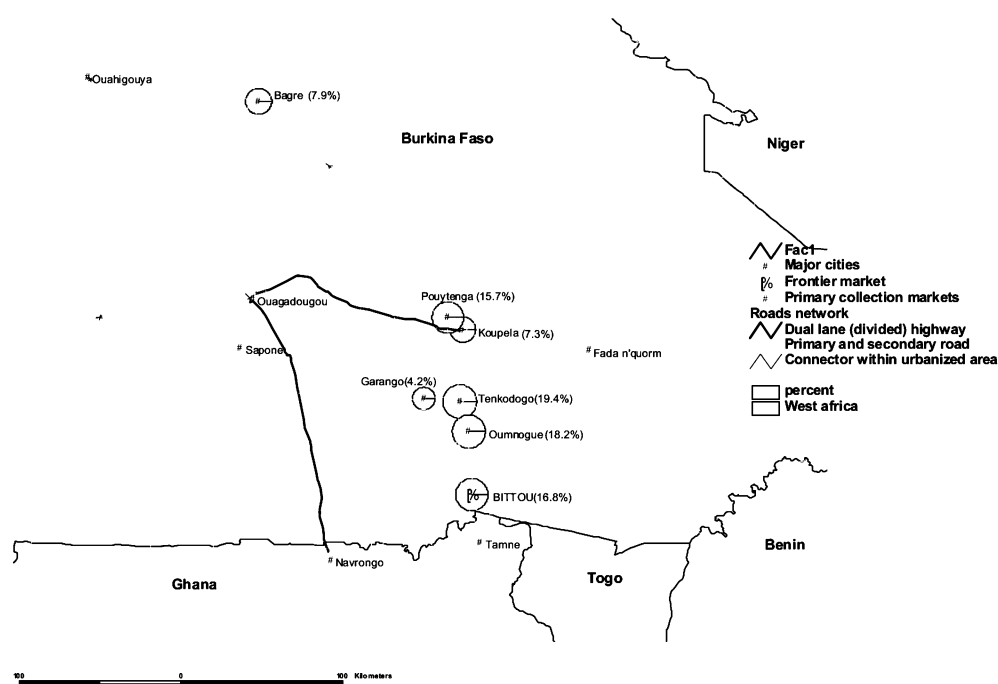


Figure 4.5: Map showing sources and percentage supply of cattle to the Bittou frontier livestock market, January 2000–June 2001.

Similarly, the collection zones and villages of origin played important roles in the case of Bittou and Niangoloko frontier markets. In Bittou, traders mentioned 23 villages where they collected animals and the contributions of these villages to the total 1,785 cattle traded in Bittou during the survey period ranged from 0.1 percent contributed by Gouni Peul to 19.4 percent by Tenkodogo. In addition, Bagre, Bittou (i.e. surrounding villages, excluding the frontier market itself), Gngangdin, Koupela, Pouytenga, and Oumnogue (also called Woumnohin) were important sources of cattle supply to the Bittou frontier livestock market. Figure 4.6 shows the location of these sources as well as their percentage contribution to the total number of transactions recorded in Bittou market. Apart from Bagre, which is relatively distant from Bittou, the other important sources were within 100 km of the market and trekking was the most important means of transporting animals from source to the frontier market.

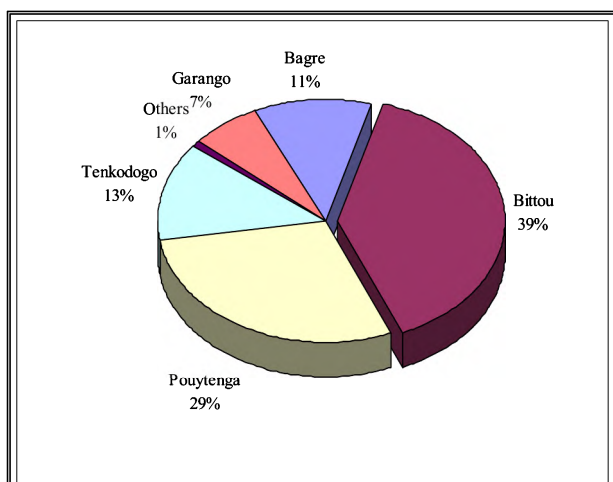


Figure 4.6: Contribution of collection zones to recorded sheep and goats transactions at Bittou (Burkina Faso) livestock frontier market, January 2000–June 2001.

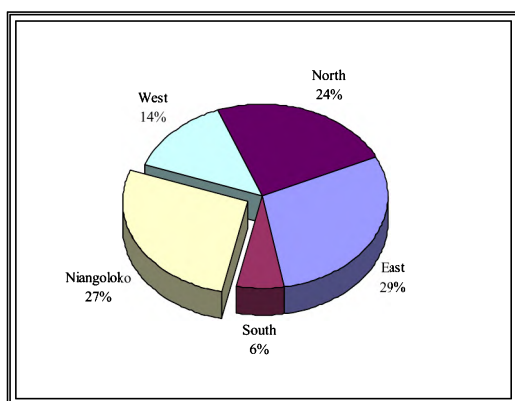


Figure 4.7: Percentage contribution of various collection zones to recorded cattle transactions at Niangoloko livestock frontier market, January 2000–June 2001.

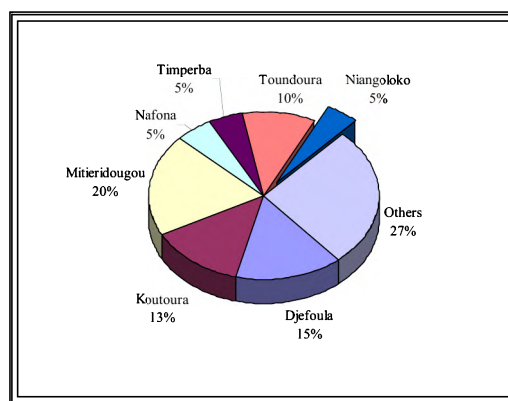


Figure 4.8: Important villages of origin of cattle traded or transiting through the Niangoloko livestock frontier market, January 2000–June 2001.

As mentioned earlier, transactions for cattle and for sheep and goats were recorded in the case of Bittou market. Cattle, sheep and goats are reared together traditionally, so the sources of sheep and goats are almost the same as those for cattle although in slightly different order of importance, with Gngandin and Koupela which were important for cattle dropping out for Garango which produced 7 percent of the traded sheep and goats. Sheep and goats bought from surrounding villages and Pouytenga accounted for almost 70 percent of the 7,582 recorded transactions, while Tenkodogo and Bagre contributed 13 percent and 11 percent respectively (Figure 4.6).

Similar to the cases of Sikasso and Bittou, Niangoloko and its surrounding villages, i.e. Niangoloko collection zone produced 27 percent of the 2,230 cattle transactions recorded at its frontier market (Figure 4.7). In terms of the contribution of individual collection markets, Niangoloko (not the frontier market itself) accounted for about 5 percent only (Figure 4.8).

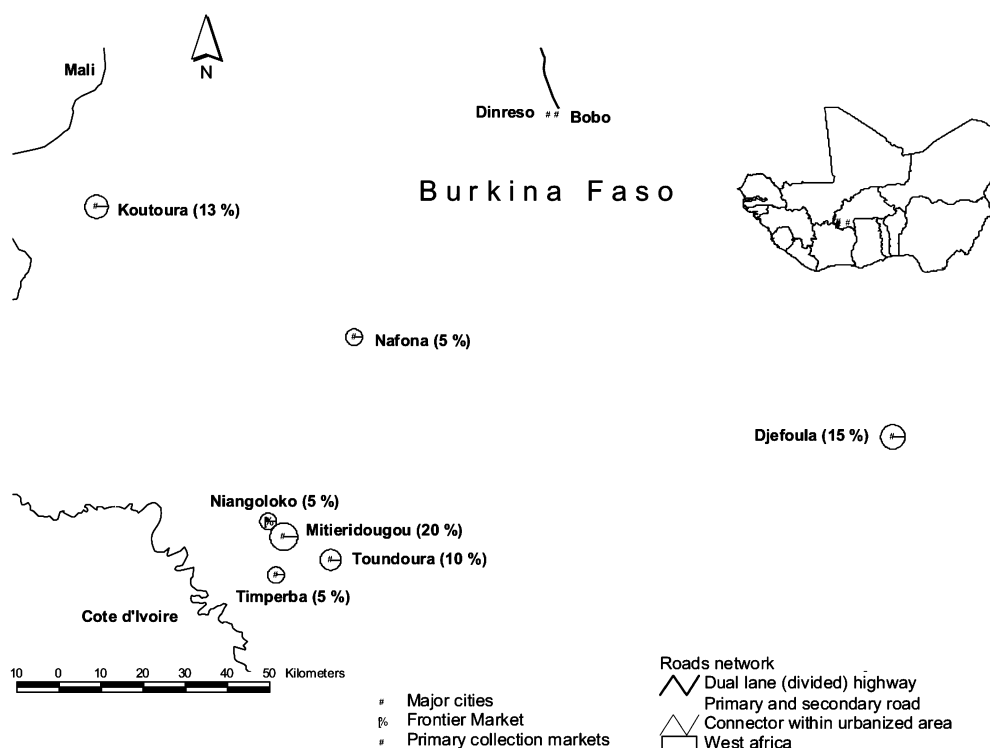


Figure 4.9: Map showing Niangoloko frontier livestock market and important villages of origin of cattle, sheep and goats, January 2000–June 2001.

Mitieridougou, about 10 km south-east of Niangoloko supplied the highest proportion (20%) of all recorded transactions for the Niangoloko market (Figure 4.9). In fact, the area within 30 km radius south/south-east of Niangoloko accounted for more than 35 percent of the supplies, but sizeable number of cattle arrived from as far afield as Koutoura (13%) and Djefoula (15%).

4.1.2 Livestock flows in the marketing channels

The study did not reveal any regulation compelling producers to sell or buy from particular markets (e.g. farm gate, collection or frontier) or through particular agents (e.g. the small itinerant trader, medium-scale or large-scale trader). As such, the flow of livestock through the channels reflected efforts by producers to sell their animals through channels that provided better prices and the strategies of traders to buy through channels where they had a higher chance of making more profit. For example, in Sikasso, farmers sold most of their animals at the farm gate to export traders in sharp contrast to Bittou where farmers sold about 40 percent of their animals at the frontier market.

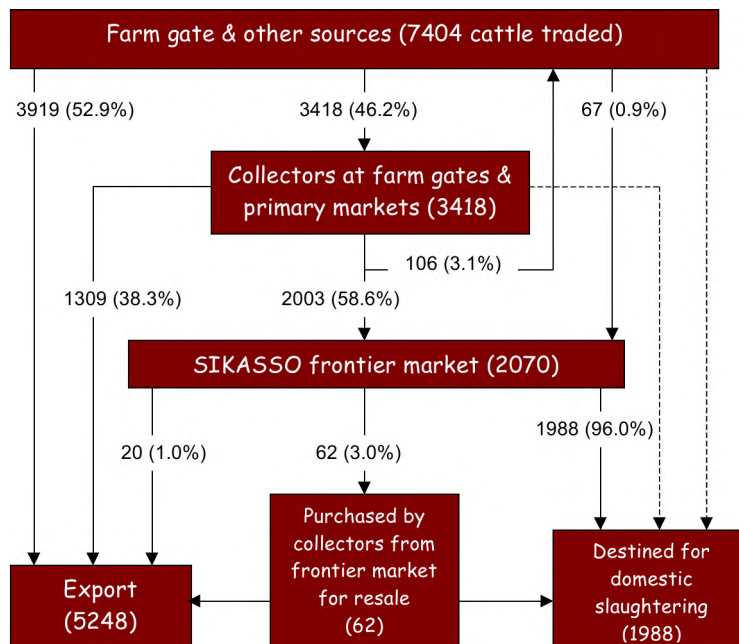


Figure 4.10: Livestock market structure and volume of flows of cattle through Sikasso livestock frontier market, January 2000–June 2001. [Dotted lines show marketing channels known to exist but not investigated].

Out of the 7,404 cattle transactions recorded in Sikasso frontier market during the study period, 3,919 or 52.9 percent were purchased by export traders directly from farm gates, while 3,418 or 46.2 percent passed through collection markets (Figure 4.10). Export traders purchased 1,309 of the 3,418 cattle that reached collection markets. From the point of view of the relative contributions of the various sources to the 5,248 cattle exported through Sikasso, it was calculated that 74.4 percent (3,919) were purchased at farm gates and other hinterland sources; 24.9 percent (1,309) from collectors at farm gates and primary markets; and only 0.4 percent (20 cattle) were purchased from the Sikasso frontier livestock market¹¹. It is clearly shown that export traders operating in the Sikasso market bought most of their animals around the farm gate and not in the frontier market. As a result, almost all the animals that reached the Sikasso frontier market were purchased for domestic slaughtering. This limited the role of the market to a location for regrouping export animals mainly. Given the relatively large capital outlays of export traders, their trading activities at the farm gate are expected to influence prices and competition at that level.

¹¹ The percentages shown in Figures 4.10 to 4.13 have been calculated to add to 100 percent *from each box* e.g. for Figure 4.10, the 7,404 cattle traded were made up of 52.9 percent for export, 46.2% for primary markets, and 0.9 percent for the Sikasso frontier market. An alternative approach was to calculate the relative importance of the different sources by making the percentage add to 100 to each box, e.g. for the description given above for the relative contribution of different sources to total export cattle. Both approaches were used and described in the text but only the results of the former are shown to avoid complicating the illustrations.

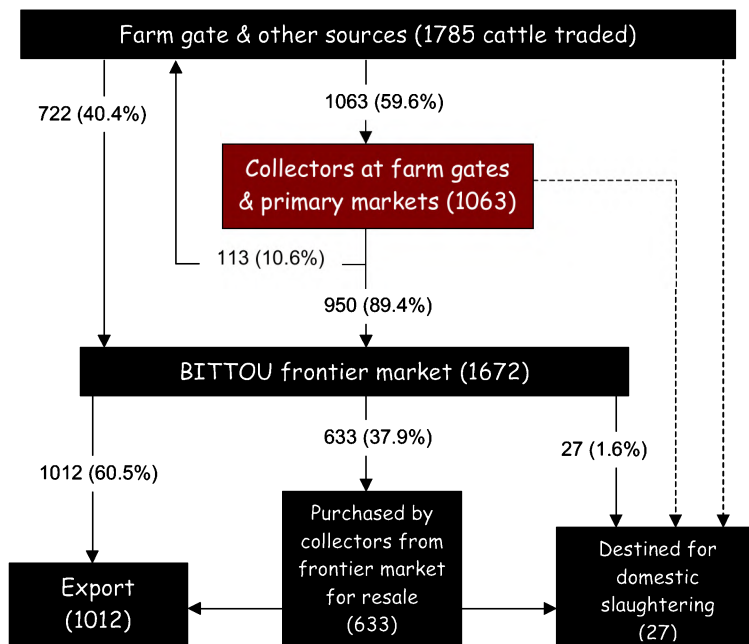


Figure 4.11: Livestock market structure and cattle flows through Bittou (Burkina Faso) livestock frontier market, January 2000–June 2001. [Dotted lines show marketing channels known to exist but not studied].

In contrast to the situation in Sikasso, the 1,012 cattle exported through Bittou were bought from the frontier market (Figure 4.11). In this case, the contact between livestock producers and export traders occurred not at the farm gate but at the frontier market where they (producers) brought 722 cattle or 40.4 percent of the traded cattle. Collectors played a relatively more prominent role in this marketing channel compared to Sikasso—about 60 percent of the cattle passed through the collection markets and even at the frontier market, collectors remained active and purchased 38 percent of the 1,672 cattle that reached there, with the sole aim of reselling them in the same market for a profit. In terms of the relative importance of sources, farm gates contributed 722 cattle (or 43.2%) to the 1,672 recorded cattle transactions at the Bittou livestock frontier market while collectors and primary markets contributed the balance of 56.8 percent. All export cattle (100%) were purchased at the Bittou frontier market. The trade in sheep and goats was found to be very similar to that of cattle (Figure 4.12) with the collectors being actively involved in the marketing process.

The high level of involvement of collectors in the Bittou export market is not unconnected, as revealed by the traders' survey, with the fact that a large part of the livestock export trade was in the hands of Ghanaians who seemed to prefer not going into the hinterland to farm gates and primary livestock market for fear of being attacked and robbed in the process of their moving their purchases to the frontier market. Apart from the security issue, they are strangers in Burkina Faso and do not understand the terrain. The level of transactions undertaken by Ghanaians in Bittou explains, at least in part, the enduring role of collectors (who are Burkinabes) in this market.

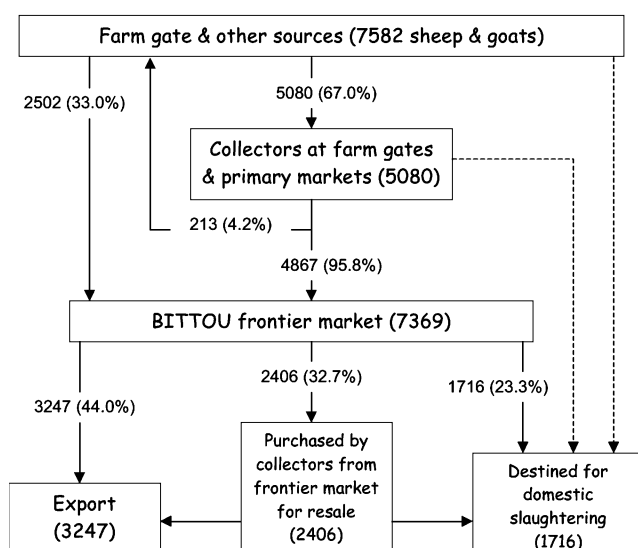


Figure 4.12: Livestock market structure and volumes of sheep and goats flows through Bittou (Burkina Faso) livestock frontier market, January 2000–June 2001. [Dotted lines show marketing channels known to exist but not studied].

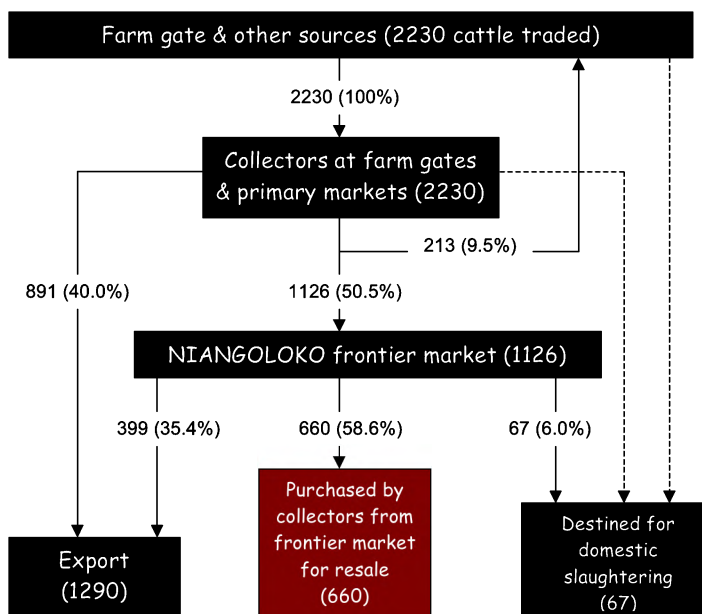


Figure 4.13: Livestock market structure and cattle flows through Niangoloko (Burkina Faso) livestock frontier market, January 2000–June 2001. [Dotted lines show marketing channels known to exist but not studied].

The livestock marketing channels around Niangoloko were found to be different from those of Sikasso and Bittou in that all 2,230 traded cattle passed through collection markets (Figure 4.13). Out of the 1,290 cattle destined for export from the above, 891 and 399 were purchased by export traders from collection and frontier markets, respectively. A point of similarity between Niangoloko and Bittou is that collectors continued to play

very prominent roles in the marketing chain up to and including the frontier market where they bought and resold 58.6 percent of the cattle that reached the frontier market compared to only 3 percent in the case of Sikasso. This behaviour of collectors in the Bittou and Niangoloko markets may be a peculiar feature of livestock trade in Burkina Faso.

Finally, for the three marketing channels that were studied, it was clear that the major value-added activity was the transfer of livestock from one location to the other as the trade is based on live animals. Metzger et al. (1998) conducted extensive analyses of prospects for developing Malian red meat and livestock exports and their results indicate that under current market conditions, livestock exports remain financially more profitable than either carcass or boxed meat exports to regional markets. However, that report predicted a bright future for value added through slaughter; due first to projections of rapid growth in domestic demand which assures slaughter industry of steady growth, and second to the several policy changes that can make the activity more attractive, e.g. removal of tax on raw hides and skins exports, the exemption of Malian meat from tariffs imposed on meat imports by coastal buyers, reducing official transportation taxes and eliminating extortion of transporters, and promoting investment in processing.

Obviously, huge capital outlays are involved in setting up the abattoirs and there will be challenges in terms of meeting minimum sanitary standards for meat export including ensuring the maintenance of the cold chain. According to Herman (1979), one of Ouagadougou's largest butchers ceased operation as a meat exporter, but went into live cattle export, because of the tremendous losses he incurred when refrigerated cars twice malfunctioned and completely ruined two large shipments of beef. Even then, it appears that processing as a value-adding activity is an inevitable step for remaining relevant in the regional livestock and meat market as well as expanding to the intercontinental market. Private entrepreneurs should be encouraged and supported to overcome some of these constraints as indications are that of an increase in the demand for high quality tender red meat in the world market. In fact, Metzger et al. (1998) suggested that there may already be substantial profits in the sale of certain boxed high quality cuts of meat beyond the region such as in the Middle East.

4.2 Profile of livestock traders operating in frontier markets

In this section, the results of the traders' surveys covering demographic characteristics, trading history, modes of buying and selling and relationships with brokers and other agents, volume of business, capital requirements, access to credit and factors constraining livestock trade are presented.

Private entrepreneurs ranging from small itinerant traders to large-scale export traders operate the livestock marketing channels described above. Other major participants are livestock producers, traders' agents and brokers (intermediaries). The major role of livestock producers is as suppliers/sellers, although they occasionally purchase animals for breeding, fattening and animal traction. Brokers (intermediaries) are seen as part of the market actors and their roles are described below. Butchers featured at every point along the marketing channel but since this study is focusing on activities leading ultimately to cross-border livestock trade, their participation is not given any further attention. Traders, as the major market actors, are focused upon in this section.

Table 4.1: Number of traders interviewed in Sikasso, Niangoloko and Bittou.

Market	Type of trader	Total no. interviewed	No. interviewed twice	No. interviewed in the 1 st series only	No. interviewed in the 2 nd series only
Sikasso	Export traders	29	15	13	1
	Domestic traders	18	8	10	
Niangoloko	Export traders	32	17	14	1
	Domestic traders	1	1		
Bittou (cattle)	Export traders	19 (+ 3 Ghanaians)	12	6 (+ 3 Ghanaians)	1
	Domestic traders	20	13	1	6
Bittou (small ruminants)	Export traders	3 (+ 4 Ghanaians)	1	2 (+ 4 Ghanaians)	
	Domestic traders	17	12	3	2
Total		146	79	56	11

During the traders' surveys, 146 traders were interviewed, 79 of them in both the first and second interview series, 56 in the first series only and 11 in the second series only, making a total of 225 interviews. A summary of the number of traders interviewed per site and number of interviews conducted per trader is presented in Table 4.1. It is noteworthy that although Ghanaian traders constituted a majority of the export traders in Bittou for both cattle and small ruminant trade, due to their tendency to conduct their businesses discretely, only 7 out of 29 export traders who consented to the interviews were Ghanaians.

4.2.1 Socio-economic characteristics of livestock traders

Domestic and cross-border trade in livestock is carried out by male traders from the various tribes that inhabit the study countries (e.g. Fulani, Bambara, Bissa, Dioulla, Senoufo, Maraka, More, Mossi, Senari, Sonrai), with the Fulani tribe making up 52 percent, 60 percent and 62 percent of the sampled traders in Sikasso, Niangoloko and Bittou frontier markets, respectively. Other tribes with prominent participation were the Senoufo (constituting 26% of the traders in Sikasso), More (38% in Niangoloko) and Bissa (23% in Bittou). These results suggest an even participation of all the tribes in the exporting countries in livestock trade. This is contrary to the feeling livestock traders in Côte d'Ivoire who feel that livestock trade in their country is dominated by foreigners.

Table 4.2: Characteristics of livestock traders operating the marketing channel in the central corridor of West Africa.

CHARACTERISTIC	PERCENTAGE PER LOCATION			
	Sikasso (n = 46)	Bittou (n = 32)	Niangoloko (n = 31)	Average
Educational level attained				
<i>No school</i>	46	38	15	33
<i>Islamic education</i>	45	40	59	48
<i>Primary</i>	9	5	16	10
<i>Secondary</i>	0	17	6	8
Experience in livestock trade (years)				
<i>1 – 3 years</i>	2	9	13	8
<i>4 – 6 years</i>	3	16	44	21
<i>7 – 9 years</i>	17	9	19	15
<i>> 10 years</i>	78	66	24	56
Original part played in market before now				
<i>Trader</i>	89	81	96	89
<i>Agent in another market</i>	0	13	0	4
<i>Broker in this market</i>	11	6	4	7
Source of initial funds				
<i>Own</i>	96	97	97	97
<i>Borrowed</i>	2	0	0	1
<i>Own + borrowed</i>	2	3	3	3
Source of funds now				
<i>Own</i>	95	75	87	86
<i>Borrowed</i>	0	0	0	0
<i>Own + borrowed</i>	5	25	13	14
Partnership status at the beginning				
<i>Alone</i>	80	91	84	85
<i>In partnership</i>	20	7	16	14
Partnership status now				
<i>Alone</i>	87	94	100	94
<i>In partnership</i>	13	6	0	6

Table 4.2 shows that on average 33 percent of the traders were illiterate with this figure ranging from 15 percent in Niangoloko to 46 percent in Sikasso. The Islamic religion background of the majority of the traders is reflected in the fact that 40 to 59 percent of them had Islamic education. The most educated traders were found around Bittou where up to 17 percent completed secondary education. Education did not seem to play a key role in determining level of participation or success as livestock traders.

4.2.2 Livestock trading history

More than half of the traders have been operating for more than 10 years. In the Sikasso market, about 78 percent of the traders had more than 10 years experience in the business, while the reverse was the case for Niangoloko where about 57 percent had experience of 6 years or less. Livestock trading involves a lot of capital and as a result some of the traders had to initially act as agents for others (assisting them in buying and transferring livestock from other markets), as brokers in the same market (building up financial capital and social capital in the form of trust) or entering into partnerships with others in order to participate in the trade. Table 4.2 indicates that 4 to 11 percent of the current traders in Sikasso, Bittou and Niangoloko markets initially acted as brokers in those markets while

for Bittou, 13 percent were agents for other traders. It could be surmised that successful participation in livestock trade requires not just the financial capital but also a period of apprenticeship that could last for many years. Although intending entrants into the livestock trade may have the required start-up capital, they would still face obstacles posed by lack of objective standards in pricing animals and a highly personalised mode of transacting business, which depends on reputation and experience built over time, hence the need for apprenticeship.

4.2.3 Funding livestock trade

At the farm gate/village level, payment for all purchases was usually made in full and in cash at the time of purchase. At times, traders give credit to farmers/pastoralists to lock them into a contract to ensure a steady source of supply. The credit is paid back when the farmers/pastoralists supply animals to the traders. Down the marketing channel, a combination of cash payment and credit is the pattern for paying for animals. Survey results showed that at the frontier market about 24 percent of the transactions were on credit while 56 percent were a combination of varying levels of cash payment and credit, and the remaining 20 percent in cash. The amount of capital required to meet direct cash purchases is often enormous and limiting for many traders (see Table 4.3).

During the interviews, traders were asked to group themselves in terms of volume of trade and financial capital required to operate successfully within the identified groups. Three groups emerged from the exercise namely; small-, medium- and big-scale traders roughly coinciding with itinerant traders (small), collectors (medium) and export traders (large-scale). Itinerant traders are usually small traders maintaining close relationship and with a similar socio-cultural background to livestock producers. They use the social capital built up over the years to enter into special buying arrangements with producers (e.g. buying on credit, where possible). Collectors have weaker ties with livestock producers compared to itinerant traders and mostly operate the livestock marketing channels between the collection and frontier markets. Finally, at the top of the ladder are export traders.

The results of the traders' own grouping exercise are summarised in Table 4.3 which shows that to start livestock trade small-scale traders needed an average of 460 thousand FCFA in Sikasso to 1.5 million FCFA in Niangoloko and large-scale traders from 2.6 million FCFA in Bittou to 7.7 million FCFA in Niangoloko. Monetary outlays for medium-scale traders, as to be expected, lie between that of small- and large-scale traders. The above-mentioned sums would enable small-scale traders to purchase 6–8 cattle, medium-scale traders 11–16 cattle, and large-scale traders 25 to 37 cattle¹².

When the financial requirements for active participation in the various categories of livestock trade are taken into consideration it becomes clear why some traders have to start as agents and others as brokers or in partnership with other traders, as Table 4.3 shows, in order to build enough capital to participate in the trade. One surprising fact is that as much as 97 percent of the traders said that they were using their own funds and 94 percent were not in partnership with others as would have been expected. The fear of losing money and conflicts with partners were mentioned by traders and seemed to partly explain the low levels of partnerships encountered.

¹² Large-scale export traders often buy cattle in multiples of 35, which is the number that makes up a truckload.

Table 4.3: Livestock traders' categories, start-up capital requirements and average number of trade animals per trip (Std. error in parenthesis).

VARIABLE	LOCATION		
	Sikasso (n = 46)	Bittou (n = 32)	Niangoloko (n = 31)
Average start-up capital (1000 CFA franc)			
<i>Small scale traders</i>	460 (390)	480 (460)	1,500 (1000)
<i>Medium scale traders</i>	1,170 (990)	950 (870)	3,300 (1,900)
<i>Big traders (exporters)</i>	3,100 (2,150)	2,600 (1,800)	7,700 (3,900)
Number of animals purchased on a typical trip			
<i>Small scale traders</i>	5.7 (2.5)	7.1 (10.2)	7.5 (2.2)
<i>Medium scale traders</i>	10.9 (7.6)	13.1 (18.1)	16.0 (3.9)
<i>Big traders (exporters)</i>	27.4 (13.9)	25.3 (22.4)	37 (4.0)

Even though 97 percent of the traders used their own funds, there was a clear indication during the interviews that the traders yearned to move to higher rungs of the ladder, e.g. from small-scale small ruminants' trader to small-scale trader in cattle and on to export cattle trade, and this required additional funding from external sources which was not readily available to many of them. It is worth mentioning at this point that small ruminant traders share similar characteristics with cattle traders. About 28 percent of the cattle traders interviewed in Niangoloko were originally small ruminant traders who made enough money to join the cattle trade. Many small ruminant traders also wanted to move over to cattle trade because they felt that the small ruminant sector of livestock trade was under-developed compared with cattle trade. In other words, even though 97 percent of the traders used their own financial resources, the sum was not enough for the type of business they aspired to do. For small-scale traders, their ambition was for vertical expansion to the highest rung of export trading while for the export trader the aspiration was for horizontal expansion, i.e. being able to export more truckloads of animals at a time than they currently do. If a small-scale cattle trader in Sikasso were to move on to become a medium-scale trader, that trader would need to build up own capital from about 460 thousand FCFA to 1.17 million FCFA (Table 4.3) or obtain credit of about 700 thousand FCFA to bridge the gap. Similarly, a medium-scale trader in the same market would need a capital boost of about 2 million FCFA to break into export trading. Table 4.2 shows that only about 14 percent of the traders have been able to obtain credit to transact business. Even though not all the (86%) traders who did not get credit were credit constrained, the evidence points to the fact that a substantial percent of livestock traders needed credit support. This is irrespective of the level at which they currently operate in the marketing channel.

Analysis also showed that the number of cattle traded per trader increased along the marketing channel from the collection markets to terminal markets. The degree of market concentration also increases, leaving only few large-scale export traders. This is because a large number of the small-scale traders withdraw as a result of being unable to mobilise enough cash, from personal and credit sources, to participate in the capital intensive cross-border trade. In effect, while domestic marketing involved all actors, cross-border trade was almost entirely the exclusive preserve of big-time entrepreneurs. The high degree of market concentration, i.e. the fewer number of traders to buyers at the export end of the marketing chain suggests a relatively less competitive environment compared to the situation in the domestic scene where there are many traders participating in the market. Our finding of a higher degree of market concentration in the export segment of

the livestock marketing chain is consistent with what Little (1992) found in the Horn of Africa. The above discussion shows that there is a demand for credit in financing livestock trade and there are opportunities to further develop this trade.

4.3 Market institutions

The markets encountered in this study are not different from other markets for live animals in other parts of sub-Saharan Africa. It is well known that when market information on prices and supplies of livestock and objective standards for selling and buying animals are not available, the purchase price of an animal will reflect not only the bargaining skills of both buyer and seller but also the buyer's preference for the characteristics of the animal and the seller's willingness to sell. The search for animals with qualities that appeal to the buyer, the negotiations, payment and transfer of ownership are costly (time consuming) and there are many cases of failed transactions when buyer and seller are 'strangers' in a market system that is highly personalised. Sometimes, these transactions costs are so high—exceeding the expected benefit—that no exchange takes place. When transactions costs are high, market institutions (e.g. brokers, market associations, social networks) emerge to lower costs and enable exchange to take place. The roles and functions of some of these actors and organisations in the livestock markets studied are discussed in the following sections.

4.3.1 The role of intermediaries (brokers) in livestock trade

The role of intermediaries in the marketing chain starts with assisting a buyer to shorten the time spent in searching for a seller with the types of animals the buyer wants. Intermediaries provide information on market prices, types, grades and number of animals in the market; linking buyers to sellers and moderating negotiations thereafter; enforcing the terms of the exchange by collecting money from the buyer and paying the seller; witnessing the transfer of animals from seller to buyer; arranging the grouping and eventual transportation of purchased animals. By acting *ex ante* to provide market information, participating in the negotiations and enforcing contractual obligations *ex post*, intermediaries perform key functions that influence market transactions costs. Their participation in the negotiation process actually cuts down on the number of negotiations that would otherwise have failed, but may lower marketing margins for traders.

In the case of Sikasso, traders used brokers in only 6 percent of the transactions in villages and collection markets and in 4 percent of the transactions at the frontier market. At the point of resale, which could be anywhere between the collection and terminal markets but mostly at the terminal markets, the roles were reversed as brokers conducted up to 97 percent of the sales on behalf of the traders. This was due to the fact that traders who operated from the Sikasso frontier market were mostly indigenes of Mali, so between the farm gate and frontier market their transactions were with people with whom they shared similar socio-cultural background and therefore they required no intermediary in most cases. On the other hand, at the terminal market in Côte d'Ivoire where they are 'strangers', they handed over to local brokers. Even in the case of Bittou where the bulk of livestock export traders were Ghanaians, the same trend was observed for sales in Accra. The Ghanaian traders left 83 percent of the trading transactions entirely to local brokers with the remaining 17 percent done jointly by both traders and local brokers. The situation in Niangoloko is similar to that described above for Bittou.

Another reason for using brokers is related to attempts to sell as many animals as possible in cash. In this case, handing most of the selling to brokers is strategic since brokers are less likely to negotiate to sell animals that did not belong to them on credit, i.e. without the express permission of the owner. It then becomes convenient for a trader who does not want to sell on credit to be out of sight and out of hearing during sale transactions.

Though costs and benefits are discussed later in a separate chapter, it is noteworthy that brokers performed their functions, in all the study markets, at a uniform fee of 500 FCFA per head of cattle. A flat fee is a way of avoiding trader–broker conflicts. Nonetheless, as mentioned earlier, in all the markets brokers saw their position in the marketing chain as a stepping stone in their march to become full-fledged traders.

4.3.2 *Societes de convoyage* (conveyance companies) as organised intermediaries

Traders' accounts show that the shipment of cattle by truck from the Sahel to the coast attracts illegal payments to public agents averaging 150 thousand FCFA per truckload of about 35 cattle. *Societes de convoyage* emerged to facilitate the movement of traders who pay a *frais de convoyage* (conveyance fees) averaging from 35 thousand FCFA per trip in 2000 to 80 thousand FCFA (US\$ 124) per trip in 2001. For traders that paid the fees, further illegal payment was reduced to a 'token' fee of 1,000 FCFA per checkpoint. Initially, traders found the arrangement convenient because it saved them time and money considering the proliferation of checkpoints, especially inside Côte d'Ivoire. However, the continued existence of these companies is considered a serious impediment to intra-regional trade in livestock because their activities increase costs and reduce the competitiveness of Sahelian beef at the coast.

4.3.3 Market associations and livestock trade

The Cooperative de Commerce de Bétail de Sikasso (COBAS) of Mali and the Union Nationale des Associations de Commerçants et Exportateur de Bétail du Burkina Faso (UNACEB) were the two most important livestock traders associations encountered in the frontier markets. As already mentioned, a large proportion of the traders that participated in the surveys were members of these market associations in their respective countries. In Sikasso, many of the traders interviewed revealed that they joined COBAS mainly to reduce search time for trucks used in exporting animals, solve administrative and social problems related to operating in the frontier market, obtain cheaper feeds sold to members and get an allocation of space for livestock fattening in the stalls available in the market. For traders interviewed in Bittou and Niangoloko, UNACEB played an important role in obtaining credit from a bank for lending to its members. This was a very highly appreciated service according to more than 90 percent of the traders. About 50 percent of the traders mentioned that they joined the association for solidarity, 19 percent to have access to market information and 16 percent joined in order to be able to control or fix livestock prices. Traders who belong to these associations paid membership fees ranging from 3,500 to 5,000 FCFA and annual dues of about 1,500 FCFA.

When, during the traders' surveys, traders were asked to list the constraints to livestock trade in order of importance, insufficient capital was listed as the most limiting constraint by 91 percent of the traders in Bittou, 42 percent in Sikasso and 34 percent in Niangoloko. Although the percentage of traders listing this constraint in Bittou and Niangoloko may seem comparatively low, no other constraint was ranked higher than credit in the two sites. The most important constraints to livestock marketing as listed by the livestock traders were as follows:

- Limited capital and difficult access to credit;
- Too many formalities, fees and taxes (legal and illegal) paid during trips;
- Shortage of trucks at the frontier markets to transport animals to terminal markets;
- Lack of cattle corridor for trekking animals to frontier markets;
- Shortage of livestock feed at the frontier market; and
- System of selling on credit to buyers which lengthens the time to recover capital outlay.

Other minor constraints listed include:

- Lack of watering points along the animal trekking routes;
- Lack of training for traders in different aspects of livestock marketing;
- Limited external market outlets in other countries;
- Insufficient support from livestock traders' associations; and
- Lack of security (risk of losing animal or money along the trading route).

Given the functions of the local-level organisations and the constraints to livestock trade listed by the traders, it appears that the emergence and existence of market associations is mainly in response to market failures that the public sector has not been able to respond to and which tend to increase the costs of transacting business. In certain instances also, deliberate policies on privatising profitable activities could lead the emergence of these types of institutions. The point being made is that, it is not always the case that the emergence of alternative or parallel private institutions is a response to the failure of a public function.

Nevertheless, no matter how altruistic and well intended the objectives of institutions are at the beginning, some of their activities (e.g. acting in concert to regulate prices) may increase the cost of meat to consumers and reduce both consumer and producer's welfare. In this situation, state intervention may be needed to curb such activities and protect consumer and producers from exploitation.

4.4 Summary

In all the markets, private entrepreneurs ranging from small itinerant traders to large-scale export traders are operators. Other major operators include livestock producers, traders' agents and brokers (intermediaries), with the traders constituting 89 percent of the operators. These operators are all males, with the Fulani being in majority of the traders sampled. About one-third of these traders also engaged in agriculture as secondary occupation. About 56 percent of the operators have above 10 years experience, 97 percent relied on personal savings for initial funds for livestock trade with only 14 percent succeeding in obtaining credit.

Domestic and cross-border livestock marketing channels around the study sites were found to be uncomplicated though they varied slightly from one site to another. In terms of the number of active intermediaries, the Sikasso case presented the simplest and least sophisticated of the marketing channels with its high proportion (74.7%) of direct exchange between livestock producers and export traders, while the Niangoloko market case presented the most complex case where all traded animals passed through collection and frontier markets before export.

Even in this latter case, where the marketing chain is long, this is only in terms of the number of market players involved because the principal value-added activity remained the transfer of animal from the farm gate to the terminal markets. There was a notable absence of processors (excluding local butchers) in the marketing channels studied, particularly the cross-border segment. This points to a potential opportunity that could be usefully explored as a means of adding value to intra-regional livestock trade and creating additional employment in the livestock sector.

The results confirm that livestock markets in the region are dyadic as in most livestock markets involving pastoral systems in sub-Saharan Africa. A very positive finding was that there were no regulations compelling producers to sell or buy from particular markets (farm gate, collection or frontier) or through particular agent (e.g. the small itinerant, medium- or large-scale trader). It is then possible that farmers who sell most of their animals at the farm gate as in Sikasso, for example, do so as a strategy to avoid the high transport, handling and transactions costs that would otherwise be involved in selling at the frontier market. This contrasts sharply with Bittou where farmers themselves take a large proportion of their animals directly to the frontier market, the reason being that the villages of origin of the animals sold are within only two days' trekking distance to the frontier market and this eliminated high transportation (trucking) costs making it possible for many more producers than elsewhere in this study, to participate directly near the consumption end of the production-to-consumption marketing chain.

While all traders (small and big) participated in the domestic segment of the marketing chain, only the large-scale traders were involved in the export segment, as inadequate capital and limited access to credit served as an entry barrier and restricted the number of traders able to participate in cross-border trade. In addition, it is the desire of every seller to move, at first, to higher levels of trade vertically until the apex position of being an export trader is reached. Thereafter, the ambition is to grow horizontally by increasing the number of truckloads of cattle they are capable of sponsoring for export per trip.

Trade in small ruminants still remained relatively undeveloped as the traders' survey showed that traders operating in the markets abandoned it in favour of cattle trade once they have accumulated sufficient capital to move to the more lucrative cattle trade. This is another pointer to the extent of financial constraints facing livestock traders in West Africa.

Due to illegal road taxation at checkpoints by law enforcement agents, *societes de convoyage* emerged ostensibly to facilitate the movement of traders who pay a *frais de convoyage* averaging from 35 thousand FCFA per trip in 2000 to 80 thousand FCFA (US\$ 124) per trip in 2001. For traders that paid the fees, further illegal payment was reduced to a 'token' fee of 1,000 FCFA per checkpoint. Initially, traders found the arrangement convenient because it saved them time and money considering the proliferation of checkpoints, especially inside Côte d'Ivoire. However, the continued existence of these companies is considered a serious impediment to intra-regional trade in livestock because their activities increase costs and reduce the competitiveness of Sahelian beef at the coast.

Market institutions, particularly livestock traders' associations e.g. COBAS and UNACEB, have emerged to facilitate intra-regional trade. Traders interviewed revealed that they joined these associations mainly to reduce search time for trucks used in exporting animals, solve administrative and social problems related to operating in the frontier market, obtain cheaper feeds sold to members and get an allocation of space for livestock fattening in the stalls available in the market. For traders interviewed in Bittou

and Niangoloko, UNACEB played an important role in obtaining credit from a bank for on-lending to its members who are highly appreciative of this role of the association. The experience of UNACEB could be exploited to expand this activity to other associations in addition to linking such associations more formally to credit institutions. Though there were these traders' associations, there was a notable absence of similar high profile producers' associations to champion the cause of the poor, small-scale livestock producers.

CHAPTER FIVE

DETERMINANTS OF LIVESTOCK PRICES AND POTENTIAL EFFECTS OF PRICE VARIATIONS ON PRODUCERS AND TRADERS' INCOMES

In this chapter we examine the factors influencing livestock prices and the extent to which inter-market and temporal price variations could potentially affect the incomes of livestock producers and marketers in the study countries. The presentation begins with seasonal and inter-market variations in livestock prices followed by the findings on the levels of market integration between the frontier livestock markets and their associated collection markets and farm gates as well as among the frontier markets only. Finally, determinants of livestock prices are discussed. These together assist to clarify factors affecting livestock prices in the study countries and suggest possible ways of increasing incomes and welfare of participants in the livestock trade.

5.1 Biological characteristics of the traded livestock

As a prelude to the presentation of the results of the various models that are relevant to this chapter, this section summarises the survey data on important biological characteristics of the animals that were traded in the frontier markets. Table 5.1 shows that cattle were generally marketed at about 7 years of age weighing approximately 250 kg, equivalent to one Tropical Livestock Unit (TLU). Cattle from Burkina Faso, i.e. Bittou and Niangoloko were marketed at five years of age (two years earlier than in Mali–Sikasso). Since it is normal for cattle to attain this live weight from about four years of age, the lower age at marketing in Bittou and Niangoloko suggests that off-take rate was higher in Burkina Faso than in Mali. Sikasso was a bigger market than either Bittou or Niangoloko and this is seen in the average number of animals presented for sale each market day. A higher percentage of the animals brought to the markets in Niangoloko and Bittou markets were sold compared to the situation in Sikasso. Table 5.2 summarises the distribution of cattle by sex and purpose of purchase.

Table 5.1: Descriptive statistics for recorded cattle transactions at the Sikasso, Bittou and Niangoloko frontier livestock markets, January 2000–June 2001.

Parameter	Market							
	Sikasso (<i>n</i> = 959)		Bittou (<i>n</i> = 839)		Niangoloko (<i>n</i> = 1940)		All markets (<i>n</i> = 3738)	
	Mean	s.e.	Mean	s.e.	Mean	s.e.	Mean	s.e.
Age of cattle (years)	7.7	0.0	5.0	0.0	5.6	0.0	6.9	0.0
Weight (kg)	256.4	1.8	250.3	2.8	253.2	1.4	253.3	1.0
Total presented* (head)	113.8	0.6	80.2	0.7	17.3	0.2	73.6	0.6
Total sold** (head)	38.7	0.2	53.8	0.7	15.3	0.2	34.3	0.3
Percentage of total sold	35.6	0.2	65.7	0.5	87.9	0.3	60.5	0.3
Price at initial market (FCFA/kg live weight)	344.3	17.8	373.2	3.5	315.3	1.6	327.1	1.6
Price at frontier market (FCFA/kg live weight)	378.4	4.4	392.1	2.9	346.3	1.6	365.0	1.6

* Total presented = average number of cattle presented for sale on each market day.

** Total sold = average number of cattle sold out of those presented per market day.

Table 5.2: Sex distribution of cattle purchased for various purposes from Sikasso, Bittou and Niangoloko frontier markets, January 2000–June 2002.

Market	Sex	Purpose of purchase (head)					Total (head)	% of total resold / exported
		Slaughtering	Fattening	Traction	Breeding	Resale / Export		
Sikasso	Female	1,438	5	0	51	544	2,038	23.6
	Male	143	4	10	22	1,455	1,634	89.0
	Castrate	404	7	7	0	3,301	3,719	88.9
	Total	1,985	16	17	73	5,300	7,391	71.7
Bittou	Female	13	3	4	8	593	621	95.5
	Male	12	40	55	3	1,001	1,111	90.1
	Castrate	0	0	0	0	46	46	100
	Total	25	43	59	11	1,640	1,778	92.2
Niangoloko	Female	54	1	2	43	698	798	87.5
	Male	13	14	136	15	942	1,120	84.1
	Castrate	0	1	1	0	310	312	99.4
	Total	67	16	139	58	1,950	2,230	87.4
All markets	Female	1,515	9	6	102	1,835	3,457	53.1
	Male	168	58	201	40	3,398	3,865	87.9
	Castrate	404	8	8	0	3,657	4,077	89.7
	Total	2,087	75	215	142	8,890	11,399*	78.0

*The difference between this figure and the total 11,419 recorded cattle transactions means that 20 cases were voided for incomplete data.

Table 5.2 shows that only a small proportion (24%) of the female cattle presented for sale was actually sold for export in Sikasso. This contrasts sharply with Bittou and Niangoloko frontier livestock markets where 96 percent and 88 percent of the female cattle offered respectively for sale were actually sold. Considering that cattle sold in Sikasso were 2 years older, then two factors namely age and sex may have counted against the sale and export of female cattle from Sikasso.

Table 5.3 presents the sex and age characteristics of sheep sold for different purposes in Bittou. Here both male and female animals of all ages appeared to be equally purchased for export and resale. Table 5.4 shows that as the body condition rating of cattle presented for sale improved, a higher percentage got purchased for export, as expected. In Sikasso, 93.9 percent of cattle in excellent condition and 100 percent of similar animals in Niangoloko were sold for export. The above results suggest that for export purposes, old female cattle were the least preferred while male cattle and castrates were the most preferred. Figure 5.1 summarises the distribution of cattle of various grades that were traded in the three frontier livestock markets.

Table 5.3: Age and sex distribution of sheep purchased for various purposes from Bittou frontier market, January 2000–June 2001.

Age group	Sex	Purpose of purchase (head)					Total (head)	% of total for export/ resale
		Slaughtering	Fattening	Gift	Breeding	Resale/ Export		
< 2 years	Female	36	2	0	12	45	95	47.4
	Male	29	4	0	3	81	117	69.2
	Castrate	0	0	0	0	0	0	0.0
	Total	65	6	0	15	126	212	59.7
2-4 years	Female	142	0	0	18	468	628	74.5
	Male	158	11	0	0	324	493	65.7
	Castrate	5	0	0	0	23	28	79.3
	Total	305	11	0	18	815	1149	70.9
> 5 years	Female	278	2	0	56	972	1308	74.3
	Male	239	7	0	2	681	929	73.3
	Castrate	5	0	0	0	6	11	54.5
	Total	522	9	0	58	1659	2248	73.8
All ages	Female	456	4	0	86	1485	2031	73.1
	Male	426	22	0	5	1086	1539	70.6
	Castrate	10	0	0	0	29	39	74.4
Total	892	26	0	91	2600	3609	72.0	

Table 5.4: The rating of body condition of cattle purchased for various purposes from Sikasso, Bittou and Niangoloko frontier livestock markets, January 2000–June 2001.

Market	Condition rating	Purpose of purchase (head)					Total (head)	% of total for export/ resale
		Slaughtering	Fattening	Traction	Breeding	Export/ resale		
Sikasso	Very lean	14	0	0	0	0	14	0.0
	Lean	339	8	0	4	34	385	0.9
	Good	1246	6	11	63	2494	3820	65.3
	Very good	346	2	4	1	2263	2616	86.5
	Excellent	31	0	0	0	476	507	93.9
Bittou	Very lean	5	0	0	0	51	56	91.1
	Lean	4	6	7	2	328	347	94.5
	Good	6	22	38	7	698	771	90.5
	Very good	7	14	14	1	485	521	93.1
	Excellent	3	1	0	1	75	80	93.8
Niangoloko	Very lean	5	0	0	0	1	6	16.7
	Lean	30	2	1	1	77	111	69.4
	Good	24	12	128	51	845	1060	79.7
	Very good	7	2	10	6	549	574	95.6
	Excellent	0	0	0	0	475	475	100
All markets	Very lean	24	0	0	0	52	76	68.4
	Lean	373	16	8	7	439	843	50.1
	Good	1276	40	177	121	4037	5651	71.4
	Very good	360	18	28	8	3297	3711	88.8
	Excellent	34	1	0	1	1026	1062	96.6
Total		2067	75	213	137	8851	11343*	78.0

*The difference between this figure and the total 11,419 recorded cattle transactions means that 76 cases were voided for incomplete data.

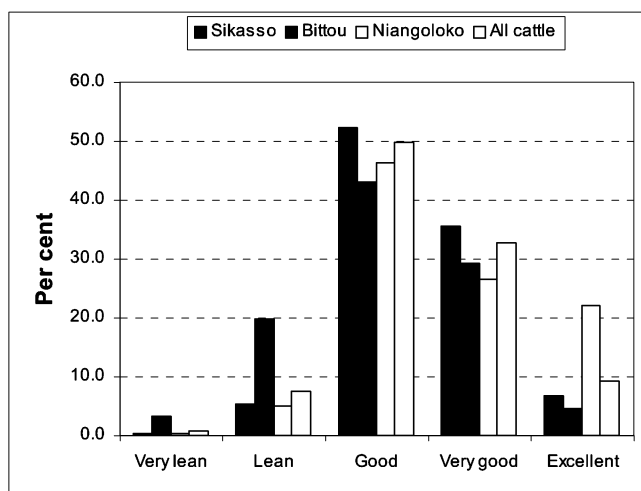


Figure 5.1: The distribution (%) of cattle traded in Sikasso, Bittou and Niangoloko frontier livestock markets by their body condition score.

Compared to Sikasso and Bittou, Niangoloko had the highest proportion (21%) of cattle rated to be in excellent body condition while Bittou had most of the cattle in the very lean to lean categories (Figure 5.1). It is interesting to note that overall, about 82 percent of the cattle were in good to very good conditioning suggesting that it may not require tremendous effort to get up to 90 percent or more of the cattle presented for sale to be in excellent body conditioning and possible attract a premium. Table 5.4 already shows well finished cattle held more attraction for export traders.

5.2 Seasonal variations in livestock flows

The peak (April–September) and off-peak (October–March) livestock trade periods estimated through the price formation models are further illustrated in Figure 5.2.

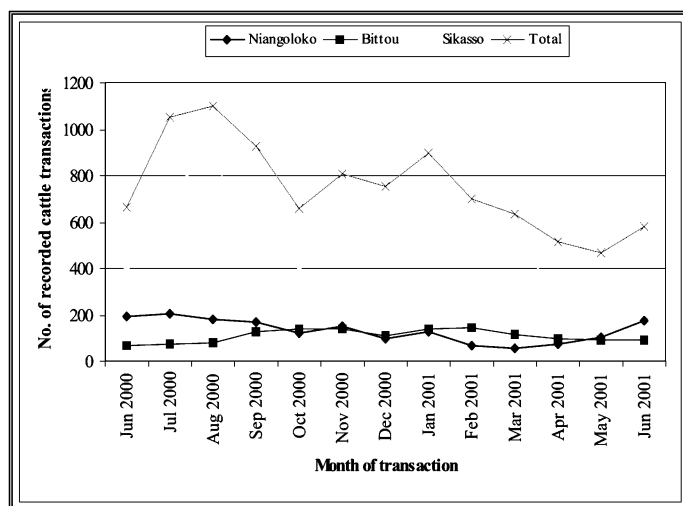


Figure 5.2: Cattle transactions recorded at Sikasso (Mali) and Niangoloko and Bittou (Burkina Faso) frontier markets, June 2000–June 2001.

Figure 5.2 shows a build up in recorded cattle transactions that reached its peak in August 2000. Flows were, however, at their lowest ebb in May 2001 for the overall case, even though another build up towards peak season was already evident for Niangoloko from March 2001.

Combining the results of the models with local knowledge and reducing the emphasis on calendar months, it can be said that the off-peak period usually coincides with the period when the availability of livestock feed from natural pastures is low and animals are not in good body condition to attract good market prices, while peak period coincides with the rainy and early harvest season when feed supply is relatively abundant. This means that shifts in peak/off-peak periods could occur as a result of changes in annual rainfall pattern. Overall, during the peak period encountered in this study, sales of animals were at least twice as high as in the off-peak period¹³.

5.3 Seasonal variation in livestock prices

As was the case for the volume of trade, livestock prices exhibited seasonal variation. Figures 5.3 and 5.4 show the variations in monthly prices per kg live weight of cattle and sheep and goats observed in the frontier markets during the survey.

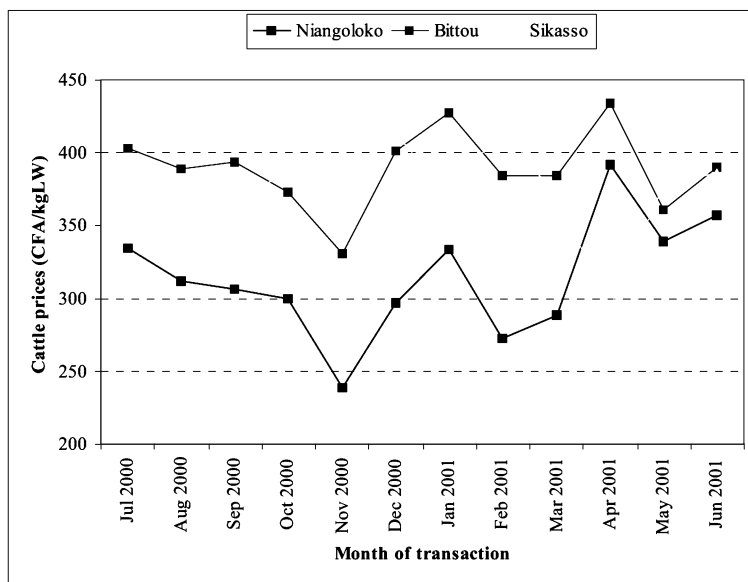


Figure 5.3: Seasonal variation in cattle prices in the Sikasso (Mali), Niangoloko and Bittou (Burkina Faso) frontier markets, July 2000–June 2001.

¹³ Having said that, it is important to note there are complex issues involved in the decision to hold on or to sell livestock irrespective of season. Some of these have been discussed by Jarvis (1980) showing how livestock owners may hold on to their livestock speculatively during years of normal rainfall (when animals are generally in very good condition) in the hope that better prices would prevail in future. Counter-intuitively, provided the severity of the dry spell is not such as to cause loss of animals, livestock owners may also decide to hold to their stock during drier years hoping that better grazing conditions would prevail, get their animals in better condition to fetch higher prices. Any of these two decisions, for example, will affect livestock supply and livestock prices.

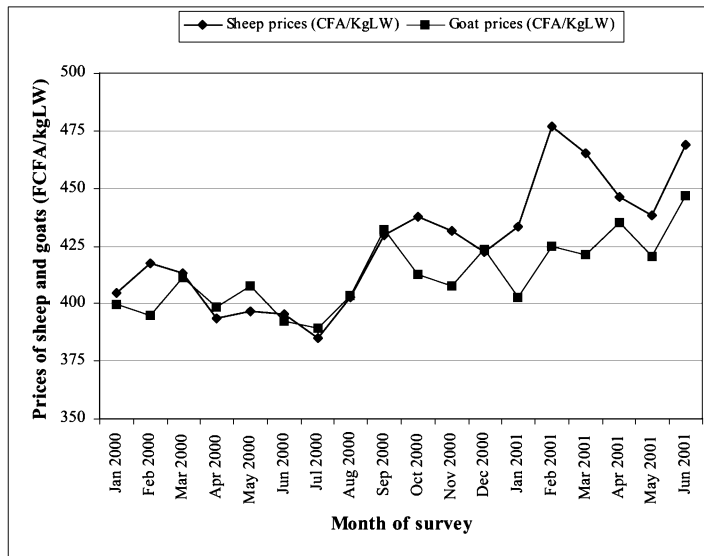


Figure 5.4: Seasonal variation in sheep and goats prices in the Bittou (Burkina Faso) frontier market, January 2000–June 2001.

During the months of November and December, high cattle prices were observed in the three markets. Cattle prices peaked during February 2001 in Sikasso and in April 2001 in Bittou and Niangoloko. Though the graphs show variation over the survey period, this trend should be interpreted with caution given the relatively short survey period, which covered only one calendar year for the observation of price movements.

Table 5.5 shows that, except for sheep, which responded more to *Tabaski* (Muslim festival—*Eid-el-Kabir*), prices were significantly higher during the peak sales period than in the off-peak period. Within the peak season and judging by the coefficient of variation (CV), prices were most volatile (42%) for cattle that were traded or passed through Sikasso and least for goat prices in the Bittou frontier livestock market. For the off-peak period, the coefficients of variation shows that prices of goats were more stable (CV = 23%) than sheep prices (CV = 41%) at the Bittou market.

The differences in CV shown in the last column of Table 5.5 could be interpreted in terms of intra-species price volatility when the peak and off-peak price variations are considered. The results indicate that small ruminant prices were more prone to exhibit fluctuations in prices compared with cattle prices. Considering cattle only, for the three frontier markets, prices were most volatile in Sikasso where the difference in the coefficient of variation was up to 5 percent compared to 2 percent in Bittou and 3 percent in Niangoloko. These price fluctuations are also related in part to the structures of the livestock marketing channels in the three case studies. The structure of the channels is shown later, in analysing market integration, to affect the price transmission mechanisms.

Overall, the results also show that during the peak sales period both the supply of livestock and animal prices were high while both were low in the off-peak period. This suggests that farmers are better off selling their animals during the rainy and early harvest seasons when feeds are readily available from rangelands and harvested crop fields and animals are in good body condition to fetch higher prices.

Table 5.5: Seasonal variations in price per kg live weight of cattle, sheep and goats at the Sikasso, Bittou and Niangoloko frontier markets during peak sales (April–September) and off-peak sales (October–March) periods, July 2000–June 2001.

Species livestock location	Peak sales period			Off-peak sales period			Absolute value of difference	
	Mean of(FCFA/ andkg live weight)	<i>n</i>	CV ¹⁴ (%)	Mean (FCFA/ kg live weight)	<i>n</i>	CV (%)	Mean (FCFA/ kg live weight)	CV (%)
CATTLE								
Bittou	415	311	22	379	543	21	36	1
Niangoloko	367	1072	16	321	878	24	45	8
Sikasso	379	647	42	377	367	26	2	16
Average	378	2030	28	350	1788	25	28	3
SHEEP								
Bittou	420	1629	16	436	1980	21	16	5
GOATS								
Bittou	415	1922	15	412	2036	14	3	1

All mean prices for peak and off-peak periods were statistically different at 0.001 level of significance.

Table 5.6: Seasonal variations in price spread per head (difference between price at frontier and collection markets) for cattle, sheep and goats traded or transiting through Bittou and Niangoloko frontier markets, July 2000–June 2001.

Location species livestock	Peak sales period			Off-peak sales period			Absolute value of difference		
	Mean	Std. Dev.	CV (%)	Mean	Std. Dev.	CV (%)	Mean	Std. Dev.	CV (%)
CATTLE									
Niangoloko	8401	3643	43	4953	2298	46	3448	1345	3
Bittou	7354	6156	84	5632	4078	72	1722	2078	11
SHEEP									
Bittou	611	286	47	745	519	70	134	233	23
GOATS									
Bittou	552	285	52	522	236	45	30	49	6

CV = coefficient of variation. All mean price spreads for peak and off-peak periods were statistically different at 0.001 level of significance except for goats ($p < 0.01$).

NB: Due to data limitations, the above calculations could not be done for the Sikasso frontier market.

Having seen how producers could be affected by seasonal variation in prices and volume of livestock trade, we also examined the case of how traders were affected by the same phenomenon. The seasonal variation in livestock prices equally affected livestock traders

¹⁴ CV = coefficient of variation calculated as the standard deviation of livestock prices divided by their mean prices and multiplied by 100. The higher the value of CV, the higher the volatility of prices.

as investigations revealed that they are likely to make higher profits in the peak period than in the off-peak period, judging by the price spread between points of purchase and the frontier markets in both periods: 8,401 and 4,953 FCFA in Niangoloko and 7,354 and 5,632 FCFA in Bittou for cattle (Table 5.6). Within the peak period, prices varied most for cattle in Bittou market (CV = 84%) and least for cattle in Niangoloko (CV = 43%). Between peak and off-peak periods, trading in sheep appeared to carry the highest risk with a difference in coefficient of variation of 23 percent compared to 3 percent for cattle in Niangoloko.

5.4 Inter-market variations in livestock prices (market integration)

As indicated in the methodology in chapter three and presented in details in Annex I, the Augmented Dickey-Fuller (ADF) test statistics were used to investigate co-movement of average weekly livestock prices between selected pairs of markets in the study area. Where prices moved together for a pair, the Granger causality tests were then used to ascertain which market determined the price in its corresponding pair. The technical details of the results are contained in Annex II.

Four markets were defined namely; i) the Niangoloko frontier livestock market, ii) primary (farm gates and collection) markets supplying Niangoloko frontier livestock market, iii) Bittou frontier livestock market, and iv) primary markets supplying Bittou frontier livestock market. The Sikasso frontier livestock market and its associated farm gates and collection markets were not part of this analysis because the number of weighed cattle in that case study was not sufficient for market integration analysis.

Table 5.7: Results of market co-integration test between Niangoloko frontier livestock market and its associated primary markets.

Variable	Coefficient	Std. Error	t-statistic	Probability
Constant	0.3535	1.9389	0.1823	0.8562
D(ser01)	0.9488	0.0657	14.4430	0.0000
Residual (-1)	-0.5967	0.1347	-4.4287	0.0001
R-squared	0.8430	Log likelihood		-190.96
R-squared adjusted	0.8360	Durbin-Watson statistic		1.9231
S.E. of regression	13.3545	F-statistic		120.80
Sum squared residual	8025.44	Prob (F-statistic)		0.0000

Using Table 5.7 as an example, the results show that the adjusted coefficient of determination (R-squared) is 0.836 for Niangoloko weekly price pairs, with the frontier market as the dependent market and the primary markets as explanatory variables. This, in essence, indicates that about 84 percent of the variations in average weekly prices of cattle at the Niangoloko frontier livestock market could be explained by the average weekly prices of cattle in its primary markets, during the same week. Also, the parameter of the error correction variable (Residual (-1)) is 0.5967 in absolute terms. This value lies between 0 and 1 (in absolute terms). It is usually interpreted in terms of the rate of adjustment of short run price to long run price as a result of demand and supply shocks in the system. At a value of about 60 percent, it indicates that the rate of adjustment of short run prices at the Niangoloko frontier market was on the fast side—being greater than 0.5 or 50 percent.

Table 5.8: Results of market co-integration test between collection markets/farm gates and Niangoloko frontier livestock market.

Variable	Coefficient	Std. Error	t-statistic	Prob.
Constant	0.0908	1.7841	0.0509	0.9597
D(ser02)	0.8424	0.0555	15.1770	0.0000
Residual (-1)	-0.6340	0.1523	-4.1612	0.0001
R-squared	0.8372	Log likelihood		-186.93
R-squared adjusted	0.8300	Durbin-Watson statistic		1.7496
S.E. of regression	12.2760	F-statistic		115.71
Sum squared residual	6781.58	Prob (F-statistic)		0.0000

A similar interpretation, as for Table 5.7 can be given to Table 5.8. The major difference in the latter case is that primary markets were examined for how their average weekly cattle prices were affected by average weekly cattle prices in the Niangoloko frontier market. The results are similar in that weekly cattle prices in the hinterland of the Niangoloko varied (83 percent of the time) due to ruling cattle prices in the Niangoloko frontier market during the same week. The rate of reaction of traders in the Niangoloko frontier livestock market to short run changes in cattle price in the hinterland prices was found to be slightly faster 63 percent (0.6340) compared to the reverse, i.e. the reaction of traders in the hinterland 60 percent (0.5967) when they learn of cattle prices in the frontier market.

Taken together, the results can be further interpreted to mean that there was instantaneous adjustment in price at Niangoloko frontier livestock market as well as the primary livestock markets in the Niangoloko area.

Similarly, the price in Bittou frontier livestock market responded instantaneously to change in the price in its related livestock collection markets and farm gates (see Annex II). However, in addition to instantaneous response to change the price in Bittou frontier livestock market by the surrounding collection markets, there was also delayed response. The weekly cattle price in primary markets around Bittou was also determined by cattle price in the previous week (one week's lag) in the Bittou frontier livestock market.

In effect, Niangoloko and Bittou frontier markets were integrated (at least in the short run) with their respective collection markets and farm gate sources given that there was instantaneous adjustment in the price of the reference market relative to the price in other markets. The instantaneous adjustment gives credence to the existence of short run integration among the cattle markets in Burkina Faso. Fafchamps and Gavian (1998) conducted a study on the spatial integration of livestock markets in Niger using monthly price data on 15 animal categories collected in 35 districts and 3 urban centres over a period of 21 years¹⁵. Their co-integration tests suggest that livestock markets are integrated along long-distance trade routes while districts removed from these routes are only loosely connected to the system. To the extent of examining short-run market integration, the above findings can be said to be in agreement with the findings of this study. For long run integration, Fafchamps and Gavian (1998) add that over extended periods of time, prices in any given district can drift apart from prices in most other districts.

¹⁵ Fafchamps and Gavian report that the data was of questionable quality and hoped that the sheer size of the data points (87 thousand) compensated somewhat for the deficient quality.

In order to test the causality between the market pairs, a pairwise Granger causality test was carried out. A one-way Granger causality is referred to as uni-directional Granger causality meaning that only one of the two markets under consideration determined the price for both markets. The 'price-determining' market is referred to as the exogenous market. However, there can be weak or strong exogeneity. There is weak exogeneity if demand and supply price shocks in both markets affect each other to about the same level. On the other hand, strong exogeneity exists when price causality is in one direction and there is no significant 'price-determining' effect from the other market pair (Hendry 1986).

Table 5.9: Pairwise Granger causality tests for price series for Bittou and Niangoloko frontier livestock markets and their primary markets.

Null hypothesis	F-statistic	Probability
Niangoloko FLM does not Granger cause Niangoloko hinterland	4.1435	0.0228
Niangoloko hinterland does not Granger cause Niangoloko FLM	5.0324	0.0110
Bittou FLM does not Granger cause Bittou hinterland	0.1599	0.8529
Bittou hinterland does not Granger cause Bittou FLM	0.5529	0.5804

* FLM refers to frontier livestock market.

In line with the above, the results of the Granger causality test are presented in Table 5.9. From the table, it is evident that there was no form of causality in the Bittou frontier market and the surrounding markets. In addition, there was no causality in prices between the Niangoloko and Bittou frontier livestock markets (see Annex II). However, since there was bi-directional relationship in the prices in Niangoloko axis then there was weak exogeneity between the markets.

In conclusion, the comparison of cattle prices over time in Bittou and Niangoloko markets and their respective supply markets shows that livestock prices tended to move in the same direction in the short run for pairs of frontier and supply markets. However, prices in the frontier markets did not respond to changes in farmers' supply (Bittou) or only weakly (Niangoloko). This suggests that prices were dictated by traders especially in the case of Bittou where all exports cattle were purchased at the frontier market unlike Niangoloko where export traders made 69 percent of their purchases from upstream collection markets and farm gates. Producers could remain price-takers if in the latter case export traders succeed in colluding. However, it is more likely that this higher level of upstream activity of export traders assisted price transmission and this explains the higher level of price response recorded in Niangoloko compared to Bittou.

The low levels of market integration and weak livestock price transmission point to the need to put in place effective livestock market information systems as a policy option for improving livestock pricing that would benefit livestock producers in the central corridor.

5.5 Buyer preferences for cattle

The price formation models described in Annex I share the following equation commonly:

$$\ln(\text{price/kg}) = \beta_0 + \beta_1 \text{AGE} + \beta_2 \text{AGE}^2 + \phi_1 \text{SEX} + \phi_2 \text{COND} + \phi_3 \text{BRD} + \phi_4 \text{COL} \\ + \phi_5 \text{POP} + \phi_6 \text{TOS} + \phi_7 \text{TOB} + \phi_8 \text{SOS} + \phi_9 \text{FM} + \varepsilon_i$$

where *AGE* = age of animal (in years), *SEX* = sex (castrate, female, male), *COND* = body condition rating (very lean, lean, good, very good, excellent), *BRD* = breed, *COL* = dominant colour, *POP* = purpose of purchase, *TOS* = type of seller, *TOB* = type of buyer, *SOS* = season of sale (cool dry, hot dry, rainy, harvest), *FM* = name of frontier market (Sikasso, Bittou, Niangoloko) and ε_i is the error term.

The total number of cattle in the models reduced from the 11,419 recorded transactions to the 3,738 weighed cattle that were among the recorded transactions. The distribution of weighed cattle in the model has been summarised in Table 5.13 to provide further insight for the interpretation of the results.

Table 5.10 shows that 52 percent of the (weighed) cattle in the model passed through the Niangoloko frontier livestock market, 22.4 percent through Bittou and the balance (25.7%) through Sikasso. Most of the cattle in the model were traded during the cool dry and hot dry seasons between January and June with 74.4 percent of the buyers being traders and breeders (smallholder pastoralist producers) constituting the most important source except in the cases of Bittou and Niangoloko where trader-to-trader transactions dominated. The most important purpose of purchase was export except for Sikasso where as much as 74.6 percent of the cattle were destined for local slaughtering. In all the models (aggregated and separate), the number of animals with body condition rated as good dominated other classes. The highest proportion (21.8%) of cattle in excellent body conditioning was found in the Niangoloko frontier livestock market. More male cattle were traded, followed by females and a small proportion (ranging from 3% in Bittou to 29% in Sikasso) of castrates.

Table 5.11 summarises the results of the price formation models for cattle for aggregated and separate-market cases. The models had R-squared values ranging from 0.208 for the Bittou market to 0.508 for Niangoloko market. The resulting coefficients had the expected signs and the F-statistics were highly significant for all the models. The combination of the above measures suggests goodness of fit of the models particularly for Niangoloko market where about 51 percent in the variability of price per kg live weight of cattle were explained by variables in the model.

The model results show that for biological characteristics, buyers paid a premium for heavily built, castrated zebu cattle in excellent body condition. This confirms the earlier inferences drawn from simple statistical summaries. As can be seen from Table 5.4, smallholder producers are not yet making the most of the fact that excellent finishing of cattle attracted a premium, as only about 14 percent of the cattle traded were rated as being in excellent body condition¹⁶.

¹⁶ This average of 14 percent in excellent body condition (for weighed cattle) differs from the even lower 9 percent shown in Figure 5.1 (for all the traded cattle).

Table 5.10: Distribution (%) of weighed cattle in the price formation model for all frontier markets (aggregated) and individually for Niangoloko, Bittou and Sikasso frontier livestock markets, January 2001 to June 2002.

	ALL <i>n</i> = 3738	NIANGOLOKO <i>n</i> = 1940	BITTOU <i>n</i> = 839	SIKASSO <i>n</i> = 959
<i>FRONTIER MARKET</i>				
Niangoloko	51.9	-	-	-
Bittou	22.4	-	-	-
Sikasso	25.7	-	-	-
<i>SEASON</i>				
Cool dry	30.9	24.0	44.7	32.8
Hot dry	32.9	35.3	23.6	36.0
Rainy	20.9	19.6	12.0	31.3
Harvest	15.4	21.1	19.7	0.0
<i>TYPE OF BUYER</i>				
Trader	74.4	91.5	91.7	24.7
Breeder	1.2	0.9	2.7	0.5
Butcher	20.7	2.4	1.9	74.1
Others	0.7	1.0	0.0	0.5
Farmer	3.0	4.2	3.7	0.2
<i>TYPE OF SELLER</i>				
Trader	38.7	3.7	61.3	89.8
Breeder	55.6	91.4	29.7	5.8
Others	0.4	0.3	0	1.0
Farmer	5.3	4.6	9.1	3.4
<i>PURPOSE OF PURCHASE</i>				
Slaughtering	21.0	2.9	1.7	74.6
Fattening	1.2	0.7	3.5	0.0
Gift	0.0	0	0.0	0.00
Traction	2.8	3.9	3.3	0.2
Breeding	1.4	2.0	1.1	0.5
Reselling	25.9	32.0	41.0	0.5
Export	47.7	58.6	49.5	24.2
<i>BREED</i>				
Dgog	18.5	33.9	3.9	
Mery	5.1	9.8	0	
Meti	40.9	56.4	0	45.3
N'dama	0.7	0	0	2.8
Zebu	34.8	0	96.1	52.0
<i>CONDITION SCORE</i>				
Very lean	1.0	0.2	3.0	1.0
Lean	11.6	5.4	18.0	18.8
Good	46.8	47.0	41.7	50.8
Very good	26.6	25.7	32.2	23.7
Excellent	13.9	21.8	5.1	5.7
<i>SEX</i>				
Female	39.8	36.8	30.3	54.3
Male	44.7	48.9	66.9	16.8
Castrate	15.5	14.3	2.9	29.0

Table 5.11: Estimated coefficients and t-ratios of multiple- and single-market analysis of covariance (AnCov) models used to estimate \ln (price/kg) of cattle at Niangoloko, Bittou and Sikasso livestock markets, January 2000–June 2001.

Parameter	ALL <i>n</i> = 3738		NIANGOLOKO <i>n</i> = 1940		BITTOU <i>n</i> = 839		SIKASSO <i>n</i> = 959	
	B	t	B	t	B	t	B	t
Intercept	618.70***	90.69	609.30***	89.67	589.50***	38.81	575.70***	33.20
Age	1.27**	2.29	1.32**	2.09	4.12***	3.20	3.07**	2.22
Age-squared	-0.16***	-4.22	-1.46***	-3.44	-0.39***	-3.97	-2.53***	-2.83
Biological characteristics								
<i>SEX</i>								
Female	-6.02***	-5.54	-10.50***	-7.79	-3.96	-0.85	-2.78	-1.42
Male	-0.81	-0.76	-1.739	-1.41	-2.65	-0.61	4.33**	1.86
Castrate	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a
<i>CONDITION SCORE</i>								
Very lean	-39.80***	-12.11	-13.70*	-1.76	-22.90***	-4.22	-80.90***	-10.26
Lean	-28.00***	-18.54	-24.10***	-12.19	-17.50***	-4.56	-40.00***	-10.06
Good	-17.20***	-14.37	-16.00***	-12.86	-10.20***	-2.95	-22.80***	-6.27
Very good	-8.02***	-7.21	-7.84***	-7.10	-3.46	-1.02	-7.05**	-2.07
Excellent	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a
<i>BREED</i>								
Dgog	2.59	1.62	-19.00***	7.79	-	-	-	-
Mery	-7.24***	-3.66	-27.446	-1.27	-	-	-	-
Meti	-4.65***	-3.68	-25.90***	-2.99	-19.10***	-3.72	-2.08	-1.35
Ndama	-4.18	-1.11	-	-	-	-	-2.57	-0.58
Zebu	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a
Marketing factors								
<i>PURPOSE OF PURCHASE</i>								
Slaughtering	-10.20	-1.59	-16.10**	-2.43	-10.10	-0.59	-	-
Fattening	-3.45	-0.83	-4.104	-0.83	-1.01	-0.14	-	-
Traction	-11.9*	-1.89	-17.8***	-2.98	2.83	0.20	-	-
Breeding	7.47*	1.82	9.43**	2.37	-1.76	-0.20	-	-
Reselling	4.53	0.53	3.07***	3.36	0.96	0.53	-32.80***	-3.21
Export	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a
<i>TYPE OF SELLER</i>								
Trader	5.94	0.37	-4.72*	-1.70	-0.60	-0.22	1.92	0.44
Breeder	0.59	0.39	136.300	0.76	-4.11	-1.48	5.85	1.18
Others	3.85	0.77	19.80***	3.08	-	-	-3.69	-0.44
Farmer	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a
<i>TYPE OF BUYER</i>								
Trader	-11.20*	-1.83	-24.10***	-3.96	4.64	0.33	28.70*	1.79
Breeder	0.92	0.16	-19.6***	-3.06	14.70	1.15	92.90***	4.95
Butcher	-0.82	-1.42	-20.8***	-3.64	16.30	0.87	27.00*	1.70
Others	-5.88	-1.04	-17.40***	-3.32	-	-	29.40	1.58
Farmer	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a
<i>SEASON</i>								
Cool dry	3.094***	2.92	-2.15**	-1.97	4.75**	2.14	0.76	0.40
Hot dry	11.10***	10.88	12.90***	13.19	11.30**	4.81	-2.24	-1.20
Rainy	10.20***	9.40	12.30***	11.17	9.01***	3.48	(0)a	(0)a
Harvest	(0)a	(0)a	(0)a	(0)a	(0)a	(0)a	-	-
<i>FRONTIER MARKET</i>								
Niangoloko	-16.50***	-9.64	-	-	-	-	-	-
Bittou	-6.505**	-2.01	-	-	-	-	-	-
Sikasso	(0)a	(0)a	-	-	-	-	-	-
R-squared	0.364		0.508		0.208		0.357	
F-Statistic	46.439***		65.938***		9.708***		42.456***	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ & n/a—variable not included in the model.

A large proportion (about 73.4%) of these cattle were only in good to very good condition, even though additional efforts to finish animals properly before marketing will be well compensated (Diarra 1998). Diarra (1998) studied past and present trends in fattening programmes in Mali and analysed net financial and economic performance of cattle and sheep fattening in 1996. The results show that financial returns per animal were consistently positive that year, with benefit–cost ratios averaging 1.85 for large scale fattening enterprises, and 4.08 and 4.52 for small-scale cattle and sheep operations. All the surveyed enterprises were profitable suggesting that a major contribution came from fortuitous price movements rather than actual weight gains. Even if that were to be the case, it is known that targeting fattening schemes to take advantage of seasonal price variation is one of the core strategies for making fattening a profitable scheme.

Female cattle attracted the least price compared to males and castrates in the aggregated model and in Niangoloko with no significant difference by sex in Bittou and Sikasso. In Sikasso, compared to castrates, male attracted significantly higher price per kg bodyweight. One reason for the lower price offered for female cattle may be that they are usually sold by pastoralists only at the end of their productive live, which makes them older than the bulls and castrates offered for sale. The coefficients for *age* and *age*² had positive and negative signs, respectively, meaning that after a certain age, the price offered for cattle declined. The age at which the price of cattle started to decline was econometrically determined as 8.8 years for Sikasso, 8.2 years for Niangoloko, and 8 years for Bittou. The practical implication of the above is that farmers should endeavour to sell their cattle before they reach 8 or 9 years for Sikasso and Niangoloko respectively. No reason was adduced for the preference for younger cattle in Niangoloko compared to the other markets studied, especially since Niangoloko and Sikasso essentially supplied the same Ivorien markets.

Among the market factors, the purpose of purchase, type of seller, type of buyer, season of sale and the related frontier market, each played a significant role in determining cattle prices. Compared to prices offered for export cattle, those purchased for gifts, fattening and slaughter attracted lower prices in that descending order. This was clearly so in Niangoloko compared to other markets. The offer of premium for export quality cattle is expected. So also the fact the animals purchased for fattening attracted lower prices given that they are mostly growing, lean animals. Livestock producers will, therefore, benefit more if they target their finished animals at the export market just as traders/producers interested in fattening for resale should source their stock from the cheaper, lean to very lean animals. In general, substantial differences did not occur as a result of type of seller.

The model also enabled the comparison of prices offered per kg for cattle at the different frontier livestock markets. Cattle were cheapest in Niangoloko followed by Bittou, and most expensive, on weight basis in Sikasso. No single reason will suffice to explain the differences in prices as they are related to the structure of the marketing channel, number of participants, level of market integration (efficiency) and a host of other possible reasons. However, it is seen later that of the markets studied, Niangoloko and its collection markets and farm gates were the most price-integrated and the most responsive to demand and supply shocks. Since the level of market integration is a measure of efficiency and well functioning of markets, the lower price per kg that prevailed in Niangoloko during the period of the study may suggest that it functioned at a higher level of efficiency than Sikasso and Bittou. This may imply that it will be rewarding to encourage the development of other marketing channels in the study area along the lines of the prevailing market structure in Niangoloko.

In the regression models, the cool dry season corresponds to January–March; hot dry season (April–June); rainy season (July–September) and the harvest season (October–December). The results show that compared to the harvest season, the highest prices were obtained during the hot dry and the rainy season except in Sikasso where there was no clear pattern. Small- and large-scale farmers involved in fattening schemes could take advantage of the higher prices that prevail during these two seasons to target finishing their animals when prices are highest. Thus, they are able to gain not only from the higher prices but also the premium that has been shown to be offered by export traders for cattle in excellent body condition.

In sum, the regression models showed that producers would be better off if they produced castrated zebu cattle in excellent body condition and sold them directly to export traders during the peak price period of April and September. However, the part of this conclusion concerning timing of sale should be treated with caution given that the surveys that provided data for the classification only covered one peak season and one off-peak season.

5.5.1 Premium on well finished cattle

The results of the price formation models in terms of premium being paid by export traders for cattle in excellent body condition elicited further statistical analyses to determine price paid per kg live weight for the five different grades of cattle presented for sale at the frontier market.

The result for 3,811 weighed cattle shows that, overall, price per kg live weight of cattle varied from 288.7 FCFA to 412.3 FCFA with the highest disparity in price due to quality of finishing occurring in the Sikasso case study where very lean cattle only attracted 199.7 FCFA compared to 472.1 that traders paid for cattle in excellent body condition (Table 5.12). Similar trends were found for Bittou and Niangoloko frontier livestock markets and reinforce the existence or emergence of a premium for well finished animals.

Table 5.12: Average prices (FCFA/kg live weight) paid by cattle traders for the five grades of cattle presented for sale at the three frontier markets studied.

		Body condition score					All cattle
		Very lean	Lean	Good	Very good	Excellent	
Niangoloko	Price/kg liveweight (std. error)	271.1 (30.4)	266.2 (7.5)	323.2 (2.0)	358.7 (3.1)	402.1 (2.8)	346.4 (1.6)
	No of cattle in category	4	104	912	499	427	1946
Bittou	Price/kg liveweight (std. error)	327.1 (20.0)	356.4 (7.7)	386.6 (4.5)	419.3 (4.2)	427.9 (10.2)	392.1 (2.9)
	No of cattle in category	25	151	359	275	43	853
Sikasso	Price/kg liveweight (std. error)	199.7 (10.5)	304.3 (5.0)	367.8 (7.3)	436.2 (5.7)	472.1 (11.8)	378.4 (4.4)
	No of cattle in category	10	182	505	248	67	1012
All cattle	Price/kg liveweight (std. error)	288.7 (16.0)	313.2 (4.2)	348.7 (2.6)	393.8 (2.3)	412.9 (3.0)	365.2 (1.6)
	No of cattle in category	39	437	1776	1022	537	3811

The consistency of this trend for the studied markets is conveyed by Figure 5.5, which also shows that traders have a good idea of what they pay for in terms of weight and meatiness with or without weighing the cattle. It could be speculated that this ability to assess the value of their purchase visually and fairly accurately ('eye-balling') is one of the reasons why the absence of weighing scale, for example in Sikasso frontier livestock market, was not seen by traders as a pressing constraint to trade.

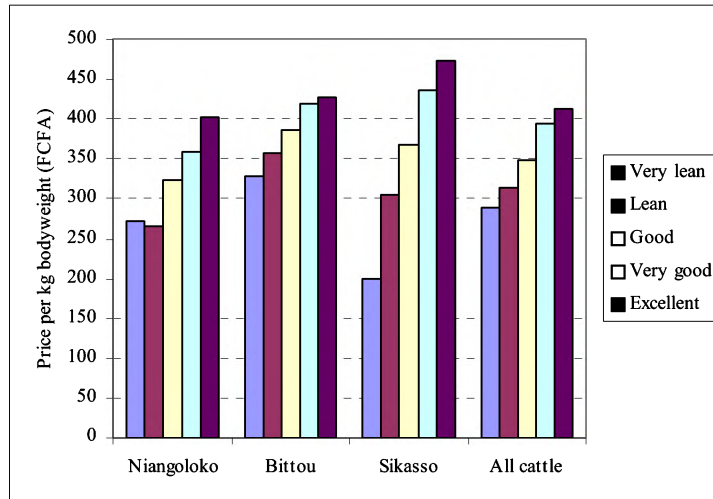


Figure 5.5: Average prices (FCFA/kg live weight) paid by cattle traders for the five grades of cattle presented for sale at the three frontier markets studied.

5.6 Buyer preferences for sheep and goats

The models estimated for sheep and goats revealed trends similar to those discussed above. Table 5.13 summarises the distribution of weighed sheep and goats by the variables included in the model. From Table 5.13, about 54 percent of the sheep and goats were females and the pattern of distribution of their body conditioning was found to be similar to that found in cattle—nearly a normal curve—with lean and excellent sheep and goats found in smaller numbers at both extremes. The least number of sheep and goats were traded during the rainy and harvest seasons compared to the cool dry and hot dry season already identified from the cattle models as representing the period for peak supplies and peak prices per kg live weight of animal.

Goats attracted higher prices than sheep except during *Tabaski* when prices offered for sheep were considerably higher¹⁷. Premium was also paid for good finishing as shown by the coefficients of the conditions' score (Table 5.14). There was no significant difference in price between castrates and males although higher prices were paid for castrates compared to female sheep and goats. Prices tended to decline for sheep and goats more than three years old.

¹⁷ Separate models were run for sheep and goats (not included in report because of space) and those models showed that sheep attracted higher prices during *Tabaski* as would be expected.

Table 5.13: Distribution (%) of weighed sheep and goats in the price formation model for Bittou frontier livestock market, January 2001 to June 2002.

Parameter	% of weighed sheep and goats
<i>SEX OF ANIMAL</i>	
Female	54.23
Male	41.22
Castrate	4.55
<i>CONDITIONS SCORE</i>	
Lean	10.45
Good	54.83
Very good	25.54
Excellent	9.18
<i>PERIOD (FESTIVAL)</i>	
Non-Tabaski	97.41
Tabaski	2.59
<i>SPECIES</i>	
Sheep	47.33
Goat	52.67
<i>SEASON</i>	
Cool dry	35.67
Hot dry	45.01
Rainy	8.94
Harvest	10.38

Table 5.14: Estimated coefficients and t-ratios of multiple- and single-market analysis of covariance (AnCov) models used to estimate \ln (price/kg) of sheep and goats at Bittou livestock market, January 2000–June 2001.

Parameter	B	t	Sig.
Intercept	628.5	197.2460	0.0000
AGE	8.5020	7.0740	0.0000
AGE_2	-1.4000	-5.3730	0.0000
<i>SEX OF ANIMAL</i>			
Female	-3.1320	-2.0950	0.0360
Male	-0.5607	-0.3650	0.7150
Castrate	0(a)	.	.
<i>CONDITIONS SCORE</i>			
Lean	-15.6000	-9.8720	0.0000
Good	-13.4000	-11.2460	0.0000
Very good	-8.3680	-7.1080	0.0000
Excellent	0(a)	.	.
<i>PERIOD (FESTIVAL)</i>			
Non-Tabaski	-18.5000	-9.4030	0.0000
Tabaski	0(a)	.	.
<i>SPECIES</i>			
Sheep	-2.1370	-3.4780	0.0010
Goat	0(a)	.	.
<i>SEASON</i>			
Cool dry	-8.5690	-8.0640	0.0000
Hot dry	-7.2700	-7.0050	0.0000
Rainy	-4.7940	-3.5040	0.0000
Harvest	0(a)	.	.

5.7 Summary

This chapter identified the determinants of livestock prices and the nature and extent of variation in these prices, which have impacts on the livelihoods of the livestock producers, livestock traders and on intra-regional trade in livestock. The extents of price variation and volatility in time and space were assessed using means, coefficients of variation and more rigorously through testing for market integration and the level of price responses to demand and supply shock in the marketing channels. Finally, price formation was analysed using hedonic price models.

Two distinct periods of livestock sales were identified: i) October to March as off-peak sales period, and ii) April to September as peak sales period. More animals were available for sale and prices offered for them were higher during the peak sales period than in the off-peak period. Price variability was highest especially during the off-peak sales season for all types of livestock with small ruminant prices being the most volatile.

Traders were equally affected by the seasonal variation in livestock flows and prices as our investigations revealed that they made significantly higher profit in the peak sales period than in the off-peak sales period, judging by the price spread between points of purchase and the frontier markets for both periods. This is an important confluence of interests in that both livestock producers and livestock traders benefited by doing business during the peak sales period.

On market integration, the comparison of cattle prices over time in Bittou and Niangoloko markets and their respective supply markets shows that livestock prices tended to move in the same direction in the short run for pairs of frontier and supply markets. However, prices in the frontier markets did not respond to changes in farmers' supply (Bittou) or only weakly (Niangoloko). This suggests that prices were dictated by traders especially in the case of Bittou compared to Niangoloko where export traders made 69 percent of their purchases from upstream collection markets and farm gates. Producers could remain price-takers if in the latter case export traders succeed in colluding. However, it is more likely that this higher level of upstream activity of export traders assisted price transmission and this explains the higher level of price response recorded in Niangoloko compared to Bittou. The results suggest the existence of price inefficiency due to weak price transmission in the study areas and point to the need to put in place effective livestock market information systems as a policy option for improving livestock pricing in the central corridor.

Results from price formation models show that buyers paid a premium for heavily built, castrated zebu cattle in excellent body condition. However, smallholder producers are not yet making the most of the fact that excellent finishing of cattle attracted a premium as only about 9 percent of the cattle traded (14% of the weighed cattle) were rated as being in excellent body condition. About 85 percent of the traded cattle (74% of the weighed cattle) were only in good to very good condition and based on the price differentials, efforts to finish animals properly before marketing will be well compensated.

CHAPTER SIX

COSTS AND BENEFITS OF DOMESTIC AND CROSS-BORDER LIVESTOCK TRADE

This chapter examines the costs and benefits that accrue to livestock producers and traders engaged in domestic marketing and cross-border trading activities. It determines what needs to be done to minimise costs and facilitate trade.

6.1 Partial trading budgets

The estimates of costs and benefits were derived using partial trading budgets developed for the domestic and cross-border trading activities. During the first quarter of 2001, detailed data were collected from traders on prices of animals at points of origin, modes of transportation, handling charges and other costs at points of purchase, transactions costs at frontier markets, prices of animals at the frontier markets, official and illicit taxes along the trading routes and prices of animals at the terminal markets. These data enabled the estimation of domestic and export traders' margins in the three study sites.

6.1.1 Transportation and handling costs

There were two main modes of transportation used by livestock producers and traders, namely, trekking and trucking. Farmers trekked their animals from the farm gate to the point of sale. For animals purchased at collection markets, trekking was the dominant means of transportation to frontier markets. Usually, animals in groups ranging from 10–100 were driven on the hoof by herders accompanied by traders' agents. Both herders and agents were paid fees per head of animal or per day. Where cost per head was available it was used in our calculations, otherwise the total cost of transportation was divided by the number of animals per trip. To obtain cost of trucking per head of animal, the total cost of trucking was divided by the number of animals transported, usually 32–35 in the case of cattle depending on the size of the animals. Loading and off-loading were included as handling charges. Since the dominant mode of transportation from the farm gate to the frontier market was trekking, it was used in calculating transportation costs from Niéna to Sikasso, Tenkodogo to Bittou and Djefoula to Niangoloko in order to maintain the same standard in all cases¹⁸.

6.1.2 Transactions costs

In contrast to physical marketing costs (e.g. cost of transportation, cost of capital invested in trading, traders' cost of living during trips etc.), transactions costs include fees paid to intermediaries, agents and market associations for entry and exit of animals into frontier markets. Outside the markets, transactions costs include administrative charges as well as official and illicit taxes. At the domestic level, due to the absence of customs posts, transactions costs were incurred only at the points of purchase and resale, while for the cross-border segment there were, in addition, the official and illegal charges paid along

¹⁸ The choice of Niéna, Tenkodogo and Djefoula for developing the trading budget for the domestic segment was based on the fact they contributed more animals than other collection markets to traded cattle arriving at the frontier market to which each site was linked. The exception to this rule was Djefoula which although contributed only 15% compared to 20% for Mitieridougou of total cattle traded at Niangoloko, it was chosen because Mitieridougou was considered to be so close to the Niangoloko frontier livestock market that it would not have offered a reasonable basis for comparing transportation costs with other itineraries.

the trade routes. All the above-mentioned costs were itemised in the partial budgets to show their relative contributions to total marketing cost.

6.2 Costs and benefits of livestock trade: The domestic segment

During the first round of traders' surveys, the traders classified themselves not only in terms of the volume of trade they handled, i.e. small, medium or big but also as domestic and export traders. This later classification served as the basis for the separate analysis of the domestic and cross-border segments. This serves to distinguish the present study from previous studies that investigated a single itinerary—mainly of export traders—from collection markets to terminal markets. That approach offered little or no information on the trading margins of domestic livestock traders—usually the small- and medium-scale traders—compared, for example, to those of export livestock traders.

Table 6.1 summarises cattle trading budgets in the domestic market segments. It showed that, on average, an animal purchased at Niéna by a domestic trader at the cost of 111,150 FCFA was resold for 124,440 FCFA at the Sikasso frontier market to export traders who finally obtained 161,611 FCFA for the animal at the terminal market in Port Bouet, Abidjan, Côte d'Ivoire. The livestock producer received about 69 percent of the final market price in the Niéna-Sikasso-Port Bouet corridor, 70 percent in the Tenkodogo-Bittou-Accra corridor and 65 percent in the Djefoula-Niangoloko-Port Bouet corridor. The proportional share of the final price received by the producers in all the three study sites compared well with those of earlier studies. Based on records of the Meat Marketing Board of Ghana, Sullivan (1979) calculated that livestock producers received about 67 percent of the final price of cattle imported into Ghana from the Sahel. Josserand (1979) also reported that the farmer's share of the final market final was 69 percent for mature Zebu steers and 66 percent for mature Zebu cows marketed in Togo (Table 6.2).

Table 6.1: Costs and returns to domestic marketing of cattle: Partial budgets based on trade originating from Niéna to Sikasso (Mali), Tenkodogo to Bittou (Burkina Faso), and Djefoula to Niangoloko (Burkina Faso), January–March 2001.

COST ITEM	DESCRIPTION	SIKASSO <i>n</i> = 1442		BITTOU <i>n</i> = 346		NIANGOLOKO <i>n</i> = 334	
		Niéna to Sikasso (FCFA /head)	% of terminal market price	Tenkodogo to Bittou (FCFA /head)	% of terminal market price	Djefoula to Niangoloko (FCFA /head)	% of terminal market price
1	Price of cattle at origin	111150	68.8	95500	69.6	80400	64.5
2	Transportation & handling	1000	0.6	500	0.4	1750	1.4
3	Transaction costs at origin	800	0.5	900	0.7	1450	1.2
3a	Purchase tax/entry fees	150		150		500	
3b	Intermediary fees	500		500		500	
3c	Market association fees	150		150		0	
3d	Communal tax	0		0		300	
3e	Market herders' fees	0		50		0	
3f	Exit fees	0		50		150	
4	Transaction costs at frontier market	850	0.5	700	0.5	350	0.3
4a	Entry fees	150		100		150	
4b	Market herders' fees	200		0		200	
4c	Agent fees	500		500		0	
4d	Communal tax	0		100		0	
5	Trader's cost of living	500	0.3	500	0.4	500	0.4
6	Cost of capital	1250	0.8	835	0.6	1250	1.0
7	Marketing margin	8890	5.5	3765	2.7	4500	3.6
8	Price of cattle at frontier market	124440	77.0	102700	74.9	90200	72.3
9	Price of cattle at the terminal market	161611	100.0	137163	100.0	124709	100.0

NB: Items 2, 3, 4 and 5 were based on the median values of the related costs obtained from the traders' surveys.

Table 6.2: Comparison of cattle marketing costs and benefits summarised by major cost from previous studies.

COST ITEM	Sullivan (1979)		Josserand (1979)*		Josserand (1979)**	
	Cedis	% of final price	FCFA	% of final price	FCFA	% of final price
Price of cattle at origin	360	66.5	43000	69.3	35000	66.0
Transport and handling	36	6.6	4378	7.0	4378	8.3
Transaction costs at origin	20.5	3.8	9890	16.0	9890	18.7
Marketing margin	124.95	23.1	4732	7.6	3732	7.0
Price of cattle at terminal market	541.45	100	62000	100	53000	100

* Average values for mature Zebu steers purchased at Fada N’Gourma and sold on the Lome (Togo) livestock market.

** Average values for mature Zebu cows purchased at Fada N’Gourma and sold at the Lome livestock market.

The marketing margins for domestic livestock traders ranged from 2.7 percent of the final price of the animal for the Tenkodogo-Bittou-Accra case to 5.5 percent for Niéna-Sikasso-Port Bouet case (Table 6.1). This range of profit is not considered excessive for the services rendered by the traders but earlier studies showed different results. While Sullivan (1979) estimated that the share of the livestock trader of the final price of cattle marketed in Ghana was 23.1 percent, Josserand (1979) found the proportion to be 7 to 7.5 percent of the final price of mature Zebu cows and steers marketed in Togo. These comparisons are only indicative because, as discussed earlier, the previous studies did not separate livestock trade into domestic and cross-border segments.

Nevertheless, from the findings of this study that showed marketing margins to range from 2.7 to 5.5 percent, it can be deduced that domestic markets function reasonably well because traders did not earn excessive margins.

6.3 Costs and benefits of livestock trade: The cross-border component

The cross-border component of the livestock marketing channel was taken to start from the time the purchase of animals took place at the frontier markets to the time of resale at the terminal markets. For the analysis of cross-border trade, costs and benefits were broken down into eight sub-sections (see Tables 6.3 to 6.5) namely: i) price of cattle at frontier market; ii) incidental costs at purchase, iii) official duties, fees and taxes; iv) transportation and handling; v) illicit taxes at checkpoints; vi) opportunity cost of capital, vii) revenue from sales and viii) net revenue. The price of cattle at the frontier market was a single cost item while incidental costs at purchase included purchase commission, fees paid to drovers at frontier market, and market commission for cattle exit (*droit de sortie*). Examples of official costs, administrative charges and taxes on cross-border livestock trade included *Certificat de vaccination*, *certificat sanitaire d’exportation*, *certificat provisoire de’exportation de Bétail*, *lettre de voiture Inter-Etats*, customs fees, *laisser-passer veterinaire*, *frais de convoyage*, *contribution au sector d’elevage* Burkina Faso etc. (see Box 6.1).

Box 6.1: A verified traders' account of formalities involved in cross-border cattle trade between Sikasso, Mali and Port Bouet, Abidjan, Côte d'Ivoire

Trading license

No longer required

Other personal documents

- **Carte Consulaire:** Obtainable from the Malian embassy in CI @ 10 thousand FCFA. Valid for 3 years.
- **Carte de Séjour:** Obtainable from the Ivorian police @ 17,500 FCFA. Valid for 1 year.
- **Carte de vaccination**

Border formalities in Mali

- **Certificat provisoire d'exportation de bétail.** This is obtained from the office of SLACAER (Service Local de l'Appui Conseil de l'Aménagement et de l'Équipement Rural) in Sikasso at a cost of 500–1,500 FCFA and is required at the customs post. To obtain this, the following two certificates costing 1,000 FCFA are required:
 - **Certificat de vaccination** to certify that the animals have been vaccinated
 - **Certificat sanitaire d'exportation.** This is handed out by agents of SLACAER to certify that visual inspection of animals by the veterinary service has been done.
- **Lettre de Voiture Inter-Etats** (Inter-States Waybill). Obtained at DNT (Direction Nationale des Transports) in Sikasso at the cost of 2,500 FCFA.
- **EMACI.** Certain traders mentioned this formality for which they pay 1,500 FCFA at Zegoua—a control post in Mali but none was able to specify what it was for.
- **Douane.** Although official duties have been abolished in Mali, traders systematically pay 5,000 FCFA per truck at 'douane' stops in both Sikasso and Zegoua.

Border Formalities in Côte d'Ivoire

Douanes. Official Ivorian customs duties are paid in Pogo (with receipt) and depend on the number of animals in a truck but range from 27,500–35,000 FCFA per truck.

Convoyage. This fee has more than doubled from 35 thousand FCFA in 2000 to 80 thousand FCFA in January 2001. Sikasso traders pay this fee in Pogo.

Laisser Passer Veterinaire. 250 FCFA/cattle or 15 thousand FCFA/truck of cattle paid to Ministère de l'Agriculture et des Ressources Animales, Direction Regionales du Nord, Poste d'entrée de Nielle.

Transportation and handling costs included charges for truck rental, drivers that accompanied trucks, loading and unloading costs, travel costs, living expenses of livestock trader, gifts to intermediaries etc. The number of checkpoints at which traders gave account of being stopped *en route* to terminal markets, the types of officials involved and the amount paid at each stop are detailed in the sub-section on illicit taxes (see Figure 6.1). For example, in Ferkessedougou and Bouake both in Côte d'Ivoire on the Sikasso and Niangoloko–Abidjan route, there were as many as three agents at each stop, i.e. police, customs and *gendarmerie*; and similarly in Zegoua in Mali on the Sikasso–Abidjan route payments were made to customs, *gendarmerie* and veterinary officials. The total of these non-receipted payments averaged 12 thousand on the Bittou to Accra route compared to 71 thousand FCFA on the Sikasso to Abidjan itineraries accounting for an average of 1.7 and 10.5 percent, respectively, of cross-border marketing costs of cattle using the two routes. On the Niangoloko–Abidjan route, illicit taxes amounted to an average of 55 thousand FCFA or 6.8 percent of cattle marketing costs. Other costs and benefits shown in the trading budgets in Tables 6.3 to 6.5 are self-explanatory single line items.

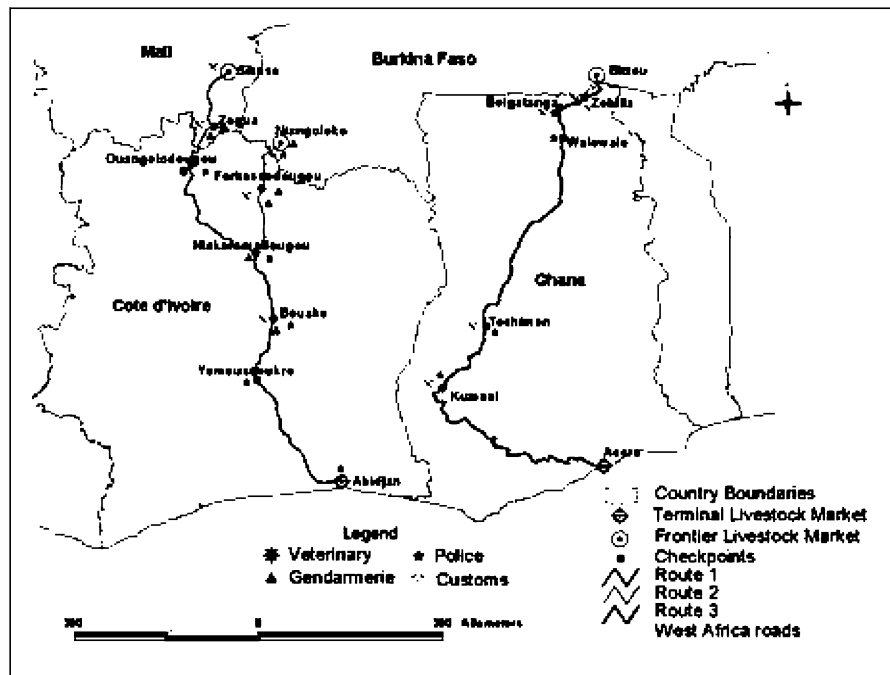


Figure 6.1: Checkpoints and types of officials manning them along the Sikasso to Abidjan, Niangoloko to Abidjan, and Bittou to Accra livestock trade itineraries.

Table 6.3 summarises the budget, derived from the traders' surveys, for a trading operation involving 35 cattle purchased in Sikasso (Mali) and transported by truck and sold in Abidjan (Côte d'Ivoire). At an average cost of 124,440 FCFA/head the purchase of cattle was the single largest cost item representing about 77 percent of the final cost of the animal at the terminal market. A single operation involving a truckload of 35 animals required as much as 4,355,400 FCFA for the purchase of cattle alone. Intermediaries and drivers were paid fees of 1,000 FCFA and 200 FCFA per head of cattle in addition to the purchase costs and these items accounted for 0.74 percent of total costs or 6.21 percent of all costs less the cost of cattle.

Official costs, duties and taxes summed up to 3,686 FCFA/head (129 thousand FCFA/truck) or 2.28 percent of the total costs. In terms of total costs less the purchase price of the animal, official costs accounted for 19.07 percent being second in magnitude only to the costs of transportation and handling. In this sub-category of costs, convoyage fees, customs duty charges and *liasser-passer veterinaire* were major cost items. For example, given a sub total of 3,686 FCFA/head of cattle, convoyage fees of 2,214 FCFA/head represented 60 percent of costs within this sub-category. It is clear that the removal of convoyage fees and customs duty charges alone would reduce final price of the animal by nearly 2 percent (or 15.5 percent of costs less purchase of animal), which is substantial enough to make a difference in the costs of transferring cattle by truck from Sikasso to Abidjan and by extension from Mali to Côte d'Ivoire.

Table 6.3: Budget for a trading operation involving 35 cattle purchased from Sikasso (Mali), transported by truck and sold in Abidjan (Côte d'Ivoire) during the 1st quarter of 2001.

COST/BENEFIT CATEGORY	FCFA/ head	FCFA/Truck	Cost of operation	As a % of final price of animal	As a % of total less purchase cost
Purchase of 35 cattle at frontier market	124,439	4,355,368	4,355,368	77.00	
Incidental costs at purchase					
Purchase commission to intermediary	1,000	35,000	35,000	0.62	5.17
Fee paid to drovers at frontier market	200	7,000	7,000	0.12	1.03
Sub-total	1,200	42,000	42,000	0.74	6.21
Official costs, duties and taxes					
Personal documents needed by trader (amortized)	86	3,000	3,000	0.05	0.45
Certificat de vaccination (Sikasso)	29	1,000	1,000	0.02	0.15
Certificat sanitaire d'exportation (Sikasso)	29	1,000	1,000	0.02	0.15
Certificat provisoire d'exportation de bétail (Sikasso)	43	1,500	1,500	0.03	0.22
Lettre de voiture Inter-Etats (Sikasso)	71	2,500	2,500	0.04	0.37
Douane CI (Pogo)	786	27,500	27,500	0.49	4.07
Laissez-passer vétérinaire Nielle)	429	15,000	15,000	0.27	2.22
Frais de Convoyage (Pogo)	2,214	77,500	77,500	1.37	11.46
Sub-total	3,686	129,000	129,000	2.28	19.07
Transportation and handling					
<i>Road transportation</i>					
Travel to Abidjan by trader	0	0	0	0.00	0.00
Truck rental	6,000	210,000	210,000	3.71	31.05
1 drover @ 30,000 FCFA/person/trip	857	30,000	30,000	0.53	4.43
Fees paid to COBAS for loading	150	5,250	5,250	0.09	0.78
Fees paid to drovers for loading	57	2,000	2,000	0.04	0.29
Straw bedding for truck	114	4,000	4,000	0.07	0.59
Unloading fees (Abidjan)	43	1,500	1,500	0.03	0.22
Return travel to Sikasso for trader	514	18,000	18,000	0.32	2.66
<i>Handling and selling costs at Port Bouet market</i>					
Market commission	1,100	38,500	38,500	0.68	5.69
2 guardians for 3 days @ 1,500 FCFA/person/day	257	9,000	9,000	0.16	1.33
3 bags of bran @ 4,000 FCFA over 3 days	343	12,000	12,000	0.21	1.77
Fodder for 3 days	214	7,500	7,500	0.13	1.11
Water for 3 days	71	2,500	2,500	0.04	0.37
Gift to intermediary	171	6,000	6,000	0.11	0.88
Food lodging for trader for 4 days @ 400 FCFA/day	46	1,600	1,600	0.03	0.24
Other small expenses for 4 days @ 1,000 FCFA/day	114	4,000	4,000	0.07	0.59
Sub-total	10,053	351,850	351,850	6.22	52.02
Bribes and Extortion					
<i>Frequent stops between Sikasso and Abidjan</i>					
Sikasso: Douane	143	5,000	5,000	0.09	0.74
Zegoua: Douane	143	5,000	5,000	0.09	0.74
Zegoua: Veterinaire	29	1,000	1,000	0.02	0.15
Zegoua: Gendarmerie	57	2,000	2,000	0.04	0.29
Ouangolodougou: Police	57	2,000	2,000	0.04	0.29
Ouangolodougou: Veterinaire	29	1,000	1,000	0.02	0.15
Ferkessedougou: Police and Gendarmerie	286	10,000	10,000	0.18	1.48
Tafire: Police	143	5,000	5,000	0.09	0.74
Niakaramandougou: Police	143	5,000	5,000	0.09	0.74
Katiola: Police	143	5,000	5,000	0.09	0.74
Bouake: Police and Gendarmerie	286	10,000	10,000	0.18	1.48
Yamoussoukro: Police	143	5,000	5,000	0.09	0.74
Abidjan: Police	143	5,000	5,000	0.09	0.74
2 additional stops @ 5,000 FCFA/stop	286	10,000	10,000	0.18	1.48
Sub-total	2,029	71,000	71,000	1.26	10.50
Total costs (without opportunity cost of capital)	141,406		4,949,218	87.50	
Opportunity cost of capital			82,487	1.46	12.20
Total costs	143,763		5,031,705	88.96	
Total costs less cost of purchase	19,324		676,337	11.96	100.00
Revenue from sales	161,611		5,656,374	100.00	
Net revenue I (net of opportunity cost of capital)			624,668		
Net revenue II (including opportunity cost of capital)			707,155		
Net revenue II/Total capital invested (%)			14.3		

Table 6.4: Budget for a trading operation involving 35 cattle purchased from Bittou (Burkina Faso), transported by truck and sold in Accra (Ghana) during the 1st quarter of 2001.

COST/BENEFIT CATEGORY	FCFA/ head	FCFA/Truck	Cost of operation	As a % of final price of animal	As a % of total less purchase cost
Purchase of 35 cattle at frontier market	102,681	3,593,821	3,593,821	74.86	
Incidental costs at purchase					
Purchase commission to intermediary	1,000	35,000	35,000	0.73	5.07
Frais de 'sortie'	100	3,500	3,500	0.07	0.51
Fee paid to drovers at fronteir market	500	17,500	17,500	0.36	2.54
Sub-total	1,600	56,000	56,000	1.17	8.12
Official costs, duties and taxes					
Personal documents needed by trader	0	0	0	0.00	0.00
Communal tax (Bittou)	200	7,000	7,000	0.15	1.01
Declaration d'exportation & other documents required	1,300	45,500	45,500	0.95	6.60
Contribution au secteur d'elevage BF (Bittou)	3,000	105,000	105,000	2.19	15.22
Formalities in Ghana (Bawku)	1,143	40,000	40,000	0.83	5.80
Sub-total	5,643	197,500	197,500	4.11	28.64
Transportation and handling					
<i>Transportation to Bawku (Ghana)</i>					
Trek to Bawku (Ghana)	500	17,500	17,500	0.36	2.54
Trader's travel to Bawku (Ghana)	21	750	750	0.02	0.11
<i>Road transportation</i>					
Trader's travel to Accra	0	0	0	0.00	0.00
Truck rental	7,857	275,000	275,000	5.73	39.87
2 drovers @ 15,000 FCFA/person/trip	857	30,000	30,000	0.62	4.35
Handling costs in Bawku (loading, etc.)	571	20,000	20,000	0.42	2.90
Return travel to Bittou for trader	143	5,000	5,000	0.10	0.73
<i>Handling and selling costs at Bawku market</i>					
Total costs for entry commission, drovers, unloading	429	15,000	15,000	0.31	2.18
Feed and water for the cattle	0	0	0	0.00	0.00
Gift to intermediary	57	2,000	2,000	0.04	0.29
Other expenses for 14 days @ 500 FCFA/day	200	7,000	7,000	0.15	1.01
Sub-total	10,114	354,000	354,000	7.37	51.32
Bribes and Extortion					
<i>Frequent stops between Bittou and Accra</i>					
Zebilla: Douane	29	1,000	1,000	0.02	0.15
Zebilla: Police	29	1,000	1,000	0.02	0.15
Bolgatanga: Douane	29	1,000	1,000	0.02	0.15
Bolgatanga: Police	14	500	500	0.01	0.07
Walewale: Police	14	500	500	0.01	0.07
Techiman: Douane	14	500	500	0.01	0.07
Techiman: Police	14	500	500	0.01	0.07
Kumasi: Douane	14	500	500	0.01	0.07
Kumasi: Police	14	500	500	0.01	0.07
Additional stops	171	6,000	6,000	0.12	0.87
Sub-total	343	12,000	12,000	0.25	1.74
Total costs (without opportunity cost of capital)	120,381		4,213,321	87.76	
Opportunity cost of capital	2,006		70,200	1.46	10.18
Total costs	122,387		4,283,543	89.23	
Total costs less cost of purchase	19,706		689,722	14.37	100.00
Revenue from sales	137,163		4,800,696	100.00	
Net revenue I (net of opportunity cost of capital)			517,152		
Net revenue II (including opportunity cost of capital)			587,374		
Net revenue II/Total capital invested (%)			13.9		

Table 6.5: Budget for a trading operation involving 35 cattle purchased from Niangoloko (Burkina Faso), transported by truck and sold in Port Bouet, Abidjan (Côte d'Ivoire) during the 1st quarter of 2001.

COST/BENEFIT CATEGORY	FCFA/ head	FCFA/Truck	Cost of operation	As a % of final price of animal	As a % of total less purchase cost
Purchase of 35 cattle at frontier market	90,171	3,155,988	3,155,988	72.31	
Incidental costs at purchase					
Purchase commission to intermediary	1,000	35,000	35,000	0.80	4.27
Market commission at frontier (droit de sortie)	500	17,500	17,500	0.40	2.13
Fee paid to drovers at frontier market	400	14,000	7,000	0.32	1.71
Sub-total	1,900	66,500	66,500	1.52	8.11
Official costs, duties and taxes					
Personal documents needed by trader (amortized)	86	3,000	3,000	0.07	0.37
Laissez-passer zoo-animal (Niangoloko)	57	2,000	2,000	0.05	0.24
Certificat d'origin (Niangoloko)	57	2,000	2,000	0.05	0.24
Autorisation d'exportation (Niangoloko)	57	2,000	2,000	0.05	0.24
Lettre de voiture Inter-Etats (Niangoloko)	71	2,500	2,500	0.06	0.30
Decalartion de transit (Niangoloko)	714	25,000	25,000	0.57	3.05
Contribution au secteur d'elevage BF (Niangoloko)	3,000	105,000	105,000	2.41	12.81
Douane CI (Ouangolodougou CI)	1,500	52,500	52,500	1.20	6.40
Certificat de vaccination (Ouangolodougou)	250	8,750	8,750	0.20	1.07
Frais de Convoiyage (Ouangolodougou)	2,429	85,000	85,000	1.95	10.37
Sub-total	8,221	287,750	287,750	6.59	35.09
Transportation and handling					
<i>Cost of trek from Ouangolodougou</i>					
3 drovers @ 15,000 FCFA/drover/trip	1,286	45,000	45,000	1.03	5.49
<i>Road transportation</i>					
Travel to Ouangolodougou by trader	57	2,000	2,000	0.05	0.24
Truck rental	4,286	150,000	150,000	3.44	18.30
2 drovers @ 20,000 FCFA/person/trip	1,143	40,000	40,000	0.92	4.88
Fees for loading (Ouangolodougou)	86	3,000	3,000	0.07	0.37
Straw bedding for truck	114	4,000	4,000	0.09	0.49
Unloading fees (Abidjan)	43	1,500	1,500	0.03	0.18
Return travel to Niangoloko for trader	514	18,000	18,000	0.41	2.19
<i>Handling and selling costs at Port Bouet market</i>					
Market commission	1,100	38,500	38,500	0.88	4.70
Fee for marking animals	14	500	500	0.01	0.06
2 guardians for 3 days @ 3,000 FCFA/person/day	343	12,000	12,000	0.28	1.46
2 bags of bran @ 5,000 FCFA over 2 days	286	10,000	10,000	0.23	1.22
Fodder for 2 days	200	7,000	7,000	0.16	0.85
Water for 2 days	71	2,500	2,500	0.06	0.30
Gift to intermediary	143	5,000	5,000	0.11	0.61
Food lodging for trader for 4 days @ 400 FCFA/day	86	3,000	3,000	0.07	0.37
Other small expenses for 4 days @ 1,000 FCFA/day	86	3,000	3,000	0.07	0.37
Sub-total	9,857	345,000	345,000	7.90	42.08
Illicit taxes					
<i>Frequent stops between Ouangolodougou and Abidjan</i>					
Ouangolodougou: Police	100	3,500	3,500	0.08	0.43
Ferkessedougou: Douane	214	7,500	7,500	0.17	0.91
Ferkessedougou: Police drogue	157	5,500	5,500	0.13	0.67
Tafire: Gendarmerie	100	3,500	3,500	0.08	0.43
Niakaramandougou: Gendarmerie	100	3,500	3,500	0.08	0.43
Katiola: Police	114	4,000	4,000	0.09	0.49
Bouake: Gendarmerie	143	5,000	5,000	0.11	0.61
Bouake: Police	143	5,000	5,000	0.11	0.61
Bouake: Douane	286	10,000	10,000	0.23	1.22
Abidjan: Police	143	5,000	5,000	0.11	0.61
<i>Additional stops (mainly police and customs)</i>					
5 additional stops @ 5,000 FCFA/stop	86	3,000	3,000	0.07	0.37
Sub-total	1,586	55,500	55,500	1.27	6.77
Total costs (without opportunity cost of capital)	111,735		3,910,738	89.60	
Opportunity cost of capital	1,862		65,179	1.49	7.95
Total costs	113,598		3,975,917	91.09	
Total costs less cost of purchase	23,427		819,929	18.79	100.00
Terminal market orice	124,709		4,364,828	100.00	
Net revenue I (net of opportunity cost of capital)			388,911		
Net revenue II (including opportunity cost of capital)			454,090		
Net revenue II/Total capital invested (%)			11.6		

The major value added activity in the marketing of livestock in West Africa is the transfer of animals from one location to another, since the trade is based mainly on live animals. Transportation and handling costs account for 6.2 percent of final price of the animal or 52 percent of other costs (i.e. excluding the cost of the animal). In this category of costs, the rental of truck at 210 thousand FCFA per trip was the highest element. The main reasons for this were the high cost of fuel and high import duties on new trucks. Governments in the region impose fuel taxes and custom duties as sources of revenue and as long as these continue to raise the market price of fuel and the on-the-road cost of new trucks, a reduction in truck hiring costs is difficult to envisage, even though other factors such as the high cost of spares and bad roads also contribute to the high cost of transportation.

Illegal taxation by uniformed personnel occurred frequently along the trading routes. Traders on the Sikasso–Abidjan route reported 13 frequent stops and 2 occasional ones where they made payments without accompanying receipts to police, customs and *gendarmerie* (Table 6.3). This illicit taxation amounted to 10.5 percent of other costs on this route. This is in spite of the fact that governments in the region through ECOWAS have agreed on the removal of all roadblocks along international routes. Enforcing this provision rigorously to stamp out bribes and extortion will reduce total costs of marketing Sahelian cattle through this route by 1.26 percent (Table 6.3).

Finally, the cattle were sold at an average price of 161,611 FCFA/head. Including the opportunity cost of capital, net revenue (as a percentage of total capital invested) reported by export traders on the Sikasso–Abidjan route amounted to 14.3 percent.

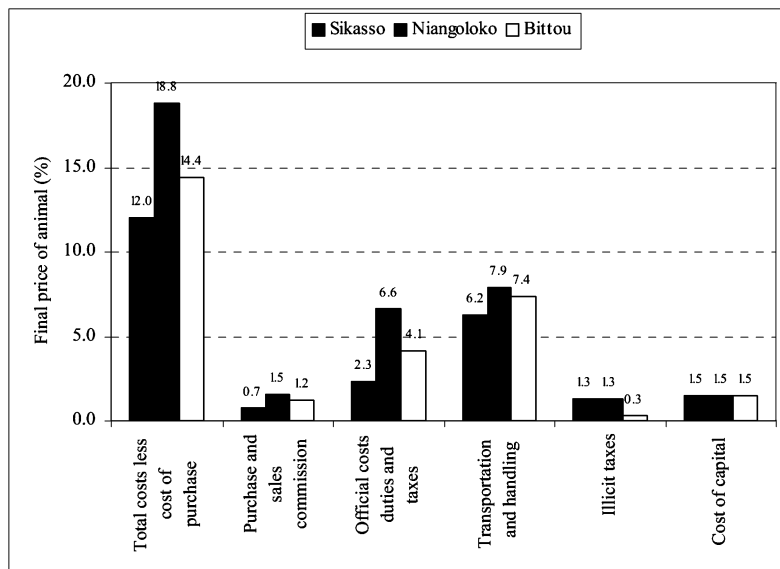


Figure 6.2: Decomposition of costs of cross-border cattle trade from Sikasso (Mali) to Abidjan (Côte d'Ivoire), Niangoloko (Burkina Faso) to Abidjan (Côte d'Ivoire) and Bittou (Burkina Faso) to Accra (Ghana).

Similar analyses were done and summarised for cattle export traders operating the Bittou (Burkina Faso) to Accra (Ghana) route in Table 6.4, and those doing Niangoloko

(Burkina Faso) to Abidjan (Côte d'Ivoire) in Table 6.5. The trends were more or less the same for Sikasso, Bittou and Niangoloko frontier livestock markets. For easier comparison, the sub-total costs (as a percentage of final price of animal) on these routes have been summarised in Figure 6.2.

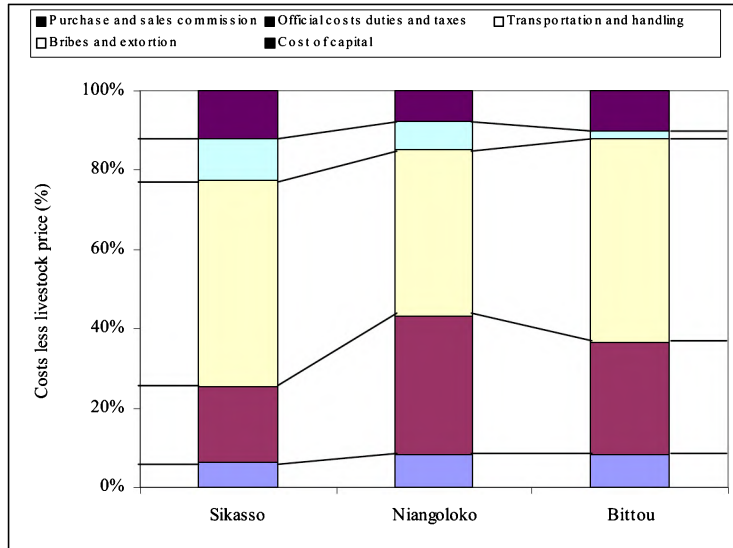


Figure 6.3: Stacked bar chart showing the decomposition of costs of cross-border cattle trade from Sikasso (Mali) to Abidjan (Côte d'Ivoire), Niangoloko (Burkina Faso) to Abidjan (Côte d'Ivoire) and Bittou (Burkina Faso) to Accra (Ghana).

Figure 6.2 shows that as a percentage of the final cost of cattle, other costs incurred in marketing cattle (less the purchase price) were highest (18.8 percent) along the Niangoloko–Abidjan route and lowest for Sikasso to Abidjan. This same pattern was repeated for the other cost items except illicit taxes, which was lowest (0.3 percent for Bittou) compared to 1.3 percent of the final price of the animal for Sikasso and Niangoloko. Figure 6.3 is an alternative presentation of the decomposition of costs, stacked to show contrasts for the three frontier markets studied.

The above results from this study are compared to previous studies in Table 6.6. During the late 1970s and early 1980s, transport and handling costs contributed 13.7 percent and 29.6 percent to the final price of cattle for cattle moved from Kati and Niono by truck to Abidjan (OMBEVI 1978; Delgado 1979). Delgado (1979) showed that at that time it was not profitable to move cattle by truck all the way from Mali to Abidjan. Trekking to Bouake and completing the rest of the journey by rail was the cheapest way, even when tied-up capital is taken into consideration.

In the 1990s, the studies by Holtzman et al. (1991) and IEMVT–CIRAD/SFC SEDES–CEGOS (1991) put the costs of transportation and handling at 13.9 percent and 10.4 percent, respectively, of the final price of the animal. Comparing the figures from the above studies with those of this study, which ranged from 6.2 percent for Sikasso to Abidjan to 7.9 percent for Niangoloko to Abidjan, suggests that there has been a decrease in the cost of transportation of cattle from the Sahel to the coast, relative to the final price of cattle at the terminal markets. However, when transportation and handling costs are viewed as a percentage of other marketing costs of cattle, they account for between 48 percent and 65 percent, and thus remain the highest cost component in all the studies that were reviewed.

Table 6.6: Comparison of cattle marketing costs and benefits from various studies summarised by major cost categories.¹

COST ITEM	Kati to Abidjan*		Niono to Abidjan**		Dougaboulou to Abidjan***		Pouytenga to Abidjan****	
	FCFA	% of final price	FCFA	% of final price	FCFA	% of final price	FCFA	% of final price
Price of cattle at market of origin	76800	68.3	76800	68.3	62500	65.1	113800	70.0
Transport and handling	15404	13.7	33200	29.5	12720	13.2	16935	10.4
Official costs duties and taxes	8800	7.8	8800	7.8	7126	7.4	9055	5.6
Transaction costs at terminal market	1150	1.0	700	0.6	1288	1.3	N/A	N/A
Bribes and extortion	5000	4.4	5000	4.4	5804	6.0	7210	4.4
Export traders' margin	5346	4.8	-12000	-10.7	6567	6.8	15500	9.5
Price of cattle at terminal market	112500	100	112500	100.0	96005	100.0	162500	100

¹ Transportation in all cases was by truck from locations in Burkina Faso or Mali to Abidjan in Cote d'Ivoire.

Sources: *OMBEVI (1978), **Delgado (1979), ***Holtzman et al. (1991), and ****IEMVT-CIRAD/SFC SEDES-CEGOS (1991).

It follows that given this high share of transportation in total cost, efforts to reduce costs of transportation and handling are likely to make substantial impact on lowering the marketing costs of Sahelian cattle in coastal countries. This will increase the competitiveness of Sahelian livestock along the coast, increase the volume of trade with likely positive benefits for producers, livestock market operators and consumers.

To compare the cost of transporting one tonne of beef to the coastal countries of West Africa from different locations, Yade et al. (1998) found that it costs US\$ 230/t of beef equivalent to ship cattle from the Sahel to the coast compared with only US\$ 80/t for beef shipped from the European Union. Our estimates from the trade itineraries already presented in Tables 6.1, and 6.3 to 6.5 show that transportation and handling costs (including illicit taxes and conveyance fee) for cattle from the Sahel to the coast averaged 95,875 FCFA (US\$ 174) per tonne for the Tenkodogo-Bittou-Accra itinerary, 133,838 FCFA (US\$ 243) for Niena-Sikasso-Abidjan and 136,668 FCFA (US\$ 249) per tonne for the Djefoula-Niangoloko-Abidjan routes (Table 6.7).

This study further shows that it costs an average of 48 FCFA (US\$ 0.09) per km to transfer the equivalent of one tonne of beef between farm gates in Djefoula and the Niangoloko frontier market compared to 172 FCFA (US\$ 0.31) per km between Niangoloko and Abidjan that have better developed transport infrastructure. Similar transfers from Niena to Sikasso and Tenkodogo to Bittou (domestic) cost 88 FCFA (US\$ 0.16) and 40 FCFA (US\$ 0.07) respectively compared to their corresponding cross-border from Sikasso to Abidjan (153 FCFA or US\$ 0.28) and Bittou to Accra (83 FCFA or US\$ 0.15). Domestic transportation costs were higher in Mali, judging from the Niéna to Sikasso case study (88 FCFA/t per km) compared to Burkina Faso where it was 48 FCFA and 40 FCFA for equivalent transfers from Djefoula to Niangoloko and Tenkodogo to Bittou.

Table 6.7 summarises these costs of transfers for the domestic segment, the cross-border segment and the entire chain from farm gates to terminal markets. The results show that it was about 33 percent cheaper per km to transfer cattle from Burkina Faso to Ghana than from Burkina Faso or Mali to Côte d'Ivoire, reflecting the efforts of the Ghanaian government to facilitate intra-regional livestock trade. The higher cost in the case of

deliveries to Côte d'Ivoire was found to be related to the large number of roadblocks (illicit taxation) and the activities of *societes de convoyage*.

Table 6.7: Transportation and handling costs per km for transferring the equivalent of one tonne of beef in the domestic and cross-border segments of the livestock marketing channels in the central corridor of West Africa.

Trade itinerary	A	B	C	D	E	F
	Transportation and handling costs + illicit taxes + convoyage fees (FCFA)*	Distance (km)**	Cost per tonne (FCFA)	Cost per tonne per kilometre (FCFA)	Cost per tonne (US \$)	Cost per tonne per kilometre (US \$)
DOMESTIC SEGMENT						
Nièna to Sikasso	35,000	100	8750	88	16	0.16
Djefoula to Niangoloko	61,250	320	15313	48	28	0.09
Tenkodogo to Bittou	17,500	110	4375	40	8	0.07
Average	37,917	177	9479	54	17	0.10
CROSS-BORDER SEGMENT						
Sikasso to Abidjan	500,350	815	125088	153	227	0.28
Niangoloko to Abidjan	485,500	705	121375	172	221	0.31
Bittou to Accra	366,000	1105	91500	83	166	0.15
Average	450,617	875	112654	129	205	0.23
FARM GATE/COLLECTION MARKETS TO TERMINAL MARKETS***						
Nièna to Abidjan	535,350	915	133838	146	243	0.27
Djefoula to Abidjan	546,750	1025	136688	133	249	0.24
Tenkodogo to Accra	383,500	1215	95875	79	174	0.14
Average	488,533	1052	122133	116	222	0.21

* Calculations were based on a truckload of 35 cattle. Assuming: i) average live weight of 250 kg/head of cattle, ii) carcass dressing out percentage of 45 percent¹⁹, iii) exchange rate of US\$ 1 = 550 FCFA.

** Distance was calculated from road map using ArcView® version 3.2 (ESRI 1999).

*** This is the sum of related itineraries, e.g. Nièna to Abidjan = Nièna to Sikasso + Sikasso to Abidjan.

The above results show that even when distance is taken into consideration in calculating transportation and handling costs, the domestic segment was still cheaper. The major reason for this is that most of the movement of trade cattle within the producing countries is on the hoof. As such, the main component of the transfer costs is the payment of drovers. Keeping livestock marketing costs low within the central corridors of West Africa involves not only lowering cross-border transportation costs but also maintaining the low costs of domestic transfer of livestock in the producing countries. The latter is predicated on the establishment, protection and maintenance of stock routes wherever it is feasible in those countries.

In the face of low agricultural productivity, as agricultural land expansion occurs in response to rapid population growth, it will become increasingly difficult to prevent encroachment on existing routes, not to talk of acquiring and demarcating new ones. In this situation, efforts to find alternative cheap modes of transportation will be rewarding.

¹⁹ Assumptions i and ii mean that 35 cattle had a total live weight of 8.75 tonnes, which dressed out to 4 tonnes of beef. Therefore, cost per tonne (FCFA), i.e. column C equals column A divided by 4.

This is another reason to justify the search for alternative cheap means of animal transportation. Resuscitation of railway lines to handle animal and other goods transfer is a possibility.

Marketing margins

Export traders' margins range from 11.6 percent in the Niangoloko–Port Bouet corridor to 14.3 percent in the Sikasso–Abidjan corridor compared to 4.8 percent for Kati to Abidjan (OMBEVI 1978), 7.2 percent for Dougaboulou to Abidjan (Holtzman et al. 1991), and 9.5 percent for Pouytenga to Abidjan (IEMVT–CIRAD/SFC SEDES–CEGOS 1991). Although the itineraries are different, the fact that export traders margins tripled from 4.8 percent for the Kati–Abidjan case study to 14.3 percent in the Sikasso–Abidjan case study shows that the trend over the last two decades or so has been towards an increase in the trading margins of export traders.

As already mentioned, this study examined the domestic and cross-border segments of livestock trade and found generally that each livestock trader operated in one but not both segments guided principally by their level of financial resource endowment. For the small and medium livestock traders that operated in the domestic segment, their trading margins range from 2.7 percent (Tenkodogo to Bittou) to 5.5 percent for Niéna to Sikasso trade itineraries (Table 6.1). By comparison, and using the highest trading margin scenario for domestic traders, i.e. 5.5 percent and the lowest trading margin scenario for export traders from this study, i.e. 11.6 percent, it is seen that export traders make at least twice the trading margins of domestic traders (Figure 6.4).

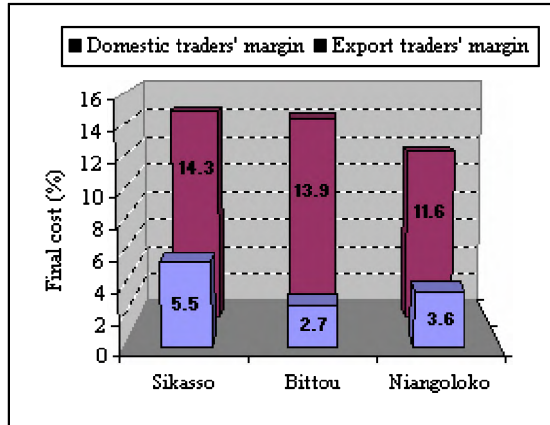


Figure 6.4: Marketing margins of domestic and cross-border traders in the Sikasso (Mali), Bittou and Niangoloko (Burkina Faso) case studies.

There are higher risks associated with export livestock trading than domestic livestock trading in livestock and, therefore, a higher margin enjoyed by export traders is justified. However, it is also the case that due to financial limitations (given that a trip involving a single truckload of 35 cattle costs from 4–5 million FCFA) competition in the export segment is lower than in the domestic segment providing opportunity for higher rent. This situation suggests that making credit readily available to livestock traders (lack of credit ranked highest among their identified constraints) will improve the level of competition in

the export segment of the marketing chain and potentially lower livestock marketing costs with similar benefits as already discussed.

Using the average trading margins of domestic traders and cross-border traders on each of the three itineraries that were studied²⁰, it can be shown that the difference in the trading margins of domestic and cross-border traders amounts to 6.5 billion FCFA (US\$ 11.9 million) per annum, for cattle exports from Mali and Burkina Faso in 2001 alone. From the point of view of improving marketing efficiency, the above amount indicates in monetary terms part of the gain that could accrue to coastal consumers and Sahelian producers if competition is increased in the export trade segment along with reducing risks associated with export trading in livestock.

6.4 Summary

Partial budget analyses were conducted for six livestock trade and marketing itineraries, three each for the domestic and cross-border segments. The three domestic livestock trade routes are Niéna to Sikasso (Mali), Tenkodogo to Bittou (Burkina Faso) and Djefoula to Niangoloko (Burkina Faso) which individually supplied the highest proportion of traded livestock to the respective frontier livestock markets. For cross-border livestock trade, Sikasso to Abidjan, Niangoloko to Abidjan, and Bittou to Accra were investigated.

The results show that producers received about 65, 69, and 70% of the final market price for the Djefoula–Niangoloko–Port Bouet, Niéna–Sikasso–Abidjan, and Tenkodogo–Bittou–Accra itineraries respectively. The proportional shares of the final price received by the producers in the above case studies compare well with those of earlier studies, which ranged from 68 to 70 percent of the final price of the animal. These results provide evidence that the remuneration of producers has not improved in the last three decades.

In the domestic segment of the trade, transportation and handling accounted for between 0.4 and 1.4 percent of the final price of the animal compared to 6.2 to 7.9 percent of the final price of the animal obtained for the cross-border segment. Distance to destination and mode of transportation largely accounted for the difference between the two segments. To enable comparison, the costs of transportation of the equivalent of one tonne of beef were calculated per km for both the domestic and cross-border segments and for individual itineraries starting from primary to terminal markets. It was found that transfer costs were more than double in the cross-border segment compared to the domestic segment. The cost of single itineraries ranged 95,875 FCFA (US\$ 174) for the Tenkodogo–Bittou–Accra route to 136,688 FCFA (US\$ 249) for the Djefoula–Niangoloko–Abidjan route.

Since illegal road taxation contributed significantly to increasing the cost of cross-border transfer of animals, the lower cost on the Bittou–Accra route is a reflection of the successful effort of the government of Ghana in eliminating the vice from its checkpoints.

²⁰ On the Niéna–Sikasso–Abidjan itinerary, the difference between the average trading margin of domestic and cross-border traders was 10,434 FCFA per head of cattle. For the 1,442 transactions recorded during field surveys, this difference amounts to 15 million FCFA. If the above itinerary is considered typical for cattle exports from Mali to Côte d'Ivoire, then for the 241,776 cattle exported from Mali in 2001 (FAOSTAT 2004), the difference in trading margins amounts to 2.52 billion FCFA (US\$ 4.6 million). Similar calculations done for the Djefoula–Niangoloko–Abidjan and Tenkodogo–Bittou–Accra itineraries for the 227 thousand cattle exported from Burkina Faso in 2001 indicate differences in trading margins equivalent to US\$ 4.4 million and US\$ 2.9 million respectively. The above estimates indicate that differences in trading margins between domestic and cross-border livestock traders was about US\$ 11.9 million for cattle exports from Mali and Burkina Faso alone in 2001.

The average cost of transferring the equivalent of one tonne of beef from the Sahel to the coast, over an average distance of 1,050 km, was estimated at 122,133 FCFA (US\$ 222) per tonne or 116 FCFA per tonne per kilometre. This finding compares well with earlier findings that put the cost at US\$ 230 per tonne from the Sahel to the coast.

Domestic transportation and handling costs was considerably lower than cross-border simply because trekking remained the dominant mode of transfer of livestock from the collection markets and farm gates to the frontier markets and as such the bulk of the expenditure on this item was towards paying drovers. On the other hand, cross-border transportation required trucking or use of rail cars and these increased costs substantially. The future of domestic transportation and handling will depend on developing and maintaining stock routes where feasible. This is especially the case as human population density increases and crop farming expands and limits available space for trekking and watering livestock *en route* to destination markets. In this situation, it will become increasingly difficult to prevent encroachment on existing stock routes, not to talk of acquiring and demarcating new ones.

From this point of view, it appears that pursuing policies to put in place the necessary legislative protection for existing stock routes could be rewarding. This is also another reason to justify the search for alternative cheap means of animal transportation. Resuscitation of railway lines to handle animal and other goods transfer is a possibility. Domestic transportation and handling costs also were low because the issue of illegal road taxation, which cross-border traders had to contend with (and which accounts for up to 1.3 percent of the final price of the animal), was not mentioned as a constraint by domestic traders.

On the other hand, costs of cross-border transportation and handling were high for a number of reasons of which the following were the most important:

- *Official costs, duties and taxes:* These were paid to obtain export permits, vaccination and health certificates for the export livestock, inter-state waybills etc. Average payment in this regard was 129 thousand FCFA for cattle exports originating from Mali, and almost twice this amount (242,625 FCFA) for cattle exports from Burkina Faso. In the case of Mali, reforms to reduce costs of intra-regional trade were advanced and one-stop windows (*guichets uniques*) for completing all livestock export procedures have been in place for more than 10 years. Even for Mali, the sum of official charges alone was greater than the cost of renting a 30-tonne truck to convey 35 cattle from the Sahel to the coast.
- *Cost and shortage of trucks:* High import duties on new trucks and spares by governments in the region raised the cost of purchase and maintenance of new trucks leading to inadequate maintenance and difficulty in replacing existing ones. The problem of import duties existed in the region with the notable exception of Ghana where pick-ups, vans and trucks are not dutiable—though subject to the payment of 12.5 percent VAT. The availability of trucks for transporting livestock to the coast also depended on the season of the year and the availability of back hauls from the coast to facilitate an early turn-around. Transit agreements for trucks plying the coast to Sahel and back to coast route were unwieldy.
- *High fuel taxes:* For a 30-tonne articulator truck, a trip from Sikasso to Abidjan required about 400 litres of diesel at 275 FCFA per litre totalling 110 thousand FCFA. The cost of diesel alone was equivalent to 52.4 percent of the cost of hiring a 30-tonne

truck or 3,143 FCFA per head of cattle transported. Fuel taxes of up to 36 percent on diesel were common in the central corridor. If reduced by half, the action would lower the cost of the trip by 19,800 FCFA or 565 FCFA per head of cattle. Without fuel taxes, the landing cost of cattle for a Sikasso to Abidjan itinerary, for example, would be cheaper by 39,800 FCFA or 1,130 FCFA per head of cattle.

- *Proliferation of checkpoints*: Numerous checkpoints exist along the national highways where non-receipted payments are made systematically per truckload of cattle to police, customs, veterinary officials, and *gendarmarie*. Out of the most regularly mentioned checkpoints where these illegal activities take place for livestock itineraries from Sikasso or Niangoloko to Abidjan, and Bittou to Accra, Ferkessedougou and Bouake both in Cote d'Ivoire harbour as much as three agents each namely: police, customs, and *gendarmarie*; also in Zegua in Mali payments are made to customs, *gendarmarie* and veterinary officials. The total of these non-receipted payments ranged from 12 thousand FCFA on the Bittou to Accra itinerary to 71 thousand FCFA on the Sikasso to Abidjan itinerary accounting for an average of 6.3 percent of cross-border marketing costs of cattle. In the Sikasso to Abidjan case, these illegal taxes are nearly twice the size of government imposed fuel taxes for the same trip suggesting that eliminating the problem would have about twice the benefits of abolishing fuel taxes. In addition, the process of illegal road taxation causes delays in travel time leading to deterioration in the condition of the cattle and sometimes to deaths which costs are passed on to consumers by traders.
- *Activities of societies de convoyage (conveyance companies)*: In response to the detrimental effects of high levels of illegal road taxation on livestock trade in the central corridor, private conveyance companies emerged to curtail (but not to abolish) corruption by charging a *frais de convoyage* (conveyance fee)—shared among the receiving private company and the implicated agencies. At the time of the survey, the *frais de convoyage* was 85 thousand and 75,500 FCFA per 30-tonne truckload for the Sikasso to Abidjan and Niangoloko to Abidjan itineraries, respectively, but not exist on the Bittou to Accra livestock trade route. Where they were in place, these fees added as much as 2,430 FCFA per head of cattle to cross-border shipment costs. Traders and transporters that paid the *frais de convoyage* were not delayed at road checkpoints though they had to pay, in addition, a 'token' 1,000 FCFA per truck per agency per control point along the Sahel to coast trans-national highway. Neither the illegal road taxation that led to their emergence nor the conveyance companies themselves that institutionalise corruption are legitimate under existing rules of the Economic Community of West African States (ECOWAS) for free flow of goods and movement of people within the region. Taken together, *frais de convoyage* and the illegal road taxes approximate the 150 thousand FCFA required to hire a 30-tonne truck from Niangoloko to Abidjan in 2001, adding about 4,286 FCFA to each head of cattle transported.
- *Handling costs*: Payment to drovers to load, feed and water the cattle *en route* to terminal markets and to off-load them at terminal markets ranged from 36,250 to 125,500 FCFA and averaged 76,750 FCFA per trip (equivalent to 17 percent of cross-border cattle marketing costs). This expenditure item that added an average of 2,193 FCFA per head of cattle to marketing costs was necessary only because the trade has continued to be mostly in live animals. Advancing intra-regional livestock trade from one based on live animals to one based on meat will eliminate this costs item—though with loss of jobs for drovers on international itineraries.

- *Inadequate and/or deteriorating transport infrastructure:* This refers to underdeveloped cattle routes in the domestic segment; deterioration of existing highways, inadequate secondary roads to link up livestock collection markets, and the deterioration of rail transport²¹ as an alternative to cross-border trucking.

For the small and medium livestock traders that operated the domestic segment, their trading margin ranged from 2.7 percent (Tenkodogo to Bittou) to 5.5 percent for Niéna to Sikasso trading itineraries. By comparison, and using the best case trading margin scenario for domestic traders, i.e. 5.5 percent and the worst case trading margin scenario for export traders from this study, i.e. 11.6 percent, it is seen that export traders make at least twice the trading margins of domestic traders. Comparison with previous studies also revealed that export traders margins tripled from 4.8 percent for the Kati to Abidjan case study in 1979 to 14.3 percent in the current Sikasso to Abidjan case study.

There are higher risks associated with export trading in livestock than domestic trading in livestock and, therefore, a higher margin enjoyed by export traders could be justified. However, it was also the case that due to financial limitations (given that a trip involving a single truckload of 35 cattle costs from 4–5 million FCFA) competition in the export segment was lower than in the domestic segment providing opportunity for high rent. This latter situation suggests that making credit readily available to livestock traders (lack of credit ranked highest among their identified constraints) will improve the level of competition in the export segment of the marketing chain and potentially lower livestock marketing costs.

Using the average trading margins of domestic traders and cross-border traders on each of the itineraries, it can be shown that the difference in the trading margins of domestic and cross-border traders amounts to about 6.5 billion FCFA (US\$ 11.9 million) per annum, for cattle exports from Mali and Burkina Faso alone. The above is an indication of part of the welfare benefits expected to accrue annually to coastal consumers and Sahelian producers if competition were to be increased in the export trade segment along with reducing risks associated with intra-regional livestock trade.

²¹ Not studied but there is evidence of decline in rail transportation of livestock.

CHAPTER SEVEN

HARMONISING LIVESTOCK TRADE POLICIES AMONG PARTICIPATING COUNTRIES

Although there are similarities in the livestock sector policies of the countries included in this project, there are also important variations. Such variations arise partly because livestock sector objectives differ across countries and partly because some of the countries are livestock exporters, while others are importers. Nonetheless, to promote expansion of intra-regional trade in livestock, trade-related policies need to be streamlined and co-ordinated to cut down on administrative impediments and to ensure that policies are mutually reinforcing, rather than antagonistic.

In this chapter, a synopsis of policy reforms that have been undertaken in the study countries to improve livestock production, marketing and cross-border trade are presented and discussed in terms of what remains to be done in streamlining and aligning national policies to promote growth in the livestock sector and regional trade. But before presenting the synopsis, a conceptual framework for policy harmonisation is first developed and described.

7.1 Conceptual framework for policy harmonisation

It is well known that policy making is by no means the rational activity that it is often held up to be in everyday discussion. Indeed, policy making is 'actually rather messy, with outcomes occurring as a result of complicated political, social and institutional processes which are at best described as evolutionary' (Juma and Clarke 1995). As a result, changes in policy rarely result from a linear progression from research findings to successful policy implementation but rather changes come about through a process of iterative, long-term, flexible and multifaceted interactions, with information sharing and stakeholders' consultation to build a political consensus to sustain the change. This complexity suggests that developing a conceptual framework to highlight the various intermediate steps involved in policy making can assist in identifying ways through which research findings can be shared with relevant stakeholders (policy makers, professional groups in livestock trade etc.) for use in policy formulation. With specific reference to this study, the aim is to find ways to channel our research findings on emerging opportunities and policy constraints to livestock marketing and cross-border trade to policy makers so that they can use this information in developing 'new' mutually reinforcing policies that would eliminate or reduce barriers and promote intra-regional livestock trade.

Figure 7.1 shows a conceptual interactive framework for livestock trade policy harmonisation in the study countries. It starts from the premise that barriers to intra-regional trade could be policy or non-policy induced and these barriers may affect trade directly or indirectly. Policy research is central in this framework as research is needed to identify the sources and nature of trade barriers and determine appropriate corrective measures. As expected, new policies will affect different stakeholders in different ways and there will be beneficiaries as well as losers. For example, reducing trade taxes in a given country may initially reduce government revenue but will benefit livestock traders, and in a well functioning market with good price transmission, producers and consumers as well.

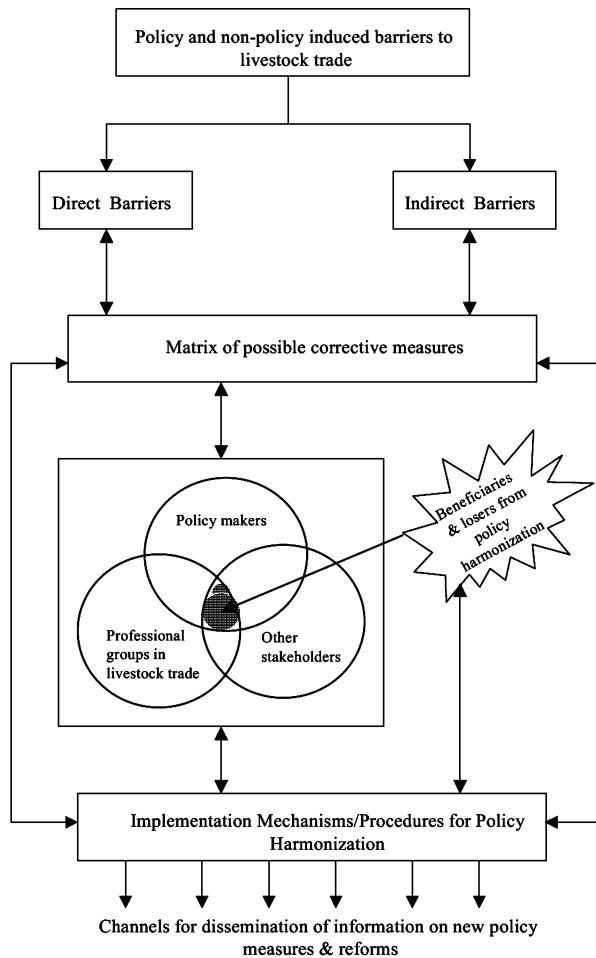


Figure 7.1: An interactive framework for policy harmonisation to reduce trade barriers and promote intra-regional livestock trade.

In a wider context where there are livestock exporting and importing countries, changes in policy in one country could very well result in positive impacts in the policy-initiating country and negative impacts in the other country. While stakeholders that expect to benefit from a new policy will support its implementation, losers will resist it. A consensus can be reached to allow the change to go ahead when winners agree to compensate losers for some of their losses. In this situation, there is an iterative and dynamic process of revising the matrix of corrective measures and policy instruments to take cognisance of the impact of policy changes on different interest groups and to cater for their viewpoints in the process of policy formulation. Once a policy is adopted, a critical step in its implementation lies in the dissemination of information about it to the public. Many good policies have faltered due to lack of awareness of the provisions of the policy by the general public. This is particularly true of livestock trade policies in the study countries as evidence gathered in the course of undertaking this study showed that partly due to lack of public awareness programmes and partly as a result of the high degree of illiteracy of livestock traders, many of them were unaware of the abolition of certain taxes and administrative laws affecting livestock marketing and trade in their own and neighbouring countries. Figure 7.2 shows a flow diagram that was developed early in

the life of this project as a means of using channels of communication already established by CILSS to share information on new policies and research findings with different stakeholders in the livestock trade.

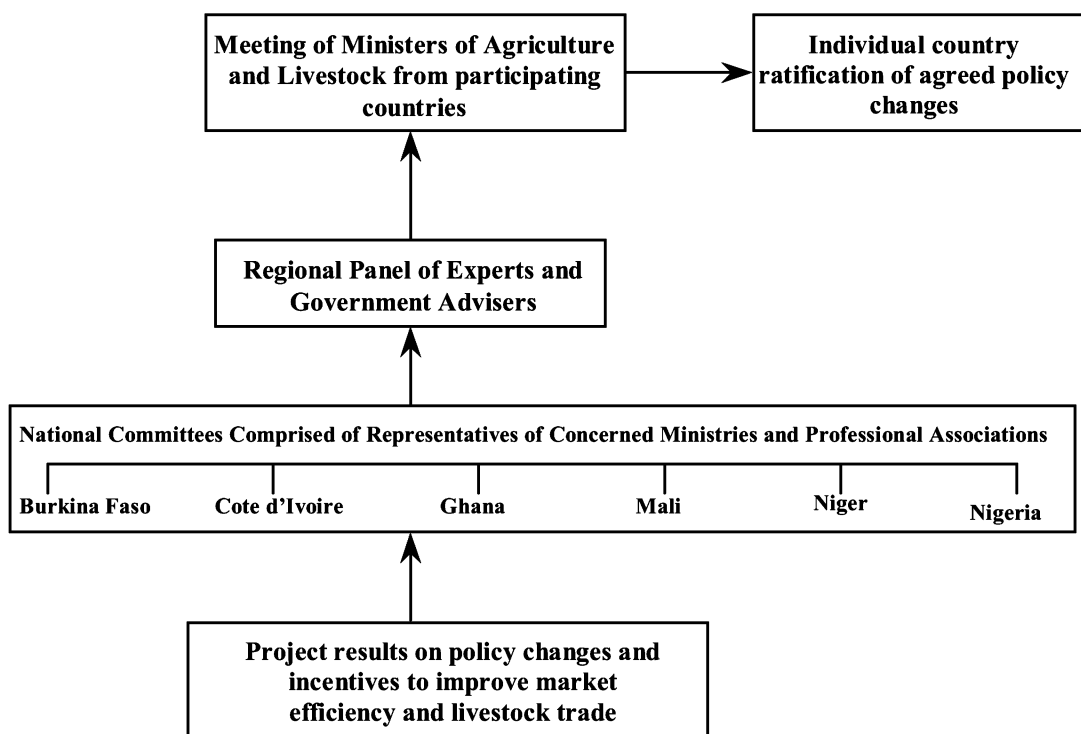


Figure 7.2: Policy information dissemination channels.

Having presented the conceptual frameworks for policy harmonisation and information dissemination, we now examine the list of barriers to cross-border livestock trade derived from interviews of representatives of livestock traders associations and selected policy advisers from the study countries. For additional information, see also Williams (1999b) and Brief No. 1.

7.2 Policy reforms affecting intra-regional livestock trade

Trade policy reforms that have been undertaken in the study countries can be discussed under four rubrics, viz: trade liberalisation, trade facilitation, exchange and payments systems and investment facilitation. Theoretically, the range of measures that can be implemented under each rubric if complete reform is feasible includes:

- **Trade liberalisation**
 - simplifying tariff structure
 - reducing tariff
 - eliminating tariffs on intra-regional trade
 - removing non-tariff barriers

- reducing other duties and charges (ODC)
- **Trade facilitation**
 - single customs declaration form
 - common road transit document
 - harmonised transit charges
 - bond guarantee scheme
- **Exchange and payments system**
 - domestic payments and settlement schemes
 - development of inter-bank foreign exchange markets
 - relaxation of restrictions on capital flows
 - insurance schemes for financial and commercial risks
- **Investment facilitation**
 - adopting a single and simple investment code
 - one-stop investment approval authority
 - statute of limitations.

Table 7.1: Progress towards trade liberalisation in the study countries.

Measures	Countries					
	Burkina Faso	Côte d'Ivoire	Mali	Niger	Ghana	Nigeria
Simplifying tariff structure	+	+	+	+	+	-
Reducing tariff	+	+	+	-	+	+
Eliminating tariffs on intra-regional trade	-	-	-	-	-	-
Eliminating non-tariff barriers (NTB)	-	-	-	-	-	-
Reducing other duties and charges (ODC)	-	+	+	+	-	-
Eliminating illicit taxes	-	-	-	-	-	-

Note: + = Plus, implying positive progress.

- = Negative, implying not much has been done.

In reality, the extent and pace of reforms in the study countries have differed. Table 7.1 shows what has been achieved in each country in terms of trade liberalisation. Much progress has been made in tariff simplification and reduction and this has facilitated the

flow of regional trade in livestock, particularly exports from Mali. On the other hand, non-tariff barriers, other duties and charges and illicit taxes continue to pose formidable constraints to regional trade. These constraints reduce incentives and lower the returns to market participants. In terms of trade facilitation, particularly in the area of single customs declaration form and road transit document, Mali and Ghana have made significant improvements. In Mali, for example, there has been in existence for some years now a one-stop window for regularising customs paper and transport document. In Ghana, there has also been a simplification of the customs declaration procedures.

In the area of exchange and payments systems and investment facilitation formidable obstacles still exist and governments in the study countries individually and collectively still have a lot to do to improve the economic environment for intra-regional livestock trade. Part of the problem here lies in the different currencies used in the different parts of the region and the problem of inter-convertibility of these currencies. The transhumance nature of extensive livestock production and trade in live animals coupled with the problem of moral hazard make formal credit and insurance schemes unavailable to livestock producers and traders in the region as financial institutions consider the risks involved in livestock production and trade too high to bear. These constraints and the barriers earlier mentioned are the major impediments that policy makers need to eliminate to improve economic benefits and growth of regional livestock trade.

7.3 Options for harmonising trade policies to enhance intra-regional livestock trade

In terms of harmonising national policies across study countries to promote intra-regional trade, the foregoing discussion has shown that there are opportunities for realignment of policies in the areas of trade liberalisation, facilitation and exchange and payment systems. In theory, there are established institutions and mechanisms that operate on these issues. One such institution is the Union Économique et Monétaire de l'Afrique de l'Ouest (UEMOA) to which four (Burkina Faso, Côte d'Ivoire, Mali and Niger) out of the six countries covered in this study belong. UEMOA established on August 1, 1994, partly as reaction to the devaluation of the FCFA, has amongst its objectives:

- creating a common market for the member states based on the free flow of people, goods, services and capital, the right of individuals to set up businesses within the area, a common external customs tariff and a common trade policy;
- promoting the co-ordination of national sectoral policy and implementation in the areas of agriculture, environment, transport, infrastructure, telecommunications, human resources, energy, industry, mining and crafts; and
- where necessary for the smooth operation of the common market, harmonising legislation across member states, particularly the fiscal system.

In reality, progress in implementation has lagged behind stated objectives. Nonetheless, UEMOA members in early 2000 adopted a customs union and common external tariff and have harmonised indirect taxation regulations (e.g. value added tax, VAT). This process which has focused so far on macro-economic convergence needs to be extended to sectoral and trade policies influencing intra-regional, including livestock trade. In this context, elimination of tariffs on intra-regional trade within UEMOA is a welcome accomplishment as is the introduction of a common external tariff for improved products coming into UEMOA member states. At present, tariff rates vary from 0 to 20 percent

with meat and live animal imports attracting duties of 20 percent and 5 percent respectively. In the same vein, legislation should be tightened to eliminate illicit taxation.

Given that there are six additional countries (apart from the eight member states in UEMOA) in the larger Economic Community of West African States (ECOWAS) grouping, two of which are covered in this study, i.e. Ghana and Nigeria, where the UEMOA harmonisation guidelines do not extend, efforts need to be made using the communication channels already established by the Comité Permanent Inter-Etats de Lutte contre la Sech eresse dans le Sahel (CILSS) to extend the progress that has been achieved in UEMOA to these other countries to promote regional livestock trade. Mobilising the political will to move forward the policy harmonisation agenda in the region is a challenge which governments in the region will have to address.

7.4 Summary

This chapter has sketched out a framework that can provide guidance in the process of implementing policy changes to promote intra-regional livestock trade. A review of policy reforms undertaken in the study countries and options for policy harmonisation showed that:

- i. Tariffs have been reduced in most of the study countries and similar progress has been made towards tariff structure simplification;
- ii. The elimination of non-tariff barriers (NTB) and illicit taxation have been particularly problematic with no country achieving any significant measure of success with the probable exception of Ghana;
- iii. The pace of progress towards trade liberalisation has been particularly uneven in the case of the reduction of other duties and charges (ODC). While C te d'Ivoire, Ghana, Mali and Niger have implemented reduction measures, not much has been achieved in the cases of Burkina Faso and Nigeria; and
- iv. Harmonising livestock trade policies within the study countries will need to build on the progress that has been made in UEMOA member states on macro-economic convergence, adoption of a customs union and streamlined indirect taxation procedures. At a regional level, this call for strong political will on the part of governments in the larger ECOWAS grouping to extend what has been achieved in the UEMOA group to the entire 14 member countries in the regional economic community.

CHAPTER EIGHT

SUMMARY, CONCLUSIONS AND IMPLICATIONS FOR POLICY AND FURTHER RESEARCH

8.1 Summary

This study has analysed the economic, institutional and policy constraints to domestic livestock marketing and cross-border trade in six West African countries in order to provide a context within which policy reforms can be instituted to improve market efficiency and the welfare of those who depend on the livestock sector for their livelihoods. The main findings of the study can be summarised under four main headings, viz: i) livestock market operations, ii) livestock pricing, iii) costs and returns to livestock marketing and trade, and iv) livestock trade policy reforms in participating countries.

8.1.1 Market operations

- i. Livestock marketing channels in the study countries are partitioned into domestic and cross-border segments. Private entrepreneurs operating through a marketing chain involving collection, regrouping and terminal markets carry out the trade in live animals. While all traders (small-, medium- and large-scale) participated in the domestic segment of the marketing chain, only large-scale traders were involved in the export segment reflecting the huge initial capital investment involved in the export trade. Inadequate own-capital and limited access to credit effectively serve as market entry barriers to small traders who would like to get involved in cross-border livestock trade.
- ii. Although the marketing channels were found to be relatively unsophisticated there were a number of constraints to efficient functioning of markets arising from cumbersome formalities, exorbitant fees and taxes (both legal and illegal) collected along the trade routes, lack of well-marked out cattle corridors for trekking animals to frontier markets, occasional shortage of trucks for moving animals to terminal markets, a system of selling on credit, particularly to butchers, lack of market information and limited own-capital and access to formal credit sources. These constraints increase actual market and transactions costs and sometimes prevent market exchange from taking place.
- iii. Local-level market associations (e.g. COBAS in Mali) and other institutions at the national level (e.g. UNACEB in Burkina Faso) have emerged in recent years to facilitate livestock trade and lower marketing costs.

8.1.2 Livestock pricing

- iv. Buyers were willing to pay a premium for heavily built, castrated zebu cattle in excellent body condition. However, smallholder producers are not yet taking advantage of this opportunity as only about 10 percent of the cattle traded were rated as being in excellent body condition even though the results showed that efforts to finish animals properly and present them in good condition would be adequately compensated.
- v. Analysis showed that export traders offered a higher price for the same type of animal than itinerant traders and collectors indicating that producers would benefit more if they deal directly with export traders.

- vi. Two distinctly marked periods of sale of animals were observed: i) October–March, the off-peak period and ii) April to September, the peak period. It was observed that more animals were available for sale and prices offered for them were higher during the peak sales period than in the off-peak period.
- vii. The seasonal variation in livestock flows and prices affected traders' profits. It appeared that traders made higher profits in the peak period than in the off-peak season. This is one occasion when both livestock producers and traders benefited by doing business during the peak sales period.

8.1.3 Costs and benefits of livestock trade

- viii. Cross-border transportation and handling costs accounted for between 5.8 percent and 6.9 percent of the final price of cattle sold in Abidjan and Accra.
- ix. Official duties and taxes were high, particularly along the Burkina Faso–Côte d'Ivoire corridor (6.6% of final cost of animal), compared with 2.6 percent of the final price of animals along the Mali–Côte d'Ivoire corridor and 4.1 percent of the final price of animal along the Burkina Faso–Ghana corridor.
- x. Cross-border traders' margins ranged from 8.9 percent of the final price of animal along the Djefoula–Niangoloko–Port Bouet corridor to 12.4 percent of the final price of animal along the Niéna–Sikasso–Port Bouet corridor. These margins were more than double the margins made by traders operating in the domestic segment of the marketing chain.

8.1.4 Livestock trade policy reforms in participating countries

- xi. Tariffs have been reduced in most of the study countries and similar progress has been made towards tariff structure simplification;
- xii. The elimination of non-tariff barriers (NTB) and illicit taxation have been particularly problematic with no country achieving any significant measure of success with the probable exception of Ghana;
- xiii. The pace of progress towards trade liberalisation has been particularly uneven in the case of the reduction of other duties and charges (ODC). While Côte d'Ivoire, Ghana, Mali and Niger have implemented reduction measures, not much has been achieved in the cases of Burkina Faso and Nigeria; and
- xiv. Harmonising livestock trade policies within the study countries will need to build on the progress that has been made in UEMOA member states on macro-economic convergence, adoption of a customs union and streamlined indirect taxation procedures.

8.2 Conclusions

From these findings, the following major conclusions were drawn:

- i. The large number of producers, intermediaries, buyers and traders in the domestic segment of the livestock marketing channel create a near 'perfect' market condition that allows this segment to function reasonably well.
- ii. Livestock producers in the study countries could increase their earnings by marketing animals that are in good body condition rather than the present practice of selling all grades of animals. Devoting attention to properly finishing the

animals before presenting them for sale (e.g. through fattening) could increase the returns to producers.

- iii. Cross-border livestock trade is constrained by high transportation and handling costs, high direct, indirect and illicit taxes, and lack of market information. In addition, performance could be improved through the provision of credit facilities to enable aspiring traders overcome market-entry limitations posed by lack of own-capital and thus increase the number of traders and volume of trade.
- iv. Progress has been made in policy reforms aimed at liberalising livestock trade in the participating countries but the pace has been uneven and this continues to hamper intra-regional trade.

8.3 Implications for policy and research

The findings and conclusions of this study suggest three major policy thrusts namely: i) facilitating access to credit for livestock trade; ii) empowering livestock producers through provision of information on market prices, buyers' preferences, supply and demand of animals in major markets etc. and iii) lowering marketing costs.

8.3.1 Facilitating access to credit

Livestock trade is capital intensive for poor entrepreneurs. This explains why an overwhelming majority of traders interviewed in the various locations listed inadequate own-capital and difficult access to credit as the most limiting constraint to livestock trade and an important reason for joining market associations. The market associations have, in response to the needs of their members, been involved in obtaining and on-lending credit at interest rates varying between 8 percent and 12 percent on top of the banks lending rates but they have been able to meet only a small fraction of the requests. Nonetheless, by running such schemes successfully and still remaining in business, these market associations have demonstrated their competence and efforts should be made to use these channels to provide credit assistance to traders and producers in the future. This is particularly important since small-scale traders and producers on their own cannot satisfy the guarantee conditions usually stipulated by formal lending institutions. Innovative and less formal credit schemes that suit the production and trading situations of small-scale entrepreneurs, along the lines of the Grameen Bank in Asia, should also be explored.

8.3.2 Empowering livestock producers

Provision of information on consumer preferences, demand and supply of animals, market prices, government policies governing cross-border trade etc. can allow producers and traders to improve their earnings from livestock sales. This study has shown the preference of export traders for castrated, heavily built zebu cattle in excellent body condition but this information has apparently not filtered down sufficiently as there was no preponderance of castrated cattle in any of the markets to reflect this preference neither was there evidence of conscientious, extra effort on the part of the producers to ensure that the animals offered for sale were in excellent body condition. Similarly, many traders were unaware of new policies that have abolished certain levies and duties and this created room for unscrupulous border officials to exploit them.

These situations point to the importance of creating the necessary level of awareness, for instance, among livestock producers about buyers' preferences at the same time that market information is being relayed to them. Also improving general public awareness of

government policies will be useful to reduce ignorance of new policy provisions. Opportunities for experimentation and creative application of ICTs should be explored to promote improved information exchange among market participants—producers, traders and policy makers. A range of ICTs, including community radios, audio-visuals, Internet, mobile telephones etc., should be used to ensure that even the most marginalised groups can find a way to improve their access to the kind of information that is relevant to their livelihoods and that can empower them. Nonetheless, it goes without saying that the information being disseminated must be of good quality and timely to be of any use. Therefore, the network for data collection, collation, analysis and broadcasting that is under Component 1 of this project needs to be made sustainable over the long-term.

8.3.3 Lowering marketing costs

As shown earlier in this study, the system of livestock marketing and trade in the study countries is still highly personalised. A personalised marketing system has high transactions costs. In addition, there are physical marketing costs, e.g. transportation and handling costs and various official and illicit taxes that increase the overall cost of cross-border trade. Lowering these costs through the gradual institution of objective standards of pricing, formalised contracts and policy reforms would go a long way to improve the volume and value of intra-regional livestock trade and the welfare of those who depend on the livestock sector for their livelihoods.

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ANNEX I

A-I Analytical methods

Analysis of data on livestock marketing operations involving marketing channels, market participants and volumes and composition of flows of livestock in the channels was based on flow diagrams and charts and descriptive statistics. Partial trading budgets for domestic marketing and cross-border trade in cattle were developed and used to estimate costs and returns to marketing operations. Marketing costs were subsequently decomposed into physical marketing and transactions costs components to determine the magnitude of transactions costs relative to other marketing costs. Results for various itineraries investigated during this study were compared. This type of comparison was also done for identical livestock trade itineraries in this study versus previous studies.

The analysis of market integration and price formation required more rigorous econometric analysis. The technical details of the models used for them are presented below.

A-I.1 Testing for market integration—A dynamic approach

In order to test for market integration between the frontier markets and hinterland markets, the approach proposed by Ravallion (1986) was adopted. In this approach, the traditional static price correlation method was extended into a dynamic model of spatial price differentials. In this context the model combines time and space in price integration. However, a variant of the Ravallion model by Mendoza and Rosegrant (1995) based on the agricultural marketing system of developing countries which is characterised by a highly atomistic production side, with numerous peasants producing agricultural produce on small farms scattered all over the rural areas and by an oligopolistic market. Along this view, the market covered by a typical trader is generally narrow due to limitations in transportation and information system and inherent structural differences, such as naturally occurring geographical barriers as well as high transportation cost. Consequently, market service areas covered by traders do overlap and lead to a high degree of price competition between the traders buying from within the same location. Thus, a price change made by a trader will likely be matched with a similar price change by other competing rural traders. Nevertheless, traders operating outside this type of market are unlikely to react to a price change unless their competitors attempt to make in road into their own market area.

Following Mendoza and Rosegrant (1995), the multiple auto regressive model is given by:

$$\Delta P_{it} = \sum_{\alpha=1}^n [\alpha_p \Delta P_{i(t-p)}] + \sum_{t=1}^n [\beta_q \Delta P_{j(t-q)}] + e_{it}$$

where, $\Delta P_{it} = [N \times 1]$ vector of contemporaneous price changes in N markets at time t ;

$[\Delta P_{ict-p}]$ and $[\Delta P_{jct-q}]$ = historical or lagged values of price changes in N markets;

$[\alpha_p]$ is an $m \times p$ and (β_q) is an $n \times p$ vector of the estimated coefficients; and

e_{it} = serially uncorrected error terms.

However, because of the problems of near single matrix and multi-collineanty as a result of the inclusion of any variables with high correlation between, exogenous variables, a simplified version of the above equation was used to test for spatial and temporal arbitrage in livestock marketing. Thus, a bivariate auto regressive model of prices of markets for cattle is specified thus:

$$\Delta P_{it} = \alpha_0 + b_0 \Delta P_{it-1} + b_1 \Delta P_{jt} + k \sum b_j \Delta P_{jt-1} + e_t \text{ and}$$

$$\Delta P_{jt} = \alpha_1 + \beta_0 \Delta P_{jt-1} + \beta_1 \Delta P_{it} + \sum \beta. \Delta P_{it-1} + e_t$$

where, ΔP_{it} and ΔP_{jt} are contemporaneous (short-term) price changes in markets i and j respectively, for $i \neq j$;

$b_i \Delta P_{jt}$ and $\beta_j \Delta P_{it}$ = measures of instantaneous changes in P_{it} as P_{jt} changes on the one hand and P_{jt} as P_{it} changes, on the other hand;

ΔP_{it-i} and ΔP_{jt-i} = lagged price changes in markets in i and j included to capture any delayed responses in the different markets as price changes; and

α_0 , α_i , b_i , and β_j are parameter estimates.

However, the appropriate lag length is attained in this study by using Engle and Granger (1987) two step procedure of moving from general to specific models. In addition, the statement of the model implies that other livestock market locations (than the frontier markets) were regarded as 'local' (peripheral) and frontier markets as 'central' reference with respect to the other market. Using Granger causality the direction of causality was determined. The above implies that there is no assumption as regards which market determines prices in another. This is appropriate because of the recognition that while prices in frontier livestock markets are expected to determine prices in collection areas, the opposite can also hold.

The model is specified in its linear form. In order to ascertain the time series characteristics of the data and avoid spurious regression, stationarity test was applied using Argumented Dickey Fuller (ADF) test statistics. This gives the order of integration of the data usually denoted by I(D). In addition, co-integration test of the data was also carried out by testing for stationarity of the residuals from a static regression of the variables. Thereafter, the model was analysed using the differences form on the basis of the order to integration of the data.

Once co-integration is accepted, an error correction model (ECM) is specified which incorporates the residual from the static regression in its logged form. The parameter of the ECM gives the rate of adjustment of short-run equilibrium to long-run equilibrium values. This value is usually negative and is usually between 0 and 1 in absolute values. The higher the value, the more spontaneous is the rate of adjustment of short run equilibrium values to long run equilibrium values following a shock in the system.

Transactions' data obtained from the surveys were aggregated into weekly data for each frontier market as well as for recorded sources of livestock supply. All supply sources were aggregated to get a consolidated one price variable per week. This was done because weekly data were not consistently available for the numerous supply locations to match those at the frontier markets. However, by merging price data for hinterland collection markets consistent pairs of weekly prices were obtained for the analyses. This was done for the three frontier livestock markets where the study was carried out. However, because of lack of weighing facilities in Sikasso and the fact that the analyses was based

on price per kg live weight of the animal, only Niangoloko and Bitton had enough price per kg series for the exercise.

A-I.2 Livestock price formation

A hedonic price model was used to examine factors affecting livestock price formation while price variations in the three frontier livestock markets and over the seasons of the year were examined using means, coefficients of variation and charts.

In the study countries as in most of SSA, information on market prices and supplies of livestock to markets is not available on a regular basis and is sometimes completely lacking. In addition, there are no uniform standards (e.g. price per kg live weight for buying and selling animals), resulting in long negotiations between buyers and sellers. Under these conditions, the purchase price of an animal will reflect not only the bargaining skills of both buyer and seller but also the buyer's preference for the characteristics of the animal (sex, age, colour, breed, body condition), the purpose of purchase (resale, slaughter, fattening, breeding, draft power) and season of the year (Andargachew and Brokken 1993; Jabbar 1997). Using animal and market characteristics as independent variables, Andargachew and Brokken (1993) estimated explicit quadratic price determination models for each of the market types they studied (i.e. redistribution, intermediate and terminal). Such explicit models contain a large number of qualitative variables each with an equally large number of categories sometimes making interpretation of results cumbersome. Jabbar (1997) used the Analysis of Covariance (AnCov) technique to formulate a hedonic price determination model following Johnston (1972), and Cowell and Todd (1980).

For this study, a hedonic price model based on Analysis of Covariance (AnCov), was also used to determine factors influencing livestock prices. The model may be written as:

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_k X_{ik} + \phi_2 Z_2 + \phi_3 Z_3 + \dots + \phi_n Z_n + \varepsilon_i \quad \dots\dots\dots(1)$$

where Y_i is price per kg live weight of an animal; X s are covariates (continuous variables) e.g. age; Z s are factors (categorical variables) each with at least two categories (e.g. sex, body condition rating, breed, season of sale); β and ϕ are parameters to be estimated while n and k are the total number of β and ϕ to be estimated. Portugal and von Oppen (1999) eliminated day-to-day variation in prices used for their hedonic model through constructing a reference value based on the average price per survey interval, while Turner and Williams (2002) equalised the residual variance through a log transformation of price. Both of these price transformations were tried and the log transformation provided a better fit with the coefficients having signs that were consistent with theoretical expectations. Thus, the empirical model estimated was specified as:

$$\ln(\text{price/kg}) = \beta_0 + \beta_1 AGE + \beta_2 AGE^2 + \phi_1 SEX + \phi_2 COND + \phi_3 BRD + \phi_4 COL \\ + \phi_5 POP + \phi_6 TOS + \phi_7 TOB + \phi_8 SOS + \phi_9 FM + \varepsilon_i \quad \dots\dots(2)$$

where AGE = age of animal (in years), SEX = sex (castrate, female, male), $COND$ = body condition rating (very lean, lean, good, very good, excellent), BRD = breed, COL =

dominant colour, *POP* = purpose of purchase, *TOS* = type of seller, *TOB* = type of buyer, *SOS* = season of sale (cool dry, hot dry, rainy, harvest) and *FM* = frontier market.

There was an attempt to use the traders' survey to arrive at peak and off-peak sale periods but the periods given by the traders varied too widely. As a result, the above seasons of sale used by Turner and Williams (2002) were used in the econometric models.

Separate models were fitted for:

- i. all types of traded cattle (e.g. cattle sold for slaughter or destined for export) in the three markets (combined and independently),
- ii. separate models for traded cattle in each of the three markets with respect to season of sale and,
- iii. sheep and goats (combined) for Bittou market.

A-I.3 Cattle weights for the Sikasso frontier livestock market

Due to lack of a functional weigh-bridge in Sikasso, the weight of cattle traded or passing through the frontier market could not be obtained directly. Instead, cattle were measured for girth of the thorax (cm), body length (cm) and height at shoulder point (cm). Next, when measured live animals were slaughtered at the local abattoir next to the market, their carcasses were weighed using the scale in the abattoir. These carcass weights were regressed against body measurements to derive parameters for estimating the live weight of cattle exported through Sikasso. The resulting equation with $R^2 = 0.59$ and *t*-ratios in parenthesis is as follows:

$$\text{Live weight} = -469.15 + 1.970 \text{ height} + 2.914 \text{ girth} + 0.757 \text{ length}$$

$$(-19.196) \quad (8.549) \quad (18.652) \quad (3.645)$$

The cattle weights reported for Sikasso were estimated from the above equation and are comparable with those of Bittou and Niangoloko obtained directly. Although the cattle weights estimated for Sikasso compared well against those obtained directly from Bittou and Niangoloko, the accuracy of results based on these estimates depends on goodness of fit of the regression models used, which in this case is adjudged to be good²². Even with the good fit, the results for price per kg for cattle purchased in Sikasso need to be interpreted with caution.

A-I.4 Data limitations

The lack of weighing facilities in Sikasso resulted in data limitation, which were overcome for cattle that were measured for height, girth and length. Due to the fact that many of the export cattle arrived the market in trucks while transiting to the terminal market, the number of measurements were still not enough to provide enough weekly price data series for market integration analyses. This explains why only Bittou and Niangoloko were analysed for market integration.

²² The measures of the goodness of fit of a regression model include the appropriate sign of the coefficients of the variables and its statistical significance from zero, a high coefficients multiple determination and low standard error, and lastly, the overall significance of the model through the F-test (Olayemi 1998).

ANNEX II

A-II Technical details of the results from tests for livestock market integration

As indicated in the methodology, the ADF test statistics was employed to ascertain the time series characteristics of the price data for the four different markets. Market 1 (P_1) depicts the price in the peripheral market in Niangoloko area while market 2 (P_2) is the frontier market at Niangoloko. Market 3 represents markets surrounding Bittou (P_3) and the last market is Bittou frontier market (P_4). Table A1 shows the unit root test indicating the stationarity or non-stationarity of the price variables.

Table A1: Stationarity tests for the price variables for the Bittou and Niangoloko frontier markets and their sources of supply of cattle during July 2000–June 2001.

Variables	ADF values	Critical values of ADF at 1%	Remark
P_1	-3.325	-3.571	Non stationary
P_2	-2.965	-3.571	Non stationary
P_3	-3.382	-3.607	Non stationary
P_4	-2.881	-3.607	Non stationary
ΔP_1	-5.640	-3.575	Stationary
ΔP_2	-7.273	-3.575	Stationary
ΔP_3	-7.407	-3.612	Stationary
ΔP_4	-7.941	3.612	Stationary
Residual 1	-4.352	-3.571	Stationary

From the table, it is evident that the price series were not stationary at their original levels. This implies that any attempt to use the prices at that level will lead to spurious regression and by extension lead to invalid policy prescriptions. When the prices were, however, differenced once, they all became stationary as seen for ΔP_1 to ΔP_4 in Table A1. Thus, the first order differenced form of the prices were used in further analysis. To ascertain whether the variable co-integrated, the residuals from the OLS estimate of the price series in the two different sets of markets were tested for stationarity.

The ADF statistics of the residuals shows that they were stationary at the first difference level indicating co-integrating relationship between the hypothesised market pairs. This then provided validity for the running of the model outlined in the methodology (chapter three) using differencing equation. Having experimented with different equations (with varying numbers of explanatory variables), the restricted form of the equation, which provided best fit for each of the market pairs is presented subsequently.

Four weekly price series are defined for the presentation of results on market integration namely: D(Ser01) represents the average weekly cattle price series (first difference) for collection markets and farm gates that supply Niangoloko frontier market; D(Ser02) represents the average weekly cattle price series (first difference) for Niangoloko frontier livestock market; D(Ser03) represents the average weekly cattle price series (first difference) for collection markets and farm gates that supply Bittou frontier livestock

market; and D(Ser04) represents the average weekly cattle price series (first difference) for Bittou frontier market. Using Sexton et al. (1991), three characteristics of the market were tested. If in a given equation, the coefficient of the independent variables is zero statistically, then the markets are not integrated. They are segmented or segregated. However, if this value is 1 and statistically significant and the coefficients of the lagged own price and the lagged independent price are zero, then there is instantaneous adjustment in the price of the dependent market as a result of price change in the independent market. This situation is referred to as short-run integration and is an evidence of one price. If the lagged price of the independent variable is statistically significant and the coefficient of the lagged price of dependent variable as well as the coefficient of the independent variable is zero, then there is delayed response in the dependent market to price changes in the independent variable.

Table A2: Results of market co-integration test between Niangoloko frontier livestock market and its associated collection markets and farm gates. Dependent variable = Weekly price series (first-differenced) for Niangoloko frontier livestock market.

Variable	Coefficient	Std. error	t-statistic	Probability
Constant	0.3535	1.9389	0.1823	0.8562
D(ser01)	0.9488	0.0657	14.4430	0.0000
Residual (-1)	-0.5967	0.1347	-4.4287	0.0001
R-squared	0.8430	Log likelihood		-190.96
R-squared adjusted	0.8360	Durbin-Watson statistic		1.9231
S.E. of regression	13.3545	F-statistic		120.80
Sum squared residual	8025.44	Prob (F-statistic)		0.0000

The results show that the adjusted coefficient of determination (R-squared) is 0.836 for Niangoloko weekly price pairs, with the frontier market as the dependent market and the collection markets and farm gates as explanatory variables (Table A2). This, in essence, indicates that about 84% of the variations in average weekly prices of cattle at the Niangoloko frontier livestock market is explained by the average weekly prices of cattle in the collection markets and farm gates, during the same week. Also, the parameter of the error correction variable (Residual (-1)) is 0.5967 in absolute terms. This value lies between 0 and 1 (in absolute terms) and can be interpreted to mean that the rate of adjustment of short run price to long run price as a result of shock in the system is on the fast side—being greater than 0.5

Table A3: Results of market co-integration test between Niangoloko frontier livestock market and its associated collection markets and farm gates. Dependent variable = Weekly price series (first-differenced) for Niangoloko collection markets and farm gates.

Variable	Coefficient	Std. error	t-statistic	Prob.
Constant	0.0908	1.7841	0.0509	0.9597
D(ser02)	0.8424	0.0555	15.1770	0.0000
Residual (-1)	-0.6340	0.1523	-4.1612	0.0001
R-squared	0.8372	Log likelihood		-186.93
R-squared adjusted	0.8300	Durbin-Watson statistic		1.7496
S.E. of regression	12.2760	F-statistic		115.71
Sum squared residual	6781.58	Prob (F-statistic)		0.0000

A similar interpretation, as for Table A2 can be given to Table A3. The major difference in the latter case is that collection markets and farm gates were examined for how their average weekly cattle prices were affected by average weekly cattle prices in the Niangoloko frontier market. The results are similar in that weekly cattle prices in the hinterland of the Niangoloko varied (83 percent of the time) due to ruling cattle prices in the Niangoloko frontier market during the same week. The rate of reaction of traders in the Niangoloko frontier livestock market to short run changes in cattle price in the hinterland prices was found to be faster (0.6340) compared to the reverse, i.e. the reaction of traders in the hinterland (0.5967) when they learn of cattle prices in the frontier market.

The results of similar analyses for Bittou are summarised in Tables A4 and A5.

Table A4: Results of market co-integration test between Niangoloko frontier livestock market and its associated collection markets and farm gates. Dependent variable = Weekly price series (first-differenced) for Bittou frontier livestock market.

Variable	Coefficient	Std. error	t-statistic	Prob.
Constant	-0.4087	4.7232	-0.0865	0.9315
D(ser03)	0.7591	0.0835	9.0916	0.0000
Residual (-1)	-0.6436	0.1547	-4.1607	0.0002
R-squared	0.7194	Log likelihood		-191.07
R-squared adjusted	0.7042	Durbin-Watson statistic		2.1593
S.E. of regression	29.8683	F-statistic		47.42
Sum squared residual	33008.34	Prob (F-statistic)		0.0000

Table A5: Results of market co-integration test between Niangoloko frontier livestock market and its associated collection markets and farm gates. Dependent variable = Weekly price series (first-differenced) for Bittou collection markets and farm gates.

Variable	Coefficient	Std. error	t-statistic	Prob.
Constant	-1.3951	4.8568	-0.2873	0.7758
D(ser03(-1))	-0.3342	0.1031	-3.2418	0.0028
D(ser04)	0.8032	0.0992	8.0959	0.0000
D(ser04(-2))	-0.3674	0.1171	-3.1361	0.0037
D(ser04(-3))	-0.3125	0.1148	-2.7229	0.0105
Residual (-1)	0.6102	0.1625	3.7553	0.0007
R-squared	0.7891	Log likelihood		-174.29
R-squared adjusted	0.7551	Durbin-Watson statistic		1.8192
S.E. of regression	29.3716	F-statistic		23.1969
Sum squared residual	26743.47	Prob (F-statistic)		0.0000

Trends in Niangoloko were similar to those found for Bittou and its supply markets when the frontier market price series was considered the dependent variable.

Following from the above, it can be seen that there is instantaneous adjustment in price at Niangoloko frontier livestock market as well as the collection markets and farm gate sources of livestock in the Niangoloko area. Similarly, the price in Bittou frontier livestock market responds instantaneously to change in the price in its related livestock collection markets and farm gates. However, in addition to instantaneous response to change the price in Bittou frontier livestock market by the surrounding collection markets, there is also delayed response. The price in collection markets around Bittou is also determined by the lagged price (one week's lag) in the Bittou frontier livestock market.

In effect, Niangoloko and Bittou frontier markets are integrated with their respective collection markets and farm gate sources given that there is instantaneous adjustment in the price of the reference market relative to the price in other markets. The instantaneous adjustment gives credence to the existence of short run integration among the cattle markets in Burkina Faso. Fafchamps and Gavian (1998) conducted a study on the spatial integration of livestock markets in Niger using monthly price data on 15 animal categories collected in 35 districts and 3 urban centres over a period of 21 years²³. Their co-integration tests suggest that livestock markets are integrated along long-distance trade routes while districts removed from these routes are only loosely connected to the system. To the extent of examining short-run market integration, the above findings can be said to be in agreement with the findings of this study. For long run integration, Fafchamps and Gavian (1998) add that over extended periods of time, prices in any given district can drift apart from prices in most other districts.

²³ Fafchamps and Gavian reported that the data was of questionable quality and hoped that the sheer size of the data points (87 thousand) compensated somewhat for the deficient quality.

To test the causality between the market pairs, a pair wise Granger causality test was carried out. Using a standard F-test that the parameters of the stated equation are zero, a rejection of this null hypothesis is taken to indicate that price in market j Granger causes price in market i . If prices in market i also Granger-cause prices in market j then, prices are determined by a simultaneous feedback mechanism (SFM). This is the phenomenon of bi-directional Granger causality. A one-way Granger causality is referred to as uni-directional Granger causality and the market which Granger-causes the other is referred to as exogenous market. However, there can be weak or strong exogeneity. There is weak exogeneity if the marginal distribution of $P_{i(t-1)}$ is independent of the joint distribution of both $P_{i(t-i)}$ and $P_{j(t-i)}$. On the other hand, strong exogeneity exists when there is no significant Granger causality from the other variable (Hendry 1986).

Table A6: Pairwise Granger causality tests for price series for Bittou and Niangoloko frontier livestock markets and their associated sources of livestock.

Null hypothesis	F-statistic	Probability
Niangoloko FLM does not Granger cause Niangoloko hinterland	4.1435	0.0228
Niangoloko hinterland does not Granger cause Niangoloko FLM	5.0324	0.0110
Bittou hinterland does not Granger cause Niangoloko hinterland	2.3487	0.1108
Niangoloko hinterland does not Granger cause Bittou hinterland	0.3124	0.7338
Bittou FLM does not Granger cause Niangoloko hinterland	1.5734	0.2180
Niangoloko hinterland does not Granger cause Bittou FLM	0.4461	0.6438
Bittou hinterland does not Granger cause Niangoloko FLM	1.5807	0.2206
Niangoloko FLM does not Granger cause Bittou hinterland	0.6258	0.5409
Bittou FLM does not Granger cause Niangoloko FLM	1.4667	0.2449
Niangoloko FLM does not Granger cause Bittou FLM	0.4980	0.6121
Bittou FLM does not Granger cause Bittou hinterland	0.1599	0.8529
Bittou hinterland does not Granger cause Bittou FLM	0.5529	0.5804

*FLM refers to frontier livestock market.

In line with the above, the results of the Granger causality test are presented in Table A6. From the table, it is evident that there is no form of causality in the Bittou frontier market and the surrounding markets. In addition, there is no causality in prices between the Niangoloko and Bittou frontier livestock markets. However, since there is bi-directional relationship in the prices in Niangoloko axis then there is some sort of weak exogeneity between the markets. The above results suggest that livestock prices in the Niangoloko area responded to both demand (frontier market) and supply (collection markets and farm gate) shocks, even though weakly, while for Bittou and its supply sources of cattle, no price response pattern could be ascertained.

Given the different contributions of the farm gates, collection markets, and the frontier livestock markets to total exports, the above results are not entirely surprising. All the export cattle through Bittou frontier livestock market were purchased at the frontier market. This is expected to contribute to the dislocation of transmission of price shocks

between the frontier market—where the export traders typically do all their business—and the hinterland (see Figure 4.11). On the other hand, in the case of Niangoloko, export traders sourced 69.1 percent of their cattle from collection markets and the rest from the frontier market. This movement of export traders further afield could account for the demand and supply price responses recorded for the Niangoloko livestock marketing channel. It could be speculated that if sufficient weighed animals allowed a similar analyses for Sikasso, the likelihood would be high for the existence of significant Granger causality between its frontier market and the rest of the hinterland since export traders that operated that channel used farm gates (74.7%), collection markets (24.9%) and, therefore, had strong interaction with the hinterland.

Finally, it could be said that overall, the results show only short run market integration and weak responses to demand and supply shocks in the marketing channels of the Bittou and Niangoloko markets and suggest the existence of price inefficiency due to weak price transmission. This points to the need to put in place effective livestock market information systems in the study area as a policy option to improve livestock pricing in the central corridor.



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