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# **Livestock marketing in the Ethiopian highlands: Changes in structure and conduct since market liberalization in 1991**

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**Abstract:** Current knowledge of the livestock marketing system in Ethiopia is poor and inadequate for designing policies and institutions to reduce inefficiencies in the system and improve the distribution of livestock. This paper addresses this knowledge gap by using survey data from 38 livestock markets conducted in 2002 in the highlands of Ethiopia to examine the structure and conduct of livestock markets. It also examines changes in the structure and conduct since 1991 when the agricultural development-led industrialization and market liberalization policies and strategies were launched. The findings suggest that improvement in stocking facilities can help to increase and sustain marketing activities throughout the year and, thus, reduce problems associated with seasonality and unstable prices. In addition, improvement in credit, licensing, and means of enforcing market contracts will also be important.

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## **1. Introduction**

Ethiopia has the largest population of livestock in Africa, contributing annually about 30-35% of agricultural gross domestic product (GDP) and 13-16% of total GDP. Livestock are essential in improving food security and reducing poverty in smallholder farming systems that exist in Ethiopia. In these systems, mixed crop-livestock especially, oxen are the main means of draft power, equines provide the main form of transport, and livestock in general are an important source of food, cash income, manure, and insurance against crop failure.

Despite its importance in improving food security and reducing poverty, current knowledge of the livestock marketing system is poor and inadequate for designing policies and institutions to reduce inefficiencies in the system and improve the distribution of livestock. The recent review of the studies on livestock marketing in Ethiopia by Ayele Solomon et al. (2003) shows the knowledge gap on the topic.

Filling this gap is the objective of this paper. Survey data from 38 live animals (livestock) markets conducted in the highlands of Ethiopia in 2001/02 are used to examine the structure and conduct of live animals markets, and examine changes since 1991 when the agricultural development-led industrialization (ADLI) and market liberalization policies and strategies were launched.

In the next section, the surveyed markets and data collected are presented. This is followed in section 3 by a descriptive analysis of the data regarding livestock market situation, structure and conduct. Then changes in the above aspects of the market since 1991 are presented. In section 4, a synthesis of the descriptive results and implications for improving livestock marketing in the Ethiopian highlands are presented. Conclusions and are presented in section 5.

## **2. Survey and data**

Market-level and trader-level surveys were carried out in 38 livestock markets in the highlands of Amhara, Oromiya and Tigray regions and Dire Dawa special region between

December 2001 and June 2002.<sup>1</sup> These markets were randomly selected from those associated with the project on *policies for sustainable land management in the highlands of Ethiopia* on which a markets component project was developed (reference). Table 1 shows the list of markets surveyed by region, zone, and district (*wereda*). The main respondents are key informants or representatives in the market or experts from trade bureaus, municipalities, and agriculture bureaus. Structured questionnaires were used to collect information on the market situation, structure and conduct of livestock traders, infrastructure, institutions, and mechanisms of livestock distribution. In addition, information were collected on changes in the above since 1991, when the current government came to power and launched the agricultural development-led industrialization (ADLI) and market liberalization policies and strategies.

### **3. Situation, structure and conduct of livestock markets, and changes since 1991**

#### ***Market situation***

Classifying livestock markets as primary, secondary or terminal is common. In this survey, however, there was no information to use to estimate the proportion of markets that fall into each category. However, about 78% of the markets surveyed served as an assembly point of animals for other markets. This suggests that several of the markets did not play a significant role in the distribution of livestock in the highland areas. For those serving as assembly points, livestock were assembled over relatively short distances, averaging 44 kilometres (km).

Use of stocking facilities (including fencing and feeding and watering troughs) by traders was not common. Use by some traders was reported in only 37% of the markets.

Livestock markets are often under the control of local authorities, and are normally convened in an open area, which is occasionally fenced. The individual sellers do not have any fencing and they stand about with their livestock close by, while the buyers circulate to bargain with the sellers. When the animals have to be fed, hay is usually brought and put on the ground. In

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<sup>1</sup> From these 38 markets, 131 livestock traders were randomly selected to collect information on traders' assets, business practices, trading activities, transaction costs, margins and profits, and problems. These data are analysed in a separate paper by Jabbar and Benin (2004) to be presented at this workshop.

the markets where use of stocking facilities by traders was reported, very few traders (4 per market on average) actually used them. Examining the change in availability of stocking facilities since 1991 shows that the situation has remained unchanged in a majority of the markets (24 of the 38 markets). Twelve of the markets reported an improvement in the availability of stocking facilities, while the remaining two markets reported a decrease.

Access to credit seems limited. Although financial institutions that provided loans to live animal traders were present in 41% of the market towns, only 25% of the traders in those places had access to loans.

### ***Market structure***

To understand the market structure, we examine the number and/or change in the number of different types of traders (wholesalers, retailers and brokers), private live animals transporters, and meat processors. Information on regulation and taxation, inspection, enforcement, and trade associations are also analysed. Although most of information here were collected and analysed by type of animals (i.e., cattle, small ruminants (sheep and goats), and pack animals), we only present the results with respect to cattle and small ruminants, as these were the main livestock that were traded. However, separate discussion for cattle and small ruminants are presented only when there are significant differences.

### ***Traders and infrastructure***

The total number of traders, including wholesalers, retailers and brokers, increased substantially since 1991, with the number of retailers increasing the most, followed by wholesalers and then brokers (Figures 1 and 2). The increment in the number of traders was larger between 1991 and 1996 compared to that in the period between 1996 and 2002. For example, while 75% of the markets reported that the number of retailers increased by a little or a lot between 1991 and 1996, about 65% reported a similar change between 1996 and 2002. Very few of the markets reported a decline in the number of traders, which mostly occurred between 1996 and 2002. A remarkable observation is the change in number of unlicensed traders. For example, about 80% of the markets reported that the number of

unlicensed livestock traders increased by a little or a lot between 1996 and 2002. Note that the pattern of change in the number of traders (either licensed or unlicensed) was identical for both cattle and sheep and goat traders (Figures 1 and 2).

There were not many private transporters in the business of transporting live animals. On average, the number of private transporters operating in each market town was about six, with a mere 7% of them transporting live animals. Almost all of the transporters were involved with grain and other crop products. The situation has changed in several markets since 1991, although it became worse in some between 1996 and 2002 (Figure 3). Between 1996 and 2002, about 42% of the markets reported that the number of private transporters operating in the market town had increased by either a little or a lot, 47% reported that the situation had not changed, while the remaining 11% of the markets reported that the number of private transporters operating in the market town had declined by either a little or a lot.

Meat processors play a significant role in the distribution of livestock for consumption purposes. The average number of slaughterhouses, butcheries, and restaurants that were present in the market towns almost doubled or more than doubled between 1991 and 2002 (Table 2). Restaurants and butcheries were by far the most common, averaging 16 and 13 per market town in 2002, respectively. The number of meat-processing factories, however, remained unchanged. Actually, only one of the market towns had a meat-processing factory.

#### *Regulation, taxation and enforcement*

As mentioned earlier on, livestock markets are primarily under the control of local authorities. We found that several institutions, including the city council, *wereda* administration, ministry of trade and the inland revenue service, were responsible for different activities with respect to regulation and infrastructure development. It was clear in almost all of the markets (more than 95%) which authority was responsible for levying and collecting taxes and providing security. In several of the markets (24-37%), however, it was not known who was responsible for licensing, health issues or infrastructure development (Table 3), leading to poor inspection and maintenance of the market facilities. For example, only 24% of the markets reported that traders' stocking facilities were inspected regularly.

Table also 3 shows the responsible authorities for different aspects of market development in those markets where the responsible authorities are known. The results show clearly that different authorities are responsible for carrying out the same activities in different markets, or that a particular authority is responsible for different activities in the same market. Regarding regulatory certain activities, however, there are some dominant authorities that are responsible. For example, licensing and entry were primarily controlled by the ministry of trade in most of the markets (54%). Taxation was equally controlled by the city council and the inland revenue service. Security, health issues and infrastructure development were controlled mostly by the city council, followed by the *wereda* administration. The private sector was also involved in all aspects of regulation, enforcement and infrastructure development in about 5-10% of the markets.

An important aspect of market structure is barriers to entry or obtaining a trading license, especially given the huge influx of unlicensed livestock traders. It is surprising that in about 55% of the markets, it was reported that livestock traders were not required to obtain a license to operate in the market. On the other hand, obtaining a license where it was required did not seem to be much of a problem either, as it was reported in 65% of those markets that it was not difficult to obtain a trading license. Even in markets where it was reported that a trading license was not required, in about 67% of them, it was felt that obtaining a license would not be difficult. These results suggest that entry and exist is very easy.

Various forms of taxes were levied on traders' transactions or on traders operating in the market. These include municipality market levy (occurring in 84% of the markets), inland revenue tax (37%), infrastructure and development tax (34%), municipality tax (32%), and *kella* (24%)<sup>2</sup>. We found that the level of taxes has increased in many markets since 1991 (Figure 4). Most of the markets (50-75%) reported that municipality market levies, inland revenue taxes and municipality taxes have increased by either a little or a lot since 1991. Regarding infrastructure and development fees and *kella*, a majority of the markets (60-70%) reported that they had not changed, although a few of them reported they had declined by either a little or a lot. Note that since the change in taxes is measured by an ordinal index

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<sup>2</sup> *Kella* is a form of tax collected at road checkpoints.

(increased or decreased by a little or a lot or no change), we cannot make any inference regarding change in real value terms due to inflation, for example.

Enforcement of market contracts was primarily done outside of the legal peasant association or district courts. In most cases, traders used community and religious leaders, friends and peers, or personal resolution to settle their disputes (Figure 5).

### ***Market conduct***

Here we examine traders' specialization and investment behaviour, seasonality of marketing activities, competition, property rights and enforcement, grades and standards, problems facing market participants.

#### *Specialization and investment behaviour*

In most of the livestock markets, traders engaged in other income-earning activities, including farming, services, and other commodity trading. It was only in a few of the markets (about 11%) that some of the traders specialized in livestock trading and did not engage in other income-earning activities. Regarding species specialization, however, many of the traders specialized in either cattle or small ruminants. This type of specialization has increased since 1991 in most of the markets (65-70%; Figure 6). Between 1996 and 2002, however, several of the markets (about 20%) reported a decline in specialized species trading activities.

Investment behaviour of traders in vehicle purchases, expanding stocking facilities, etc. has not changed by much since 1991 (Figure 7), compared to changes in other aspects of the markets. About 34 % of the markets reported that traders' investments had increased either by a little or by a lot. In a few markets (less than 5%), however, it was reported that traders' investments had declined since 1996. As the change in investments was measured by an ordinal index (increased or decreased by a little or a lot or no change), we cannot make any inference about the change in the real value of investments.

#### *Seasonality and competition*

As expected, livestock trading activities tended to be seasonal and were concentrated between



January and May (Figure 8). March and May were the two most important months, although cattle trading activities dominated those of sheep and goats. April, February and January were the next in order of importance. Unlike in March and May, however, sheep and goats trading activities dominated. On average, the number of livestock traders increased by about 55% between the peak and non-peak months, while the number of livestock transporters increased by about 22%. These findings are consistent with common knowledge and empirical evidence that the volume of livestock sales or purchases and prices are highest during religious festivals (Ehui et al. 2000; Andargachew and Brokken 1993). One of the most celebrated religious holidays in Ethiopia is Easter, which occurs in March. However, April and May also coincide with the beginning of the cropping season when farmers tend to sell off livestock to purchase key farm inputs or even food consumption items, as food stocks (especially grain) from the previous harvest is depleted.

We also examined how seasonality in livestock trading (including marketed volume, prices, and number of traders and transporters) has changed over the years. In most of the markets (65-75%), seasonality with respect to marketed volume, prices and number of traders had increased either by a little or a lot since 1991 (Figure 9). That is, these aspects of livestock marketing have tended to be concentrated more in a few months or, in other words, the difference between the peak and non-peak activities has increasingly widened. In some of the markets (about 25%), however, seasonality in prices has declined since 1991. Seasonality in the number of livestock transporters has remained fairly stable since 1991, increasing in about 30% of the markets only.

A very important aspect of market conduct is price determination. Livestock prices in the markets were not fixed from outside. Prices are determined by supply and demand, and in most of the markets by direct buyer-seller negotiation. In a few of the markets (about 18%), however, prices were mostly negotiated through a broker.

#### *Property rights enforcement*

One of the remarkable findings from the surveys was the sense of a high level of security in the market place. It was only in one market that some level of insecurity was expressed, due

to the rare incident of theft. In addition to the sense of a high level of security, there was a general feeling that the level of security had increased since 1991. For example, in 81% of the markets, it was felt that the level of security had increased by either a little or a lot. While in the remaining 19% of the markets, it was felt that the level of security had not changed.

#### *Grades, standards, and marketing problems*

In most developing countries, one of the major constraints in the development of markets in general and livestock markets in particular is the limited use of grades and standards. In most cases, breed is commonly used for distinguishing among a particular species of livestock. In a little over one-half of the markets surveyed, known names were used to refer to different breeds that were traded in the markets. However, other factors were also used. For cattle trading for example, region of origin, colour and appearance, size, and horn, in that order of importance, were also used to determine breeds. In the case of small ruminants, colour and appearance, region of origin, and hair or wool were also used. To differentiate level of quality within a particular breed, body condition and weight were used for both cattle and small ruminants.

Several problems facing the markets were identified. Table 4 shows how the problems were ranked. The most common problems mentioned, in order of importance, were unstable prices, too low or high prices, poor quality of breeds, weak market infrastructure (trekking routes, watering holes, information, etc.), and unlicensed traders. Unfortunately, there were no trade associations in any of the markets, and none of the traders in any market got together to collectively discuss and try to solve the problems facing them. This is unlike in grain or coffee markets where trade associations exist and traders collectively discuss problems (Wolday Amha and Eleni Gabre-Madhin, 2003).

#### **4. Synthesis of results and implications**

Although the contribution of livestock to the Ethiopian economy and the livelihoods of smallholders is large, the livestock production system is not adequately market oriented. In the highland areas, cattle are mainly kept for farm draft power and milk production, small

ruminants for occasional sale, and equines for transportation. As such, strategic production for the market is not evident, except where sales are targeted to religious holidays such as Easter. Consequently, livestock marketing is not well developed, compared to grain and coffee marketing for example. Livestock marketing is characterized by small-scale businesses with very few assets, personalized trading (mostly with known people), and trading over very short distances. The implication is that animals have to be traded several times in order to reach the large and terminal distant markets. This has the tendency of increasing handling costs, thereby raising retail and suppressing farm-gate prices.

Seasonality in marketing is a common phenomenon with most agricultural products, especially in developing countries. However, the problem of unstable prices and too high or low livestock prices is tied to targeting sales to a few days only in an entire year (when there is a huge oversupply of livestock) as well as under demand in the rest of the year, especially during religious fasting periods. Increasing and improving stocking facilities so that animals can be stocked in the market for long periods of time can help to stabilize prices. To increase and improve traders' investment in stocking facilities, the credit situation needs to be addressed, as the results show that access to credit by livestock traders was very limited.

The issue of unlicensed traders is unclear. In more than one-half of the markets, it was reported that trading licenses were not required. Whether or not this is legally true is not clear, as it is likely that traders were stating their disapproval of obtaining a license. Interestingly, in the others where licenses were required, it was generally felt that obtaining a license was not difficult. The same feeling exists even in the markets where it was reported that licenses were not required. This begs the question, why so many unlicensed traders then? This is likely due to the taxation system, as it was reported that multiple and non-transparent taxes was a problem. Since unlicensed traders cannot be taxed (in the legal sense), traders prefer to operate without it. A similar situation exists in grain and coffee markets (Wolday Amha and Eleni Gabre-Madhin, 2003). The consequences are loss of revenue for the government and encouragement of informal livestock markets, making enforcement of marketing contracts more difficult.

## 5. Conclusions

Using survey data from 38 livestock markets in the highlands of Ethiopia, this paper examined the structure and conduct of livestock markets, and changes since 1991 when the agricultural development-led industrialization (ADLI) and market liberalization policies and strategies were launched.

Most of the markets seemed ad hoc, as traders mostly convened in an open area with very little, if any, infrastructure development. Use of stocking facilities (fencing and feeding and watering troughs) was rare. For traders with some stocking facilities, the number and quality were poor, and have not improved by much since 1991. Nevertheless, the number livestock traders (wholesalers, retailers and brokers) have increased significantly since 1991. In addition, livestock and meat processors such as butcheries and restaurants have more than doubled, while other processors have remained unchanged.

It was clear in almost all the markets (about 95%) the institution that was responsible for levying taxes and providing security. In many of the markets (24-37%), however, it was not known who was responsible for licensing, health issues and infrastructure development. Thus, it is not surprising that there were many unlicensed traders operating in the markets, and their number have increased substantially since 1991. In addition, there was regular inspection of traders' facilities in a few markets only.

Livestock trading activities are competitive, as there was no monopolistic or collusive price setting. Prices were determined mostly by direct buyer-seller bargaining and occasionally through a broker. There were no legal means (i.e., through a court) of enforcing market contracts, and so traders resorted mostly to elder mediation, friends or personal resolution. As expected, the bulk of trading activities through the year coincided with the most celebrated religious holidays or just before the cropping season when farmers sell livestock to purchase key farm inputs or consumption goods to replenish food stocks from the previous harvest.

Common problems facing the markets include unstable prices (including too high or low prices), poor quality of breeds, and weak infrastructure (trekking routes, watering holes, information, etc.).

## References

- Andargachew, K. and Brokken, R.F. 1993. Intra-annual sheep price patterns and factors underlying price variations in the central highlands of Ethiopia. *Agricultural Economics* 8:125-138.
- Ayele Solomon, Assegid Workalemahu, Jabbar, M.A., Ahmed, M.M., and Belachew Hurissa. 2003. Livestock marketing in Ethiopia: a review of structure, performance and development initiatives. *Socio-economics and Policy Research Working Paper 52*. ILRI (International Livestock Research Institute), Nairobi, Kenya.
- Ehui, S., Benin, S., and Gebreselassie, N. 2000. Factors affecting urban demand for sheep: The case of Addis Ababa, Ethiopia. *Socio-economics and Policy Research Working Paper 31*. ILRI, Nairobi, Kenya.
- Wolday Amha and Eleni Gabre-Madhin. 2003. An analysis of the structure, conduct, and performance of the Ethiopian grain market. Presented at the Workshop on Harnessing Markets for Agricultural Growth in Ethiopia: Bridging the Opportunities and Challenges, ILRI, Addis Ababa, Ethiopia, 7-8 July 2003.

Table 1. Names of markets surveyed, by region, zone and district in the highlands of Ethiopia

Region	Zone	District	Market	Market Classification
Amhara	North Gondar	Gondar Zuria	Gondar	Secondary
	South Gondar	Farta	Debre Tabor	Primary
	East Gojjam	Machakel	Amanuel	Primary
		Gozamen	Debre Markos	Primary
	West Gojjam	Bahir Dar Zuria	Bahir Dar	Secondary
			Tis Abay	Primary
		Bure Wonberma	Bure	Primary
	North Shewa	Gerakey	Mehal Meda	Primary
		Mida	Meranya	Primary
	South Wollo	Kalu	Habru	Primary
		Tuluhedere	Haik	Primary
		Dessie Zuria	Dessie	Secondary
Oromiya	West Shewa	Chelia	Jaji	Primary
	West Wellega	Ayira Gulibo	Gulibo	Primary
		Gimbi	Gimbi	Primary
		Lalobabie	Inango	Primary
		Guto Wayu	Nekemphe	Secondary
	East Wellega	Algesachi	Algae	Primary
		Metu	Metu	Secondary
	Illubabor		Nopha	Primary
		Arsi	Assela	Secondary
		West Harrege	Tulo	Primary
		Chiro	Asbe Teferi	Primary
Dire Dawa	Dire Dawa	Dire Dawa	Dire Dawa	Secondary
Tigray	South Tigray	Hintalo Wejerat	Adigudum	Primary
		Enda Mokoni	Maychew	Secondary
		Alimata	Alimata	Primary
		Ambalage	Adishiho	Primary
		Enerta	Quiha	Primary
		Kolla Tembem	Abiy Adi	Primary
		Adwa	Adwa	Primary
		Tahtay Koraro	Axum	Secondary
	East Tigray		Wukro Maray	Primary
		South Mekelle	Mekelle	Secondary
		Shebe Tsaedaembo	Edaga Hamus	Primary
		Atsbi Wenberta	Atsbi	Primary
		Gonta Ageshum	Adigrat	Secondary
	North-west Tigray	Tatay	Shire	Secondary

Table 2. Average number of livestock and meat processors in the market towns, by year

Type of processing agent	1991	1996	2002
Slaughterhouse	0.51	0.73	0.92
Butchery	6.05	8.84	12.62
Meat factory	0.03	0.03	0.03
Meat sellers or restaurants	6.92	11.57	6.92

Table 3. Institutions responsible for aspects of market development

	Licensing and entry	Taxation	Security	Health concerns	Infrastructure
City council	2	11	16	7	11
<i>Wereda</i> administration	1	2	8	5	3
Ministry of trade	15	2	0	0	0
Inland revenue service	2	10	0	0	0
Private operators	3	4	3	3	1
Others	0	4	8	12	5
No one	4	3	2	2	3
Don't know	11	2	1	9	14
<b>Total</b>	<b>38</b>	<b>38</b>	<b>38</b>	<b>38</b>	<b>38</b>

Table 4. Ranking of marketing problems (% of markets reporting), by species

Marketing problem	Cattle		Sheep and goats	
	1 <sup>st</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>
Too low/high prices	13.5	5.6	11.1	5.6
Unstable prices	27.0	5.6	30.6	2.8
Poor quality of goods	10.8	13.9	8.3	16.7
Absence of grades and standards	--	5.6	--	5.6
Multiple taxes or non-transparent taxation	--	8.4	--	8.4
Difficulties in obtaining license	--	--	--	--
Unlicensed traders	8.1	11.1	8.3	16.7
Weak infrastructure (trekking routes, etc)	5.4	11.2	5.6	11.2
Limited credit access	5.4	8.3	5.6	8.3
Weak legal system of contract enforcement	--	2.8	--	2.8
Absence of government support	2.7	2.8	2.8	2.8
Weak demand	5.4	5.6	5.6	5.6
Other	21.6	19.4	22.2	13.9

1<sup>st</sup> and 2<sup>nd</sup> mean first and second most important, respectively.

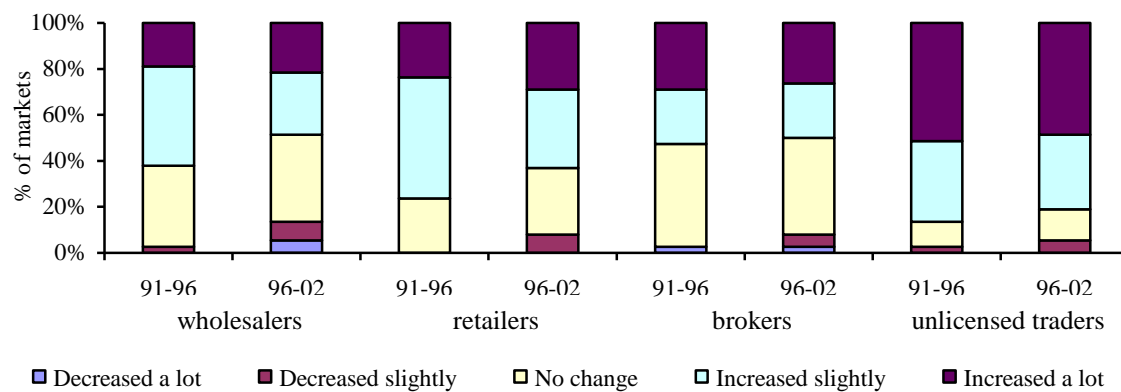


Figure 1. Change in number of cattle traders

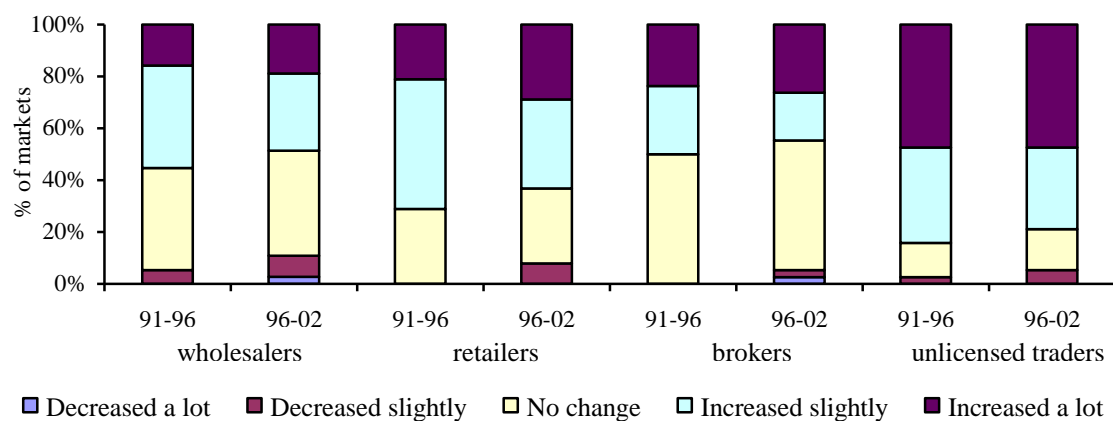


Figure 2. Change in number of sheep and goats traders

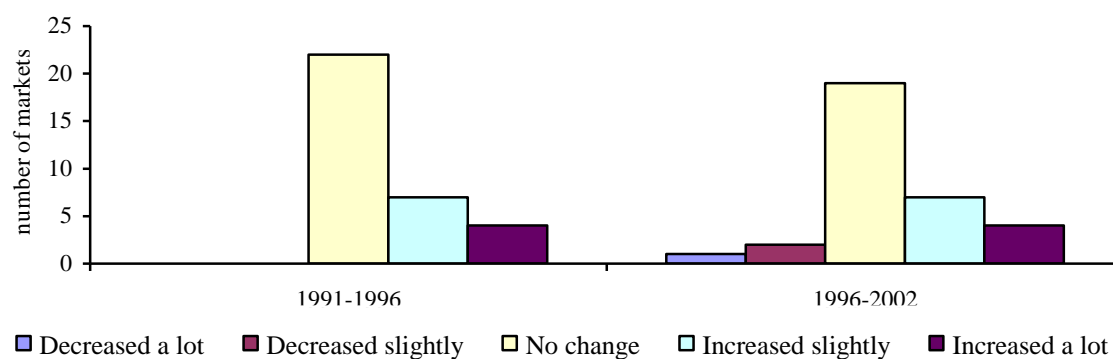
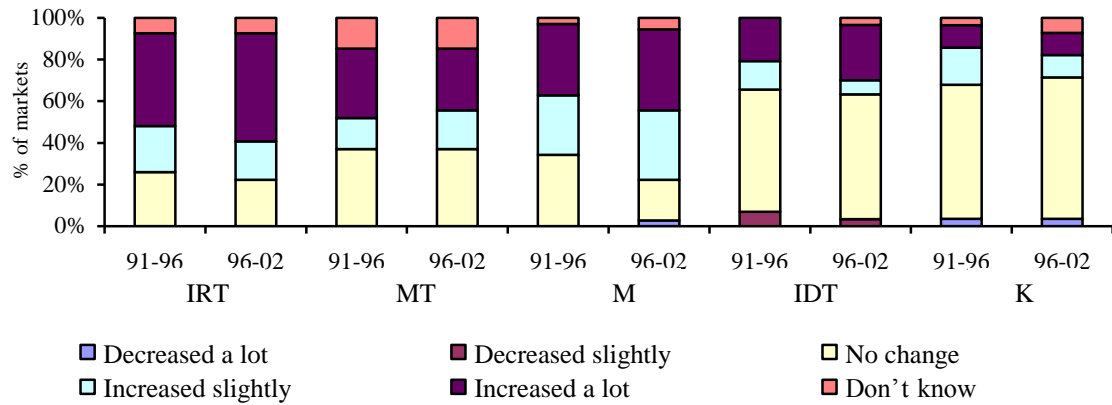


Figure 3. Change in number of private transporters





Notes: IRT is inland revenue tax; MT is municipality tax; ML is market levy; IDT is infrastructure and development tax; and K is *kella*.

Figure 4. Change in level of taxes

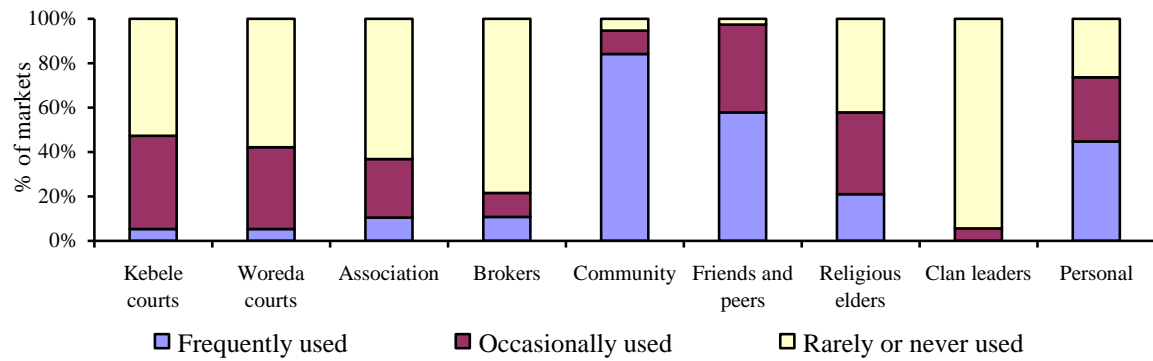


Figure 5. Means of settling dispute

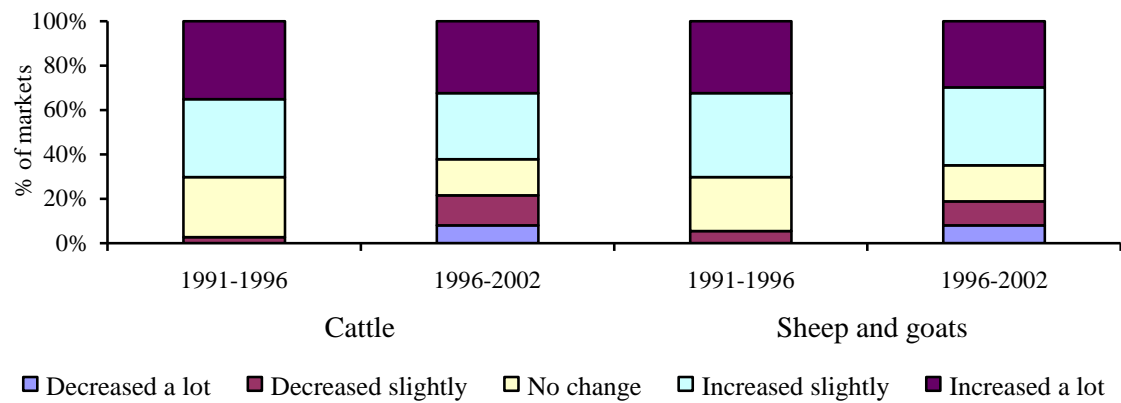


Figure 6. Change in number of specialized species trading

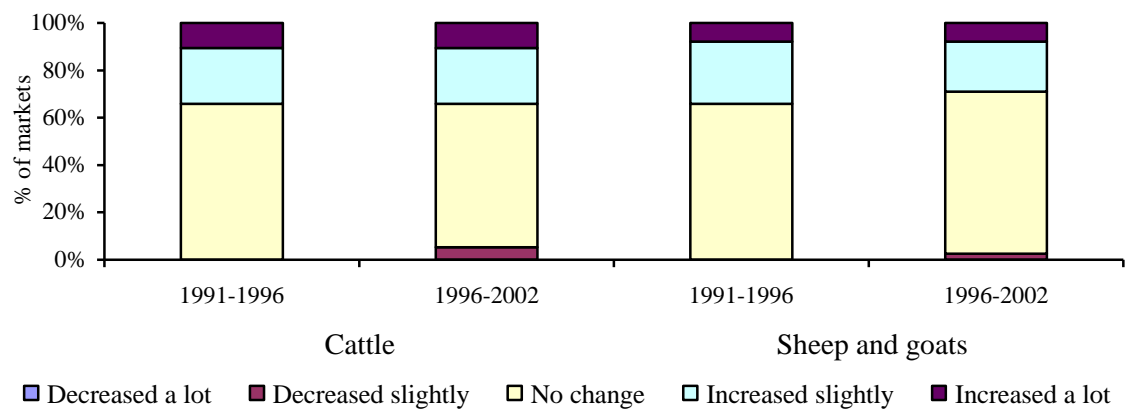


Figure 7. Change in traders' investments

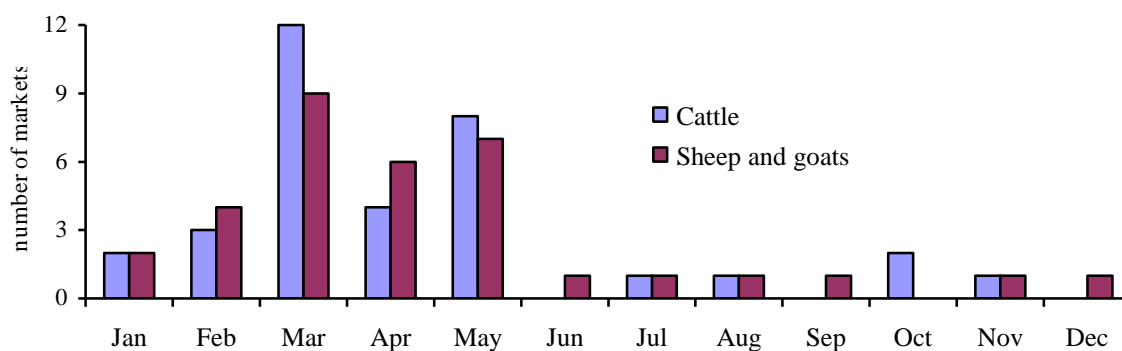


Figure 8. Seasonality of trading activities

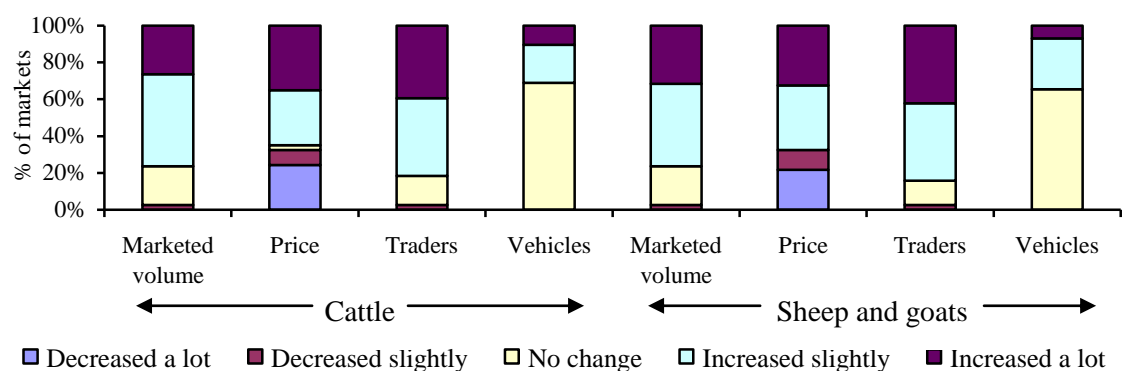


Figure 9. Change in seasonality of trading