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Commercial Offtake of Cattle under Smallholder Mixed Crop-Livestock Production System in Ethiopia, its Determinants and Implications for Improving Live Animal Supply for Export Abattoirs

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Background and Justification

Recently, several large scale meat processing abattoirs have been established in Ethiopia in response to the emerging meat export opportunities to the Middle East and North African Countries. There are also several meat export abattoirs under construction and more are planned to be established in the near future in different regions of the country. These developments are in the right direction toward diversifying and increasing Ethiopia's foreign exchange earnings and improving the livelihoods of livestock producers and other actors engaged in the livestock related activities.

However, one of the major challenges facing the meat export abattoirs has been that the competitiveness of these firms in the domestic and export markets has been limited by the underutilization of their meat processing capacities. It has been observed that the live animal throughput is inadequate and as a result the existing meat processing facilities operate at less than 50% of their operational capacities. This is apparently due to inadequate supply of the required quality live animals for meat processing by the export abattoirs. The export abattoirs are competing for the domestic supply of live cattle and

shoats with the demand for live animals for domestic consumption, and for formal and informal (cross-border) trade.

The key issue is that when the meat processing abattoirs are not operating at their optimum capacity they are not minimizing their costs of operations and they are facing cost disadvantage which makes them less competitive in the global or regional meat market. The meat export abattoirs are also required to ensure a consistent and continuous supply of meat in order to meet the demand of the customers in the importing countries. Thus, there is an urgent need for meat export abattoirs to devise alternative strategies to ensure adequate market supply of quality live animals to meet their processing needs in order to improve their efficiency and competitiveness.

The first step towards improving the market supply of quality live animals is to understand the livestock producers' ownership patterns and marketing behaviour and factors affecting them. Such information provides useful insights towards the designing and implementation of strategies to alleviate the shortage of quality live animal supply in the market. However, this type of information is currently un-available or inadequate at best. There is a need to assess whether and how the existing small-scale and pastoral livestock production systems can provide sustainable and adequate live animal supply which can meet the demand for domestic consumption and the demand for export markets.

Objectives

The main objective of this study is to assess the current commercial offtake rates for cattle and shoats in the highland areas of Ethiopia in order to overcome the limited empirical information related to the offtake rates. The specific objectives are: (1) to analyze the ownership and marketing behaviour of livestock producers, and (2) to identify factors affecting the market participation and commercial offtake of live animals by livestock producers.

Methods and Data Sources

Both descriptive and econometric analyses of cattle and shoats market offtake rates are made using secondary data obtained from different sources for different years

covering the highlands and pastoral areas. The main data sources used include: (1) sample household survey conducted by the International Livestock Research Institute (ILRI) and International Food Policy Research Institute (IFPRI) in 1999/2000, and (2) sample survey of livestock conducted by the Central Statistical Authority (CSA) in 2004/2005.

Key Findings

a) Descriptive Analysis

Several key observations emerge from the descriptive analysis. First, majority of the smallholder farmers in Ethiopia own cattle while only about half of the households own shoats. Second, in absolute terms, it was observed that the households own only few heads (usually less than or equal to 3) of cattle and shoats. Third, the cattle were mostly comprised of draft oxen and milking cows and the main purpose of keeping cattle was for draft. Fourth, very low commercial offtake rate was observed for both cattle and shoats. For example, based on the ILRI/IFPRI dataset the net commercial offtake rate of cattle, sheep, and goats were 8%, 22% and 18%, respectively. On the other hand, based on the CSA dataset, the net commercial offtake rate for cattle, sheep, and goats was 7%, 7% and 8%, respectively. Furthermore, it was observed that not only the net commercial offtake of cattle from the highland mixed farming system was considerably low, but also that the bulk of this net commercial offtake was of low quality animals such as culled draft oxen. For example, oxen accounted for 75% of the net commercial offtake. The net commercial offtake of young animals was very minimal as farmers kept them for replacement of older animals. The low market offtake is an indication of low market orientation of the farm households. Furthermore, for those households who participate in the market, the size of transaction (sale or purchase of cattle or shoats) was found to be very small. For example, the number of cattle or shoats transacted during a year was mostly one.

The dynamics of farm households' and pastoralists' cattle herds and shoats flocks were analyzed in terms of the major sources of cattle and shoats inflows and outflows over a year. It was observed that animal births were more important than purchases from the market in building and maintaining the size of cattle herd and shoats flocks. This highlights the importance of reproduction rates of cattle and shoats owned by the farm

households and pastoralists for herd and flocks growth and maintenance since they generally rely less on the market to build herd and flocks. On the other hand, there were five components of cattle outflows: deaths, sales, slaughters, gifts, and thefts. The deaths and sales were the major components of cattle outflows. This indicates the potential of increasing cattle sales or offtake rate just by reducing cattle mortality. The size of on-farm cattle slaughters, thefts, and gifts were found to be very minimal.

b) Econometric Analysis

The econometric analysis of the factors affecting small-scale farmers' nature and level of market participation in the cattle and shoats markets was conducted using ILRI/IFPRI household survey data. The nature of small farmer's market participation was analyzed in two ways. First, the farm households were classified as buyers only, sellers only, both buyers and sellers, and neither buyers nor sellers. Then, the multinomial regression analysis was used to determine the factors affecting small farmers' choices of the four types of market participation regimes. It is observed that the main factor influencing the household's choice of participation in cattle market as a buyer only, seller only, both buyer and seller, and neither buyer nor seller is herd size. The herd size is positively associated with household's choice of participation in cattle market as a seller only and both as a seller and buyer. As the herd size increases, the probability that the household participate in cattle market as a seller only increases while the probability of non-participation in cattle market decreases.

There is negative effect of land holding on the household decision to participate in cattle market as a seller only while it has positive effect on household decision to participate in cattle market as a buyer only. As the size of land holdings increases, the probability that the household participate in cattle market as a buyer only increases while the probability of non-participation in cattle market decreases. This may be due to the fact that as the land size increase the farm households need more cattle for draft purpose instead of selling it in the market.

Similar to the results for cattle, the main factor influencing the household's discrete-choice decision to participate in shoats market as a seller only is also flock size. The flock size is positively associated with household's participation in shoats market as

a seller only. As the flock size increases, the probability that the household participate in shoats market as a seller only increases while the probability of non-participation in shoats market decreases. The effect of land holding was found to be negative in the case of market participation as a seller only. As the size of land holding increases, the probability that the household participate in shoats market as a seller decreases. This may reflect the fact that farm households with sufficiently large land holdings give priority to crop production and cattle production.

Second, based on the relative transaction sizes of sales and purchases of livestock made, the farm households were also classified into three groups: net buyers (bought more than what they sold), autarkic (bought and sold equal amount or neither bought nor sold), and net sellers (sold more than what they bought). The net market position was obtained by subtracting purchases from the sales of animals. Then, the factors affecting farmer's choices of different net market positions for cattle and shoats were analyzed using ordered probit regression model. The key variables affecting households' choice of net market position for cattle are livestock herd size and the size of land holdings.

The herd size is positively associated with households' choice of net market position for cattle which shows that as the herd size increases the household would be more likely to be a net seller instead of being an autarkic or a net buyer. The marginal effect of change in the herd size was negative for net buyers and autarkic, and positive for net sellers. These results indicate that the limited market offtake from highland areas of Ethiopia is due to smaller herd size and highlight the importance of increasing herd size in order to increase the market participation of households in the highland areas. However, the potential to increase the herd size may be constrained by the already limited land holdings of smallholders.

The total land holding is found to be negatively associated with a household's choice of net market position for cattle. This indicates that as the total land holding increases a household would be more likely to be net buyer instead of being autarkic, and more likely to be autarkic instead of being net seller. The marginal effects of change in the total land holdings are also positive for net buyers and autarkic and negative for net sellers. Thus, the increase in the total land holding decreases the likelihood of a household to be a net seller. This counter intuitive relationship may be explained by the

fact that as the total land holding increases, household demand for draft cattle increase which would decrease the number of cattle available for sale in the market. However, this relationship is not exactly linear as available land and the land laws do not permit expansion of farm size beyond a small limit. Thus, land holding limits a household's capacity to participate in the market by limiting cattle holding but also increased land holding limits market participation because larger cattle numbers are required to cultivate the crop land.

In the case of shoats, only total crop income was observed to have statistically significant effect on the household choice of net market position. Similar to cattle, the total crop income is negatively associated with household's choice of net market position for shoats. This indicates that as total crop income increases a household would be more likely to be a net buyer of shoats to build asset instead of being an autarkic, and more likely to be autarkic instead of being a net seller. There was also significant negative association between total land holdings and ordered shoats market participation. This shows that the importance of shoats in generating household income decreases as the land holding and crop income increases.

Implications and Way Forward

The implication of limited market participation is that under the current production and marketing conditions small-scale farmers' livestock production systems does not provide regular and adequate supply of quality live animals to the market which adversely affect the efficient utilization of meat processing capacity of export abattoirs. Therefore, there is a need to explore different alternative strategies of increasing the supply of quality live animals for export abattoirs. However, the social and economic feasibilities of alternative strategies need to be carefully evaluated and there is a need to consider how to effectively and efficiently integrate smallholder farmers to the high value domestic and export markets value chains for live animals and meat through the development of appropriate institutions, policies and marketing infrastructure and support services.

In the absence of specialised commercial ranches and feedlots, nearly the entire supply of marketed animals come from the smallholder households in mixed crop-

livestock, agro-pastoral and pastoral production systems. In response to the emerging market opportunities, the methods of production and marketing practices of households in these systems and agricultural extension services have changed very little. The main challenge is how to increase the supply of quality live animals from these systems by changing the production and marketing behaviour of producers, the purchasing behaviour and strategies of market actors including abattoirs, and the extension and other support systems helping farmers. Some specific options for consideration by the relevant stakeholders are as follows;

First, abattoirs apparently buy animals from limited supply hinterlands perhaps because they look for animals of specific breeds and types. Expansion of purchases of animals from wider supply hinterlands should be considered both to meet the requirements of the importers as well as to promote animal types from a given location not yet known by the buyers due to lack of knowledge. Moreover, there is evidence from literature which suggest that there are strong peaks and troughs of producer sales of animals at different times in different locations. These strong spatial and seasonal dimensions are induced by various factors, e.g., cash need, drought, feed shortage, and festivals. It is critical to identify these peaks and troughs for specific supply hinterlands and develop seasonal purchase strategies to comply with supply characteristics. Such purchase strategies may also be used to gradually induce changes in producer selling behaviour in terms of type of animals sold, and time and place of sale to suit the needs of the abattoirs.

Second, animals for export abattoirs are mainly purchased through spot market transactions either by the staff of the abattoirs themselves or through designated agents. Spot market transaction poses several problems on the operation of the abattoirs. Majority of the animals offered for sale in these spot markets do not satisfy quality requirements of the abattoirs due to the lack of adequate price differentiation based on quality of animals supplied. The timing and volume of purchases by abattoirs and prices paid are usually guided by terms or information about prior orders and delivery time lags allowed by buyers along the chain. Because of these reasons, abattoirs or their agents may not be able to procure adequate number of quality animals out of the limited supply of such animals.

In order to overcome these purchase related problems, the abattoirs should consider using contracts as an instrument for sustained delivery of adequate number of quality animals throughout the year. Several options may be tried. For example, abattoirs may contract existing farmer cooperatives or groups for producing or fattening and delivering certain number of animals of specific quality at specific intervals at pre-agreed attractive prices. They may also encourage formation of new farmer groups for the same purpose. By doing so, overall transaction costs of spot market purchase may be reduced because the cost of monitoring groups handling larger number of animals should be much lower than the time and effort required to locate, select, negotiate and complete transaction of one or two or few animals from a large number of sellers at several spot markets. The other option may be to contract existing experienced, reputed and reliable livestock traders operating in primary and secondary markets to regularly supply animals of pre-defined number and quality at agreed attractive prices. Such traders already deal with regular sellers and buyers as a business practice, so are adept to this. They may procure required animal types and assemble them for delivery to the abattoir or even go into contract with farmers or farmer groups for fattening or producing such animals. This mechanism may also ensure regular supply at minimal transaction cost yet create opportunities for smallholder producers to become more market oriented due to access to higher price markets.

Third, some abattoirs currently operate feedlots where animals purchased from the market are fed and treated for a short period to finish at desired weight and quality for slaughter. Again, rather than purchasing at spot markets, strategic use of contract arrangements of one type or the other is likely to help the procurement of better quality animals and reduce the time and cost of finishing such animals to slaughter.

Fourth, in the long run, specialised ranches and feedlots may be developed by abattoirs or others interested in commercial livestock production for producing quality animals in large numbers. But these need not be self-contained enterprises doing everything from breeding to finishing. Rather large number of smallholders can be linked with such enterprises as supply sources of young animals for fattening provided attractive prices are paid to smallholders to encourage them to get into such activities as income generating businesses.

Fifth, currently smallholders' production and marketing behaviour neither optimise feed resource use nor their flow of returns from livestock as they do not cull animals at optimum age and weight rather they continue feeding the animals at maintenance weight until they are induced to sell to meet cash needs for one or the other reason. While much improvement has been achieved in crop production practices due to new and improved crop extension approaches, livestock extension remains very poor. Given the importance of livestock in the livelihood of smallholder households in several ways and given the importance of livestock in national output and income generation, strategic improvement of extension delivery is essential to improve productivity and quality of animals and market orientation of smallholder producers. Along with dissemination of technology for better feeding and health management practices, educating farmers about the benefits and the desirability of selling animals at optimal age and weight will be necessary to significantly increase the quantity and quality of offtake. This is not the responsibility of public sector only. If abattoirs are interested in the regular supply of better quality animals by smallholders, they should be active partners in this strategy. Use of contracting as an instrument will provide the scope for the application of such extension and informal education strategy to induce change in the production and marketing behaviour of smallholders.

Sixth, in this research the detailed cost structure of export abattoirs was not analyzed. However, it is very important that the export abattoirs examine their operational efficiency, cost structures and develop sound management practices to improve their overall efficiency rather than just concentrating on the supply side constraints. In the future detailed study of cost structure for export abattoirs is required to identify major cost components and identify areas where significant cost reductions can be made.

Seventh, there is lack of reliable baseline data to support the business and policy decision making in the livestock sub-sector. For example, adequate information on what is demanded in the market and the production and marketing practices of livestock producers in different production systems is lacking. Even export statistics are not recorded and managed in ways to allow accurate aggregation and quick analysis to support policy decision making. For the purpose of monitoring the dynamics of livestock

production and marketing there is a need for regular collection of production and marketing data and their dissemination in user friendly format.

References

- Ayele, G., Mohammad A.J., Hailemariam Teklewold, Elias Mulugeta, Getahun Kebede. 2006. "Seasonal and Inter-Market Differences in Prices of Small Ruminants in Ethiopia." *Journal of Food Products Marketing*, 12(4): 59-77.
- Barrett, C. 2001. "Livestock Pricing and Markets Performance." Research Brief 01-05-PARIMA. Global Livestock Collaborative Research Support Program (GL-CRSP), University of California, Davis.
- Barrett, C., S. Osterloh, P.D. Little, and J.G. McPeak. 2004. "Constraints Limiting Marketed Offtake Rates Among Pastoralists." Research Brief 04-06-PARIMA. Global Livestock Collaborative Research Support Program (GL-CRSP), University of California, Davis.
- Bellemare, M.F. and C.B.Barrett. 2006. "An Ordered Tobit Model of Market Participation: Evidence from Kenya and Ethiopia." *American Journal of Agricultural Economics*, 88(2): 324-337.
- Bouwman, A.F., K.W. Van der Hoek, B. Eickhout, and I soenario. 2005. "Exploring Changes in World Ruminant Production Systems." *Agricultural Systems*, 84(2): 121-153.
- CSA (Central Statistical Authority). 2006. *Agricultural Sample Survey, 2004/2005 (1998 EC), Report on Livestock and Livestock Characteristics*, Statistical Bulletin 361. FDRE: Addis Ababa.
- CSA (Central Statistical Authority). 2003. *Ethiopian Agricultural sample Enumeration, 2001/02 (1994 E.C.) Results at Country and Regional Level, Statistical Report on Farm Management Practices, Livestock and Farm Implements, Part II, Raw data in softcopy*, Addis Ababa, Ethiopia.
- CSA (Central Statistical Authority). 2001. *Report on the 1999/2000 Household Income and Expenditure Survey, Statistical Bulletin 258, Raw Data in softcopy*, Addis Ababa, Ethiopia.
- CSA (Central Statistical Authority). 1998. *The 1994 Population and Housing Census of Ethiopia: Results at Country Level, Volume I, Statistical Report*, Addis Ababa.

- DAGRIS (Domestic Animal Genetic Resources Information System). 2006. International Livestock Research Institute, Addis Ababa, Ethiopia. <http://dagris.ilri.cgiar.org>.
- De Janvry, A., M. Fafchamps, E.Sadoulet.1991. "Peasant Household Behavior with Missing Markets: Some Paradoxes Explained". *Economic Journal* 101:1400-17
- FAOSTAT, 2003. Country Time Series Livestock Growth Rate Database for Ethiopia. FAO: Rome <http://faostat.fao.org> .
- Gebru, Getachew and J. McPeak. 2004. "Herd Accumulation: A pastoral Strategy to Reduce Risk Exposure." Research Brief 04-05-PARIMA. Global Livestock Collaborative Research Support Program (GL-CRSP), University of California, Davis.
- Goetz, S., 1992. "A selectivity model of household food marketing behavior in sub-Saharan Africa". *American Journal of Agricultural Economics*. 74, 444–452.
- Greene, W., 1993. *Econometric Analysis*, second ed. Macmillan, New York.
- Heltberg R., F. Tarp. 2002. "Agricultural Supply Response and Poverty in Mozambique". *Food Policy*, 27: 103-124
- Holloway, G., Nicholson, C., Delgado C., Staal, S., Ehui, S.2004. "A revised Tobit Procedure for Mitigating Bias in the Presence of Non-Zero Censoring with an Application to Milk Market Participation in the Ethiopian Highlands". *Agricultural Economics* 31 (2004) 97-106.
- Key, N. Sadoulet, E.;De Janvry A.2000. "Transactions Costs and Agricultural Household Supply Response." *American Journal of Agricultural Economics Association*.82:245-245.
- Lapar, M.L., G. Holloway, and S. Ehui. 2003. "Policy Options Promoting Market Participation among Smallholder Livestock Producers: A Case Study from the Philippines." *Food Policy* 28: 187-211.

- Long, S.J. 1997. *Regression Models for Categorical and Limited Dependent Variables*, SAGE Publications, Inc., Thousand Oaks, California.
- McPeak, J. 2001. "Pastoralists' Use of Markets." Research Brief 01-04-PARIMA. Global Livestock Collaborative Research Support Program (GL-CRSP), University of California, Davis.
- Sadoulet, E. and A.de Janvry. 1995. *Quantitative Development Policy Analysis*. Baltimore and London: The Johns Hopkins University Press.
- Santos, P. and C. Barrett. 2005. "Herd Dynamics, Social Networks, and Informal Transfers Among Southern Ethiopian Pastoralists." Research Brief 05-07-PARIMA. Global Livestock Collaborative Research Support Program (GL-CRSP), University of California, Davis.
- Sutter, J.W. 1987. "Cattle and Inequality: Herd Size Differences and Pastoral Production among the Fulani of Northeastern Senegal." *Africa: Journal of International Institute*, 57(2): 196-218.
- Wooldridge, J. *Econometric Analysis of Cross Section and Panel Data*, MIT Press. 2002.