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**DEVELOPMENTS IN FERTILIZER MARKETING IN ZAMBIA:
COMMERCIAL TRADING, GOVERNMENT PROGRAMS AND THE
SMALLHOLDER FARMER**

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BACKGROUND AND OBJECTIVES: The fertilizer reform process in Zambia has been ongoing for a decade. Both Government and the private sector are actively involved in fertilizer marketing. Some stakeholders continue to be convinced that the private sector is unable to adequately serve the needs of smallholder farmers, especially in the more remote parts of the country. The Government has continued to be involved in distributing fertilizer on credit to smallholders and at the same time has allowed private traders to distribute fertilizer. Meanwhile, only 20% of smallholder farmers used fertilizer in 1999/00.

This policy synthesis highlights the key findings and conclusions contained in the full report, “Developments in Fertilizer Marketing in Zambia: Commercial Trading, Government Programs and the Smallholder Farmer”. The key objective of this policy synthesis is to summarize the key findings in order to inform policy makers and stakeholders in the agricultural sector in their efforts to improve the performance of the fertilizer marketing system in Zambia.

FACTORS AFFECTING FERTILIZER SUPPLY TRENDS:

Government Supplies

The direct involvement of government in importing fertilizer has declined steadily since the reforms were initiated. Fertilizer imported for use in government distribution programs has declined from over 100,000 metric tonnes at the beginning of 1990s to less than 40,000 metric tonnes at the close of 1990s. The decline in state fertilizer distribution is mainly due to the cessation of local production since 1993/94, the end of fertilizer donations by aid agencies to the government in 1996/97, and budget constraints reinforced by pressure from international lenders to reduce government’s role in fertilizer distribution.

However, government has continued to direct the allocation of fertilizer in Zambia. Since 1997, government has shifted from direct importation and distribution to entering into agreements with several large private companies to handle the logistics of government loan programs. Firms selected to carry out the government programs receive a risk-free commission for every tonne of fertilizer imported and distributed to clients specified by government, usually cooperatives. Government incurs all of the risk of loan non-repayment and all of the losses associated with selling the fertilizer at below cost. The government program adversely affects those firms who fail to win government supply tenders because they face stiff competition from subsidized fertilizer delivered on credit through government programs. These companies have incurred losses as their stocks pile up, increasing the riskiness of distributing fertilizer. The government programs selectively benefit the companies distributing fertilizer on behalf of government. Over time, this may lead to a more concentrated fertilizer market structure.

Smallholder farmers also face a dilemma: whether to buy fertilizer on a cash basis at full cost from a private dealer, or wait and hopefully be in a position to procure cheap fertilizer on credit from the government program. Because many farmers choose the latter option, the commercial demand for fertilizer becomes depressed. This has two major consequences. First, it gives the impression that there is limited demand for fertilizer on a cash basis, and contributes to perceptions that smallholder farmers cannot afford fertilizer. Second, as farmers learn to wait for the possibility to receive cheap fertilizer on credit, this depresses the incentives of private dealers and stockists to bother supplying fertilizer. This in turn depresses the amount of fertilizer that importers can profitably bring into the country for the smallholder market, except that which can be sold for use under government programs. In these multi-faceted ways, the government programs throughout

the liberalization process have unintentionally adversely affected the development of a commercial fertilizer marketing system and has contributed to the perception that the private sector cannot do the job.

Commercial supplies

Despite the problems facing private sector input suppliers as noted above, commercial sales of fertilizer have been increasing over time. This is reflected in a rise in private sector commercial imports. Overall private sector imports in the late 1990s have ranged from 100,000 to 130,000 tonnes per year. Of this, small-scale farmers have received roughly 40,000 to 50,000 tonnes annually, while the remainder was used by large-scale farmers. In the last three seasons, all the fertilizer used in Zambia was imported and distributed by the private sector, although about half of this was financed by government. The private sector has a proven capacity to import all the requirements of large scale and small-scale farmers. What remains untested is (1) the demand for cash purchases of fertilizer at full cost by smallholder farmers in the absence of government programs, (2) the percentage of smallholder farmers that would be able to purchase fertilizer only on credit terms, and (3) workable schemes for providing and recovering fertilizer loans for use on maize by small-scale farmers.

Reasons for low levels of fertilizer use by smallholder farmers

Fertilizer use is not profitable for many smallholders in Zambia. Recent research using on-farm and trial data in six areas shows that applying recommended amounts of fertilizer on maize was profitable only in two of six sites for which data was available from the Ministry of Agriculture (Donovan et al. 2002). It is very important to understand why the application of fertilizer on maize appears to be unprofitable for many small-scale farmers. There are seven main reasons:

1. *Inappropriate application rate recommendations:* In the six sites examined by Donovan et al (2002), fertilizer application had a higher likelihood of being profitable at application rates significantly lower than the nationally-recommended 200 kgs/hectare of D Compound and 200 kgs/hectare of urea.
2. *Lack of availability of improved maize seed:* The ability of fertilizer to benefit farmers depends on their use of seed varieties that are responsive to fertilizer application. Less than 50% of maize grown by smallholder was grown using hybrid seed in 1999/00 (see Table 2). In recent years, problems have arisen both in the generation of

improved maize hybrids as well as their dissemination to smallholder farmers.

3. *Highly variable farmer management practices:* Better management practices could make it more profitable for farmers to use fertilizer. On average, smallholder farmers get 4 kg of maize for every kg of fertilizer applied, while commercial farmers get roughly 10 kgs (FAO, 1999). And there is wide variation in the yield response that smallholder farmers are getting from fertilizer even in the same agro-ecological zones. Many factors affect yield response of fertilizer application, including timing of application, seed spacing, row spacing, adoption of conservation farming practices, etc. This points up the need for better extension and management education.
4. *Lack of access to credit:* many poor households may find fertilizer use profitable but lack the cash to buy (or maize to swap for) fertilizer. While many households are indeed purchasing fertilizer on cash or barter terms from traders (shown in Table 1 below), it is clear that some households need credit in order to use fertilizer. The importance of credit constraints in influencing fertilizer use is discussed in Section 3.
5. *Output market price effects:* as the proportion of farmers using fertilizer increases, crop production rises and prices fall. While increased food supplies are good for the country, the productivity-enhancing benefit of increased fertilizer use constrains profits for the less-efficient farmers. Effectively tackling some of the other problems mentioned here will help to reduce the costs of crop production and make the use of fertilizer more profitable for small-scale farmers.
6. *Poor rural infrastructure:* high transport costs adversely affect fertilizer profitability in two ways: they reduce output prices and raise the cost of fertilizer.
7. *Poor soils and/or rainfall:* some parts of Zambia are simply not suited to fertilizer application on maize at any realistic range of input and output prices. In other regions, fertilizer use might be economically viable in combination with lime application to reduce soil acidity.

In areas where some of these adverse conditions prevail, the limited presence of private traders does not infer weak private sector response to policy reform, but it is a reflection of the more fundamental reasons why fertilizer use is unprofitable for many smallholders. These reasons help to explain why 80% of the small-scale farmers in Zambia do not use

fertilizer. In the 1980s, a greater proportion of rural households did use fertilizer, but this was because it was highly subsidized. Often, the cost of the fertilizer was higher than the value of the increased output produced (Howard 1994). Relatively poor farmers' limited ability to bear risks also impedes fertilizer use. In case of a crop failure, households have little ability to repay loans and may choose not to take fertilizer on credit unless they are sure that the loan will be forgiven or rescheduled. The bottom line is that fertilizer on its own, without complementary actions, is simply not a cost-effective means to promote the incomes and living standards of many of the 80% of households that are currently not using fertilizer. But a key role of government is to take cost-effective steps to make fertilizer use more profitable for a larger proportion of these households. In the last section of this note, we identify a set of potentially cost-effective government activities to make fertilizer use more profitable for a larger proportion of small farmers.

MARKETING CHANNELS FOR DISTRIBUTING FERTILIZER TO SMALLHOLDER FARMERS – 1999/2000:

Government programs

About 35% of the fertilizer received by smallholder farmers in 1999/00 was from the government's loan program (Table 1). Roughly 38% of the cost of the government program was recovered. The accounting procedures of the government program are designed such that it is impossible to identify the portion of the overall loan default attributable to farmers, cooperatives, or the designated private firms operating as agents of the government. The lack of transparency and accountability in the process for recovering loans over the years has contributed to longstanding credit recovery problems that have beset the government programs.

Low repayment rates do not appear to be totally due to farmer default. Government statistics indicate that roughly 35,000 tonnes of fertilizer were distributed through the government program in 1999/00. Of this volume, Smith et al (2000) estimate that roughly 5,000 tonnes were sold illegally at some stage in the distribution system.

Government distribution programs were concentrated in districts in Southern and Eastern Provinces where private sector marketing channels are relatively well-developed.

Commercial cash sales

By contrast, 64% of the fertilizer received by farmers in 1999/00 was from private traders (not counting the fertilizer distributed by private firms under government programs). About 82 per cent of this fertilizer acquired by farmers from private firms was sold on cash or barter terms; the other 18% was distributed on credit. These findings indicate that a higher proportion of smallholder farmers have the ability to afford fertilizer on a cash basis than is generally acknowledged.

Credit sales by private sector

The perception that private fertilizer traders have no capacity to give fertilizer on credit to smallholder farmers is not supported empirically. Outgrower firms supported the production of tobacco and cotton by providing fertilizer on loan as part of their pre-harvest input package. This is very evident in Eastern Province, where the quantity of fertilizer distributed on loan by private traders was as large as that distributed under government programs (Table 1). Private firms, however, find it risky to offer fertilizer on credit unless the probability is high that they can recover the loan through the purchase of the farmer's crop. Interlocking arrangements -- tying input loans to a commitment that the farmer will sell the output back to the firm that provides the loan -- typically achieve higher rates of loan repayment for crops with few buyers, like cotton, than for crops with many potential buyers, like maize (Dorward et al. 1998). But as long as there are viable interlocking arrangements, evidence suggests that households also utilize these programs to expand their use of fertilizer on food crops as well (Govereh and Jayne 1999). Redressing the credit repayment problem of government programs would be likely to instill in farmers a more commercial orientation toward the decision to accept inputs on loan. Over time, this might make private traders more willing to extend credit to smallholders for crops under interlocking arrangements (e.g., cotton), which in turn, would help to raise the level of smallholder fertilizer use on food crops as well.

Crop with fertilizer swaps

Small and medium scale farmers also have the option of procuring fertilizer through direct exchange with maize and other crops. Traders are willing to exchange fertilizer with maize to increase their volume of fertilizer sales and to benefit from seasonal maize price rises. Given current low loan repayment rates, exchanging fertilizer with maize is less risky for dealers than offering fertilizer on loan.

TARGETING OF GOVERNMENT FERTILIZER LOANS:

In the 1999/00 season, 20 per cent of small and medium scale farmers acquired fertilizer. Of these, roughly two-thirds acquired fertilizer from commercial channels, and one-third acquired fertilizer through government programs (shown earlier in Table 1). Since government programs are designed with the aim of reaching "low-resource" farmers who cannot afford to purchase fertilizer as well as those located in isolated areas, it would be anticipated that government programs should tend to be targeted toward farmers with relatively low incomes and assets who cannot purchase fertilizer from commercial outlets.

Table 2 compares the attributes of farmers receiving fertilizer through government programs, farmers receiving from private traders on commercial terms, and farmers not using fertilizer.

Government fertilizer recipients had higher farm incomes and higher total incomes than those who purchased from commercial outlets and especially those who did not use fertilizer. Government program recipients had total household incomes that were more than twice as high as non-users. However, the farmers who purchased fertilizer from commercial outlets had higher off-farm income than other farmers. Access to off-farm income contributes positively to farmers' ability to purchase inputs on a cash basis. Households not using fertilizer were the worst-off. On the surface, these findings might indicate that the government fertilizer loans helped recipient households to achieve higher levels of crop income.

However, it was also the case that the recipients of government loans had access to more land, higher levels of education, and more livestock income than farmers in the other two categories. Also, government recipients were less likely to be female-headed than non-recipients. These household attributes were not likely to have been affected by the receipt of government credit, at least in the short run. Moreover, recipients of government loans were five times as likely to have a civil service employee in the household as those who did not use fertilizer. These findings suggest that government loans are not necessarily reaching the low-resource households. Moreover, given the relatively high incomes of households acquiring fertilizer from government programs, the results indicate that the government programs might be taking away from commercial sales by private traders.

CONCLUSIONS: The review found that:

1. Only 20% of smallholder farmers used fertilizer in 1999/00. These households were relatively better-off than households who didn't use fertilizer. The government's program was not significantly more likely to deliver fertilizer to poor farmers and remote areas than private firms. The recipients of government-subsidized fertilizer were better off, on average, than those who did not receive the subsidized fertilizer.
2. Evidence suggests that the government programs created an un-level playing field for fertilizer trading and reduced the possibilities for private firms unaffiliated with the government programs to develop and expand the scope and scale of their services.
3. Promoting fertilizer use in areas where its use is not profitable, would represent a loss in national income, not the elimination of a constraint to efficient use of fertilizer.
4. Even in the districts where fertilizer use is the highest (e.g., Mazabuka, Chipata, Mkushi), the CSO's national survey data indicate that no more than 50% of small-scale farmers use fertilizer despite the fact that it is available for purchase or swap by private traders. Small-scale farmers differ considerably in their resources, ability to make investments and take risks, and in their knowledge. These and other resource- and knowledge-related constraints of small-scale farmers (besides the cost of fertilizer) explain why so many do not use fertilizer despite its availability in relatively "high-potential" and "well-connected" areas. The limited use of fertilizer in Zambia's small-scale farming sector is more complex than simply agro-ecology, infrastructure, and credit. Identifying these other household-level constraints and overcoming them will raise the value of using fertilizer to farmers and to the nation.

KEY CHALLENGES FOR GOVERNMENT IN IMPROVING THE MARKETING SYSTEM:

A key role of government is to identify cost-effective strategies to make fertilizer profitable for more of the 80 per cent of small-scale farmers who currently don't use fertilizer. "Cost-effective" strategies are those that, at a minimum, provide a greater value of output than the cost of the input. While promoting the profitable use of fertilizer for "resource poor" farmers is important, it must be borne in mind that fertilizer use is not appropriate in areas where the agro-ecology is unsuitable for it. But there appears to be great

scope for government to raise the use of fertilizer in Zambia by taking steps to overcome some key constraints that currently limit its profitable use by small-scale farmers. These include:

1. Government should take direct steps to identify the most fertilizer responsive maize varieties for each agro-ecological region of Zambia and pro-actively support the distribution of these varieties to smallholder farmers.
 2. Given that there is a blanket recommendation on fertilizer application levels throughout Zambia, government, in collaboration with the private sector, should develop fertilizer application recommendation domains that are more appropriate to local conditions, and then work with the extension service to publicize improved new recommendation rates to smallholder farmers in each area. Emphasis should also be given to publicizing the benefits of using lime and to provide incentives for the private traders to distribute it.
 3. Given that fertilizer prices are sensitive to transportation costs, it is recommended that government should determine where the highest payoffs from increased road and transport investments would occur, and consider making these investments to make fertilizer use by small-scale farmers more profitable. Further investments in rural electrification and communication services are instrumental in the establishment and expansion of existing smallholder cash crop production schemes.
 4. Recognizing that well-off and resource poor farmers live side by side, regional targeting might be inappropriate. Government should explore the possibility of having profiles of farmers and promote self-targeting mechanisms on fertilizer programs. To allow self-targeting mechanisms for conferring benefits to resource poor smallholder farmers, government should eliminate the need to administer a costly credit program by replacing it with a program where beneficiaries work for inputs. A "service for work" program may also help government extricate itself from spending resources to recover loans. Relevant experiences need to be studied closely to identify how a "fertilizer for work" program can be designed and implemented.
 5. Creating a more level playing field between agents of government programs and non-agent private companies will lead to greater incentives for new entry by other firms and will discourage the potential for non-competitive practices.
- Government programs should complement and not compete with non-agent private sector.
6. To facilitate effective preparation and planning by the private sector, government should make clear statements backed by consistent action about its on-going and intended operations in the fertilizer market.
 7. To facilitate the smooth exit of government from programs providing fertilizer on credit to smallholder farmers, government needs to specify a plan for phasing out the programs. Clearly stating how long and under what conditions the government plans to continue in the fertilizer business, that is, the length of the transitional phase, could provide more long-term clarity for the sector and would facilitate long-term investment decisions on the part of the private sector.
 8. Recognizing that the private sector is not fully exploiting the cash market for fertilizer due to inherent market risks, government should facilitate further reduction of these risks by dissemination of market information, establishing market centers, capacity building of farmer organizations, and by exploring co-financing and risk sharing opportunities with the private sector.
 9. To facilitate the smooth passage of fertilizer at ports and borders, it is recommended that government should negotiate for favorable terms for handling Zambia's fertilizer cargo at shipping ports through Joint Permanent Commissions (JPCs) and regional bodies.

The Food Security Research Project is a collaboration between the Agricultural Consultative Forum, the Ministry of Agriculture and Cooperatives, Michigan State University's Department of Agricultural Economics, and the United States Agency for International Development in Lusaka. The Zambia FSRP field team is comprised of J. Govereh, B. Mwiinga, J.J. Nijhoff, G. Tembo, and B. Zulu. MSU-based researchers in the FSRP are C. Donovan, T. Jayne, D. Tschirley, M. Weber, E. Knepper, A. Negassa, and A. Chapoto.

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Table 1. Total Fertilizer (Tonnes) Acquired by Small and Medium Scale Farmers by Province and Source, 1999/2000.

Province	Fertilizer transaction channel for smallholders (tonnes)					Group Total
	FRA Loan	Private Sector Loan	Commercial exchange/barter	Cash purchases	Gift	
Central	1,462	1,054	988	4,765	174	8,443
Copperbelt	611	258	30	1,920	23	2,843
Eastern	2,473	2,475	2,040	5,743	126	12,859
Luapula	113	17	0	731	25	886
Lusaka	383	30	188	1,245	56	1,903
Northern	3,069	484	55	2,395	150	6,155
Nwestern	247	71	21	214	63	617
Southern	8,280	1,005	509	4,063	72	13,931
Western	112	69	0	183	10	375
Total	16,749	5,465	3,834	21,264	704	48,017

Source: CSO/MAFF/FSRP 1999/00 Post Harvest Supplemental Survey, 2001

Table 2. Small- and Medium Farmer Characteristics by Source of Fertilizer Acquisition, 1999/00

Household attributes	Government fertilizer loan recipients	Private sector fertilizer recipients			Non-users
		Cash purchase	Credit purchase	Fertilizer Maize Exchange	
Count in sample (no.)	306	955	173	70	4890
Weighted Proportion (%) ^a	4.5	9.4	2.4	1.0	82.2 ^a
Land access (ha)	3.43	2.90	2.94	3.08	2.70
Education of the household head (years)	7.5	6.5	5.9	5.0	4.8
Female-headed households (%)	9.0	16.0	8.0	16.0	26.0
Civil service employee in household	10.1	11.5	4.4	8.6	2.3
Net crop income (\$)	398	257	307	380	145
Net crop income per capita (\$/capita)	56	45	56	65	30
Net crop income per hectare (\$/hectare)	157	126	123	134	86
Total off-farm income (\$)	260	337	203	131	120
Livestock income (\$)	25	16	14	9	8
Total household income (\$)	683	611	525	521	274

^a Proportions do not add to 100% because roughly 0.5 per cent of the sample received fertilizer from both government and the private sector, and these households were excluded from results in this table; households receiving fertilizer from NGOs and from fellow farmers were also excluded (about 2% of the total sample).

Source: CSO/MAFF/FSRP 1999/00 Post Harvest Supplemental Survey, 2001