Title:
The Costs and Profitability of Tobacco Compared to Other Crops in Zimbabwe

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Publication Date:
07-01-2002

Series:
WHO Tobacco Control Papers

Publication Info:
WHO Tobacco Control Papers, Center for Tobacco Control Research and Education, UC San Francisco

Permalink:
http://escholarship.org/uc/item/76b25769

Keywords:
economics, tobacco yield, cost, profitability, Zimbabwe, tobacco growing

Abstract:
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This study finds that tobacco is a highly profitable cash crop for both large and small farmers. Tobacco would remain relatively profitable at considerably lower prices or yields than pertained in 2001. However, even for farmers in suitable agro-ecological areas, tobacco is expensive to grow, with high up-front costs and high labor requirements. Many commercial farmers have diversified sources of income, and most smallholder tobacco farmers grow only small amounts of tobacco, and grow other food and cash crops (maise, soybeans, cotton, groundnuts, and wheat) as part of a crop rotation system, to help provide a steady cash flow and/or as an essential part of their household food security strategy.

In early 2001, there were about 2,000 large-scale commercial tobacco growers, and 16,000 tobacco-growing smallholder farmers in Zimbabwe. Simbabwe exports almost all of her tobacco crop, so if global demand for tobacco were to fall significantly in the future the impact on employment and the broader economy would depend on the extent to which commercial farmers were able to switch to other high value export crops, which are also highly labor intensive. It should be noted that some analysts predict robust or growing global tobacco demand, others predict a very gradual decline. Changes in Zimbabwe's land policy in 2001/2002 are likely to have a much

larger impact on tobacco growing an exports and on the economy than demand-induced changes in the global market for tobacco.

H N P D I S C U S S I O N P A P E R

Economics of Tobacco Control Paper No. 1

The Costs and Profitability of Tobacco Compared to other Crops in Zimbabwe

John C. Keyser

June 2002

Tobacco Free Initiative
World Health Organization

HNP
HEALTH, NUTRITION, AND POPULATION
THE WORLD BANK

THE COSTS AND PROFITABILITY OF TOBACCO COMPARED TO OTHER CROPS IN ZIMBABWE

John C. Keyser

Completed April 2001, published July 2002

HEALTH, NUTRITION AND POPULATION (HNP) DISCUSSION PAPER

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ISBN 1-932126-19-8

HEALTH, NUTRITION AND POPULATION (HNP) DISCUSSION PAPER
ECONOMICS OF TOBACCO CONTROL PAPER NO. 1

The Costs and Profitability of Tobacco Compared to Other Crops in Zimbabwe

John C. Keyser

Consultant

Paper prepared for the World Bank, funded jointly by the World Bank and the United Nations Foundation (UNF) supported WHO/UNICEF Project on Youth and Tobacco

Abstract: This study compares the financial costs and returns to tobacco growing with twelve (traditional and non-traditional) alternative crops, looking at profitability, costs, labor intensity, financial support, technical infrastructure, land-suitability, marketing difficulties, world demand and production risks. It aims to provide an improved understanding of the trade-offs farmers face in deciding what crops to grow. The analysis is based on an original set of 91 production budgets estimated in January 2001 specifically for this study.

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Keywords: tobacco yield, cost, profitability, Zimbabwe, tobacco growing

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TABLE OF CONTENTS

PART TWO - DATA SECTION

The complete quantitative data set is presented in Part Two. There are separate tables for large-scale commercial and smallholder farmers in which the various enterprises are ranked by selected indicators including (i) cash required before sale; (ii) total production costs; (iii) gross profit; (iv) net profit; (v) return to cash; (vi) return to total costs; (vii) total labour requirement; (viii) return per day family labour; (ix) return to total labour; and (x) vulnerability to price.

ACRONYMS AND ABBREVIATIONS

CFU	Commercial Farmers' Union
CGA	Coffee Growers' Association
CSO	Central Statistical Office
FDT	Farmers' Development Trust
GMB	Grain Marketing Board
HPC	Horticultural Promotion Council
TIMB	Tobacco Industry and Marketing Board
LSC	Large-scale commercial farmer/s
SSC	Small-scale commercial farmer/s
ZFU	Zimbabwe Farmers' Union
ZTA	Zimbabwe Tobacco Association

CURRENCY EQUIVALENTS

Local Currency = Zimbabwe Dollar (ZWD)

USD 1.00 = ZWD 55.00

ZWD 1.00 = USD 0.018

WEIGHTS AND MEASURES

1 hectare (ha) = 2.417 acres

1 kilogram (kg) = 2.204 pounds

1 kilometre (km) = 0.62 miles

ACKNOWLEDGEMENTS

The marketing information and crop models presented in this study are based on discussions with large-scale commercial and smallholder farmers, agricultural extension workers, farmers' representatives, commodity associations, agribusiness firms, input supply companies, government officials and others with a detailed knowledge of sector performance and agricultural conditions in Zimbabwe. This paper would not have been possible without the contributions of these individuals and the assistance of all people met is gratefully acknowledged. Special thanks go to Shepherd Shamu for his help and collaboration during the data collection phase of this project.

Special thanks also go to Kuda Ndoro, Richard Amyot, Malcolm Vowles, Stanley Heri, Chris Molam, Jabulani Ndabambi, Dave Golloch, Graeme Evans, Malcolm Jones, Jabulani Marumahoko, Stanley Mutepfa, Dave Rockingham, John Robertson, and Leslie Cousins. Additional advice and comments were provided by Joy de Beyer, Ayda Yurekli and Steven Jaffee of the World Bank. Victoriano Arias helped prepare the manuscript for publication.

Questions and comments on this study are welcome by writing to the author at Box 35220 Lusaka, Zambia or by email to jck@zamnet.zm.

Executive Summary

Why this study?

Zimbabwe's economy depends heavily on tobacco. There is concern that global efforts to reduce tobacco use may reduce demand for tobacco and significantly affect Zimbabwe's economy and tobacco exports. Global tobacco demand has recently been stable or falling very gradually. However, public health efforts to reduce demand are offset by aggressive cigarette marketing, rising population and incomes, and the strongly addictive effects of nicotine. But tobacco prices have softened, and the long-term prospects are uncertain. Governments concerned about the future of tobacco are considering diversification options and strategies to develop other high-value crop substitutes (as well as broader diversification and growth opportunities).

The world's fourth largest flue-cured tobacco producer and the largest producer of tobacco leaf in Africa, Zimbabwe exports 90 percent of its raw tobacco and has typically earned around USD 600 million in foreign revenue annually, equal to almost 10 percent of GDP, 30 percent of total exports and 50 percent of agricultural exports. Moreover, 250,000 people or 5% of Zimbabwe's total labor force are engaged in tobacco-related work including tobacco farming, manufacturing and retailing. Most tobacco in Zimbabwe is grown by large-scale commercial farmers, who account for about 87% of the land under tobacco and 95% of the total crop.

This study compares the financial costs and returns to tobacco with twelve (traditional and non-traditional) alternative crops, looking at profitability, costs, labor intensity, financial support, technical infrastructure, land-suitability, marketing difficulties, world demand, and production risks. The information may be useful to agriculturalists and government officials who are interested in exploring the potential for diversification by different sized farmers, as Zimbabwe considers options for the future. The study aims to provide an improved understanding of the trade-offs individual growers face in deciding what crops to grow. The analysis is based on an original set of 91 production budgets estimated in January 2001 specifically for this study, that estimated financial costs and returns in Natural Region II at the time.

It should be noted that in 2000/2001, veterans of the independence war occupied several commercial farms and Government subsequently gazetted over 5,300 farms for compulsory acquisition and resettlement. This study took place before the impact of these events on agricultural output (and tobacco in particular) was evident, and does not address whether and how they might affect tobacco farming and its contribution to the economy of Zimbabwe.

Short summary of the Study

The study shows that tobacco is a highly profitable cash crop for both large and small farmers, generating direct income for large-scale farmers, and indirect (wage) income for smallholder farmers. Dramatic changes in prices and yield are unlikely in the near future. And tobacco would remain relatively profitable, even if prices fell considerably.

Farmers in Zimbabwe are aware of the risk of depending on one cash crop and have begun diversifying to lessen their tobacco dependence. Large scale commercial (LSC) farmers have diversified into coffee and paprika, and horticultural crops - notably roses and supermarket vegetables- using their tobacco profits. These products can be grown in the

same soil as tobacco, and generate high profits as well as employment opportunities. The study discusses the limitations of these alternatives, and notes that despite some rapid increases in some crops (especially horticulture), they are still grown at a very limited scale compared with tobacco.

Tobacco

Tobacco is one of the most profitable cash crops for both large-scale commercial and smallholder farmers. The study shows that tobacco would provide good financial returns even after a large drop in yield or price. Tobacco is likely to remain a very attractive crop for all categories of farmer even under progressively difficult market conditions.

There are around 2,000 large-scale commercial tobacco growers, and 16,000 tobacco-growing smallholder farmers – less than 1.5% of all smallholder households. Most smallholders grow only very small amounts of tobacco, in part because few smallholders have land that is suitable for intensive farming of tobacco. Even for farmers in suitable agro-ecological areas, however, tobacco is expensive to grow, with high up-front costs that smallholder farmers may not be able to cover. For example, high costs of production of flue-cured tobacco are a barrier to most cash-poor smallholders in tobacco areas. The financial incentives to smallholder farmers with the appropriate land to grow tobacco are, however, strong with the relative returns to cash and labor considerably higher than for most other crops.

Traditional Crops

The study examined five traditional crops: maize, soybeans, cotton, groundnuts, and wheat. These crops are cheaper to produce but provide much lower income to farmers. In fact, LSC farmers appear to earn a net loss from many of these crops when the annual depreciation cost of fixed assets is taken into account. In addition to being an important part of most crop rotation systems, however, these traditional crops provide farmers with a steady cash flow, and in the case if maize, are important for on farm consumption.

For smallholder farmers, maize, cotton and groundnuts are important sources of cash income and an essential part of most household food security strategies.

a. **Cotton** is Zimbabwe's third most valuable agricultural export after tobacco and horticulture and is a key economic sector in terms of contribution to GDP, employment, and export earnings. More than 200,000 smallholder households derive their livelihood directly from cotton. 60% to 80% of Zimbabwe's total cotton crop is produced by communal and resettlement farmers (part of smallholder farms).

b. **Groundnuts** are suited to tobacco soil, which makes it an excellent rotation crop. Smallholder farmers produce 95% of the crop, most for domestic consumption, with only 5% grown as a cash crop. Groundnuts are more labor intensive than other traditional crops except cotton and are one of the most important sources of protein in rural diets. Smallholder groundnuts are generally not exported due to problems with mixed and outdated varieties and with aflatoxin.

c. **Soybean** is mainly produced by LSC farms. Soybeans can often return a net loss, but are inexpensive to produce and can provide a good gross income to finance other more profitable enterprises. Soybeans are the least labor intensive crop and are rotated with irrigated wheat, which is highly profitable.

d. **Wheat** is much cheaper to produce than cotton and groundnuts, but more profitable than all other traditional crops and requires very little labor. Wheat prices were controlled until 1994, and all sales had to be through the state-owned GMB. LSC farms are not equipped with storage space for wheat, and therefore need to sell their crops in the high supply season when the prices are low. Zimbabwe is a net importer of wheat.

e. **Maize** is Zimbabwe's primary staple food and arguably more important to the national economy than even tobacco. Communal and resettlement farmers grow 60% of the national maize crop, mostly for their own consumption. Because of low producer prices and market uncertainty, most emphasis by LSC and smallholder farmers alike is now given to producing maize mainly for on-farm consumption rather than cash sale.

Alternative crops and diversification

Most commercial farmers already have diversified sources of income, and have introduced various high-value crops including export roses, supermarket vegetables, paprika and coffee as part of their farm system, specifically to lessen their dependence on tobacco. As with all business decisions, the challenge for farmers is to find the right blend of crop enterprises that works best for them. Beyond the enterprises covered here, for example, the study indicates that, other than the crops discussed in the study, many other niche products also offer diversification potential for smallholder and LSC farmers including mushrooms, flower seeds, medical plants and spices. Citrus crops, including oranges, grapefruit and lemons are an important diversification option with more than 88,000 hectares of orchards planted on LSC farms as of 1999. Game ranching on LSC farms has been another popular diversification activity and can provide an important source of supplemental income.

Issues with alternative non-traditional and horticultural crops:

Non-traditional crops are costly to produce when compared to traditional crops but less costly than tobacco and horticultural exports.

a. Non-traditional crops have their own limitations. For example, paprika is highly dependent on climatic conditions (rainfall), coffee is a relatively new crop and would require substantial investment. Cotton offers lower income than tobacco but does offer an excellent rate of return on cash and total production costs.

b. Smallholder farmers generally enjoy fewer opportunities to grow and market non-traditional cash crops than LSC farmers because of the lack of extension support, uncertain returns and special infrastructure requirements.

c. The study shows that these alternative highly profitable crops, specifically horticultural exports - roses and supermarket vegetables - are very expensive to grow and require large capital investment to create specialized infrastructure and processing facilities, (eg special irrigation equipment) and are highly skill intensive. These crops face marketing constraints when compared to tobacco.

d. The study indicates that horticulture is Zimbabwe's second most valuable agricultural export after tobacco and earned more than USD 124.9 million in gross foreign income in 1999/2000 season, equal to approximately 1.5% of total GDP. More than 80% of horticultural exports are grown on LSC tobacco farms and were first developed using tobacco revenues.

e. For smallholder farmers, successful horticultural exports depend heavily on technology transfer. The exporter provides extension agents to give advice and ensure that each crop is being grown to the required standards. The study reports that despite the barriers to entry, there are now plans to try and expand to new areas and involve more farmers.

Employment and income generating potential

One of the main arguments against measures to reduce the demand for tobacco is the worry that falling demand will cause job losses in the farm sector. Tobacco is a good source of indirect income for smallholder farm households with family members who work as wage-laborers on large-scale commercial tobacco farms. Simple calculations suggest that the total wage bill for tobacco grown on LSC farms is around USD 47.3 million. To the extent that a share of this income is sent as remittance payments to family members in communal areas, tobacco can play a major role in helping to finance the inputs needed for improved management of major smallholder crops including maize and cotton.

In countries where most of the tobacco crop is consumed domestically, expenditure switching will create demand for other goods and services, and employment gains in these other sectors are likely to offset the losses in the tobacco sector. Zimbabwe exports most of her tobacco crop, however, so if global demand for tobacco were to fall in future (although this is by no means certain and some analysts predict robust or even growing global demand), the impact on employment would depend on the extent to which commercial farmers were able to switch to other export crops such as roses, paprika, coffee and vegetables which are also highly labor intensive. Many other crops have similar per hectare labor requirements to tobacco, and some have further opportunities for downstream processing and growth linkages. Most of these crops are currently grown on a fairly limited scale, however, so the question would be how quickly and successfully farmers would be able to scale up exports and production of these crops, in the face of declining tobacco markets.

THE COSTS AND PROFITABILITY OF TOBACCO COMPARED TO OTHER CROPS IN ZIMBABWE

PART ONE

NARRATIVE TEXT

THE COSTS AND PROFITABILITY OF TOBACCO COMPARED TO OTHER CROPS IN ZIMBABWE

I. INTRODUCTION

1. This paper considers the financial costs and returns for tobacco and twelve other important crops grown by commercial and smallholder farmers in the intensive farming areas of northern and central Zimbabwe. Tobacco is of critical importance to the Zimbabwean economy and typically generates around USD 600 million in foreign revenue annually, equal to almost 10 percent of GDP and 30 percent of total exports. Although global demand for tobacco is still strong, pressure from international health organisations, anti-smoking groups and new trade protocols all threaten the long-term prospects of this important crop. As Zimbabwe looks to the future, therefore, it is important to consider diversification options and growth strategies in which other crops could play an increasingly important role and eventually substitute for some of the foreign earnings and employment currently accounted for by tobacco.

2. Towards this end, the primary aim of this analysis to provide an improved understanding of the trade-offs individual growers face in deciding which crops to grow. Agricultural production begins with the decisions farmers make and any successful diversification strategy must have the costs and returns for individual producers in mind. More specifically, at this critical juncture in the development of Zimbabwe, how do different crops and production technologies now compare in terms of total production costs, investment requirements, farmer profitability, employment creation, demand for credit and other matters of private and social importance? Are there attractive crop options that would justify farmers making a shift away from tobacco and what would be the implications for Zimbabwe's trade balance and local employment opportunities? This paper has been prepared to help answer some of these questions and to provide an improved basis for discussion of recent development trends and future growth strategies.

3. Table 1 provides a complete list of agricultural enterprises covered by the analysis.

Table 1: List of Enterprises Analysed.

	Large-Scale Commercial		Smallholder
	Dryland	Irrigated	Dryland
Tobacco			
Flue-cured	X	X	X
Burley			X
Traditional Field Crops			
Maize	X	X	X
Cotton	X	X	X
Groundnuts	X	X	X
Soybeans	X	X	X
Wheat		X	
Non-traditional Crops			
Coffee		X	X
Paprika		X	X
Marigold		X	
Horticultural Exports			
Mangetout		X	
Baby carrots		X	
Baby corn		X	
Roses		X	

A. Background

4. In geographic terms, it is first important to note that tobacco is grown almost exclusively in high-potential farm areas of Natural Region II in northeastern and central Zimbabwe. This zone accounts for less than 15% of Zimbabwe's total land area (5.86 million hectares), but is ideally suited to intensive farming with a more or less reliable 750 to 1 000 mm of rainfall coming in the summer months from late-October until the end of March. Large-scale commercial farmers occupy almost 63% of this high potential farmland. By contrast, Natural Regions III, IV and V are much less suited to intensive farming with progressively arid conditions less suited to tobacco and other crops. Smallholder farmers occupy about 71% of the farmland in these lower-potential areas equal to about 18.7 million hectares in total. Natural Region I is mostly in the Eastern Highlands with a mild climate suited to specialised farming and forestry. Maps showing the location and rainfall expectations of each Natural Region and also the location of Zimbabwe's 15 main flue-cured tobacco growing districts are given in Appendix 1. Further details on the breakdown of land classification by farm sector and area planted to different crops in each Natural Region are given in Appendix 2.

5. In interpreting the discussion that follows, it is also important to bear in mind that large-scale commercial farmers dominate Zimbabwe's tobacco sector. Although there are fewer than 2 000 commercial tobacco growers, these producers account for about 87% of area planted and 95% of the total crop equal to some 180 to 240 million kilos of flue-cured tobacco annually. Furthermore, most commercial farmers already have diversified sources of income. Although tobacco is still the backbone of commercial agriculture in most locations, other important crops for large-scale farmers include wheat, soybeans, maize, groundnuts and livestock, which (in tobacco areas) are typically grown in rotation with tobacco. Most commercial tobacco farmers practice a 5-year rotation and these crops are an important part of the overall land use system and help provide a steady cash flow. More recently, many commercial growers have also introduced other high-value crops including export roses, supermarket vegetables, paprika and coffee as part of their farm system specifically to lessen their dependence on tobacco. More than 80% of all horticultural exports, for example, are grown on tobacco farms and were first developed using tobacco revenue.

6. Smallholder farmers, by comparison, are only marginally involved in the direct production of tobacco. Although there are roughly eight times as many smallholder tobacco growers (about 16 000 in total for burley and flue-cured tobacco) compared with large commercial farmers, these account less than 1.5% of all smallholder households and just 7% of those in suitable agro-ecological areas. Certainly, the importance of tobacco as a high profit crop with fully developed market outlets cannot be overlooked for these producers, but it should also be noted that maize, cotton and groundnuts are all more important for smallholder farmers in most locations. In this respect, the greatest threat from shrinking tobacco markets for the smallholder sector is not so much the potential loss of direct farm enterprise income, but rather the loss of remittances sent by family members employed on large-scale commercial farms.

7. Before proceeding, it should also be noted that this analysis has been prepared at a critical time in the development of Zimbabwe. Apart from the pressure on tobacco from international health organisations, new trade protocols and other sources, the overall future of the agriculture sector is now facing great uncertainty in terms of the controversial program of land acquisition and resettlement. Although this paper has no interest to enter the political debate over land or to predict the outcome of current events, it is not possible

to overlook the present situation and implications for development opportunities in agriculture.

8. No matter how one interprets recent events, for example, it is clear that current conditions in Zimbabwe not only discourage new investment but also make it difficult to sustain existing farm production in terms of access to seasonal credit, fuel shortages, high inflation, land occupations and foreign exchange controls that distort the cost of imported inputs. For large-scale commercial farmers, the strategy now is mainly one of survival and bracing for the worst rather than to invest in new technologies and infrastructure as part of a drive towards crop diversification. Smallholder farmers have likewise been affected by the poor investment climate and are perhaps even more dependent on improved conditions than commercial growers. One of the key findings from the analysis is that that the most profitable crops and management systems depend on specialised infrastructure and technical support services. Quite simply, until the economic and political situation improves, few entrepreneurs are willing (or able) to invest in these services, thereby limiting the opportunities for broad-based growth and diversification.

B. Main Findings

9. Putting aside current political and economic constraints, the overall results of the analysis are encouraging and show that several crops apart from tobacco offer an opportunity for high producer profits and attractive rates of return. Other crops that rival and/or surpass tobacco in terms of potential net profit include roses, paprika, coffee and supermarket vegetables for large-scale commercial farmers and paprika, coffee and cotton for smallholder growers. These crops can all be grown in the same areas as tobacco and provide excellent rates of return to total production costs. On the other hand, these crops are also relatively expensive to produce and, with high-input management, are sometimes more costly than tobacco. This is especially true for high-value horticultural crops and long-season irrigated paprika on commercial farms.

10. The analysis also shows that many traditional agricultural crops including wheat, soybeans, groundnuts and maize are now marginal activities for large-scale commercial farmers and, in some cases, even return a net loss and fail to cover the long-run depreciation cost of fixed assets. On the other hand these traditional crops do, in most cases, provide a positive gross income and are therefore important in terms of helping to finance other more profitable and expensive crops like tobacco, paprika and coffee. In turn, the very good financial returns from these high-value enterprises help offset the net losses from traditional field crops and the analysis shows these are still a fundamental ingredient to most successful farm strategies.

11. For smallholder farmers, the opportunities to earn high profits from crops other than tobacco are more limited. Although paprika, coffee and cotton do, in certain cases, offer a potential for more income compared with burley tobacco and low-input flue-cured tobacco, these crops each have their own limitations.

12. In the case of paprika, for example, which is the most profitable smallholder crop apart from tobacco, yields are highly dependent on rainfall and can easily be wiped out by adverse growing conditions. Whereas large-scale farmers are able to protect themselves from some of these risks through irrigation, most smallholder farmers do not have access to this technology and paprika is typically considered a risky enterprise for smallholder growers. Coffee is likewise an attractive possibility and can provide a net income that rivals many tobacco scenarios, but is a relatively new crop in tobacco areas and would

require a substantial investment in farmer training and also pulping and processing facilities before it can be widely promoted in these locations. With respect to cotton, this enterprise generally provides a much lower income that tobacco (except compared with some levels of burley management), but does offer an excellent rate of return to cash and total production costs. At the national level, cotton is the most widely grown smallholder cash crop.

13. Importantly, for all categories of farmer, the analysis shows that the most profitable crops and production technologies require specialised infrastructure, processing facilities and other support services. This is especially true with respect to roses and vegetable exports, which can be very profitable but are also extremely expensive to grow and extraordinarily skill intensive. These enterprises also require a large capital investment in processing and packing facilities, special irrigation equipment and other infrastructure including greenhouses and insulated trucks for roses. Some large vegetable exporters have been working with smallholder farmers near Harare to provide inputs and develop a network of collection points for baby corn and mangetout, but these programs are expensive to establish and are still relatively small with only limited farmer participation.

14. In this respect, marketing constraints are one of the main obstacles to success with most high-value crops that could compete with tobacco in terms of profitability and potential export earnings. Again, this is most obvious in the case of roses and export vegetables, which must be grown to exacting European standards and delivered in fresh condition according to a tight time schedule. Paprika, on the other hand, is far more forgiving and can be sold to local export agents and processing companies on forward contract. Although this helps to minimise some production and marketing risks, relatively small world demand for paprika means that prices are highly sensitive to increased production and the crop could never substitute for tobacco on its own.

15. In terms of labour requirements, the data show that tobacco generates more employment opportunities per hectare than nearly every other enterprise analysed. This is one factor often noted by proponents of tobacco to illustrate the overall importance of the crop to the national economy and the calculations here suggest that the total wage bill for tobacco grown on large-scale commercial farms could be as high as ZWD 2 600 million (USD 47.3 million).[1] To the extent that a share of this income is sent as remittance payments to family members in communal areas, tobacco can play a major role in helping to finance the inputs needed for improved management of major smallholder crops including maize and cotton.

16. Although these benefits of tobacco cannot be ignored, the data show that many other crops are also very labour intensive and so offer similar opportunities for employment creation on a per hectare basis. Roses are perhaps the best example of this where just one hectare generates almost as many jobs as 25 hectares of flue-cured tobacco. Of the other (more comparable) field crops, paprika, coffee and export vegetables all demand a similar amount and sometimes more labour than tobacco with further opportunities for downstream processing and growth linkages. Because of limited market outlets and intensive management requirements, however, these crops are mostly grown on a much smaller-scale than tobacco and it is unlikely any single enterprise could ever

[1] Calculations based on average per hectare wage bill for LSC flue-cured tobacco of ZWD 34 053 (USD 619.14) and total area planted in 2000 (76 110 hectares).

substitute for a loss of tobacco employment without growth in other economic sectors including industry and tourism. It should also be noted that crops with a high labour requirement are not always attractive from the farmer's point of view. Given the potential for labour unrest, concerns over security and still rising rates of HIV infection, machine cultivated crops can sometimes be more attractive even with lower financial returns.

17. Finally, in terms of vulnerability to variations in price and yield, the analysis shows that tobacco is one of the most robust options available to both large-scale commercial and smallholder farmers in that the crop is still able to provide good financial returns even after a large drop in yield or price. Although Zimbabwe's ability to compete in world tobacco markets also depends on the costs of production compared with other tobacco growing countries, this finding is important and suggests that tobacco is likely to remain a very attractive crop for all categories of farmer under progressively difficult market conditions. This statement is not to suggest that Zimbabwe can afford to be complacent in terms of aiming for an agriculture sector that is less dependent on tobacco. The long-term future of tobacco is still under considerable pressure. The analysis does, however, suggest that time may be on Zimbabwe's side as it works to develop other high-value crop substitutes.

18. No matter how the results are interpreted, it is important to stress that the analysis has been prepared mainly to stimulate discussion of the opportunities for agricultural growth and diversification and cannot point to optimal or best farm strategies for individual tobacco growers. Profitability, risk and production costs are important to the process of farm decision-making but only tell part of the story. Each grower must consider their own cash flow requirements, distance to market, local climate and personal preferences among other factors in deciding which crops to grow. Many other farm enterprises besides those covered here also offer diversification potential including spice crops, game ranching, medicinal plants and sun-dried vegetables. These and other crops can all provide an important source of farm income and the challenge for each farmer is to find the right mix of enterprises that works best for them.

II. METHODOLOGY AND PROCEDURES

19. This section summarises and explains the methodology, key assumptions and financial indicators used for the analysis. All monetary values are expressed in Zimbabwe Dollars (ZWD) using observed financial prices prevailing in late January 2001. The official exchange rate of ZWD 55.00 = USD 1.00 was used to convert foreign values as needed.

A. Approach

20. The quantitative analysis is based on a set of 91 production budgets estimated specially for this study to reflect current financial costs and returns to agriculture in Natural Region II to the best extent possible. These budgets cover fourteen distinct crop enterprises including flue-cured and burley tobacco plus twelve other crops that either complement tobacco or offer diversification potential. To provide a broad indication of the relative costs and returns for different crops, several levels of farm management are considered for each enterprise. Livestock enterprises have not been covered, but do offer a certain amount of diversification potential in terms of their capacity to provide a regular income and help in sustaining other farm activities.

21. Data collection was carried out in Zimbabwe during the second half of January 2001 with assistance from a local counterpart. This exercise involved first-hand discussions with large and small commercial farmers as well as other smallholder growers, input dealers, commodity brokers, extension workers, government and donor representatives, farmer unions and others with a first hand knowledge of agriculture conditions in Zimbabwe. Draft crop budget data were supplied by the Commercial Farmers' Union (CFU), Zimbabwe Farmers' Union (ZFU), Agritex, Zimbabwe Tobacco Association (ZTA), Farmers' Development Trust (FDT), Horticultural Promotion Council (HPC) as well as other corporate and private producers met along the way.

22. Based on the results of this exercise, the next step was to prepare the full set of indicative production budgets being analysed here. This was done by comparing the draft budget data and other information collected in Zimbabwe for consistency and by crosschecking this with CSO and other statistical data for general accuracy. Yield and input assumptions are based on high-potential farm areas in Natural Region II where most tobacco is grown.

23. Although great care was taken to produce a consistent data set based on current prices, standard investment costs and realistic yield assumptions, it should be stressed that these models do not provide a definitive picture of all the costs and returns for individual producers. Rather, the overall objective is to provide an indication of the costs and returns for a broad range of crops and it is most helpful to think of the results as a continuum of production possibilities. Specific levels of input use, actual yields and overhead costs all vary substantially from producer to producer. It must also be emphasised that the analysis cannot point to optimal farm strategies. Profitability, risk, operating costs and investment requirements are critical to the process of farm decision making but only tell part of the story. Many other demand-side factors, including regional market conditions, price trends and consumer preferences must also be considered in deciding which enterprises should be pursued and how best to allocate scarce investment resources.

24. In presenting the results for each enterprise, a brief overview of production trends and marketing issues is given to help interpret the quantitative indicators. Brief summary tables with key financial results for each crop accompany the narrative test. The complete data set is presented in Part Two with separate tables ranking each enterprise by selected indicators.

B. Farm Sectors

25. The production models developed here cover three farm sectors including (i) large-scale commercial farmers; (ii) small-scale commercial farmers; and (iii) communal and resettlement farmers. These distinctions are especially important to how annualised per hectare investment costs for each enterprise are calculated. They also help to separate farmers in terms of management skill, input use, labour requirements and access to technology and credit.

26. Throughout the text, the term "smallholder farmer" is often used to refer both to small-scale commercial (SSC) and also communal and resettlement farmers. Although SSC farmers generally produce at a much higher level than communal and resettlement farmers, this approach is consistent with the use of crop budgets to represent a continuum of production possibilities. A distinction is still made in terms of how annual investment costs are calculated for each sub-sector based on the additional inputs required for more intensive management.

27. **Large-scale commercial farmers (LSC).** LSC farmers are characterised by their use of modern machinery, overhead and drip line irrigation and permanent waged labour. Holdings in this sector can be very large and it has been estimated that fewer than 5 000 LSC farmers occupy 21% of Zimbabwe's total land area equal to 8.2 million hectares, including 3.69 million hectares in Natural Region II. Less than 20% of all LSC farms are smaller than 200 hectares and half are greater than 1 000 hectares. Of this total, however, only a relatively small area may be suitable for cultivation and most LSC farmers crop between 100 to 500 hectares annually. The majority of LSC farms are under freehold ownership by individuals, limited liability companies and large corporations.

28. For this study, it is assumed that LSC farmers in tobacco areas cultivate a total of 300 hectares annually of which 80 hectares are irrigated and therefore double cropped. This gives a total farm size of 380 hectares against which the per hectare depreciation costs of basic machinery, vehicles and buildings are calculated.[2] Again, specific conditions can vary quite considerably from farm to farm with important implications for overall crop profitability.

29. **Small-scale commercial farmers (SSC).** Loosely defined as indigenous commercial farms, these holdings were first developed by the Rhodesian Government between 1931-1961 in an effort to reduce congestion in communal areas reserved for the indigenous population. There are about 9 000 holdings in the SSC sector occupying a total area of 1.4 million hectares including 240 000 hectares in Natural Region II. Half of these farms are under conditional freehold title, while others are under a long-term lease with an option to buy. Although not as advanced as LSC growers, most SSC farmers still produce at a reasonably high level and enjoy good access to basic equipment including ox ploughs and carts, hand sprayers sufficient barn space for curing tobacco and baling equipment. It is not unusual for some SSC farmers to cultivate by own or hired tractor.[3]

30. For this study, it is assumed that SSC farmers have access to a total of 10 hectares of arable land of which 6 hectares are cultivated each year. These farmers are assumed to own two teams of work oxen and most basic implements.

31. **Communal and resettlement farmers.** Communal areas were previously referred to as native lands or tribal trust lands and collectively occupy about 42% of Zimbabwe's total land area equal to 16.4 million hectares. Although most of Zimbabwe's 1.13 million communal farmers are located in the relatively drier parts of the country outside Natural Region II, there are still an estimated 243 000 holdings (covering 308 000 hectares) in high potential areas suitable for tobacco. The concept of resettlement farming was introduced shortly after independence in 1980 to ease congestion in communal areas, and also to resettle landless people. There are approximately 71 000 resettlement farms occupying a total area of 3.3 million hectares, including 590 000 hectares in Natural Region II. Especially in areas where farmers have recently been resettled, however, limited access to rural services and other infrastructure needed to support commercial and subsistence agriculture is often a major constraint.

32. For this study, it is assumed that communal and resettlement farmers have access to 5 hectares of arable land of which 3 hectares are sown to crops each year. These

[2] This applies to most field crops. For coffee, roses and export vegetables separate calculations of appropriate investment costs have been carried out. See Appendix 3 for details.

[3] Because of recent fuel shortages, most of these farmers have had to revert to ox cultivation.

farmers produce at a fairly basic level, but still use some purchased inputs including fertiliser and agro-chemicals at most management levels. It is assumed that cultivation is by hired ox plough.

C. Management Levels

33. Several levels of commercial and smallholder management are analysed for most enterprises. For LSC farmers, the first or "low" input level is intended to reflect fairly basic management practices and is characterised by relatively light application of fertilisers, pesticides, herbicides and other inputs. The second, or "medium" production level is based on a more intensive use of inputs and, in a broad sense, is roughly indicative of the management practices employed on most LSC farms. The third, or "high" input level is based on even more intensive use of crop inputs and yields that can be achieved through very good management under most normal conditions.

34. For smallholder farmers, similar definitions of low, medium and high input management apply. Each successive level is based on better weed control, timelier planting and more intensive use of purchased inputs. For many crops, only three levels of smallholder production are considered. In these cases, production using low and medium management is attributed to communal and resettlement farmers and production at the high level is attributed to SSC growers. In the case of tobacco and maize where management practices vary more widely, three management levels are considered for each sub-sector. Again, actual conditions can vary quite considerably from farm to farm it is most helpful to think of the results (for all farm sectors) as a continuum of production possibilities rather than a literal expression of the costs and returns for individual growers.

D. Main Assumptions

35. **Yield.** Yield assumptions are intended to reflect the output farmers in Natural Region II can expect in a year with normal growing conditions using the inputs costed in each production model. These assumptions are based on budget information collected during fieldwork and discussions with farmers, crop experts, input dealers and others with a detailed knowledge of farm conditions in Zimbabwe. To ensure that these estimates reflect actual performance by each farm sector, CSO data for the past six agricultural seasons were also compared to derive the estimates used for budget analysis. A complete list of all yield assumptions is given in Appendix 3.

36. **Prices.** Current prices as of January 2001 are applied to the analysis of each enterprise. This snapshot approach assumes that domestic inflation will affect all prices to the same extent so that future costs and returns for each enterprise retain their same general relation. The only exception to this approach is the case of maize where additional calculations are made based on the higher cost of purchasing grain ten months after harvest when local supplies are scarce. More detailed analysis would require estimation of a monthly cash flow using expected future prices.

37. **Crop marketing.** Marketing arrangements vary by crop. For most commodities, it is assumed that farmers transport their output to Harare where it is sold directly to the Grain Marketing Board (GMB), a private buyer or, in the case of tobacco, by auction. With vegetable exports, it is assumed that farmers deliver their crop to a nearby depot where it is collected by an export agent. For roses, two marketing arrangements are considered in which farmers either sell 100% of their flowers through the Dutch auction or

as part of an export consortium with a direct contract for delivery to a European buyer.[4] As noted, a special exception is also made in the case of maize, which is grown by both LSC and smallholder farmers as a cash crop and for on-farm consumption. In this case, imputed farmer profits are calculated for growers who sell different shares of their total harvest.

38. **Transportation costs.** So that the results for each enterprise can be compared directly, all farms are assumed to be 100km from Harare. This is where all crop inputs are procured and most outputs sold. A standard cost of ZWD 680.00 (USD 12.36) per ton is charged in all production budgets for fertiliser and other heavy items that must be moved over this distance. For coffee, an additional cost of hauling green coffee 250km to the Mutare Coffee Mill is included.[5] Other adjustments have been included depending on the marketing arrangement for each crop.

39. **Labour.** For LSC farmers, a distinction is made between permanent waged labour and casual workers. As is standard practice, permanent waged labourers are provided housing, medical benefits and education support for children. A standard cost of ZWD 84.00 (USD 1.52) per day is used in all budgets for this labour including direct wages and additional benefits. For casual workers on LSC farms, a daily rate of ZWD 54.00 (USD 0.98) is used.

40. On smallholder farms, a distinction is made between family and casual labour. Casual workers are paid a standard fee of ZWD 40.00 (USD 0.73) per day and are employed only for tasks where there is a shortage of family labour. The cost of family labour, on the other hand, is not included as a financial charge in the production budgets since this does not have to be paid for with an actual expenditure of cash. The availability of family labour is estimated on the basis of a five-member household with adjustments for specific tasks that must be carried out over a limited number of days.

41. **Interest.** No charge for seasonal credit is included in the crop budgets. Although nominal interest rates are currently very high at around 65%, these charges are much lower in real terms and have even been strongly negative in recent times (measured as nominal interest minus inflation). Given that the analysis works entirely in current prices, therefore, it would not be appropriate to include nominal interest charges since these would be offset by inflation when the loan is due. Furthermore, the credit requirements of individual producers vary greatly depending on the range of farm enterprises and each system's cash flow requirements.

42. To avoid possibly serious error, therefore, the approach taken is simply to identify all expenses that must be covered before each crop is sold. Depending on real movement in interest rates, it should be stressed that this approach risks of a bias in favour of crops that require heavy material inputs that are often borrowed for. This should be kept in mind when interpreting the results that follow. More advanced farm modelling based on the costs and returns for different cropping patterns would be needed to estimate indicative credit requirements for an entire production system.

[4] In these scenarios, 15% of flowers are still sold through the auction to establish their benchmark price.

[5] Actual transport costs for coffee (and all other crops) vary depending on the location and specific marketing arrangement used by each farmer. As a new crop in northern areas, many tobacco farmers that have introduced coffee are also installing their own hulling equipment with the aim of selling coffee directly to international buyers form their own farmgate.

43. **Investment costs.** The annual per hectare cost of long-term investment items including tractors, ploughs, ox drawn equipment, tobacco barns, sprayers, buildings and other crop inputs with a useful life spread over more than one season have been estimated for each farm sector. Briefly, the approach taken was to determine the so-called *capital recovery cost* of each fixed investment required by different crops. Specifically, this cost is the annual payment that will repay the cost of a fixed input over its useful life and provide an economic rate of return on the investment. This approach has the advantage over the simple division of an input's value by its useful life as it accounts for the fact that if the farmer did not purchase the input, the money could have been invested in some other on- or off-farm enterprise.[6]

44. Capital recovery costs have been estimated for several different sets of farm machinery. These include a standard cost for all basic machinery, vehicles and buildings used by each farm sector plus separate calculations for special equipment and materials required for specific enterprises. In the case of irrigated wheat for example, this crop must cover per hectare depreciation costs of all basic machinery plus irrigation equipment. Dryland maize only has to cover the per hectare cost of basic machinery whereas irrigated tobacco must cover the cost of basic machinery, irrigation equipment and specialised tobacco implements. Full details of the calculations for implements used by each farm sector are given in Appendix 3.

E. Financial Indicators

45. The spreadsheet models calculate a broad set of financial indicators to help interpret the financial costs and profitability of each enterprise and production level. Unless noted, all values are expressed in per hectare terms to allow cross-commodity comparisons.

46. **Production costs.** Five cost measurements are provided for each enterprise as follows.

- **Cash costs before sale** are inputs that must be paid for before the crop is sold including seed, fertiliser, agro-chemicals, packing materials, coal, firewood, vehicle and tractor operation, wages and crop insurance. These costs must either be financed with seasonal credit or income from other farm activities.
- **Cash deductions after sale** include auction fees, crop levies and other marketing charges that are deducted after each crop is sold. For smallholder farmers, it is assumed that the farmer strikes a deal with a local vehicle owner so that transportation costs to market are treated as a cash deduction.
- **Total variable costs** are all cash costs incurred on a seasonal basis. These exclude family labour for both LSC and smallholder farmers.
- **Investment costs** are measured as the annual per hectare share of the capital recovery cost for each implement as described above.

[6] Annual cost per hectare = purchase price of implement * per hectare share of use * capital recovery factor. CRF = ((1+i)^n)*i/(1+i)^n-1 where i = real interest on savings and n = number of years in the implement's useful life. For a full description of this methodology see Monke and Pearson (1989), *The Policy Analysis Matrix for Agricultural Development*, Cornell University Press, Ithaca.

- **Total production costs** include all variable or cash costs and fixed investment costs. These do not include an imputed value for family labour.

47. **Farmer income.** Farmer income is measured in gross and net terms. Gross profit shows the seasonal income from each enterprise; net profit measures the ability of each activity to cover the long-term depreciation cost of fixed assets.

- Gross profit = total revenue – all cash costs.
- Net profit = total revenue – all cash costs – annualised investment costs.

48. **Rates of return.** The returns to cash and total expenditure are measured as follows. Enterprises with a high ratio provide a better return to the expenditure on inputs than those with a low ratio.

- Return to variable costs = gross profit/total cash costs.
- Return to total costs = net profit/total production costs.

49. **Labour.** In addition to the estimated number of days of family and hired labour required for each enterprise, the following information is also provided. For LSC enterprises, the total wage bill includes the cost of both permanent and casual workers.

- Wage bill = days hired labour * applicable wage rate.
- Gross profit per day family labour = gross profit/days family labour.
- Gross profit per day total labour = gross profit/days family and hired labour.

F. Sensitivity Indicators

50. Of the risks farmers face, variations in yield and price are among the most important. These risks are particularly evident in Zimbabwe due to the threat of drought and uncertain economic and political conditions. Because fluctuations in yield and price are of direct importance to crop profitability, the yield and price at which each enterprise returns gross and/or net profit equal to zero have also been calculated. A crop that is able to withstand a relatively large drop in price or yield before returning a financial loss is said to be more robust than those where only a small variation in yield or price results in the loss of all profits.

51. When considering crop risk, farmers must also make an additional calculation of how likely a variation in price will be. A crop that is able to withstand only a small variation in price before returning a net loss could be entirely acceptable from the farmer's point of view if that crop is certain to attract the expected price. Speculative enterprises with less certain price structures involve greater risk no matter how large a variation is needed to erode all profits. As all investors do, farmers must consider ways of spreading their risk between crops that return a high profit and those that provide a stable income.

III. FLUE-CURED AND BURLEY TOBACCO

52. Zimbabwe is the largest producer of tobacco leaf in Africa and the world's fourth largest producer of flue-cured tobacco overall after China, Brazil and the USA in that order. It is possible to classify the tobacco industry in Zimbabwe into three components including (i) tobacco growing; (ii) tobacco manufacture; and (iii) tobacco distribution, including merchandising and retailing. The major focus of activity in the tobacco industry, however, is on the growing, curing and subsequent handling and distribution of tobacco leaf. The country does not have a large tobacco manufacturing industry and only produces enough cigarettes to supply domestic demand and provide a relatively small volume for export. An unusual characteristic of Zimbabwe, therefore, is that 98% of all tobacco production is exported.

53. Against this background, tobacco obviously plays a major role in the national economy. The crop normally accounts for more than 50% of agricultural exports, 30% of total exports and nearly 10% of GDP. All tobacco grown in Zimbabwe is sold on the auction floors in Harare as unprocessed leaf. In terms of revenue to farmers, total annual sales since 1990 have ranged form USD 270 to USD 593 million. An important advantage of this system and one reason many farmers like to grow tobacco is that they are paid in foreign exchange on the day the crop is sold. This money can be held in a foreign currency account for up to 60 days and is often used to procure essential imports needed to sustain farm production. Tobacco sold through the auctions then undergoes further processing by merchant companies to remove stems and tips from the leaf before being shipped abroad. This adds 30% to 50% to the crop's final export value. In 1998, the total value of tobacco exports was roughly USD 582 million.

54. Three main types of tobacco are grown in Zimbabwe including flue-cured, burley and oriental tobacco. Of these varieties, flue-cured is (by far) the most important and accounts for around 97% of the total volume. Northern and central areas of Natural Region II mostly produce a Virginia type of tobacco, whereas farmers in the east grow a thicker, slower developing type used for blended cigarettes. Burley tobacco is farmed mainly in the northeast and in the Eastern Highlands and is predominately a smallholder crop. These areas have better rainfall and longer periods of high relative humidity needed for curing. Oriental tobacco accounts for less than 1% of total output by mass and is grown mainly in Masvingo Province. Details of flue-cured and burley production by farm sector for the past two years are given are given in Table 2. A full analysis of flue-cured tobacco showing number of commercial growers, area planted and average price received in each of Zimbabwe's 15 main tobacco-growing districts is presented in Appendix 2.[7]

[7] This analysis corresponds with the map in Appendix 1 showing the location of each flue-cured growing district.

Table 2: Record of Tobacco Production by Sector (1999-2000).

	1999			2000		
	No of growers	**Total hectares**	**Total mass (kg '000)**	**No of growers**	**Total hectares**	**Total mass (kg '000)**
Flue-Cured Tobacco						
LSC	1 791	77 875	188 056	1 766	76 110	230 299
SSC	441	1 010	920	461	1 164	1 290
Communal	1 571	1 756	1 011	2 557	2 959	1 951
Resettlement	3 365	3 928	2 038	3 734	4 566	3 282
Co-ops	26	193	119	19	158	125
Total	**7 194**	**84 762**	**192 144**	**8 537**	**84 957**	**236 947**
Burley Tobacco						
LSC	74	1 820	2 856	72	1 094	2 584
SSC	365	332	150	449	398	201
Communal	6 222	2 484	2 302	6 674	2 670	3 037
Resettlement	2 234	2 056	1 392	2 888	2 775	2 313
Co-ops	8	32	31	8	24	28
Total	**8 903**	**6 724**	**6 731**	**10 091**	**6 961**	**8 163**

Source: TIMB data.

55. Employment: Tobacco accounts for an estimated 250 000 jobs including direct and indirect workers in growing, manufacturing and retailing, about 5% of Zimbabwe's total labour force.[8] Many other jobs also stem from tobacco's forward and backward linkages to other parts of the economy including input supply, transportation, coal mining, hospitality during the auction season and other consumer services. Remittances sent by tobacco workers to family members on communal farms can also help improve smallholder production of major crops like cotton and maize. The analysis shows that both of these traditional crops are much more profitable when smallholder farmers can afford the inputs needed for production at medium and high input levels and it is important that LSC tobacco can help finance some of these costs indirectly.

56. Tobacco is also an important source of government revenue through a levy system in which growers and buyers both pay fixed percent on the value of crop sales. This system generates several millions of USD annually as summarised in Table 3. To encourage production, the tax rates have been reduced each year since 1999 as shown. At the new 2001 tax rate and a typical LSC yield of 2 500 kg per hectare, flue-cured tobacco generates an estimated ZWD 7 260 (USD 132) in government revenue per hectare.

Table 3: Government Tobacco Levy.

Auction Year	Tax Rate	Total Revenue USD	Total Revenue ZWD
1996	5% + 5%	43 553 989	429 486 819
1997	5% + 5%	43 236 859	492 759 409
1998	5% + 5%	37 248 464	750 248 172
1999	5% + 5%	33 455 822	1 272 750 774
2000	2.5% + 2.5%	18 400 000	862 500 000
2001 (forecast)	1.5% + 1.5%	*11 000 000*	*605 000 000*

Source: ZTA data. 2001 forecast based on own budget analysis (average yield 2 500kg/ha) and total area planted as reported by ZTA.

[8] Industry estimate of tobacco related jobs and World Bank (1998) *African Development Indicators 1998/*99 for estimate of total labour force (5.18 million "economically active" workers in 1996 using ILO definition). A misleading figure often cited in Zimbabwe is that the crop accounts 25% of total employment. This is perhaps true if measured as a share of formal employment and tobacco is certainly a major source of economic activity in terms of household remittances and demand for consumer services. A useful area for further research would be to look at the question of tobacco related employment in more detail.

57. In the high-potential agricultural areas being considered here, most commercial farm strategies (for both LSC and SSC farmers) begin with, and revolve around tobacco. Other crops are mainly grown in rotation with tobacco, either to generate cash to sustain tobacco production or as food for on-farm consumption. Tobacco is one of the most profitable enterprises in commercial agriculture and the primary reason many commercial farms exist. Although other cash crops including cotton and even maize are more important for vast majority of communal and resettlement farmers, burley and flue-cured tobacco offer a unique opportunity for exceptionally high producer profits and is grown by around 16 000 of smallholder farmers as shown in Table 2.

58. Tobacco is a 12 to 16 month crop with sowing in the nursery starting in early-June and final marketing ending in October the following year. LSC farmers typically grow two distinct tobacco crops each year including an early, irrigated crop planted in the field at the beginning of September and a second, dryland (rain fed) crop planted in late-October. The primary reason for this is to maximise the use of limited barn space over a longer curing period.[9] Typical plot sizes for flue-cured tobacco range from as few as 20 hectares to more than 80. Smallholder farmers exclusively produce dryland tobacco and mostly cultivate very small plots of no more than 0.5 to 2 hectares at most.

59. An important characteristic of tobacco is that this is a relatively drought tolerant crop that also grows well on sandy soils. Although tobacco is produced in some of the best farm areas of Zimbabwe, it occupies a particular environmental niche in these locations and is generally able to out-perform other crops that demand more intensive irrigation and better soils. Most LSC farmers practice a five-year rotation where tobacco is followed for two years by Rhodes grass or some other combination of crops including wheat, soybeans, maize and groundnuts and then left fallow with grazing for livestock. Smallholder farmers typically follow a tobacco-maize rotation with small plots of groundnuts and other crops grown mainly for home consumption.

A. Flue-cured Tobacco

60. **Large-scale commercial farmers.** Per hectare financial indicators for LSC flue-cured tobacco are summarised in Table 4. Compared with all other enterprises analysed, these results are extremely favourable and show that tobacco offers excellent potential for high producer profits and employment creation. As shown in the complete data set in Part Two, only roses, paprika and some coffee scenarios offer a potential for greater net profits. Export vegetables are normally triple (or even quadruple) cropped each season and so also offer a potential for similar earnings on a per hectare basis as tobacco, but are normally grown over a smaller area because of intensive management requirements.

61. As one of the most profitable crops analysed, an important advantage of tobacco that this income can be used to help finance new agricultural enterprises. More than 80% of all rose exports, for example, are grown on LSC tobacco farms and were first introduced using tobacco income. Similarly, 55% of the total area now under coffee is on tobacco farms including 5 500 hectares planted within the past three years.

[9] A typical LSC farm growing 60ha of tobacco will require 35 or more conventional 8-tier flue-barns, which are used continuously throughout the curing season.

Table 4: Financial Indicators for LSC Flue-Cured Tobacco.

	Dryland Tobacco			Irrigated Tobacco		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
Yield (kg/ha)	2 200	2 500	2 800	2 800	3 100	3 500
Production Costs						
Cash before sale	113 454	120 002	126 311	135 718	140 504	145 886
Total variable costs	130 663	140 036	148 979	157 697	165 431	174 317
Total production costs	142 849	152 222	161 165	174 388	182 122	191 008
Labour						
Hired labour (days/ha)	382	415	437	462	482	497
Wage bill (ZWD/ha)	30 128	31 976	33 208	35 308	36 428	37 268
Wages as % var costs	23%	23%	22%	22%	22%	21%
Farmer Profit						
Gross profit	73 827	101 964	126 681	104 103	136 354	172 183
Net profit	61 641	89 778	114 495	87 412	119 663	155 492
Rates of Return						
Return to var. costs	0.57	0.73	0.85	0.66	0.82	0.99
Return to total costs	0.43	0.59	0.71	0.50	0.66	0.81
Sensitivity Indicators						
Chg in yield to gp = 0	-44%	-51%	-55%	-48%	-55%	-60%
Chg in yield to np = 0	-37%	-45%	-50%	-41%	-58%	-54%
Chg in price to np = 0	-32%	-39%	-44%	-35%	-42%	-47%

62. Importantly, the data in Table 4 also show that LSC tobacco is very expensive to grow. Tobacco not only demands a heavy application of fertilisers, but also makes intensive use of pesticides, herbicides and other special inputs and so demands greater cash expenditure before harvest than almost every other enterprise analysed. Although the share of costs that need to be financed with seasonal credit vary from farm to farm, this clearly represents a large challenge for Zimbabwe's banking system. Traditionally, LSC farmers have been able to use land as collateral to cover their bank overdraft but, as a result of current resettlement policy, farmers are now being denied this opportunity and many have been forced to scale back their operations. Other crops have also been affected by this situation, but tobacco has been especially hard hit because of very high up-front costs.

63. In terms of employment creation, the data show that LSC tobacco is one of the most labour intensive crops analysed. Although other enterprises including roses, paprika, coffee and export vegetables are also very labour intensive, tobacco is grown on a much larger scale and the calculations here suggest that the flue-cured tobacco is likely to account for 34 million days total of employment with and a wage bill of around ZWD 2.6 billion (USD 47.1 million).[10] In addition to about one full-time worker per hectare, tobacco demands an additional 70 to 160 days of casual labour per hectare for specific tasks (equivalent to one full time job for every 2.1 to 4.5 hectares under production). Irrigated tobacco requires more labour than dryland tobacco because of additional yield and time spent moving sprinkler heads and pipes.

64. Finally, it is worth noting that the sensitivity indicators for LSC tobacco are all very robust and show that a relatively large drop in price or yield is required before the crop returns a financial loss. This finding is especially important given the mounting pressure on tobacco from health groups, new trade protocols and changing consumer tastes

[10] Based on total area planted on LSC farms in 2000 (Table 3) and of calculation average wage bill and days worked for all production levels (Table 4).

and suggests that Zimbabwe is well positioned to continue as one of the world's leading tobacco exporters under progressively difficult market conditions. Although LSC farmers are likely to feel some pressure to diversify in order to protect themselves from the risk of diminishing tobacco markets, therefore, tobacco still has many useful roles to play in the development of Zimbabwe and is likely to remain an important part of most farm systems for many years to come.

65. **Smallholder farmers.** Summary data for communal, resettlement and SSC flue-cured tobacco are given in Table 5. Overall, these data tell a similar story as for LSC farmers and show that tobacco offers smallholder growers excellent potential for very high producer profits but is also expensive to grow. Some merchant companies (tobacco buyers) now offer input support to selected SSC and other smallholder farmers on an outgrower basis whereby the cost of fertiliser, pesticides and other inputs given on loan are deducted through the auction using a stop-order on the farmer's final payment. Opportunities to participate in these programs, however, are still limited and reserved for the best, most trustworthy smallholder growers. The high costs of production for flue-cured tobacco, therefore, are a disincentive to most cash-poor smallholders in tobacco areas and an important factor limiting the area cultivated and choice of management technology.

Table 5: Financial Indicators for Smallholder Flue-Cured Tobacco.

	Communal and Resettlement			Small-Scale Commercial (SSC)		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
Yield (kg/ha)	650	800	1 050	1 100	1 500	1 800
Production Costs						
Cash before sale	18 640	24 264	30 576	38 727	52 180	62 774
Total variable costs	24 078	31 008	39 647	47 880	66 027	78 442
Total production costs	28 024	35 034	43 593	52 701	78 442	83 272
Labour						
Total labour (days/ha)	260	320	365	375	445	480
Hired labour (days/ha)	110	170	215	225	295	330
Wage bill (ZWD/ha)	4 400	6 800	8 600	9 000	11 800	13 200
Ret/day family labour	185.06	235.68	332.44	318.07	483.52	612.25
Farmer Profit						
Gross profit	27 760	35 352	49 866	47 710	72 528	91 838
Net profit	23 814	31 406	45 920	42 880	67 698	87 008
Rates of Return						
Return to var. costs	1.15	1.14	1.26	1.00	1.10	1.17
Return to total costs	0.85	0.90	1.05	0.81	0.95	1.04
Sensitivity Indicators						
Chg in yield to gp = 0	-66%	-65%	-68%	-60%	-63%	-64%
Chg in yield to np = 0	-56%	-58%	-62%	-45%	-58%	-61%
Chg in price to np = 0	-48%	-50%	-54%	-47%	-51%	-54%

66. Compared with LSC tobacco, one notable difference is that the financial rates of return for smallholder farmers are generally more favourable. From the farmer's point of view, these very good rates of return help justify the large expenditure on variable inputs and show that growers who are able to afford these costs are likely to be well rewarded. With respect to labour, the data show that flue-cured tobacco is likely to require at least some hired labour at each management level. Although precise requirements depend on the availability of family workers, this can be an important constraint and must be considered in deciding how much area to plant.

B. Burley Tobacco

67. In addition to flue-cured tobacco, six levels of smallholder management for burley tobacco have also been considered. As shown in Table 2, smallholder farmers account for 90% of all burley growers by number and 60% of total production. Nearly two times as many communal and resettlement farmers grow burley tobacco compared with flue-cured tobacco. One important advantage of burley tobacco is that this is an air-cured crop and so does not demand a large investment in expensive barns or firewood and coal for curing.[11] On the other hand, burley tobacco needs relatively high humidity for curing and so is not suited to production in all areas. The financial indicators for smallholder burley tobacco are summarised in Table 6.

Table 6: Financial Indicators for Burley Tobacco.

	Communal and Resettlement			Small-Scale Commercial (SSC)		
	Low	Medium	High	Low	Medium	High
Yield (kg/ha)	700	1 000	1 300	1 100	1 300	1 500
Production Costs						
Cash before sale	13 147	20 378	26 222	21 048	26 636	41 097
Total variable costs	17 517	27 375	35 071	28 565	35 839	51 880
Total production costs	19 964	29 822	37 518	31 381	38 665	54 696
Labour						
Total labour (days/ha)	225	315	350	330	360	390
Hired labour (days/ha)	75	165	200	180	210	240
Wage bill (ZWD/ha)	3 000	6 600	8 000	7 200	8 400	9 600
Ret/day family labour	85.80	165.83	215.36	168.153	228.21	215.13
Farmer Profit						
Gross profit	12 871	24 875	32 304	25 280	34 321	32 270
Net profit	10 424	22 428	29 875	22 464	31 415	29 454
Rates of Return						
Return to var. costs	0.73	0.91	0.92	0.88	0.96	0.62
Return to total costs	0.52	0.75	0.80	0.72	0.81	0.54
Sensitivity Indicators						
Chg in yield to gp = 0	-50%	-56%	-56%	-55%	-57%	-44%
Chg in yield to np = 0	-41%	-50%	-52%	-49%	-52%	-41%
Chg in price to np = 0	-36%	-45%	-47%	-44%	-47%	-37%

68. Compared with flue-cured tobacco, these data show that burley tobacco is less expensive to grow but also provides a lower net income. Although still relatively expensive compared with most other smallholder crops like cotton and maize, the data for communal and resettlement farmers indicate that burley tobacco costs between ZWD 6 000 to 9 000 (USD 109 to 164) less per hectare than flue-cured tobacco. For SSC farmers, the estimated savings are even greater and range between ZWD 21 000 to 40 000 (USD 382 to 727). This savings can be an important incentive to smallholder farmers and, in addition to local climatic conditions, helps explain why more smallholder farmers cultivate burley rather than flue-cured tobacco.

69. Just as total costs with burley tobacco are lower, however, so too are the estimated net profits. Based on the average gross profit for all smallholder models, the data show that the returns from burley tobacco are about 50% lower compared with those for flue-

[11] Burley barns are generally far simpler in construction than flue barns and can be made almost entirely from local materials including wooden poles and thatching. Flue barns require heating ducts and must be completely enclosed with a ventilation system to regulate temperature.

cured tobacco, equal to some ZWD 28 000 (USD 509) per hectare. Burley tobacco still offers a potential for very high profits compared with most other smallholder crops, although paprika and high input cotton both offer an opportunity for greater income and better rates of return to the expenditure on cash inputs and investment of family labour. With the right types of support, the data also show smallholder coffee could surpass burley tobacco in terms of total income. Importantly, burley tobacco and coffee are already produced in similar geographic regions (mainly around the Eastern Highlands) where growing conditions are well suited to both crops.

IV. TRADITIONAL FIELD CROPS

70. This section considers the costs and returns for five traditional field crops including maize, cotton, groundnuts, soybeans and wheat that complement tobacco and play an important role in most LSC and smallholder farm systems. Following a comparative overview of how the indicators for these crops compare with those for tobacco, the detailed results for each enterprise are discussed along with an analysis of production trends, marketing issues and other factors with a bearing on opportunities for growth and diversification.

A. Overview

71. The traditional field crops considered here all cost considerably less to grow than tobacco, but (for the most part) also provide much less income. With many crops, LSC farmers even appear to earn a net loss indicating that these activities do not cover the annual depreciation cost of fixed assets. Nevertheless, these enterprises still play an important role by helping to provide the steady cash flow needed to sustain the production of tobacco and other more profitable crops. For smallholder farmers, traditional crops are not only important as a source of cash income, but are also essential part of most household food security strategies. Maize and groundnuts, for example, are grown primarily for family consumption, with only small surpluses sold for cash in most cases.

72. **Large-scale commercial farmers.** A summary of the total variable costs for traditional LSC field crops is given in Table 7. Of these enterprises, groundnuts, cotton and wheat are the most expensive in that order followed by maize then soybeans. Irrigated crops cost more than dryland crops due to additional labour requirements, incremental tractor operating costs, water rates and electricity charges. As a group, the total variable costs for traditional field crops are only about 12% to 39% of those for flue-cured tobacco on a per hectare basis.

Table 7: Comparison of Total Variable Costs for Traditional LSC Crops.

	Dryland Crops			Irrigated Crops		
	Low	Medium	High	Low	Medium	High
Total Var. Costs (ZWD/ha)						
Flue-Cured Tobacco	**130 663**	**140 036**	**148 979**	**157 697**	**165 431**	**174 317**
Maize	20 996	23 720	27 712	34 143	37 819	40 625
Cotton	30 540	34 330	38 904	48 049	51 213	55 944
Groundnuts	27 452	31 521	34 711	48 452	52 892	57 196
Soybeans	21 554	23 610	25 034	29 087	31 143	32 567
Wheat	. .	. .	. .	41 370	44 879	50 992

73. The next summary table compares the labour requirements and total wage bill for traditional LSC field crops with those for flue-cured tobacco. Of the traditional field crops, cotton and groundnuts are the most labour intensive, but still demand considerably less labour than flue-cured tobacco. From the social perspective, an important advantage of these crops is that cotton and groundnuts both require casual workers to help at harvest time and so provide employment opportunities for workers beyond each farmer's permanent labour force. Maize, soybeans and wheat, on the other hand, use considerably less labour with few (if any) jobs created for casual workers. For LSC farmers, this can be an important advantage since these crops avoid the trouble and expense of hiring outside workers.

Table 8: Comparison of Labour Requirements for Traditional LSC Crops.

	Dryland Crops			Irrigated Crops		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
Hired Labour (days/ha)						
Flue-Cured Tobacco	**382**	**415**	**437**	**462**	**482**	**497**
Maize	19	23	27	30	45	50
Cotton	145	172	198	212	245	278
Groundnuts	57	68	83	90	110	135
Soybeans	12	13	14	22	23	24
Wheat	. .	. .	. .	19	20	21
Total Wage Bill (ZWD/ha)						
Flue-Cured Tobacco	**30 182**	**31 976**	**33 208**	**35 308**	**36 428**	**37 268**
Maize	1 596	1 932	2 268	2 520	3 780	4 200
Cotton	9 380	10 873	12 367	13 113	14 980	16 847
Groundnuts	3 847	4 463	5 499	5 964	7 112	8 680
Soybeans	1 008	1 092	1 176	1 848	1 932	2 016
Wheat	. .	. .	. .	1 596	1 680	1 764

74. Finally for LSC farmers, Table 9 compares the gross and net profit from tobacco with the income that can be earned from other traditional crops.

Table 9: Comparison of Farmer Profits for Traditional LSC Crops.

	Dryland Crops			Irrigated Crops		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
Gross Profit (ZWD/ha)						
Flue-Cured Tobacco	**73 827**	**101 964**	**126 681**	**104 103**	**136 354**	**172 183**
Maize	(836)	2 200	3 968	417	2 501	5 455
Cotton	2 805	7 907	12 225	10 551	19 089	26 096
Groundnuts	2 518	6 774	11 909	1 498	13 708	26 054
Soybeans	(1 554)	2 640	7 466	913	5 107	9 933
Wheat	. .	. .	. .	19 130	26 621	31 508
Net Profit (ZWD/ha)						
Flue-Cured Tobacco	**61 641**	**89 778**	**114 495**	**87 412**	**119 663**	**155 492**
Maize	(6 677)	(3 641)	(1 873)	(9 929)	(7 845)	(4 891)
Cotton	(3 036)	2 066	6 384	205	8 743	15 750
Groundnuts	(3 323)	933	6 063	(8 848)	3 362	15 708
Soybeans	(7 395)	(3 201)	1 625	(9 433)	(5 239)	(413)
Wheat	. .	. .	. .	8 784	16 275	21 162

These data clearly show that most traditional crops are now marginal for the LSC sector and provide very little gross income with which to finance other, more lucrative farm activities. Once long-run depreciation costs are taken into account, many of these crops return a net loss. This situation is not only a serious concern for LSC farmers, but also

adds to the pressure on Zimbabwe's banking sector to provide seasonal credit for crop inputs. In the case of irrigated cotton, for example, per hectare gross profits from high input management are roughly equal to 20% of the up-front cash costs for medium-input dryland tobacco. The remaining costs for tobacco must be covered by other sources of income, including traditional farm enterprises, or through seasonal credit.

75. **Smallholder farmers.** A comparison of total variable costs (excluding family labour) for tobacco and other traditional smallholder crops grown in Natural Region II is given in Table 10. As with the LSC sector, these data show that traditional field crops all cost much less to grow than tobacco on a per hectare basis. This is especially important to understanding the decisions smallholders make since only very few farmers have reliable access to seasonal credit or other sources of crop finance. Of the traditional field crops, cotton is generally the most expensive, but special input schemes (managed by cotton buyers) help alleviate this pressure. It should also be kept in mind that smallholder farmers mostly cultivate less than a full hectare of most crops so that the actual costs and returns from each enterprise will less than the per hectare results shown below.

Table 10: Comparison of Total Variable Costs Traditional Smallholder Crops.

	Communal and Resettlement			Small-Scale Commercial (SSC)		
	Low	Medium	High	Low	Medium	High
Total Var. Costs (ZWD/ha)						
Flue-Cured Tobacco	**24 078**	**31 088**	**39 647**	**47 880**	**66 072**	**78 442**
Burley Tobacco	**17 517**	**27 375**	**35 071**	**28 565**	**35 839**	**51 880**
Maize	2 226	5 914	8 662	7 404	10 373	16 210
Cotton	4 218	9 052	. .	. .	. .	15 383
Groundnuts	4 087	5 369	. .	. .	. .	7 785
Soybeans	4 388	5 439	. .	. .	. .	7 584

76. Table 11 looks at the labour requirements for tobacco and other traditional smallholder crops. These data clearly show that flue-cured and burley tobacco are (by far) the most labour intensive crops analysed for smallholder farmers and also create significantly more jobs for casual workers than any other enterprise. Very high labour requirements can be a strong disincentive for individual farmers, and especially for households with a shortage of active workers. Where farmers anticipate a shortage of family labour to carry out a specific task, the choice is either to pay casual workers (who are often paid in kind rather than with cash) or to reduce the area given to that crop.

Table 11: Comparison of Labour Requirements for Traditional Smallholder Crops.

	Communal and Resettlement			Small-Scale Commercial (SSC)		
	Low	Medium	High	Low	Medium	High
Total Labour (days/ha)						
Flue-Cured Tobacco	**206**	**320**	**365**	**375**	**445**	**480**
Burley Tobacco	**225**	**315**	**350**	**330**	**360**	**390**
Maize	54	72	86	80	95	125
Cotton	102	145	. .	. .	. .	170
Groundnuts	75	90	. .	. .	. .	120
Soybeans	50	60	. .	. .	. .	70
Hired Labour (days/ha)						
Flue-Cured Tobacco	**110**	**170**	**215**	**225**	**295**	**330**
Burley Tobacco	**75**	**165**	**200**	**180**	**210**	**240**
Maize	0	0	0	0	0	25
Cotton	0	30	. .	. .	. .	50
Groundnuts	0	0	. .	. .	. .	0
Soybeans	0	0	. .	. .	. .	0

77. Table 12 compares the gross and net profits for traditional smallholder field crops with those from tobacco. As discussed above, these data show that flue-cured and burley tobacco provide a far greater income than virtually every other option analysed. Although very high production costs for tobacco are a serious constraint for most households, these data suggest that smallholder farmers can earn more income by cultivating only a small area of tobacco than an entire hectare of most other crops. The only exception to this is the case of cotton where it appears possible to earn more income with high input management compared with low-input burley.

Table 12: Comparison of Crop Profits for Traditional Smallholder Crops.

	Communal and Resettlement			Small-Scale Commercial (SSC)		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
Gross Profit (ZWD/ha)						
Flue-Cured Tobacco	**27 760**	**35 352**	**49 866**	**47 710**	**72 528**	**91 838**
Burley Tobacco	**12 871**	**24 875**	**32 304**	**25 280**	**34 231**	**32 270**
Maize	2 526	1 286	2 858	2 388	4 315	6 254
Cotton	9 649	14 720	. .	. .	. .	16 147
Groundnuts	5 071	8 367	. .	. .	. .	10 530
Soybeans	3 802	6 261	. .	. .	. .	7 626
Net Profit (ZWD/ha)						
Flue-Cured Tobacco	**23 814**	**31 406**	**45 920**	**42 880**	**67 698**	**87 008**
Burley Tobacco	**10 424**	**22 428**	**32 920**	**22 464**	**31 415**	**29 454**
Maize	2 059	819	2 391	1 552	3 479	5 418
Cotton	9 182	14 253	. .	. .	. .	15 311
Groundnuts	4 604	7 901	. .	. .	. .	9 694
Soybeans	3 335	5 794	. .	. .	. .	6 790

78. In terms of rural poverty alleviation, the data above appear to suggest that efforts to promote smallholder tobacco could be of major benefit to farmer income. High production costs and uncertain market prospects make this a difficult and risky development strategy, but the potential for tobacco to generate more profit than most other major crops is still an important advantage and something Zimbabwe should look to exploit.

B. Maize

79. Maize is Zimbabwe's primary staple food and arguably more important to the national economy than even tobacco. Although only about half of the total national harvest is sold each year for cash, more area is given to this crop than any other equal to about 1.2 to 1.5 million hectares per year over the past five years. Communal and resettlement farmers typically account for about 85% of total area planted, but only produce about 60% of the national harvest. Total domestic consumption is approximately 1.8 million tons per year for all uses including direct human consumption, as an ingredient in stockfeed and other industrial uses. Zimbabwe often exports small quantities of maize to neighbouring countries, but has only been in surplus five times in the past ten years, largely due to problems with recurrent drought.

80. **Large-scale commercial farmers.** Total maize production by LSC farmers has decreased every year since the mid-1990s when some 150 000 hectares were regularly planted to this crop. In the current 2000/01 season, only 75 000 hectares are thought to be

under maize as a grain crop.[12] Apart from the current political and economic situation, which has led to deeper than normal reductions in area planted, LSC farmers have been giving less emphasis to maize for several years and are now focusing mainly on producing enough grain for their permanent workers and to use as stockfeed if needed. Reasons for this development include problems with low producer prices, increased risk of crop theft and financial constraints caused through delayed payments by the Grain Marketing Board (GMB). These factors have had a similar impact on SSC farmers who also report they are now growing maize mainly for home consumption rather than for cash sales.

81. Financial indicators for LSC maize are summarised in Table 13. These data clearly show there is good reason for the move away from maize grown as grain for cash sales. Although most production scenarios yield a small gross profit, the net returns are strongly negative in all cases. Depending on the management level, the sensitivity indicators show that estimated crop yields would have to improve by 8% to 43% just to break even in net terms. Maize requires very little labour and rarely demands outside casual workers.

Table 13: Financial Indicators for LSC Maize.

	Dryland Maize			Irrigated Maize		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
Yield (kg/ha)	3 500	4 500	5 500	6 000	7 000	8 000
Production Costs						
Cash before sale	20 875	23 564	27 522	33 936	37 577	40 349
Total variable costs	20 996	23 720	27 712	34 143	37 819	40 625
Total production costs	26 837	29 561	33 553	44 498	48 165	50 971
Labour						
Hired labour (days/ha)	19	23	27	30	45	50
Wage bill (ZWD/ha)	1 596	1 932	2 268	2 520	3 780	4 200
Wages as % var costs	8%	8%	8%	7%	10%	10%
Farmer Profit						
Gross profit	(836)	2 200	3 968	417	2 501	2 455
Net profit	(6 677)	(3 641)	(1 873)	(9 929)	(7 845)	(4 891)
Rates of Return						
Return to var. costs	(0.04)	0.09	0.14	0.01	0.07	0.13
Return to total costs	(0.25)	(0.12)	(0.06)	(0.22)	(0.16)	(0.10)
Sensitivity Indicators						
Chg in yield to gp = 0	5%	-11%	-16%	-1%	-8%	-14%
Chg in yield to np = 0	43%	18%	8%	35%	24%	13%
Chg in price to np = 0	34%	14%	6%	29%	20%	11%

82. Because an increasing number of LSC farmers are producing maize mainly for on-farm consumption, a series of calculations were carried out to estimate the imputed returns for farmers who sell different shares of their total harvest. In these cases, grain saved for on-farm consumption was valued at the higher cost of purchasing maize ten months after harvest when local supplies have become scarce. These calculations are based an analysis of historic data which show that, since 1997, maize prices have increased by an average of 54% in nominal ZWD-terms from the period just after harvest until the next harvest.

[12] CSO and CFU data. LSC farmers also grow seed maize, which is a more expensive but higher return activity. In 1999, there were 99 500 hectares of LSC maize grown for grain in Natural Region II (1 560 farmers) and a further 8 500 hectares of seed maize (172 farmers).

Table 14: Imputed Returns for LSC Maize by Marketing Arrangement.

	Dryland Maize			Irrigated Maize		
	Low	Medium	High	Low	Medium	High
Crop Revenue						
Sell all	20 160	25 920	31 680	34 560	40 320	46 080
Sell 80%	22 325	28 704	35 028	38 272	44 650	51 029
Sell 20%	28 821	37 055	45 290	49 407	57 641	65 876
Sell none	30 986	39 839	48 692	53 119	61 972	70 825
Gross Profit						
Sell all	(836)	2 201	3 968	417	2 501	5 454
Sell 80%	1 805	5 597	8 118	4 944	7 783	11 491
Sell 20%	9 728	15 784	20 569	18 528	23 630	29 602
Sell none	12 369	19 180	24 720	23 055	28 913	35 639
Net Profit						
Sell all	(6 677)	(3 640)	(1 873)	(9 929)	(7 845)	(4 892)
Sell 80%	(4 036)	(244)	2 277	(5 402)	(2 563)	1 145
Sell 20%	3 887	9 943	14 728	8 182	13 284	19 265
Sell none	6 528	13 339	18 879	12 709	18 567	25 293

83. These data clearly show that maize is much more attractive when grown for on-farm consumption and help explain why many farmers have moved away from this crop as a cash enterprise. On the other hand, the imputed savings on the cost of purchasing grain are attractive in their own right and compare well with the cash earnings from other higher-value crops. On this basis, limited maize production is still a good option for LSC farmers and is likely to remain a fundamental element of most farm systems.

84. **Smallholder farmers.** At the national level, most maize in Zimbabwe is grown by communal and resettlement farmers for whom this is the principal food crop. Although other food crops (including sorghum and millet) are of greater importance outside Natural Region II, virtually every smallholder farmer (including SSC farmers) cultivates maize to some extent or another to meet at least some of their subsistence needs. Compared with LSC farmers, sales to the GMB are more common and most smallholder farmers also plan to earn at least some cash income from maize each year. Smallholder farmers normally account for 55% to 70% of total sales to the GMB.

85. The financial indicators for smallholder maize are summarised in Table 15 for farmers who sell all of their output for cash. Management practices vary considerably in the smallholder sector and the low input level for communal and resettlement farmers is based on growers using recycled seed without fertiliser; all other production levels are for hybrid maize with more intensive use of fertiliser at each successive management level.

86. Compared with LSC farmers, the results for smallholder maize are generally more favourable. Although crop profits are still very low compared with other smallholder enterprises, maize does at least return a positive gross and net profit at each management level. It should be noted, however, that for all models for hybrid maize (i.e. every production scenario except low-input communal and resettlement management) the costs of production are greater than the estimated gross returns indicating that farmers must have some other source of cash income to sustain this activity. To the extent that tobacco is often grown in rotation with maize on smallholder farms, it is clearly important to include a similar high-value crop as part of the strategy for household and even national food security. Even for smallholders not growing tobacco, the crop can still help finance

improved maize production through remittance income sent by family members or from casual employment on LSC tobacco farms.

Table 15: Financial Indicators for Smallholder Maize.

	Communal and Resettlement			Small-Scale Commercial (SSC)		
	Low	Medium	High	Low	Medium	High
Yield (kg/ha)	825	1 250	2 000	1 700	2 500	3 900
Production Costs						
Cash before sale	1 665	5 064	7 302	6 248	8 639	13 558
Total variable costs	2 226	5 914	8 662	7 404	10 373	16 210
Total production costs	2 693	6 381	9 129	8 204	11 209	17 046
Labour						
Total labour (days/ha)	54	72	86	80	95	125
Hired labour (days/ha)	-	-	-	-	-	25
Wage bill (ZWD/ha)	-	-	-	-	-	1 000
Ret/day family labour	46.78	17.86	33.23	29.85	45.42	62.54
Farmer Profit						
Gross profit	2 526	1 286	2 858	2 388	4 315	6 254
Net profit	2 059	819	2 391	1 552	3 479	5 418
Rates of Return						
Return to var. costs	1.13	0.22	0.33	0.32	0.42	0.39
Return to total costs	0.76	0.13	0.26	0.19	0.31	0.32
Sensitivity Indicators						
Chg in yield to gp = 0	-64%	-21%	-30%	-29%	-35%	-33%
Chg in yield to np = 0	-52%	-14%	-25%	-19%	-28%	-29%
Chg in price to np = 0	-43%	-11%	-21%	-16%	-34%	-24%

87. The imputed returns for smallholder maize by marketing arrangement are summarised below. In interpreting these data, it should be kept in mind that the optimal technological choice and marketing arrangement depends (at least in part) on each household's own consumption requirements and availability of storage space. In these terms, production at the high and medium levels is much more profitable compared with low-input maize because of the additional grain harvested. Nevertheless, because the estimated profits are positive in all cases, the data show that some cash sales can still be justified at each production level to raise money for minor household expenses.

Table 16: Imputed Returns for Smallholder Maize by Marketing Arrangement.

	Communal and Resettlement			Small-Scale Commercial (SSC)		
	Low	Medium	High	Low	Medium	High
Crop Revenue						
Sell all	4 752	7 200	11 520	9 792	14 688	22 464
Sell 80%	5 263	7 973	12 757	10 844	16 265	24 877
Sell 20%	6 793	10 293	16 469	13 999	20 998	32 115
Sell none	7 304	11 066	17 706	15 050	22 575	34 527
Gross Profit						
Sell all	2 527	1 287	2 858	2 388	4 315	6 254
Sell 80%	3 149	2 320	4 367	3 671	6 240	9 197
Sell 20%	5 017	5 060	8 895	7 519	12 013	18 026
Sell none	5 639	6 003	10 404	8 802	13 937	20 969
Gross Profit per Day Family Labour						
Sell all	46.79	17.87	33.23	29.85	45.43	62.54
Sell 80%	58.32	30.97	50.78	45.89	65.68	91.97
Sell 20%	92.90	70.27	103.43	93.99	126.45	180.26
Sell none	104.43	83.37	120.98	110.03	146.70	209.69

C. Cotton

88. Cotton is Zimbabwe's third most valuable agricultural export after tobacco and horticulture and is a key economic sector in terms of contribution to GDP, employment and export earnings. More than 200 000 smallholder households derive their livelihood directly from cotton, which is well suited to production in more marginal agricultural areas. About 80% of the lint produced each year is exported with the balance used by a small but vibrant textile industry with numerous downstream jobs. Cottonseed is used for crushing and supplies a large portion of Zimbabwe's vegetable oil and cake used in stockfeed. Over the past five years, communal and resettlement farmers have accounted for 80% to 90% of total plantings by area and typically produce 60% to 80% of Zimbabwe's total crop. The total annual export value for cotton normally ranges from USD 61 to 75 million depending on price and yield.

89. The cotton industry was deregulated in 1995 with the commercialisation of the Cotton Marketing Board (now the Cotton Company of Zimbabwe). Two other companies have since entered the industry and the resulting competition has benefited all cotton growers in the form of better market related prices, improved efficiencies and better service. Each buyer sets their own prices based on world market conditions and distinguish between four grades of smallholder cotton to encourage good crop management and post-harvest handling. This system also contributes to Zimbabwe's very good reputation as a supplier of top quality lint.

90. Compared with most neighbouring countries, Zimbabwe enjoys a very good ginning outturn (GOT) of about 41% lint per unit of seed cotton. This is mostly because of a highly developed seed breeding and multiplication system that ensures all farmers start with good gene stock. Because lint is the most valuable product of cotton, this allows more favourable prices to be paid to farmers than in countries with a lower GOT. Compared with Zambia for example (where the GOT is about 38%), producer prices in Zimbabwe are normally 20% higher in USD terms depending on world market conditions. About 98% of all cotton in Zimbabwe is handpicked which further contributes to the good quality and high prices on offer.

91. Per hectare yields are highly dependent on adequate pest control and, like tobacco, cotton makes intensive use of agro-chemicals and other purchased inputs. To help smallholder farmers afford these costs, each ginning company operates their own input scheme. Group lending, for example, has been used to good effect by The Cotton Company, which only extends credit through associations. Under this scheme, each association member must sign an agreement stating that the entire group will be ineligible for credit next year if just one individual defaults by selling outside the system. One of the new private companies, on the other hand, operates a voucher system in which farmers can choose to accept part of their payment in the form of a voucher exchangeable for inputs later in the year. Although this means that farmers are effectively put in the position of extending credit to the scheme operator, most growers have welcomed this system, both as a form of protection from inflation and as a way to avoid the problem of saving cash until later in the year to buy inputs.

92. **Large-scale commercial farmers.** The financial indicators for LSC cotton are given in Table 17. Roughly one third of total LSC production, equal to about 7 000 hectares per year, is under irrigation; a further 14 000 hectares are normally planted as a dryland crop. Irrigated production results in higher yields and more valuable cotton with a longer staple length.

93. Compared with other traditional field crops, the results for LSC cotton are reasonably attractive. Of the traditional field crops, only wheat offers a potential for greater farmer profits. Although far less profitable than tobacco and other high-value crops, cotton is normally grown on large plots of 100 hectares or more and so can represent an important source of income when high yields are achieved. This is not necessarily true with low-input management (especially for dryland cotton) and irrigated production is more profitable in every case despite higher production costs. As a handpicked crop, cotton is very labour intensive and requires an estimated 100 to 233 days of casual labour per hectare (based on a picking rate of 15kg per person per day). This is slightly more than the estimated casual labour requirements for LSC tobacco.

Table 17: Financial Indicators for LSC Cotton

	Dryland Cotton			Irrigated Cotton		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
Yield (kg/ha)	1500	1 900	2 300	2 500	3 000	3 500
Production Costs						
Cash before sale	30 040	33 696	38 137	47 170	51 076	54 713
Total variable costs	30 541	34 329	38 904	48 049	52 131	55 944
Total production costs	36 382	40 170	44 745	58 359	62 477	66 290
Labour						
Hired labour (days/ha)	145	172	198	212	245	278
Wage bill (ZWD/ha)	9 380	10 873	12 367	13 113	14 980	16 847
Wages as % var. costs	31%	32%	32%	27%	29%	30%
Farmer Profit						
Gross profit	2 804	7 908	12 225	10 551	18 189	26 096
Net profit	(3 037)	2 064	6 384	205	7 843	15 750
Rates of Return						
Return to var. costs	0.09	0.23	0.31	0.22	0.35	0.47
Return to total costs	(0.08)	0.05	0.14	0.00	0.13	0.24
Sensitivity Indicators						
Chg in yield to gp = 0	-11%	-25%	-31%	-23%	-34%	-41%
Chg in yield to np = 0	12%	-6%	-16%	-0%	-14%	-25%
Chg in price to np = 0	9%	-5%	-13%	-0%	-11%	-20%

94. **Smallholder Farmers.** Since the mid-1990s, smallholder farmers have planted around 260 000 hectares to cotton annually, including more 250 000 hectares by communal and resettlement farmers. Most production overall is in Natural Regions III and IV although cotton is also suited to higher potential areas and does well in Natural Region II where yields are typically 50 to 100 kg per hectare greater than the national average. The financial indicators for smallholder cotton are summarised in Table 18 below.

95. Compared with all other smallholder crops, the results for cotton are quite favourable and help explain why so many growers give high priority to this enterprise. Although somewhat expensive compared with other alternatives, the input schemes described above help cover many of these costs and cotton is not normally difficult to afford. On the other hand, input support packages do not always cover the costs of producing at the more intensive management levels and farmer profits are considerably greater with high and medium input use (6 to 8 sprays) than with more typical low input management (4 sprays). To the extent that communal farmers are able to afford more intensive production as a result of remittances sent by family members working on LSC tobacco farms, a shift away from tobacco could impact the cotton sector. The sensitivity indicators for cotton are among the best compared with all other smallholder crops and

show that the good results for this enterprise are extremely robust. Cotton demands a large amount of labour, especially for good weed control and picking. Spraying is normally done with handheld knapsack sprayers.

Table 18: Financial Indicators for Smallholder Cotton.

	Low (Com/Restl)	Medium (Com/Restl)	High (SSC)
Yield (kg/ha)	700	1 200	1 500
Production Costs (ZWD/ha)			
Cash before sale	3 742	8 236	13 890
Total variable costs	4 218	9 052	15 383
Total production costs	4 685	9 519	16 219
Labour			
Total labour (days/ha)	102	145	170
Hired labour (days/ha)	-	30	50
Wage bill (ZWD/ha)	-	1 200	2 000
Gr. Return/day family labour	94.60	128.00	134.56
Farmer Profit (ZWD/ha)			
Gross profit	9 649	14 720	16 147
Net profit	9 182	14 253	15 311
Rates of Return			
Return to variable costs	2.29	1.63	1.05
Return to total costs	1.96	1.50	0.94
Sensitivity Indicators			
Chg in yield to gp = 0	-74%	-66%	-55%
Chg in yield to np = 0	-70%	-64%	-52%
Chg in price to np = 0	-66%	-60%	-49%

D. Groundnuts

96. Smallholder farmers produce roughly 95% of Zimbabwe's total groundnut crop, mainly on very small plots for home consumption. Groundnuts are one of the most important sources of protein in rural diets and are grown by nearly every smallholder farmer to some extent or another. Recently, total plantings by communal and resettlement farmers has varied between 100 000 to 140 000 hectares per annum. Only about 5% of these groundnuts are grown as a cash crop however and total deliveries to the GMB have been less 3 000 metric tons per year for the past three years. Smallholder groundnuts are generally not suitable for export due to problems with mixed and outdated varieties, and also because of problems with aflatoxin. To the extent that groundnuts can be promoted as a cash enterprise, the most urgent challenge is to develop a seed multiplication program to produce the varieties demanded by international buyers.

97. Most LSC farmers grow long-season flamingo nuts as a dryland crop; only about one third of total production is irrigated. These pink skin confectionery nuts have many the characteristics sought by international buyers, but are not normally grown in sufficient quantities to attract European interest. Most trade therefore is with South Africa and Australia and any LSC groundnuts not exported are normally used domestically for the manufacture of peanut butter. An important advantage of groundnuts is that the crop performs well on the same sandy soils suited to tobacco and so makes an ideal rotation crop. Nevertheless, groundnuts are normally grown on small plots on most farms with only about one third of the area used for tobacco given to this activity. The total area planted to LSC groundnuts had fallen to just 1 000 hectares in recent years compared with more than 8 000 hectares annually in the early 1990s.

98. **Large-scale commercial farmers.** The financial indicators LSC groundnuts are summarised in Table 19. Except with low input management, these data show that irrigated groundnuts are roughly twice as profitable compared with dryland management at each corresponding production level. Compared with other traditional LSC crops, on the other hand, cotton and wheat both offer higher producer profits. Although only about one third of total production is under irrigation, when high yields are achieved, the estimated gross profits from groundnuts equal about 22% of the pre -harvest cash costs for medium input dryland tobacco. In other words, the income from every 4.6 hectares of irrigated groundnuts, has the potential to finance roughly one hectare of flue-cured tobacco. In terms of labour requirements, groundnuts typically use some casual workers to help with harvesting and are more labour intensive compared with all other traditional field crops except cotton.

Table 19: Financial Indicators for LSC Groundnuts.

	Dryland Groundnuts			Irrigated Groundnuts		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
Yield, (kg unshelled/ha)	1 800	2 300	2 800	3 000	4 000	5 000
Production Costs						
Cash before sale	27 152	31 138	32 425	47 952	52 226	56 363
Total variable costs	27 451	31 521	34 712	48 451	52 892	57 196
Total production costs	33 292	33 292	40 553	58 797	63 328	67 542
Labour						
Hired labour (days/ha)	57	68	83	90	110	135
Wage bill (ZWD/ha)	3 847	4 463	5 499	5 964	7 112	8 680
Wages as % var. costs	14%	14%	16%	12%	13%	15%
Farmer Profit						
Gross profit	2 519	6 774	11 908	1 499	13 708	26 054
Net profit	(3 322)	933	6 067	(8 848)	3 362	15 708
Rates of Return						
Return to var. costs	0.09	0.21	0.34	0.03	0.26	0.46
Return to total costs	(0.10)	0.02	0.15	(0.15)	0.05	0.23
Sensitivity Indicators						
Chg in yield to gp = 0	-10%	-21%	-31%	-4%	-25%	-38%
Chg in yield to np = 0	13%	-3%	-16%	21%	-6%	-23%
Chg in price to np = 0	11%	-2%	-13%	18%	-5%	-19%

99. **Smallholder farmers.** The quantitative results for smallholder groundnuts are summarised in Table 20. These data show that groundnuts are relatively inexpensive for smallholders to grow, but that farmer profits are also very low. Because most households produce groundnuts mainly as a food crop, however, the imputed food security value should also be taken into account and returns would be greater than shown if the measured against the cost of buying groundnuts throughout the year. On the other hand, most farmers only cultivate a very small area of groundnuts and rarely grow the crop over an entire hectare.

100. The high input SSC model is indicative of a farmer who produces groundnuts mainly for cash sales. Importantly, these data (and those for medium input management as well) show that groundnuts can be an attractive cash enterprise with the potential to generate similar net earnings to cotton. In order for this potential to be realised, however, farmers must have access to improved seed so as to produce a uniform crop with the characteristics international buyers demand. This would not only require an investment in seed multiplication and breeding, but also a reorientation of farmer attitudes to see groundnuts as a cash crop rather than something grown mainly for household subsistence.

Table 20: Financial Indicators for Smallholder Groundnuts.

	Low (Com/Restl)	Medium (Com/Restl)	High (SSC)
Yield, (kg unshelled/ha)	550	825	1 100
Production Costs (ZWD/ha)			
Cash before sale	3 713	4 808	6 762
Total variable costs	4 087	5 369	7 785
Total production costs	4 554	5 836	5 621
Labour			
Total labour (days/ha)	75	90	120
Hired labour (days/ha)	-	-	-
Gr. Return/day family labour	67.61	92.98	87.75
Farmer Profit (ZWD/ha)			
Gross profit	5 071	8 368	10 530
Net profit	4 604	7 901	9 649
Rates of Return			
Return to variable costs	1.24	1.56	1.35
Return to total costs	1.01	1.35	1.12
Sensitivity Indicators			
Chg in yield to gp = 0	-59%	-65%	-62%
Chg in yield to np = 0	-53%	-61%	-57%
Chg in price to np = 0	-50%	-58%	-54%

E. Soybeans

101. Large-scale commercial farmers produce more than 95% of Zimbabwe's total soybean crop. Since 1985, communal and resettlement farmers have produced less than 4 500 tons per year compared with an annual total of more than 100 000 tons for commercial growers; in 1999/2000 LSC farmers produced a record harvest equal to nearly 140 000 metric tons. Most soybeans are grown in the high-potential areas of Natural Region II where approximately one third of the area planted on LSC farms is under irrigation.

102. Zimbabwe is self-sufficient in soybean meal and regularly exports cake to South Africa, Zambia and other regional markets. Domestic market outlets for soybeans include use as (i) a high protein cake for stockfeed; (ii) a high energy feed for livestock; (iii) a source of protein in corn-soy blends; (iv) a meat extender; and (v) a direct human food. Large refining companies process more than 90% of Zimbabwe's soybean harvest using solvent extraction methods that yield about 18% oil. Zimbabwe is not self-sufficient in edible oil, however, and regularly imports about one third of its annual crude oil requirement for domestic refining.[13] Although price controls are not imposed on soybeans, it is sometimes difficult to obtain export permits for trade with higher-value international markets.

103. Soybeans are typically grown by most LSC farmers on very large plots in rotation with irrigated winter wheat. This rotation is an important part of many farm systems, not only in terms of the revenue generated, but also because soybeans help maintain soil fertility and offer a good way to share limited irrigation equipment. On the other hand, both soybeans and wheat grow best on heavier soils than those suited to tobacco and many farmers also prefer to cultivate these crops in different sections of their

[13] The annual import requirement depends on the size of Zimbabwe's cotton crop and amount of cottonseed available for oil extraction.

farm depending on soil type. Most LSC farmers achieve a yield between 2.2 and 2.5 tons per hectare; smallholder yields are around 1.0 tons per hectare when fertiliser is used.

104. **Large-scale commercial farmers.** The financial indicators for dryland and irrigated soybeans are summarised in Table 21. Compared with all other LSC enterprises, these data show that soybeans are highly unprofitable except for the fact that they are relatively inexpensive to produce and usually grown in large quantities throughout the year. It must also be kept in mind that soybeans are normally grown in rotation with irrigated wheat, which is highly profitable and can easily offset the net losses shown below. With high input management, the gross profits from dryland and irrigated soybeans are reasonably attractive, but still only sufficient to finance 6% to 8% of the pre-harvest cash costs for a single hectare of dryland flue-cured tobacco respectively. In terms of labour requirements, LSC soybeans are the least labour intensive crop analysed and rarely demand additional casual workers.

Table 21: Financial Indicators for LSC Soybeans.

	Dryland Soybeans			Irrigated Soybeans		
	Low	Medium	High	Low	Medium	High
Yield (kg/ha)	1 600	2 100	2 600	2 400	2 900	3 400
Production Costs						
Cash before sale	21 420	23 434	24 816	28 886	30 900	32 282
Total variable costs	21 554	23 610	25 034	29 087	31 143	23 567
Total production costs	27 395	29 451	30 875	39 433	41 489	42 913
Labour						
Hired labour (days/ha)	12	13	14	22	23	24
Wage bill (ZWD/ha)	1 008	1 092	1 176	1 848	1 932	2 016
Wages as % var. costs	5%	5%	5%	6%	6%	6%
Farmer Profit						
Gross profit	(1 554)	2 640	7 466	913	5 107	9 933
Net profit	(7 395)	(3 201)	1 625	(9 433)	(5 239)	(413)
Rates of Return						
Return to var. costs	(0.07)	0.11	0.30	0.03	0.16	0.31
Return to total costs	(0.27)	(0.11)	0.05	(0.24)	(0.13)	(0.01)
Sensitivity Indicators						
Chg in yield to gp = 0	5%	-11%	-25%	-3%	-16%	-26%
Chg in yield to np = 0	41%	13%	-6%	35%	16%	1%
Chg in price to np = 0	37%	12%	-5%	32%	15%	1%

105. **Smallholder farmers.** Although relatively few smallholder farmers grow soybeans, a quantitative analysis was carried out to assess the overall viability of this enterprise. Efforts were made a few years ago to promote soybeans as a cash crop among smallholder farmers through a seed distribution program. However, most of the harvest was retained for home consumption and there has been little work to support smallholder soybeans since. The smallholder soybeans results are summarised in Table 22.

106. These data show that soybeans are one of the least expensive crop options available to smallholder farmers. On the other hand, the estimated gross and net profits are also very low and all other enterprises (except maize sold entirely for cash) offer a potential for greater farmer income. In interpreting these results, however, it should be noted that that the daily returns to family labour are higher than for any other crop that does not require additional hired workers. The returns would be even greater if measured by the crop's imputed food security value, suggesting that soybeans may be an especially good food security choice for households with a shortage of active workers. As a cash

enterprise, however, smallholder farmers do not have the capacity to grow soybeans in large quantities and so are unable to achieve the same economies of scale that help to justify LSC production.

Table 22: Financial Indicators for Smallholder Soybeans.

	Low (Com/Restl)	Medium (Com/Restl)	High (SSC)
Yield (kg/ha)	700	1 000	1 300
Production Costs (ZWD/ha)			
Cash before sale	3 912	4 759	6 598
Total variable costs	4 388	5 439	7 584
Total production costs	4 855	5 906	8 420
Labour			
Total labour (days/ha)	50	60	70
Hired labour (days/ha)	-	-	-
Gr. Return/day family labour	76.04	104.35	108.95
Farmer Profit (ZWD/ha)			
Gross profit	3 802	6 261	7 626
Net profit	3 335	5 794	6 790
Rates of Return			
Return to variable costs	0.87	1.15	1.01
Return to total costs	0.69	0.98	0.81
Sensitivity Indicators			
Chg in yield to gp = 0	-50%	-58%	-55%
Chg in yield to np = 0	-44%	-54%	-49%
Chg in price to np = 0	-41%	-49%	-45%

F. Wheat

107. LSC farmers grow virtually all the wheat produced in Zimbabwe as an irrigated winter crop. Total production is normally between 225 000 and 250 000 metric tons from an area of about 50 000 hectares. Zimbabwe is a net importer of wheat, but still exports several thousand tons annually (both as grain and milled flour) to Zambia, Malawi and other regional buyers. Very little wheat is traded with South Africa, however, since farmers in that country benefit from production and export subsidies with which Zimbabwe cannot compete. In this respect, there has been some recent debate over the efficiency of growing wheat in Zimbabwe since high irrigation costs make domestic production expensive compared with other world producers. Once transportation costs are taken into account, however, it is generally acknowledged the costs of local production are lower than import parity. Zimbabwe also enjoys a competitive edge in other regional markets like Zambia where production costs are even higher. Total domestic demand is around 400 000 metric tons per year.

108. Wheat has been an important catalyst for the development irrigation in Zimbabwe and is a central part of most LSC farm systems. The crop was mainly introduced during the 1970s as part of the strategy to cope with international sanctions imposed on what was then Rhodesia. A revolving fund was established specifically to help LSC farmers invest in the irrigation equipment needed for wheat. Although farmers were obliged to grow wheat as part of this scheme, they quickly started to use the new equipment for other crops as well including irrigated tobacco groundnuts, soybeans and maize. Wheat grows best on relatively heavy soils and is typically planted in rotation with rain fed soybeans. Although not ideal complements in terms of soil type, a typical rotation

for many LSC farmers is to follow flue-cured tobacco by irrigated winter wheat and then smaller plots of soybeans, groundnuts and maize in the next rainy season.

109. Until 1994, wheat prices were controlled and all sales had to be through the state-owned GMB. Since the introduction of economic reforms, wheat prices are now market determined although there is still some interference in the form of export permits, which are not always available. In this respect, one inherent problem with the marketing of wheat is that the entire national harvest is produced at roughly the same time and so results in very low prices. Most LSC farmers are not equipped with sufficient storage space to take advantage of seasonal price fluctuations and, whenever possible, try and produce on a forward contract from a buyer with storage capacity who typically passes on some of this price advantage to the producer.

110. **Large-scale commercial farmers.** The quantitative indicators for irrigated LSC wheat are summarised in Table 23. These data compare very well with those for all other traditional field crops and show that wheat is not only relatively inexpensive to produce (cotton and groundnuts both cost more) but also offers higher profits than any other crop in this category. Consequently, the rates of return for wheat are among the best compared with all other irrigated LSC enterprises and only slightly lower than those for tobacco. Even once the depreciation costs of irrigation equipment are taken into account, wheat still provides a good net profit and reasonable rate of return. As a combine harvested crop, very little labour is required and permanent workers normally handle all tasks.

Table 23: Financial Indicators for LSC Wheat.

	Irrigated Wheat		
	Low	**Medium**	**High**
Yield (kg/ha)	5 500	6 500	7 500
Production Costs (ZWD/ha)			
Cash before sale	40 965	44 400	50 439
Total variable costs	41 371	44 879	50 992
Total production costs	51 717	55 225	61 338
Labour			
Hired labour (days/ha)	19	20	21
Wage bill (ZWD/ha)	1 596	1 680	1 764
Wages as % var. costs	4%	4%	3%
Farmer Profit (ZWD/ha)			
Gross profit	19 129	26 261	31 508
Net profit	8 783	16 275	21 162
Rates of Return			
Return to var. costs	0.46	0.59	0.62
Return to total costs	0.17	0.29	0.35
Sensitivity Indicators			
Chg in yield to gp = 0	-35%	-41%	-43%
Chg in yield to np = 0	-16%	-25%	-29%
Chg in price to np = 0	-15%	-23%	-26%

111. **Smallholder farmers.** Because of irrigation requirements, wheat is not generally suited to smallholder production. The crop could be grown as a rain fed crop during summer, but would involve a very high risk of disease and low yields of less than one ton per hectare. Furthermore, wheat requires specialised harvesting and threshing equipment that smallholders do not have.

V. NON-TRADITIONAL CROPS

112. This section considers the costs and returns for three non-traditional crops: coffee, paprika and marigold.[14] Horticultural exports including supermarket vegetables and roses are considered separately in the next section.

113. As a group, the crops covered here all have the potential to grow well in tobacco areas and are indicative of some of the diversification opportunities available in Zimbabwe. The costs of production for these crops are generally higher than for most traditional field crops, but lower than for tobacco and horticultural exports. In most cases, tobacco still provides more income on a per hectare basis, but the returns from non-traditional crops are attractive in their own right and (under the right conditions) could perhaps even substitute for tobacco as the foundation of a highly profitable farm system. Specific production and marketing issues for each crop are discussed below.

114. Beyond the crops covered here, many other niche products also offer diversification potential for smallholder and LSC farmers including mushrooms, flower seeds, game ranching, medicinal plants and spices. These enterprises are all being pursued on a limited basis in Zimbabwe and can provide an important source of farm income and improved cash flow. Compared with tobacco, however, the market outlets for these products are more limited and each farmer must find the right mix of enterprises that works best for them. A good area for further analysis would be to calculate production budgets and farm models based on these and other diversification options.

115. Citrus crops including oranges, grapefruit and lemons, for example, are an especially important diversification option with more than 88 000 hectares of permanent orchards planted on LSC farms as of 1999. Unfortunately, reliable data on the costs of production for these crops were not available and it would be misleading to comment on their costs and profitability. Anecdotal evidence, however, suggests that the returns may not be very high and one farmer with a fifty-hectare orchard complained of serious marketing problems and large net losses. One of the problems this grower identified with citrus is that these crops are perishable and so cannot be stored for a long time (like coffee) to take advantage of seasonal price variations. On the other hand, this grower also pointed out that citrus can be sold for foreign exchange (like tobacco) and so can be justified as part of the farm system even at a net loss. Citrus trees take about three to four years to produce their first fly crop and only reach full maturity after ten years.

116. Game ranching on LSC farms is another popular diversification activity. In tobacco areas, wildlife ranching began in the mid-1970s mainly as a hobby on unused land not suited for intensive cropping. Since then, the wildlife sector has developed into a fully integrated part of many farm systems with production for (i) hunting and photographic safaris; (ii) game meat; and (iii) sale of live animals to other ranches or private tourist parks. Although wildlife could never substitute for intensive cropping in high potential areas, game management has become an important source of supplemental income and can easily generate an income of several thousand USD annually. Establishment costs include game fencing, animal stock, watering points plus road construction and guest cottages for safari visitors. As an industry that caters primarily to overseas tourists, the wildlife sector has been especially hard hit by recent instability in Zimbabwe.

[14] Coffee has been grown for many years in Zimbabwe, but is a relatively new crop for LSC farmers in the main tobacco growing areas. Marigold is grown mainly for food colour and is also used in stockfeed.

A. Overview

117. **Large-scale commercial farmers.** A summary of key production costs for the three non-traditional LSC crops covered here is given in Table 24. Compared with tobacco, each non-traditional crop costs about the same or less than tobacco except for long-season (high input) paprika. Marigold costs about the same as many traditional field crops whereas coffee and paprika are among the most expensive enterprises analysed because of high irrigation requirements and intensive use of fertilisers and agrochemicals. These 3 crops all demand less labour than tobacco, but still have a high overall wage bill and generate anywhere from 50 to 250 days casual employment per hectare plus additional jobs in downstream processing. Because coffee and paprika are grown to fairly uniform standards only two management levels have been analysed for these crops; marigold is relatively new to Zimbabwe and just one management level is considered in this case.

Table 24: Comparison of Main Production Costs for Non-Traditional LSC Crops.

	Dryland Crops			Irrigated Crops		
	Low	Medium	High	Low	Medium	High
Total Var. Costs (ZWD/ha)						
Flue-Cured Tobacco	**130 663**	**140 036**	**148 979**	**157 697**	**165 431**	**174 317**
Coffee	. .	. .	. .	. .	122 494	134 151
Paprika	. .	. .	. .	. .	124 126	172 459
Marigold	. .	. .	. .	. .	. .	56 934
Hired Labour (days/ha)						
Flue-Cured Tobacco	**382**	**415**	**437**	**462**	**482**	**497**
Coffee	. .	. .	. .	. .	321	375
Paprika	. .	. .	. .	. .	270	310
Marigold	. .	. .	. .	. .	. .	136
Total Wage Bill (ZWD/ha)						
Flue-Cured Tobacco	**30 128**	**31 976**	**33 208**	**35 308**	**36 428**	**37 268**
Coffee	. .	. .	. .	. .	21 713	24 915
Paprika	. .	. .	. .	. .	20 720	23 800
Marigold	. .	. .	. .	. .	. .	10 024

118. Table 25 compares estimated gross and net profits for non-traditional LSC crops. Three fob prices for green bean coffee are considered, because current coffee prices are very low by historic standards at around USD 1 360 per metric ton fob Mutare. Market analysts expect that coffee prices will improve in the near future and, until recently, a price of around USD 2 000 per metric ton was not uncommon.

Table 25: Comparison of Farmer Profits for Non-Traditional LSC Crops.

	Dryland Crops			Irrigated Crops		
	Low	Medium	High	Low	Medium	High
Gross Profit (ZWD/ha)						
Flue-Cured Tobacco	**73 827**	**101 964**	**126 681**	**104 013**	**136 354**	**172 183**
Coffee – USD 1 360/mt	. .	. .	. .	. .	27 106	52 849
Coffee – USD 1 500/mt	. .	. .	. .	. .	42 506	72 099
Coffee – USD 2 000/mt	. .	. .	. .	. .	97 506	140 849
Paprika	. .	. .	. .	. .	101 474	278 741
Marigold	. .	. .	. .	. .	. .	24 688
Net Profit (ZWD/ha)						
Flue-Cured Tobacco	**61 641**	**89 778**	**114 495**	**87 412**	**119 663**	**155 492**
Coffee – USD 1 360/mt	. .	. .	. .	. .	(1 191)	24 552
Coffee – USD 1 500/mt	. .	. .	. .	. .	14 209	43 802
Coffee – USD 2 000/mt	. .	. .	. .	. .	69 209	112 552
Paprika	. .	. .	. .	. .	84 783	262 050
Marigold	. .	. .	. .	. .	. .	14 340

119. Importantly, the results above clearly show that gross and net profits from other crops can rival and even surpass tobacco on LSC farms. Although the returns from coffee are rather low with current prices, farmer profits improve significantly at values closer to the long-term average. The returns from paprika are also very attractive, especially when grown as a long-season crop with high input management. Although limited world demand means that paprika prices are highly sensitive to production increases, inclusion of this crop as part of a mixed farm system has the potential to reduce growers' dependence on tobacco. Estimated profits for marigold are considerably lower than for coffee and paprika, but still rival the income that can be earned from most traditional crops including wheat, cotton, groundnuts and maize consumed on-farm.

120. **Smallholder farmers.** Due to various barriers including high production costs, lack of extension support, uncertain returns and special infrastructure requirements, smallholder farmers have fewer opportunities to grow and market non-traditional cash crops than LSC farmers. Previous efforts to promote coffee and paprika among smallholder growers have been uneven at best and certainly not on a scale needed to attract broad segments of the tobacco growing population away from this crop. Smallholder coffee is perhaps the best developed, but production has been based entirely in the Eastern Highlands and there has been no work to develop the type of communal irrigation and pulping facilities needed to support farmers in flue-cured tobacco areas. Even as an alternative to burley tobacco grown in the Eastern Highlands, much work is still needed to develop appropriate management skills and infrastructure. As yet, marigold has not been promoted to any great extent as a smallholder crop but is likely to do well on communal lands since it is not fastidious to soil type or moisture.

121. Key production costs for non-traditional smallholder crops are summarised in Table 26. Coffee and paprika both cost less to produce than flue-cured and burley tobacco at each management level. Although paprika looks expensive in its own right, and certainly costs more than coffee, total variable costs are still only about 57% of those for flue-cured tobacco at each corresponding management level. Paprika and coffee are also less labour intensive than tobacco and so may be easier to manage for households with a shortage of active workers. On the other hand, these enterprises still require more labour than other traditional smallholder crops including cotton and the need for most households to hire workers if cultivating a large area may discourage some producers.

Table 26: Comparison of Main Production Costs for Non-Traditional Smallholder Crops.

	Communal and Resettlement			Small-Scale Commercial (SSC)		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
Total Var. Costs (ZWD/ha)						
Flue-Cured Tobacco	**24 078**	**31 088**	**39 647**	**47 880**	**66 072**	**78 442**
Burley Tobacco	**17 517**	**27 375**	**35 071**	**28 565**	**35 839**	**51 880**
Coffee	2 070	11 757	. .	. .	. .	29 720
Paprika	13 861	18 222	. .	. .	. .	43 141
Total Labour (days/ha)						
Flue-Cured Tobacco	**206**	**320**	**365**	**375**	**445**	**480**
Burley Tobacco	**225**	**315**	**350**	**330**	**360**	**390**
Coffee	135	210	. .	. .	. .	310
Paprika	220	260	. .	. .	. .	300
Hired Labour (days/ha)						
Flue-Cured Tobacco	**110**	**170**	**215**	**225**	**295**	**330**
Burley Tobacco	**75**	**165**	**200**	**180**	**210**	**240**
Coffee	25	60	. .	. .	. .	160
Paprika	70	110	. .	. .	. .	150

122. Table 27 compares estimated net profits for non-traditional smallholder crops. As with the results for LSC farmers, these data clearly show that other crops offer a potential for comparable and sometimes higher profits than tobacco. Since these crops also cost less to produce than tobacco, paprika and coffee appear to be excellent alternatives for smallholder growers. As noted, successful development of these crops depends on many things including major investment in support services and infrastructure.

Table 27: Comparison of Farmer Profits for Non-Traditional Smallholder Crops.

	Communal and Resettlement			Small-Scale Commercial (SSC)		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
Gross Profit (ZWD/ha)						
Flue-Cured Tobacco	**27 760**	**35 352**	**49 866**	**47 710**	**72 528**	**91 838**
Burley Tobacco	**12 871**	**24 875**	**32 304**	**25 280**	**34 231**	**32 270**
Coffee – USD 1 360/mt	9 150	21 903	. .	. .	. .	30 120
Coffee – USD 1 500/mt	10 305	25 368	. .	. .	. .	36 280
Coffee – USD 2 000/mt	14 430	37 743	. .	. .	. .	58 280
Paprika	32 539	39 778	. .	. .	. .	73 859
Net Profit (ZWD/ha)						
Flue-Cured Tobacco	**23 814**	**31 406**	**45 920**	**42 880**	**67 698**	**87 008**
Burley Tobacco	**10 424**	**22 428**	**32 920**	**22 464**	**31 415**	**29 454**
Coffee – USD 1 360/mt	8 055	20 808	. .	. .	. .	28 656
Coffee – USD 1 500/mt	9 210	24 273	. .	. .	. .	34 816
Coffee – USD 2 000/mt	13 445	36 648	. .	. .	. .	56 816
Paprika	32 072	39 311	. .	. .	. .	69 029

B. Coffee

123. Coffee was first introduced in the 1960s on LSC farms in Natural Region I near Chipinge in the Eastern Highlands. Until the mid-1990s, very little coffee was grown outside this area and the Eastern Highlands still account for more 70% of all exports. This situation is now set for great change in that LSC farmers in tobacco growing areas of Natural Region II have been planting large areas to coffee in an effort to diversify their income base. Of the total 9 900 hectares now under coffee in Zimbabwe, some 5 500 hectares are immature 1-2 year old trees grown on tobacco farms. When these plantations come into full production over the next 3 years, total annual exports are expected to increase from around 7 000 metric tons of green coffee at present to over 20 000 metric tons. Current export values are in the range of USD 8.1 million; once the trees already planted are fully mature, this could easily increase to over USD 43.5 million, equal to about 7.5% of the gross foreign income from tobacco.[15] Zimbabwe grows high quality Arabica coffee that normally attracts a 10% to 20% premium in the world market.

124. Coffee is now one of the fastest growing agricultural sectors in Zimbabwe and is being financed mainly by individual LSC farmers with income from tobacco. As a tree-crop, coffee takes around three years to mature until the first major harvest and few banks are willing to lend for this type of long-term project, especially in the current economic climate.[16] In addition to the trees themselves, other establishment costs include

[15] CGA estimates based on total yield expectation of 21 740/mt by 2004 for trees already planted and a price of USD 2 000/mt fob Mutare. Assuming prices remain at the current low of USD 1 360/mt, total export value is still set to increase to USD 29.6 million.

[16] Because of the current land situation, commercial banks are generally not willing to finance long-term investments on most LSC farms. This depends on how each farm has been listed for acquisition, but almost constant changes to these lists only adds to the confusion and serves to discourage new investment.

pulping machines, fermentation tanks, drying racks and, ideally, drip line irrigation. These costs can easily add to more than ZWD 10.6 million (USD 193 000) for a 60 hectare project until the trees are fully mature.[17]

125. Government does not control the coffee industry and individual LSC farmers are free to market their crop directly in US dollars. Coffee prices are based on the New York Futures Market and most growers are able to fix prices up to 12 months in advance. An important advantage of this system is that sales against a forward contract can be used to obtain credit and help smooth individual cash flow requirements. Currently, however, New York coffee markets are suffering from a large oversupply and are at their lowest point for 25 years equal to an average fob export price of only USD 1 360 per metric ton from the Mutare Coffee Mill. Analysts predict the situation will improve over the next 12 months and export prices around USD 2 000 per ton fob Mutare are more indicative of the long-run average. Therefore the quantitative analysis is carried out using three price scenarios: the current low price (USD 1 360/mt), a long-run average price (USD 2 000/mt) and a middle price (USD 1 500/mt).

126. **Large-scale commercial farmers.** Quantitative results from the analysis of LSC coffee grown in Natural Region II are summarised in Table 28 for a mature, four year old crop.[18]

Table 28: Financial Indicators for LSC Coffee.

	Irrigated Coffee	
	Medium	**High**
Yield (kg green bean/ha)	2 000	2 500
Production Costs (ZWD/ha)		
Cash before sale	121 397	132 784
Total variable costs	122 494	134 151
Total production costs	150 791	162 448
Labour		
Hired labour (days/ha)	321	375
Wage bill (ZWD/ha)	21 713	24 915
Wages as % var. costs	18%	19%
Gross Profit (ZWD/ha)		
USD 1 360/mt	27 106	52 849
USD 1 500/mt	42 506	72 099
USD 2 000/mt	97 506	140 849
Net Profit (ZWD/ha)		
USD 1 360/mt	(1 191)	24 552
USD 1 500/mt	14 209	43 802
USD 2 000/mt	69 209	112 552
Return to variable costs		
USD 1 360/mt	0.22	0.39
USD 1 500/mt	0.35	0.54
USD 2 000/mt	0.80	1.05
Sensitivity Indicators (USD 1 360/mt)		
Chg in yield to gp = 0	-20%	-31%
Chg in yield to np = 0	1%	-15%
Chg in price to np = 0	1%	-13%

[17] Plantation establishment costs have been annualised and are included as an investment item along with irrigation and other special equipment in the calculation of net profit. See Appendix 3 for details.

[18] Coffee trees on LSC farms are normally replaced or rationed after 7-8 years and most farmers aim to stager their planting to achieve a steady yield from the entire area given to this crop.

Because coffee is grown to a more or less uniform standard, only two management levels are considered for this enterprise. In this case, the medium input level is based on a conservative yield of 2.0 metric tons per hectare used for most farm budgeting exercises in Zimbabwe. Compared with large commercial farmers in southern Zambia, however, where growing conditions are more or less similar, this is a fairly low yield and it is not unrealistic to expect at least 2.5 tons per hectare for a mature crop with good management. The high input level is based on this expectation.

127. Key results from the quantitative analysis have already been compared with the data for flue-cured tobacco in the overview section above. Without repeating this discussion, it is useful to note that farmer profits improve by proportionately more with higher crop prices than the price increase itself. Furthermore, even though crop profits are very low with current prices (especially with average management), coffee still returns a gross profit and therefore contributes to the viability of a mixed LSC farm system. In other words, even under very difficult market conditions, coffee is still an attractive enterprise with great potential for increased profits as prices improve. In terms of the two management levels, the data suggest there is further potential for even higher profits through better management and increased yields. It may not always be possible to achieve 2.5 tons per hectare because of local agro-climatic conditions, but the potential for significantly greater profits no doubt means that some farmers already target this level.

128. **Smallholder farmers.** There are around 2 000 registered smallholder coffee growers in Zimbabwe located exclusively in the Eastern Highlands. Most growers are organised into co-operatives that manage the pulping and milling of smallholder coffee and oversee international marketing, which is handled on commission by the Mutare Coffee Mill. Smallholder farmers currently produce about 30 metric tons of green bean coffee annually equal to about 1.5% of the national total from an area of just over 100 hectares. Although smallholder coffee has not been promoted in the northern flue-cured areas, the quantitative analysis helps to assess the overall viability of this enterprise. As described, the major challenge with promoting smallholder coffee in these locations would be that pulping and processing facilities have to be developed. Simple irrigation facilities, including water furrows and treadle pumps, may also be needed for high yields depending on local conditions. Smallholder coffee, therefore, is more likely to substitute for burley tobacco grown in eastern Zimbabwe where there is better (but still limited) access to existing pulping and processing equipment.

129. The quantitative results for smallholder coffee are summarised in Table 29 below. These models assume farmers have access to pulping and processing facilities and no account has been taken of the cost for Zimbabwe to develop these services. Although more through analysis is needed to assess the viability of introducing coffee to a new location, the results here suggest this may be a very attractive proposition. Most encouragingly, the results are especially favourable with low input management where coffee costs less than almost every other enterprise analysed and provides relatively high profits similar to cotton.[19] On this basis, the rates of return are outstanding and indicate that coffee can be a very good low risk investment for smallholder farmers. With more intensive management and/or improved world prices, the returns from coffee rival tobacco. Although somewhat labour intensive because of the time spent picking, crop

[19] At this level, farmers do little more than harvest the cherries when ripe. The only cash costs are pulping fees, hired labour and maintenance of farm buildings and equipment (incurred by all crops).

profits improve significantly with more intensive management and the returns to family labour at these higher levels are similar to the very good daily returns from tobacco.

Table 29: Financial Indicators for Smallholder Coffee.

	Low (Com/Restl)	Medium (Com/Restl)	High (SSC)
Yield (kg/ha)	150	450	800
Production Costs (ZWD/ha)			
Cash before sale	1 734	10 749	27 928
Total variable costs	2 070	11 757	29 720
Total production costs	3 165	12 852	31 184
Labour			
Total labour (days/ha)	135	210	310
Hired labour (days/ha)	25	60	160
Gr. Return/day family labour			
USD 1 360/mt	83.18	146.02	200.08
USD 1 500/mt	93.68	169.12	241.87
USD 2 000/mt	131.18	251.62	388.53
Gross Profit (ZWD/ha)			
USD 1 360/mt	9 150	21 903	30 120
USD 1 500/mt	10 305	25 368	36 280
USD 2 000/mt	14 430	37 743	58 280
Net Profit (ZWD/ha)			
USD 1 360/mt	8 055	20 808	28 656
USD 1 500/mt	9 210	24 273	34 816
USD 2 000/mt	13 335	36 648	56 816
Return to variable costs			
USD 1 360/mt	4.42	1.86	1.01
USD 1 500/mt	4.98	2.16	1.22
USD 2 000/mt	6.97	3.21	1.96
Sensitivity Indicators (USD 1 360/mt)			
Chg in yield to gp = 0	-86%	-68%	-53%
Chg in yield to np = 0	-75%	-65%	-51%
Chg in price to np = 0	-72%	-62%	-48%

C. Paprika

130. Paprika was first introduced to Zimbabwe in the early 1990s by private investors who sought to promote the crop mainly among large-scale commercial farmers. One advantage of paprika is that the soil types and skills required are very similar to those needed for tobacco so that farmers are already well positioned for success. Compared with tobacco, however, world markets for paprika are relatively small with a total demand of only about 120 000 metric tons per year. Production in Zimbabwe has ranged from 8 500 to 15 000 metric tons annually and, in the years when production peaked, this had a noticeable impact on world prices which discouraged many LSC farmers from continuing to grow the crop. Until recently, paprika buyers typically offered LSC farmers production contracts with a guaranteed minimum price fixed in USD at the start of the season. Deteriorating economic conditions, however, mean this is no longer feasible for most export companies.

131. About 70% of world paprika is used as a condiment in powder form with the balance sent for hexane extraction to derive a colour lipid for industrial food processing. Until now all paprika grown in Zimbabwe has been dried, de-seeded and exported in baled form (similar to tobacco) for processing outside the country. This

situation is about to change, however, in that one local firm has nearly completed a new solvent extraction plant with the capacity to process 1 000 to 1 500 metric tons of paprika annually. Once operational, this facility will help add value locally and save on high overland transportation costs for bulk paprika.

132. Although there has been much private investment in Zimbabwe to promote paprika among LSC farmers (including crop research and breeding programs), relatively little attention has been given to smallholder growers for the past 2-3 years. Neighbouring countries including Zambia and Malawi have enjoyed some measure of success with smallholder paprika, but buyers in Zimbabwe prefer to work with LSC farmers who are a more reliable source of supply and able to produce higher quality crop that is easier to market internationally. Buyers in Zimbabwe also consider that paprika is a risky enterprise for smallholder farmers because of problems with crop disease and potential for yield loss from localised flooding and other conditions these growers cannot control.

133. **Large-scale commercial farmers.** The results for LSC paprika are summarised in Table 30. For this analysis, two management levels are considered including a late-season, low-cost crop planted with the rains and a long-season crop aiming for very high yields. Both production models require supplemental irrigation. As discussed in the overview section above, these results compare very favourably with those for flue-cured tobacco. Although limited world demand means that paprika could never substitute entirely for tobacco, the crop clearly has the potential to provide high farmer profits and so can play important role in a mixed farm system. In terms of employment creation, paprika demands an estimated 70 to 80 days of casual labour per hectare and is among the most labour intensive crops analysed. The rates of return and sensitivity indicators for both short- and long-season paprika are excellent and show this is a robust activity that remains profitable even with a significant reduction in price.

Table 30: Financial Indicators for LSC Paprika.

	Irrigated Paprika	
	Medium (short-season)	**High (long-season)**
Yield (kg dry/ha)	3 000	6 000
Production Costs (ZWD/ha)		
Cash before sale	124 126	172 459
Total variable costs	124 126	172 459
Total production costs	140 817	189 150
Labour		
Hired labour (days/ha)	270	310
Wage bill (ZWD/ha)	20 730	23 800
Wages as % var. costs	17%	14%
Farmer Profit (ZWD/ha)		
Gross profit	101 474	278 741
Net profit	84 738	262 050
Rates of Return		
Return to var. costs	0.82	1.62
Return to total costs	0.60	1.39
Sensitivity Indicators		
Chg in yield to gp = 0	-49%	-66%
Chg in yield to np = 0	-41%	-62%
Chg in price to np = 0	-38%	-58%

134. **Smallholder farmers.** Despite limited interest by most private buyers in paprika as a smallholder crop, some promotion and training work was carried out a few years ago in tobacco areas and there are now several thousand smallholder farmers who cultivate the crop each year. Around 75% of smallholder paprika (equal to less than 300 metric tons annually) is grown in Natural Region II on very small plots of just 0.1 to 0.2 hectares on most farms. In 1999, a total of 12 500 smallholder households planted paprika over an area of 1 600 hectares for all natural regions; there were 9 800 growers in Natural Region II cultivating a total of around 1 200 hectares. Paprika is priced according to colour and smallholders generally produce a lower-value crop than LSC farmers. Contamination with foreign matters including dirt, stones and even rat hairs because of poor on-farm storage also lead to lower crop value and restricted export opportunities.

135. Results from the quantitative analysis of smallholder paprika are summarised in Table 31. Although production and marketing risks cannot be overlooked, the data for smallholder paprika compare very well with those for smallholder tobacco. Not only are the estimated profits comparable to those from burley and even flue-cured tobacco, but paprika also costs less to grow at each corresponding management level. These are attractive characteristics for smallholder farmers for whom the ability to afford purchased inputs can be a major constraint. Compared with tobacco and all other crops analysed, the data show that paprika offers outstanding rates of return to both cash and total production costs.

Table 31: Financial Indicators for Smallholder Paprika.

	Low (Com/Restl)	Medium (Com/Restl)	High (SSC)
Yield (kg/ha)	800	1 000	1 800
Production Costs			
Cash before sale	12 997	17 142	41 917
Total variable costs	13 861	18 222	43 141
Total production costs	14 328	18 689	47 971
Labour			
Total labour (days)	220	260	300
Hired labour (days)	70	110	150
Gr. Return/day family labour	216.93	265.19	492.39
Farmer Profit			
Gross profit	32 539	39 778	73 859
Net profit	32 072	39311	69 029
Rates of Return			
Return to variable costs	2.35	2.18	1.71
Return to total costs	2.24	2.10	1.44
Sensitivity Indicators			
Chg in yield to gp = 0	-73%	-71%	-68%
Chg in yield to np = 0	-71%	-70%	-63%
Chg in price to np = 0	-69%	-68%	-59%

136. Furthermore, despite the perception among many buyers that paprika is a risky crop ill-suited to smallholder production, the sensitivity data show that the very good financial results for this crop are extremely robust and suggest that smallholder farmers may be well positioned to compete in the world market even with lower prices. Assuming all of the roughly 16 000 smallholder farmers currently growing tobacco were to produce an average of 400kg of paprika, for example, this would result in a total yield of just 6 400 tons, equal to less than half of Zimbabwe's record crop. Although it is not unreasonable to expect this could lead to lower international prices, smallholder farmers appear well

positioned to cope. To the extent this provides a window of opportunity for Zimbabwe's buyers to focus on lower-value smallholder paprika, there could be good potential for a gradual shift away from tobacco. Whether or not this potential can be realised, however, still depends on the development of crop extension services and input supply arrangements. As with all other enterprises, more comprehensive modelling is needed to assess the conditions under which such an investment would make financial and economic sense.

D. Marigold

137. Marigold flowers are a relatively new niche product in Zimbabwe and are grown almost exclusively by LSC farmers for their value as a colour extract. Marigold is a much lower-value commodity than either coffee or paprika, but grows well on most soil types and is forgiving to management input. As a bulky and relatively low-value commodity the returns to marigold are highly sensitive to transportation costs and most LSC farmers dry the crop in a cement-lined silage pit before delivery to Harare for processing. Dry flowers are converted to a compact pellet form for export or for domestic use either as an industrial food colour or ingredient in stockfeed. Research is ongoing in Zimbabwe to determine an optimal pest control strategy and fertiliser recommendations for LSC marigold. Current production is around 700mt of dry flowers annually.

138. **Large-scale commercial farmers.** The quantitative results for LSC marigold are summarised in Table 32. As a very new crop, only one management level is analysed based on data for a "high input" model provided by a local firm that is promoting marigold to supply its processing unit.

Table 32: Financial Indicators for LSC Marigold.

	Irrigated Marigold – high input
Yield (kg/ha) – dry	1 400
Yield (kg/ha) - wet	14 000
Production Costs (ZWD/ha)	
Cash before sale	56 934
Total variable costs	56 934
Total production costs	67 280
Labour	
Hired labour (days/ha)	136
Wage bill (ZWD/ha)	10 024
Wages as % var. costs	18%
Farmer Profit (ZWD/ha)	
Gross profit	24 686
Net profit	14 340
Rates of Return	
Return to var. costs	0.43
Return to total costs	0.21
Sensitivity Indicators	
Chg in yield to gp = 0	-34%
Chg in yield to np = 0	-20%
Chg in price to np = 0	-18%

139. Overall, these results are similar to many of the traditional field crops discussed in Section IV. Although marigold could never be expected to substitute for tobacco or other high-value crops as the foundation of a commercial farm system, the estimated costs and returns are similar to cotton, groundnuts and wheat. Marigold could play a useful role in helping to finance other farm activities and clearly could be part of the

process of agricultural diversification. Marigold is more labour intensive than many other traditional crops with about 40% of the total labour input consisting of casual workers used during harvest.

140. **Smallholder farmers.** As noted, marigold grows well on most soil types and is relatively forgiving to farmer management. These characteristics suggest that marigold flowers could do well as a smallholder crop, but as yet there has been almost no effort to promote this enterprise in communal and resettlement areas. Because of the favourable results for LSC farmers, however, a very promising area for future research would be to look at this and other niche products in more detail. Although marigold and other commodities that are in limited demand could never substitute for tobacco and other major crops, these could be a potential area where (in a stable economic environment) targeted finance could help develop new private sector partnerships.

VI. HORTICULTURAL EXPORTS

141. This section looks at costs and returns for two types of horticultural exports supermarket vegetables (mangetout, baby carrots and baby corn) and cut flowers (roses).

A. Overview

142. Horticulture is Zimbabwe's second most valuable agricultural export sector after tobacco and earned over USD 124.9 million in gross foreign income in the 1999/00 season, equal to approximately 1.5% of total GDP and 22% of the revenue generated by tobacco.[20] An overview of sector performance by export season is given in Table 33 and shows that horticulture has grown rapidly in the past ten years with total value now five times greater than in 1990. But unstable political and macroeconomic conditions have slowed these growth rates and it is projected that total exports in the 2000/01 season could decline by 10% or more. Roses (and to a lesser extent, supermarket vegetables) require a large expenditure on imported inputs, especially during establishment, for irrigation equipment, planting materials and greenhouse construction, and the total export values listed below would be considerably less if measured in net terms.

Table 33: Record of Horticultural Exports, 1989-2001.

	Flowers		Vegetables		Total Exports	
	Volume (mt)	Value (USD '000)	Volume (mt)	Value (USD '000)	Volume (mt)	Value (USD '000)
1989/90	2 872	13 211	2 823	8 469	5 695	21 680
1990/91	3 722	17 121	4 215	12 645	7 937	29 766
1991/92	4 757	21 885	4 354	13 063	9 111	34 948
1992/93	5 206	23 948	3 999	11 996	9 205	35 944
1993/94	5 769	26 541	5 202	15 607	10 971	42 148
1994/95	9 095	41 839	8 989	26 967	18 084	68 806
1995/96	11 630	53 497	10 202	30 605	21 832	84 102
1996/97	13 832	63 628	9 792	29 377	23 624	93 005
1997/98	17 290	79 535	12 730	38 190	30 020	117 725
1998/99	14 799	64 600	13 649	40 947	28 448	105 547
1999/2000	18 279	84 084	13 594	40 783	31 873	124 867
2000/01 est.	18 198	83 710	9 085	27 255	27 283	110 965

Source: Ministry of Lands and Agriculture, *Statistical Bulletin 2000*, Harare.

[20] These figures are for supermarket vegetables and cut flowers only. Citrus crops are normally also considered as part of Zimbabwe's horticultural exports and, in 1999/2000, total exports were USD 11.1 million, bringing the total gross value for all horticultural exports to USD 136.0 million. Reliable budget data for citrus crops were not available and no comment can be made on their costs and profitability.

143. More than 80% of Zimbabwe's horticultural exports are grown on LSC tobacco farms and were first developed using tobacco revenue. For most farmers, the main objective behind the introduction of roses and other horticultural exports was to lessen their dependence on tobacco. Not only can horticultural crops be extremely profitable, but like tobacco, they also earn foreign exchange and so have the potential to play a similar anchor role in a mixed farm system. Furthermore, although horticultural crops tend to be expensive because of high costs for pest and disease control, export vegetables and roses both provide a steady cash flow in their own right with weekly and even daily sales throughout the export season. From the social point of view, a further advantage of horticulture is that these crops are extremely labour intensive and create more jobs on a per hectare basis than any other farm enterprise including tobacco. These characteristics all make horticulture a very attractive sector, both for farmers and for Zimbabwe as a whole in terms of more diverse export earnings, employment creation and potential for growth linkages.

144. Despite these advantages, the production and marketing of horticultural crops is a highly specialised business that cannot be entered into lightly. At the field level, success demands unparalleled attention to quality control and strict adherence to European standards governing the use of pesticides, fertilisers and other inputs. Export crops must also be carefully graded and presented according to exact specifications. It is not unusual for more than 30% of a vegetable crop to be rejected because of quality and this risk has discouraged many LSC farmers from continuing with production. Marketing, therefore, is one of the biggest obstacles to success. Although cut flowers can still be sold independently on the Dutch auction, most other produce must be sold as part of a forward contract negotiated by a central agent or export consortium with the capacity to supply the specific volumes and varieties of produce European buyers demand.

145. High freight costs and the availability of direct flights to Europe further add to the challenge of success with horticulture and are currently among the most pressing constraints facing Zimbabwe's export sector. Over the past 12 months, direct flights from Harare to the UK, Europe and Australia have been reduced from 32 to 14 per week, resulting in a shortfall of approximately 150 tons of cargo space per week with a potential value USD 17 million over the 25-week peak export season.[21] As a result, many flower exporters have been forced to drive their produce by road to Johannesburg nearly 1 200 kilometres away simply to find cargo space. Zimbabwe also has some of the highest costs for aviation fuel in the region leading to high air freight prices which now account for as much as 40% of total production costs for both vegetables and roses.

146. For these and other reasons, more than 95% of vegetable exports and 100% of cut flowers are grown on individual LSC and large corporate farms, mainly within 200km of the International Airport in Harare. Smallholder farmers are only marginally involved in the export sector with fewer than 3 000 vegetable growers linked to established agents. This is in sharp contrast with the experience in Kenya where there are perhaps 60 000 to 75 000 smallholders involved in export-oriented vegetables, including production for canners and freezers. Despite more stringent marketing standards that apply today than when Kenyan horticulture first developed, there is still considerable scope for increased participation of Zimbabwean smallholders on an outgrower basis in some of the high potential farm areas near Harare.

[21] HPC estimates.

B. Supermarket Vegetables

147. Three indicative export vegetables are considered for this analysis including mangetout (snow peas), baby carrots and baby corn. Other important export crops for LSC farmers include sugar snaps, fine beans, cherry tomatoes, courgettes and asparagus. Each vegetable crop is typically grown over an 8 to 9 week period with most LSC farmers producing three crops in rotation each season. Although some growers have tried to form local export associations with neighbouring producers, most vegetable crops are farmed on an outgrower basis for a local contractor who collects, washes, grades and packs the produce as a shelf-ready product for delivery to a UK or other European supermarket chain. Individual farmers simply cannot guarantee the variety and continuity of supply needed to negotiate export contracts with supermarket buyers and this system is a vital link to the international market.

148. To ensure a steady supply of good quality produce, most export agents also grow vegetable crops themselves, especially during the rainy season when many LSC farmers switch away from commodities that are difficult to grow. Mangetout and baby carrots, for example, are almost impossible to produce during the heavy rains, but baby corn is more forgiving and better suited to production throughout the year. In some cases, this means that export agents have even found it necessary to grow mangetout and other crops in plastic houses just to meet the conditions of regular supply demanded by European buyers. This can be justified for a few months each year, but is only feasible for a large supplier with effective economies of scale.

149. Unlike roses, one important advantage of export vegetables is that these crops do not require a major investment in green houses and other specialised equipment by LSC farmers. Although most crops do best with drip line irrigation, it is perfectly acceptable to use existing overhead spray systems already available on most farms. For export agents, on the other hand, total investment costs can be very high and include the establishment of rural depots, grading and packing sheds, heat extraction units and cold rooms. Generators as well as insulated and refrigerated trucks are also required to ensure the cool chain to Europe is never broken.

150. **Large-scale commercial farmers.** Per hectare results for each of the LSC vegetable crops covered here are summarised in Table 34. These calculations are based on delivery to a nearby depot where an agent collects the produce for final grading and export presentation. Importantly, LSC farmers are only paid for produce actually exported and yield assumptions are estimated on this basis. Unsurprisingly, this system has led to suspicions by LSC farmers that they are not always paid for all of the produce actually shipped abroad. Certainly, the grading system is not entirely transparent and this problem has caused some farmers to switch away from export vegetables in favour of other crops with more certain terms of payment. Because vegetable crops are all grown to a uniform standard, only one management level for each product is considered.

151. Taken together, the results below are encouraging and show that, under the right conditions, export vegetables can be an important source of steady income for LSC farmers. Although per hectare profits are perhaps somewhat low compared with other enterprises on a single crop basis, export vegetables are normally triple (and sometimes quadruple) cropped throughout the year and so easily rival flue-cured tobacco and other high-value enterprises in terms of total annual income. Assuming the three crops covered here were grown in rotation, for example, total annual income would be ZWD 102 503 (USD 1 864) per hectare, which is almost identical to the estimated profits for medium-

input dryland flue-cured tobacco. Unlike tobacco, however, one the most important advantages of export vegetables is that these crops provide a steady cash flow in their own right. Not only are export vegetables planted in three to four cycles throughout the year, but most producers also aim to stagger their plantings on a weekly basis to produce a steady harvest throughout the season. This helps minimise the need for large cash expenditure at any one time and also provides a more regular income than almost any other farm enterprise.

Table 34: Financial Indicators for LSC Export Vegetables.

	Irrigated Vegetables		
	Mangetout	**Baby Carrots**	**Baby Corn**
Yield (kg export quality/ha)	4 000	3 800	950
Production Costs (ZWD/ha)			
Cash before sale	68 641	66 500	37 674
Total variable costs	68 641	66 500	37 674
Total production costs	78 916	76 775	47 949
Labour			
Hired labour (days/ha)	295	275	190
Wage bill (ZWD/ha)	20 020	18 900	13 440
Wages as % var. costs	29%	28%	36%
Farmer Profit (ZWD/ha)			
Gross profit	52 539	38 000	11 964
Net profit	42 084	27 725	1 689
Rates of Return			
Return to var. costs	0.76	0.57	0.32
Return to total costs	0.53	0.37	0.04
Sensitivity Indicators			
Chg in yield to gp = 0	-43%	-36%	-24%
Chg in yield to np = 0	-35%	-27%	-3%
Chg in price to np = 0	-35%	-27%	-3%

152. In terms of employment creation, the data show that an important advantage for Zimbabwe is that export vegetables are all very labour intensive and, on a per hectare basis, easily create more jobs than tobacco. Again assuming the three crops listed above were grown in rotation, a total of 760 days labour would be required per hectare, which is considerably more than for any other enterprise except roses. Although the precise situation will vary from farm to farm, casual workers normally fill more than 50% of the total labour requirement and vegetable exports can be an important source of employment and supplemental income for local residents. It should be stressed, however, that vegetable crops and other horticultural products could never substitute entirely for tobacco, which is grown on a much larger scale. Furthermore, crops with a large labour requirement are not always attractive from the farmer's perspective because of potential management problems and incremental costs of housing and other benefits for permanent staff.

153. **Smallholder farmers.** Vegetable crops have long been an important part of most smallholder farm systems and are grown both for household consumption and for sale in local markets. Crops including tomatoes, cabbage, onion, kale and okra all enjoy good demand in rural and urban markets and are an important part of many Zimbabwean diets.

154. Domestic production, however, is entirely different from growing vegetables for the export market and there are currently fewer than 1 700 smallholder

farmers within 100km of Harare producing baby corn, mangetout, butternut squash and sweet corn on an outgrower basis for one leading export company. These farmers include (i) established SSC producers also growing tobacco; (ii) irrigation scheme participants; and (iii) individual communal farmers with limited access to other sources of cash income. Depending on the time of year, these farmers produce from 50% to 90% of all baby corn and up to 5% of the mangetout shipped by the export company. Success with smallholder export horticulture depends heavily on technology transfer and the exporter provides extension agents to give advice and ensure that each crop is being grown to the required standards. A network of rural depots has been established to collect the produce and the outgrower company itself does crop spraying with the cost deducted from each farmer's final payment. Despite the high costs of establishing this system, there are now plans to try and expand to new areas and involve more farmers.[22]

155. In order to attract smallholder growers, a more transparent payment system is used than with LSC farmers in which vegetables are rough graded at the depot while farmers watch.[23] Only about 2% to 5% of produce is rejected at this stage and smallholder farmers are paid on the spot for all produce the depot accepts. Although this system means that smallholder farmers are paid less on a per unit basis than LSC growers, this method avoids potential conflict and helps to impress on farmers the importance for good quality control. Final pack-out percentages for smallholder produce are similar to those for LSC farmers at around 70% to 80% of total production for mangetout and baby corn respectively.

156. Although sufficient information was not available to carry out a full financial analysis of smallholder vegetable crops, partial budget information provided by the export company indicates these can be an attractive enterprise. These data are summarised in Table 35 but cannot be compared directly with the results for other enterprises since information on labour requirements, transportation costs, overhead costs and investment requirements were not available. It should also be noted that the results below are expressed for typical 300 and 600 square meter plots for mangetout and baby corn respectively, rather than in per hectare terms. Irrigation is carried out using watering cans or some other equally simple technology.

Table 35: Partial Indicators for Smallholder Export Vegetables.

Yield	Total Revenue (ZWD/plot)	Purchased Inputs (ZWD/plot)	Farmer Profit (ZWD/plot)
Mangetout (300m^2)			
100 kg	1 200	980	220
250 kg	2 000	980	1 020
300 kg	2 400	980	1 420
Baby corn (600m^2)			
5 000 cobs	1 200	634	566
7 000 cobs	1 680	634	1 046
9 000 cobs	2 160	634	1 526

Note: Data are based on prices from October 2000 rather than constant January 2001 prices used in all other calculations.

[22] This outgrower scheme was designed using technical assistance provided under the World Bank's Agricultural Credit and Export Promotion Project.

[23] LSC farmers normally do rough grading on their own to eliminate any crop clearly unsuited for export.

157. Although the numbers above cannot be compared directly with the results for other crops, the data suggest that export vegetables can be attractive for smallholder farmers with the right type of support. One important advantage of the system modelled above is that all purchased inputs, including seed, fertiliser and chemicals are all given on loan by the export company with the cost deducted at the time of delivery. From the farmer's point of view this is an ideal (and rare) opportunity since almost no cash is required to grow export vegetables. The estimated profits are perhaps rather low in absolute terms, however, and the data show it is unlikely that vegetables could ever substitute for tobacco, cotton or other more traditional crops grown on a larger scale. Nevertheless, the opportunity for a diverse and regular income from only a small area of land must not be overlooked and the data suggest that vegetable crops could provide a bridge away from tobacco for some smallholder growers.

158. **Export agents.** Because success with vegetable crops depends on the services of an export agent as part of the overall production chain, separate calculations were carried out to illustrate the costs and returns for these important sector participants. These calculations are based exclusively on the costs and returns of working with LSC farmers and no account has been made for the additional cost of input and extension services provided to smallholder farmers described above.

159. The results from this analysis are summarised in Table 36 and show that total costs of delivering shelf-ready produce to Europe can be extremely high, but that total profits are also very good. The rates of return are much lower than for most other crop enterprises, but as a different type of investment, the primary objective in this case is to achieve effective economies of scale by trading large volumes of produce. Unfortunately, information on the number of workers required at this stage of the production chain was not available.

Table 36: Financial Indicators for Export Agent.

	Irrigated Vegetables		
	Mangetout	**Baby Carrots**	**Baby Corn**
Production Costs (ZWD/ha)			
Crop purchases (LSC farmer)	121 000	104 500	49 638
Packing materials & labour	99 000	94 050	23 513
Air freight	381 920	362 824	90 706
European handling	363 000	344 850	86 213
Agent's Profit (ZWD/ha)			
Gross profit	60 170	51 624	35 650
Net profit	55 739	47 193	31 219
Rates of Return			
Return to var. costs	0.06	0.06	0.14
Return to total costs	0.06	0.05	0.12

C. Roses

160. Floriculture has been one of the most successful areas of Zimbabwean agriculture in recent years with a wide variety of flowers including roses, asters, chrysanthemums and carnations now shipped to Europe, USA, South Africa, Australia and the Far East. Roses account for the bulk of export flowers and there are now approximately 400 hectares under production, which is second only to Kenya compared with all other African countries.

161. Zimbabwe enjoys two fundamental advantages in rose production. First is inexpensive labour, which is necessary for growing, cutting, grading and packaging of blooms. Second, is the local climate which is well suited to quality rose production in the summer months coinciding with the European winter. Although it is possible to grow roses throughout the year, output is low and most growers prefer to rest their plants from April to October so as to produce a strong flush of blooms from early-November through to late-March when heating costs in Europe make greenhouse production there very expensive. Roses in Zimbabwe are all produced in polythene houses to protect the blooms from heavy rains and harsh sunlight. This method of production is capital intensive and high output is required to justify the investment.

162. Export roses are marketed through one of two channels. First, is the traditional route of selling through the Dutch auction and most flowers are still traded this way. The main advantage of this system is that individual growers are able to send their flowers for sale with few barriers to entry. On the other hand, auction fees and commissions using this system are very high and represent the second largest cost component after airfreight equal to around 16% of gross sales. In an effort to save on these costs, the second marketing channel to develop is that some rose farmers have joined together to form an export consortium with the capacity to guarantee a steady supply of flowers under direct contract with Dutch and other European buyers. Currently, there are two such consortia operating in Zimbabwe with 6 to 8 members each. Consortium members must carefully plan which varieties of roses they will grow in order to attract the highest price and guarantee the steady flow of flowers buyers demand. Under these contracts, 10% to 15% of each consortium's total production must still be sold though the auction in order to establish their benchmark price.

163. Total start-up costs for a rose project are very high and have been estimated at ZWD 23.4 million (USD 425 000) for a two hectare project including plastic houses, drip line fertigation, rose bushes, royalties, grading rooms, cold storage space and an insulated truck. Most farms aim to expand after a few years and some of this investment can be shared over four hectares without additional cost. A mature rose project rarely covers more than 4 to 6 hectares at most. Rose bushes alone can cost more than ZWD 5 million (USD 91 000) per hectare including royalties and are normally replaced after five years with new varieties.

164. **Large-scale commercial farmers.** The costs and profitability of LSC roses have been estimated for short, medium and long-stem flowers sold through the auction and as part of an export consortium. One of the key challenges all rose farmers face is deciding what type of bushes to plant and how best to time their production for a strong flush when prices are high. Yields and prices for specific varieties of flower vary greatly and it is again important to read these data as a continuum of possibilities rather than an exact expression of costs and returns for a particular type of flower. It must also be stressed that roses are rarely grown over more than 4 to 6 hectares for a mature project.

165. Financial indicators for roses sold by auction are summarised in Table 37. In the first place, these data clearly show that roses are in a league of their own with the potential to generate nearly as much or more income as tobacco from only a small area. Using the example of medium-stem roses, the estimated gross profit from a two hectare starter-project works out at around ZWD 6.7 million (USD 122 000) which is nearly as much as the total income from a full 60 hectares of medium input dryland and irrigated tobacco of about ZWD 7.2 million (USD 131 000). A three or four hectare rose project,

therefore, could easily surpass tobacco in terms of the total contribution to farm income. On the other hand, the data in Table 37 also show that roses demand a very large up-front expenditure. Because flowers are shipped weekly or even daily throughout the export season, however, the opportunity for a regular income helps to cover many of these production costs. Still, at least during the expensive start-up period, farmers must have some way of covering the very high variable and investment costs and it is no accident that 80% of total rose production started on tobacco farms.

166. In terms of employment, Table 37 shows that roses are (by far) the most labour intensive crop analysed. The estimated requirement of 9 630 days is based on a standard practice of using 30 full time workers per hectare which translates to a total input of 19 260 to 57 780 days labour for a 2 to 6 hectare project respectively. By comparison, the total labour input for 60 hectares of flue-cured tobacco works out at only around 27 000 days. Importantly, most rose farmers prefer to use female labour whereas men do most work for tobacco. Often this division of labour translates into as a husband and wife pairing. From the farmer's point of view, therefore, roses and tobacco are complementary in terms of the potential for savings on the cost of staff housing.

Table 37: Financial Indicators for LSC Roses Sold by Auction.

	Irrigated Roses - auction sales		
	Short Stem	**Medium Stem**	**Long Stem**
Yield (stems/ha)	2 750 000	1 750 000	1 100 000
Production Costs (ZWD/ha)			
Cash before sale	8 483 740	8 546 850	7 752 433
Total variable costs	10 653 849	10 894 513	10 139 553
Total production costs	12 219 140	12 459 804	11 704 844
Marketing Fees (ZWD/ha)			
Air freight	4 840 000	4 876 667	4 087 111
Auction fees	1 578 261	1 707 391	1 736 087
Commissions	526 087	569 130	578 696
Labour			
Hired labour (days/ha)	9 630	9 630	9 630
Wage bill (ZWD/ha)	786 240	786 240	786 240
Wages as % var. costs	7%	7%	7%
Farmer Profit (ZWD/ha)			
Gross profit	2 498 325	3 333 748	4 327 838
Net profit	933 034	1 768 457	2 762 547
Rates of Return			
Return to var. costs	0.23	0.31	0.43
Return to total costs	0.08	0.14	0.24
Sensitivity Indicators			
Chg in yield to gp = 0	-43%	-50%	-56%
Chg in yield to np = 0	-16%	-26%	-36%
Chg in price to np = 0	-10%	-15%	-24%

167. Table 38 looks at the returns for roses sold by an export consortium under direct contract.

Table 38: Financial Indicators for LSC Roses Sold by Export Consortium.

	Irrigated Roses – consortium sales		
	Short Stem	**Medium Stem**	**Long Stem**
Yield (stems/ha)	2 750 000	1 750 000	1 100 000
Production Costs (ZWD/ha)			
Cash before sale	8 733 740	8 796 850	8 002 433
Total variable costs	9 115 153	9 209 470	8 421 988
Total production costs	10 680 444	10 774 761	9 987 279
Marketing Fees (ZWD/ha)			
Air freight	4 840 000	4 876 667	4 087 111
Auction fees	236 739	256 109	260 413
Commissions	78 913	85 370	86 804
Labour			
Hired labour (days/ha)	9 630	9 630	9 630
Wage bill (ZWD/ha)	786 240	786 240	786 240
Wages as % var. costs	9%	9%	9%
Farmer Profit (ZWD/ha)			
Gross profit	4 037 021	5 018 791	6 045 404
Net profit	2 471 730	3 453 500	4 480 113
Rates of Return			
Return to var. costs	0.44	0.54	0.72
Return to total costs	0.23	0.32	0.45
Sensitivity Indicators			
Chg in yield to gp = 0	-32%	-58%	-62%
Chg in yield to np = 0	-19%	-40%	-46%
Chg in price to np = 0	-20%	-24%	-33%

168. Compared with the results for roses sold through the auction, these calculations show that farmer profits improve by an estimated 40% to 60% when marketed by an export consortium. This is entirely a result of the savings on fees and commissions farmers are charged on all sales through the auction. Direct marketing by a consortium involves certain costs to negotiate export contracts, but once established, only 10% to 15% of each consortium's flowers must be sold through the auction equal to a savings of ZWD 1.9 million (USD 35 000) in per hectare transaction charges for medium stem roses. The rates of return and sensitivity indicators for roses sold by consortium members, therefore, are all much more favourable than for individual growers who sell entirely on the auction. Given these good results, it seems likely that more growers may try and organised themselves into marketing groups in the future. The two consortia operating in Zimbabwe were self-formed and the data above suggest these were very good business decisions.

VII. SUMMARY AND CONCLUSIONS

169. This paper set out to provide an improved understanding of the opportunities for agricultural growth and diversification in Zimbabwe. Towards this end, a set of 91 enterprise budgets covering tobacco and 12 other important crops grown by large-scale and smallholder farmers were developed and used to compare the likely costs and returns from different production decisions. Although this approach cannot be used to identify optimal production strategies for individual farmers, it is important to understand the trade-offs these producers face in deciding which crops to grow. From the national perspective, the analysis also helps to understand some of the implications for Zimbabwe's

trade balance and opportunities for employment creation that may result from a gradual shift away from tobacco. Several points stand out from this analysis with important policy implications.

170. In the first place, the analysis clearly shows that tobacco is of major importance to the national economy and must not be neglected in the formulation of effective development strategies. Despite mounting pressure from international health organisations and anti-smoking groups, world demand for tobacco is still strong and the analysis clearly demonstrates that this crop offers some of the best potential for high producer profits, excellent rates of return and protection from variations in price and yield for both LSC and smallholder farmers in suitable agro-ecological areas. Furthermore, as one of the most labour intensive and widely produced crops in Zimbabwe, tobacco accounts for more jobs than any other farm enterprise and has benefits that extend far beyond national export income and individual producer profits. To the extent that tobacco wages are sent as remittances to family members in communal areas or used by casual worker to buy crop inputs, for example, the analysis shows that tobacco can play an important role in helping to support improved management of traditional smallholder crops like cotton and maize. With a gross annual foreign exchange contribution of around USD 600 million, Zimbabwe clearly cannot afford to turn its back on tobacco and any shift away from this crop must be gradual.

171. Rather than neglect tobacco for fear of shrinking markets, therefore, these finding all show that tobacco is uniquely positioned to help fuel the very process of agricultural growth and diversification. Certainly tobacco has played a major role in the economic development of Zimbabwe so far and, despite the health risks for tobacco consumers, it would be irresponsible to suggest that Zimbabwe should curtail tobacco and not continue to make use of this potential. More than 80% of all rose exports, for example, are grown on LSC tobacco farms and were first introduced using tobacco income. Similarly, 55% of the total area now under coffee is on tobacco farms including 5 500 hectares planted within the past three years. Zimbabwe's LSC farmers are fully aware of the building pressure on tobacco markets and that favourable outlets for this crop are unlikely to last forever. Towards this end, tobacco growers have already taken steps to diversify their income base by investing in various new enterprises. This process should be supported with constructive domestic and international trade policies that help maintain tobacco and also encourage investment in new areas.

172. In this respect, the results of the analysis are encouraging and show that several farm enterprises apart from tobacco offer a similar potential for good financial returns and high levels of employment creation. Coffee, roses, paprika and export vegetables can all be grown in the same areas as tobacco with good opportunities for high producer profits and payment in foreign exchange. Several other enterprises apart from those covered here have also been introduced on tobacco farms in recent years including citrus crops, wildlife production and small-scale tourism for photographic and hunting safaris. Other niche crops like marigold, spices, mushrooms, medicinal plants and flower seeds also offer potential on a limited scale.

173. Importantly, each of these alternative crops is generally more difficult to market than tobacco with only limited international demand. This is especially true with respect to paprika and supermarket vegetables, which can be grown using much of the same equipment already available on most LSC farms, but do not offer the same potential for broad participation by all farmers as tobacco. Most of the so-called diversification

crops also require a large initial investment in special infrastructure and processing facilities. This is especially true for roses, which can generate more income on a per hectare basis than any other enterprise, but are extremely expensive to produce and can easily cost more than ZWD 23 million (USD 418 000) to establish for a typical two hectare project. Tree crops like coffee (and citrus) are less expensive than roses, but take several years to mature and so demand a long-term perspective from potential investors. For these and other reasons, it is unlikely that any single enterprise could ever substitute for tobacco on its own and the challenge for each farmer must be to find the right blend of enterprises that works best for them.

174. With LSC farmers, for example, it is not difficult to imagine a future in which various crops like horticulture, coffee, paprika and other similar enterprises could play a similar anchor role to tobacco in a mixed farm system. Assuming key production and marketing constraints can be overcome (partly by investing revenue currently generated by tobacco in these new enterprises), these export crops can all be highly profitable and could easily substitute for some of the foreign income and employment currently accounted for by tobacco. Like tobacco, however, these commodities are all expensive to produce and it is also probable that traditional field crops including maize, cotton, groundnuts, soybeans and wheat will still have an important role to play in terms of providing supplemental income and steady cash flow needed to sustain the overall system. Traditional crops are perhaps less important for a farm system based entirely around horticulture since these crops can generate a steady cash flow in their own right, and it is again important to stress that the optimal enterprise mix can vary greatly from farm to farm depending on each system's own individual requirements and farmer objectives.

175. For smallholder tobacco farmers, the analysis shows the opportunities for growth and diversification away from tobacco are more limited. Paprika, coffee and export vegetables produced on an outgrower basis all offer considerable potential, but still depend on new infrastructure and support services for farmer training and input supply. Whereas LSC farmers have (at least until recently) been able and willing to finance this type of investment on their own using tobacco revenue, smallholder farmers generally do not have this capacity and will require support from both public and private sector participants to succeed with these new crops. In this respect, a return of economic and political stability to Zimbabwe is especially important as a prerequisite for broad-based growth and diversification.

176. In commenting on the diversification opportunities for smallholder farmers it must also be recognised that these growers are only marginally involved in the tobacco sector and account for less than 5% of total annual production. More specifically, of the estimated 1.21 million SSC, communal and resettlement farmers operating in Zimbabwe, only about 16 000 of these actually grow tobacco. Finding remunerative alternative to tobacco for these households is still an important challenge, but certainly not on the scale of having to work with all smallholder farmers in all locations. In a stable macroeconomic environment, for example, it is not unreasonable to expect that private investors could help develop some of the support services and infrastructure smallholder farmers need for success with other high value crops like paprika, supermarket vegetables and coffee. More than 1 700 smallholder farmers in tobacco areas are already organised around water points to produce export vegetables on an outgrower basis for one private firm and Zimbabwe should look to encourage these and other similar developments.

177. In terms of the potential negative effects on smallholder farmers from a loss of tobacco revenue, therefore, the greatest impact over time is likely to be felt through reduced remittance payments from workers on large-scale commercial farms. The quantitative analysis clearly demonstrates that each of the major smallholder crops covered here including maize, cotton, groundnuts and even soybeans are much more profitable when farmers are able to afford the fertilisers and agro-chemicals needed to produce using medium and high input management than with low input use. To the extent that remittance payments facilitate improved crop management, therefore, the loss of this income could seriously impact smallholder agriculture throughout the country. Clearly, one of the main challenges for Zimbabwe is to develop reliable supply networks that ensure affordable crop inputs are available in all areas. Although many of the so-called diversification crops being introduced on LSC farms are also very labour intensive and so could provide a reliable income for some of the workers displaced by a gradual shift away from tobacco, Zimbabwe cannot afford to ignore the role this traditional cash crop in helping to support smallholder farmers.

178. Many other conclusions besides those noted above can be drawn from the detailed information presented in the narrative text and quantitative data section. Agricultural administrators, farmers, policy makers, agribusiness firms and others are all likely to interpret the data differently with an increased emphasis on their particular area of concern. Once a basic set of enterprise models have been prepared, however, it is very easy to use computer software to test the effects of alternative yield and price assumptions. At the very least, it is hoped this discussion has helped to illustrate the benefits of this approach to agriculture sector analysis. In the absence of a well defined methodology for assessing individual crop attributes, sector planning can easily become an exercise in guess work based on presuppositions about which crops and policy initiatives are best. The approach adopted here cannot point to optimal farm strategies, but can help to interpret some of the trade-offs and decisions farmers must make.

THE COSTS AND PROFITABILITY OF TOBACCO COMPARED TO OTHER CROPS IN ZIMBABWE

PART TWO

DATA SECTION

PRESENTATION

This part of the paper presents the complete data set from the quantitative analysis. There are separate data tables for large-scale commercial and smallholder farmers in which the various enterprises are sorted by selected indicators as follows.

Large-scale commercial farmers.

- Alphabetical listing of results for all enterprises
- Enterprises sorted by cash required before sale
- Enterprises sorted by total production costs
- Enterprises sorted by gross profit
- Enterprises sorted by net profit
- Enterprises sorted by return to cash (gross profit/total cash costs)
- Enterprises sorted by return to total costs (net profit/total production costs)
- Enterprises sorted by labour requirement
- Enterprises sorted by return per day labour
- Enterprises sorted by vulnerability to price
- Irrigated and dryland enterprises sorted by total production costs
- Irrigated and dryland enterprises sorted by net profit
- Irrigated and dryland enterprises sorted by return to total costs
- Enterprises sorted by management level and total production costs
- Enterprises sorted by management level and net profit
- Enterprises sorted by management level and return to total costs

Smallholder farmers.

- Alphabetical listing of results for all enterprises
- Enterprises sorted by cash required before sale
- Enterprises sorted by total production costs
- Enterprises sorted by gross profit
- Enterprises sorted by net profit
- Enterprises sorted by return to cash (gross profit/total cash costs)
- Enterprises sorted by return to total costs (net profit/total production costs)
- Enterprises sorted by return to total labour requirement
- Enterprises sorted by return per day family labour
- Enterprises sorted by return per day total labour
- Enterprises sorted by vulnerability to price
- Enterprises sorted by management level and total production costs
- Enterprises sorted by management level and gross profit
- Enterprises sorted by management level and return to total costs
- Enterprises sorted by management level and return per day family labour
- Enterprises sorted by sub-sector and total production costs
- Enterprises sorted by sub-sector and gross profit
- Enterprises sorted by sub-sector and return to total costs
- Enterprises sorted by sub-sector and return per day family labour

LARGE SCALE COMMERCIAL SECTOR: Alphabetical listing of results for all enterprises.

Return to cash costs measured as gross profit/total cash costs; return to total costs measured as net profit/total production costs (excl. family labour).
For roses, yield is per 1,000 stems and management varies according to marketing arrangement (100% auction sales vs. blended sales for consortium by auction and direct contract).

					Production Costs (ZWD/ha)					Farmer Income (ZWD/ha)				Labour			Sensitivity Indicators		
Activity	Irrigation	Mgt. Level	Yield (kg/ha)	Gross Revenue (ZWD/ha)	Cash required before sale	Cash deductions after sale	Total cash costs	Annual investment cost	Total production costs	Gross profit (gr. revenue - cash costs)	Net profit (gr. revenue - total cost)	Return to cash costs	Return to total costs	Hired labour (days)	Wage bill (ZWD/ha)	Gr. profit per day (ZWD/ha)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
Coffee (USD 1,360mt)	drip line	med	2,000	149,600	121,397	1,097	122,494	28,297	150,791	27,106	(1,191)	0.22	(0.01)	321	21,713	84.44	-20%	1%	1%
Coffee (USD 1,500mt)	drip line	med	2,000	165,000	121,397	1,097	122,494	28,297	150,791	42,506	14,209	0.35	0.09	321	21,713	132.42	-28%	-9%	-9%
Coffee (USD 2,000mt)	drip line	med	2,000	220,000	121,397	1,097	122,494	28,297	150,791	97,506	69,209	0.80	0.46	321	21,713	303.76	-48%	-34%	-31%
Coffee (USD 1,360mt)	drip line	high	2,500	187,000	132,784	1,367	134,151	28,297	162,448	52,849	24,552	0.39	0.15	375	24,915	140.93	-31%	-15%	-13%
Coffee (USD 1,500mt)	drip line	high	2,500	206,250	132,784	1,367	134,151	28,297	162,448	72,099	43,802	0.54	0.27	375	24,915	192.26	-38%	-23%	-21%
Coffee (USD 2,000mt)	drip line	high	2,500	275,000	132,784	1,367	134,151	28,297	162,448	140,849	112,552	1.05	0.69	375	24,915	375.60	-55%	-44%	-41%
Cotton	no	low	1,500	33,345	30,040	500	30,540	5,841	36,381	2,805	(3,036)	0.09	(0.08)	145	9,380	19.34	-11%	12%	9%
Cotton	no	med	1,900	42,237	33,696	634	34,330	5,841	40,171	7,907	2,066	0.23	0.05	172	10,873	45.97	-25%	-6%	-5%
Cotton	no	high	2,300	51,129	38,137	767	38,904	5,841	44,745	12,225	6,384	0.31	0.14	198	12,367	61.74	-31%	-16%	-13%
Cotton	overhead	low	2,500	58,600	47,170	879	48,049	10,346	58,395	10,551	205	0.22	0.00	212	13,113	49.77	-23%	0%	0%
Cotton	overhead	med	3,000	70,320	50,176	1,055	51,231	10,346	61,577	19,089	8,743	0.37	0.14	245	14,980	77.91	-34%	-14%	-11%
Cotton	overhead	high	3,500	82,040	54,713	1,231	55,944	10,346	66,290	26,096	15,750	0.47	0.24	278	16,847	93.87	-41%	-25%	-20%
Export veg - baby carrots	drip line	high	3,800	104,500	66,500	-	66,500	10,275	76,775	38,000	27,725	0.57	0.36	275	18,900	138.18	-36%	-27%	-27%
Export veg - baby corn	drip line	high	950	49,638	37,674	-	37,674	10,275	47,949	11,964	1,689	0.32	0.04	190	13,440	62.97	-24%	-3%	-3%
Export veg - mange tout	drip line	high	4,000	121,000	68,641	-	68,641	10,275	78,916	52,359	42,084	0.76	0.53	295	20,020	177.49	-43%	-35%	-35%
Groundnuts	no	low	1,800	29,970	27,152	300	27,452	5,841	33,293	2,518	(3,323)	0.09	(0.10)	57	3,847	44.18	-10%	13%	11%
Groundnuts	no	med	2,300	38,295	31,138	383	31,521	5,841	37,362	6,774	933	0.21	0.02	68	4,463	99.62	-21%	-3%	-2%
Groundnuts	no	high	2,800	46,620	34,245	466	34,711	5,841	40,552	11,909	6,068	0.34	0.15	83	5,499	143.48	-31%	-16%	-13%
Groundnuts	overhead	low	3,000	49,950	47,952	500	48,452	10,346	58,798	1,498	(8,848)	0.03	(0.15)	90	5,964	16.64	-4%	21%	18%
Groundnuts	overhead	med	4,000	66,600	52,226	666	52,892	10,346	63,238	13,708	3,362	0.26	0.05	110	7,112	124.62	-25%	-6%	-5%
Groundnuts	overhead	high	5,000	83,250	56,363	833	57,196	10,346	67,542	26,054	15,708	0.46	0.23	135	8,680	192.99	-38%	-23%	-19%
Maize	no	low	3,500	20,160	20,875	121	20,996	5,841	26,837	(836)	(6,677)	(0.04)	(0.25)	19	1,596	(44.00)	5%	43%	34%
Maize	no	med	4,500	25,920	23,564	156	23,720	5,841	29,561	2,200	(3,641)	0.09	(0.12)	23	1,932	95.65	-11%	18%	14%
Maize	no	high	5,500	31,680	27,522	190	27,712	5,841	33,553	3,968	(1,873)	0.14	(0.06)	27	2,268	146.96	-16%	8%	6%
Maize	overhead	low	6,000	34,560	33,936	207	34,143	10,346	44,489	417	(9,929)	0.01	(0.22)	30	2,520	13.90	-1%	35%	29%
Maize	overhead	med	7,000	40,320	37,577	242	37,819	10,346	48,165	2,501	(7,845)	0.07	(0.16)	45	3,780	55.58	-8%	24%	20%
Maize	overhead	high	8,000	46,080	40,349	276	40,625	10,346	50,971	5,455	(4,891)	0.13	(0.10)	50	4,200	109.10	-14%	13%	11%
Marigold	overhead	high	14,000	81,620	56,934	-	56,934	10,346	67,280	24,686	14,340	0.43	0.21	136	10,024	181.51	-34%	-20%	-18%
Paprika	overhead	short	3,000	225,600	124,126	-	124,126	16,691	140,817	101,474	84,783	0.82	0.60	270	20,720	375.83	-49%	-41%	-38%
Paprika	overhead	long	6,000	451,200	172,459	-	172,459	16,691	189,150	278,741	262,050	1.62	1.39	310	23,800	899.16	-66%	-62%	-58%
Roses (long stem)	drip line	auction	1,100	14,467,391	7,752,433	2,387,120	10,139,553	1,565,291	11,704,844	4,327,838	2,762,547	0.43	0.24	9,360	786,240	462.38	-56%	-36%	-24%
Roses (long stem)	drip line	blend	1,100	14,467,391	8,002,433	419,554	8,421,987	1,565,291	9,987,278	6,045,404	4,480,113	0.72	0.45	9,360	786,240	645.88	-62%	-46%	-33%
Roses (medium stem)	drip line	auction	1,750	14,228,261	8,546,850	2,347,663	10,894,513	1,565,291	12,459,804	3,333,748	1,768,457	0.31	0.14	9,360	786,240	356.17	-50%	-26%	-15%
Roses (medium stem)	drip line	blend	1,750	14,228,261	8,796,850	412,620	9,209,470	1,565,291	10,774,761	5,018,791	3,453,500	0.54	0.32	9,360	786,240	536.20	-58%	-40%	-24%
Roses (short stem)	drip line	auction	2,750	13,152,174	8,483,740	2,170,109	10,653,849	1,565,291	12,219,140	2,498,325	933,034	0.23	0.08	9,360	786,240	266.92	-43%	-16%	-10%
Roses (short stem)	drip line	blend	2,750	13,152,174	8,733,740	381,413	9,115,153	1,565,291	10,680,444	4,037,021	2,471,730	0.44	0.23	9,360	786,240	431.31	-32%	-19%	-20%
Soybeans	no	low	1,600	20,000	21,420	134	21,554	5,841	27,395	(1,554)	(7,395)	(0.07)	(0.27)	12	1,008	(129.50)	9%	41%	37%
Soybeans	no	med	2,100	26,250	23,434	176	23,610	5,841	29,451	2,640	(3,201)	0.11	(0.11)	13	1,092	203.08	-11%	13%	12%
Soybeans	no	high	2,600	32,500	24,816	218	25,034	5,841	30,875	7,466	1,625	0.30	0.05	14	1,176	533.29	-25%	-6%	-5%
Soybeans	overhead	low	2,400	30,000	28,886	201	29,087	10,346	39,433	913	(9,433)	0.03	(0.24)	22	1,848	41.50	-3%	35%	32%
Soybeans	overhead	med	2,900	36,250	30,900	243	31,143	10,346	41,489	5,107	(5,239)	0.16	(0.13)	23	1,932	222.04	-16%	16%	15%
Soybeans	overhead	high	3,400	42,500	32,282	285	32,567	10,346	42,913	9,933	(413)	0.31	(0.01)	24	2,016	413.88	-26%	1%	1%
Tobacco, flue-cured	no	low	2,200	204,490	113,454	17,209	130,663	12,186	142,849	73,827	61,641	0.57	0.43	382	30,128	193.26	-44%	-37%	-32%
Tobacco, flue-cured	no	med	2,500	242,000	120,002	20,034	140,036	12,186	152,222	101,964	89,778	0.73	0.59	415	31,976	245.70	-51%	-45%	-39%
Tobacco, flue-cured	no	high	2,800	275,660	126,311	22,668	148,979	12,186	161,165	126,681	114,495	0.85	0.71	437	33,208	289.89	-55%	-50%	-44%
Tobacco, flue-cured	overhead	low	2,800	261,800	135,718	21,979	157,697	16,691	174,388	104,103	87,412	0.66	0.50	462	35,308	225.33	-48%	-41%	-35%
Tobacco, flue-cured	overhead	med	3,100	301,785	140,504	24,927	165,431	16,691	182,122	136,354	119,663	0.82	0.66	482	36,428	282.89	-55%	-48%	-42%
Tobacco, flue-cured	overhead	high	3,500	346,500	145,886	28,431	174,317	16,691	191,008	172,183	155,492	0.99	0.81	497	37,268	346.44	-60%	-54%	-47%
Wheat	overhead	low	5,500	60,500	40,965	405	41,370	10,346	51,716	19,130	8,784	0.46	0.17	19	1,596	1,006.84	-35%	-16%	-15%
Wheat	overhead	med	6,500	71,500	44,400	479	44,879	10,346	55,225	26,621	16,275	0.59	0.29	20	1,680	1,331.05	-41%	-25%	-23%
Wheat	overhead	high	7,500	82,500	50,439	553	50,992	10,346	61,338	31,508	21,162	0.62	0.35	21	1,764	1,500.38	-43%	-29%	-26%

LARGE SCALE COMMERCIAL SECTOR: Enterprises sorted by cash required before sale.

Return to cash costs measured as gross profit/total cash costs; return to total costs measured as net profit/total production costs (excl. family labour).

For roses, yield is per 1,000 stems and management varies according to marketing arrangement (100% auction sales vs. blended sales for consortium by auction and direct contract).

					Production Costs (ZWD/ha)				Farmer Income (ZWD/ha)				Labour			Sensitivity Indicators		
Activity	Irrigation	Mgt. Level	Yield (kg/ha)	Gross Revenue (ZWD/ha)	Cash required before sale	Cash deductions after sale	Annual investment cost	Total production costs	Gross profit (gr. revenue - cash costs)	Net profit (gr. revenue - total cost)	Return to cash costs	Return to total costs	Hired labour (days)	Wage bill (ZWD/ha)	Gr. profit per day (ZWD/ha)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
Roses (medium stem)	drip line	blend	1,750	14,228,261	8,796,850	412,620	1,565,291	10,774,761	5,018,791	3,453,500	0.54	0.32	9,360	786,240	536.20	-58%	-40%	-24%
Roses (short stem)	drip line	blend	2,750	13,152,174	8,733,740	381,413	1,565,291	10,680,444	4,037,021	2,471,730	0.44	0.23	9,360	786,240	431.31	-32%	-19%	-20%
Roses (medium stem)	drip line	auction	1,750	14,228,261	8,546,850	2,347,663	1,565,291	12,459,804	3,333,748	1,768,457	0.31	0.14	9,360	786,240	356.17	-50%	-26%	-15%
Roses (short stem)	drip line	auction	2,750	13,152,174	8,483,740	2,170,109	1,565,291	12,219,140	2,498,325	933,034	0.23	0.08	9,360	786,240	266.92	-43%	-16%	-10%
Roses (long stem)	drip line	blend	1,100	14,467,391	8,002,433	419,554	1,565,291	9,987,278	6,045,404	4,480,113	0.72	0.45	9,360	786,240	645.88	-62%	-46%	-33%
Roses (long stem)	drip line	auction	1,100	14,467,391	7,752,433	2,387,120	1,565,291	11,704,844	4,327,838	2,762,547	0.43	0.24	9,360	786,240	462.38	-56%	-36%	-24%
Paprika	overhead	long	6,000	451,200	172,459	-	16,691	189,150	278,741	262,050	1.62	1.39	310	23,800	899.16	-66%	-62%	-58%
Tobacco, flue-cured	overhead	high	3,500	346,500	145,886	28,431	16,691	191,008	172,183	155,492	0.99	0.81	497	37,268	346.44	-60%	-54%	-47%
Tobacco, flue-cured	overhead	med	3,100	301,785	140,504	24,927	16,691	182,122	136,354	119,663	0.82	0.66	482	36,428	282.89	-55%	-48%	-42%
Tobacco, flue-cured	overhead	low	2,800	261,800	135,718	21,979	16,691	174,388	104,103	87,412	0.66	0.50	462	35,308	225.33	-48%	-41%	-35%
Coffee (USD 2,000mt)	drip line	high	2,500	275,000	132,784	1,367	28,297	162,448	140,849	112,552	1.05	0.69	375	24,915	375.60	-55%	-44%	-41%
Coffee (USD 1,500mt)	drip line	high	2,500	206,250	132,784	1,367	28,297	162,448	72,099	43,802	0.54	0.27	375	24,915	192.26	-38%	-23%	-21%
Coffee (USD 1,360mt)	drip line	high	2,500	187,000	132,784	1,367	28,297	162,448	52,849	24,552	0.39	0.15	375	24,915	140.93	-31%	-15%	-13%
Tobacco, flue-cured	no	high	2,800	275,660	126,311	22,668	12,186	161,165	126,681	114,495	0.85	0.71	437	33,208	289.89	-55%	-50%	-44%
Paprika	overhead	short	3,000	225,600	124,126	-	16,691	140,817	101,474	84,783	0.82	0.60	270	20,720	375.83	-49%	-41%	-38%
Coffee (USD 2,000mt)	drip line	med	2,000	220,000	121,397	1,097	28,297	150,791	97,506	69,209	0.80	0.46	321	21,713	303.76	-48%	-34%	-31%
Coffee (USD 1,500mt)	drip line	med	2,000	165,000	121,397	1,097	28,297	150,791	42,506	14,209	0.35	0.09	321	21,713	132.42	-28%	-9%	-9%
Coffee (USD 1,360mt)	drip line	med	2,000	149,600	121,397	1,097	28,297	150,791	27,106	(1,191)	0.22	(0.01)	321	21,713	84.44	-20%	1%	1%
Tobacco, flue-cured	no	med	2,500	242,000	120,002	20,034	12,186	152,222	101,964	89,778	0.73	0.59	415	31,976	245.70	-51%	-45%	-39%
Tobacco, flue-cured	no	low	2,200	204,490	113,454	17,209	12,186	142,849	73,827	61,641	0.57	0.43	382	30,128	193.26	-44%	-37%	-32%
Export veg - mange tout	drip line	high	4,000	121,000	68,641	-	10,275	78,916	52,359	42,084	0.76	0.53	295	20,020	177.49	-43%	-35%	-35%
Export veg - baby carrots	drip line	high	3,800	104,500	66,500	-	10,275	76,775	38,000	27,725	0.57	0.36	275	18,900	138.18	-36%	-27%	-27%
Marigold	overhead	high	14,000	81,620	56,934	-	10,346	67,280	24,686	14,340	0.43	0.21	136	10,024	181.51	-34%	-20%	-18%
Groundnuts	overhead	high	5,000	83,250	56,363	833	10,346	67,542	26,054	15,708	0.46	0.23	135	8,680	192.99	-38%	-23%	-19%
Cotton	overhead	high	3,500	82,040	54,713	1,231	10,346	66,290	26,096	15,750	0.47	0.24	278	16,847	93.87	-41%	-25%	-20%
Groundnuts	overhead	med	4,000	66,600	52,226	666	10,346	63,238	13,708	3,362	0.26	0.05	110	7,112	124.62	-25%	-6%	-5%
Wheat	overhead	high	7,500	82,500	50,439	553	10,346	61,338	31,508	21,162	0.62	0.35	21	1,764	1,500.38	-43%	-29%	-26%
Cotton	overhead	med	3,000	70,320	50,176	1,055	10,346	61,577	19,089	8,743	0.37	0.14	245	14,980	77.91	-34%	-14%	-11%
Groundnuts	overhead	low	3,000	49,950	47,952	500	10,346	58,798	1,498	(8,848)	0.03	(0.15)	90	5,964	16.64	-4%	21%	18%
Cotton	overhead	low	2,500	58,600	47,170	879	10,346	58,395	10,551	205	0.22	0.00	212	13,113	49.77	-23%	0%	0%
Wheat	overhead	med	6,500	71,500	44,400	479	10,346	55,225	26,621	16,275	0.59	0.29	20	1,680	1,331.05	-41%	-25%	-23%
Wheat	overhead	low	5,500	60,500	40,965	405	10,346	51,716	19,130	8,784	0.46	0.17	19	1,596	1,006.84	-35%	-16%	-15%
Maize	overhead	high	8,000	46,080	40,349	276	10,346	50,971	5,455	(4,891)	0.13	(0.10)	50	4,200	109.10	-14%	13%	11%
Cotton	no	high	2,300	51,129	38,137	767	5,841	44,745	12,225	6,384	0.31	0.14	198	12,367	61.74	-31%	-16%	-13%
Export veg - baby corn	drip line	high	950	49,638	37,674	-	10,275	47,949	11,964	1,689	0.32	0.04	190	13,440	62.97	-24%	-3%	-3%
Maize	overhead	med	7,000	40,320	37,577	242	10,346	48,165	2,501	(7,845)	0.07	(0.16)	45	3,780	55.58	-8%	24%	20%
Groundnuts	no	high	2,800	46,620	34,245	466	5,841	40,552	11,909	6,068	0.34	0.15	83	5,499	143.48	-31%	-16%	-13%
Maize	overhead	low	6,000	34,560	33,936	207	10,346	44,489	417	(9,929)	0.01	(0.22)	30	2,520	13.90	-1%	35%	29%
Cotton	no	med	1,900	42,237	33,696	634	5,841	40,171	7,907	2,066	0.23	0.05	172	10,873	45.97	-25%	-6%	-5%
Soybeans	overhead	high	3,400	42,500	32,282	285	10,346	42,913	9,933	(413)	0.31	(0.01)	24	2,016	413.88	-26%	1%	1%
Groundnuts	no	med	2,300	38,295	31,138	383	5,841	37,362	6,774	933	0.21	0.02	68	4,463	99.62	-21%	-3%	-2%
Soybeans	overhead	med	2,900	36,250	30,900	243	10,346	41,489	5,107	(5,239)	0.16	(0.13)	23	1,932	222.04	-16%	16%	15%
Cotton	no	low	1,500	33,345	30,040	500	5,841	36,381	2,805	(3,036)	0.09	(0.08)	145	9,380	19.34	-11%	12%	9%
Soybeans	overhead	low	2,400	30,000	28,886	201	10,346	39,433	913	(9,433)	0.03	(0.24)	22	1,848	41.50	-3%	35%	32%
Maize	no	high	5,500	31,680	27,522	190	5,841	33,553	3,968	(1,873)	0.14	(0.06)	27	2,268	146.96	-16%	8%	6%
Groundnuts	no	low	1,800	29,970	27,152	300	5,841	33,293	2,518	(3,323)	0.09	(0.10)	57	3,847	44.18	-10%	13%	11%
Soybeans	no	high	2,600	32,500	24,816	218	5,841	30,875	7,466	1,625	0.30	0.05	14	1,176	533.29	-25%	-6%	-5%
Maize	no	med	4,500	25,920	23,564	156	5,841	29,561	2,200	(3,641)	0.09	(0.12)	23	1,932	95.65	-11%	18%	14%
Soybeans	no	med	2,100	26,250	23,434	176	5,841	29,451	2,640	(3,201)	0.11	(0.11)	13	1,092	203.08	-11%	13%	12%
Soybeans	no	low	1,600	20,000	21,420	134	5,841	27,395	(1,554)	(7,395)	(0.07)	(0.27)	12	1,008	(129.50)	9%	41%	37%
Maize	no	low	3,500	20,160	20,875	121	5,841	26,837	(836)	(6,677)	(0.04)	(0.25)	19	1,596	(44.00)	5%	43%	34%

LARGE SCALE COMMERCIAL SECTOR: Enterprises sorted by total production costs.

Return to cash costs measured as gross profit/total cash costs; return to total costs measured as net profit/total production costs (excl. family labour).

For roses, yield is per 1,000 stems and management varies according to marketing arrangement (100% auction sales vs. blended sales for consortium by auction and direct contract).

					Production Costs (ZWD/ha)				Farmer Income (ZWD/ha)				Labour			Sensitivity Indicators		
Activity	Irrigation	Mgt. Level	Yield (kg/ha)	Gross Revenue (ZWD/ha)	Cash required before sale	Cash deductions after sale	Annual investment cost	Total production costs	Gross profit (gr. revenue - cash costs)	Net profit (gr. revenue - total cost)	Return to cash costs	Return to total costs	Hired labour (days)	Wage bill (ZWD/ha)	Gr. profit per day (ZWD/ha)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
Roses (medium stem)	drip line	auction	1,750	14,228,261	8,546,850	2,347,663	1,565,291	12,459,804	3,333,748	1,768,457	0.31	0.14	9,360	786,240	356.17	-50%	-26%	-15%
Roses (short stem)	drip line	auction	2,750	13,152,174	8,483,740	2,170,109	1,565,291	12,219,140	2,498,325	933,034	0.23	0.08	9,360	786,240	266.92	-43%	-16%	-10%
Roses (long stem)	drip line	auction	1,100	14,467,391	7,752,433	2,387,120	1,565,291	11,704,844	4,327,838	2,762,547	0.43	0.24	9,360	786,240	462.38	-56%	-36%	-24%
Roses (medium stem)	drip line	blend	1,750	14,228,261	8,796,850	412,620	1,565,291	10,774,761	5,018,791	3,453,500	0.54	0.32	9,360	786,240	536.20	-58%	-40%	-24%
Roses (short stem)	drip line	blend	2,750	13,152,174	8,733,740	381,413	1,565,291	10,680,444	4,037,021	2,471,730	0.44	0.23	9,360	786,240	431.31	-32%	-19%	-20%
Roses (long stem)	drip line	blend	1,100	14,467,391	8,002,433	419,554	1,565,291	9,987,278	6,045,404	4,480,113	0.72	0.45	9,360	786,240	645.88	-62%	-46%	-33%
Tobacco, flue-cured	overhead	high	3,500	346,500	145,886	28,431	16,691	191,008	172,183	155,492	0.99	0.81	497	37,268	346.44	-60%	-54%	-47%
Paprika	overhead	long	6,000	451,200	172,459	-	16,691	189,150	278,741	262,050	1.62	1.39	310	23,800	899.16	-66%	-62%	-58%
Tobacco, flue-cured	overhead	med	3,100	301,785	140,504	24,927	16,691	182,122	136,354	119,663	0.82	0.66	482	36,428	282.89	-55%	-48%	-42%
Tobacco, flue-cured	overhead	low	2,800	261,800	135,718	21,979	16,691	174,388	104,103	87,412	0.66	0.50	462	35,308	225.33	-48%	-41%	-35%
Coffee (USD 2,000mt)	drip line	high	2,500	275,000	132,784	1,367	28,297	162,448	140,849	112,552	1.05	0.69	375	24,915	375.60	-55%	-44%	-41%
Coffee (USD 1,500mt)	drip line	high	2,500	206,250	132,784	1,367	28,297	162,448	72,099	43,802	0.54	0.27	375	24,915	192.26	-38%	-23%	-21%
Coffee (USD 1,360mt)	drip line	high	2,500	187,000	132,784	1,367	28,297	162,448	52,849	24,552	0.39	0.15	375	24,915	140.93	-31%	-15%	-13%
Tobacco, flue-cured	no	high	2,800	275,660	126,311	22,668	12,186	161,165	126,681	114,495	0.85	0.71	437	33,208	289.89	-55%	-50%	-44%
Tobacco, flue-cured	no	med	2,500	242,000	120,002	20,034	12,186	152,222	101,964	89,778	0.73	0.59	415	31,976	245.70	-51%	-45%	-39%
Coffee (USD 2,000mt)	drip line	med	2,000	220,000	121,397	1,097	28,297	150,791	97,506	69,209	0.80	0.46	321	21,713	303.76	-48%	-34%	-31%
Coffee (USD 1,500mt)	drip line	med	2,000	165,000	121,397	1,097	28,297	150,791	42,506	14,209	0.35	0.09	321	21,713	132.42	-28%	-9%	-9%
Coffee (USD 1,360mt)	drip line	med	2,000	149,600	121,397	1,097	28,297	150,791	27,106	(1,191)	0.22	(0.01)	321	21,713	84.44	-20%	1%	1%
Tobacco, flue-cured	no	low	2,200	204,490	113,454	17,209	12,186	142,849	73,827	61,641	0.57	0.43	382	30,128	193.26	-44%	-37%	-32%
Paprika	overhead	short	3,000	225,600	124,126	-	16,691	140,817	101,474	84,783	0.82	0.60	270	20,720	375.83	-49%	-41%	-38%
Export veg - mange tout	drip line	high	4,000	121,000	68,641	-	10,275	78,916	52,359	42,084	0.76	0.53	295	20,020	177.49	-43%	-35%	-35%
Export veg - baby carrots	drip line	high	3,800	104,500	66,500	-	10,275	76,775	38,000	27,725	0.57	0.36	275	18,900	138.18	-36%	-27%	-27%
Groundnuts	overhead	high	5,000	83,250	56,363	833	10,346	67,542	26,054	15,708	0.46	0.23	135	8,680	192.99	-38%	-23%	-19%
Marigold	overhead	high	14,000	81,620	56,934	-	10,346	67,280	24,686	14,340	0.43	0.21	136	10,024	181.51	-34%	-20%	-18%
Cotton	overhead	high	3,500	82,040	54,713	1,231	10,346	66,290	26,096	15,750	0.47	0.24	278	16,847	93.87	-41%	-25%	-20%
Groundnuts	overhead	med	4,000	66,600	52,226	666	10,346	63,238	13,708	3,362	0.26	0.05	110	7,112	124.62	-25%	-6%	-5%
Cotton	overhead	med	3,000	70,320	50,176	1,055	10,346	61,577	19,089	8,743	0.37	0.14	245	14,980	77.91	-34%	-14%	-11%
Wheat	overhead	high	7,500	82,500	50,439	553	10,346	61,338	31,508	21,162	0.62	0.35	21	1,764	1,500.38	-43%	-29%	-26%
Groundnuts	overhead	low	3,000	49,950	47,952	500	10,346	58,798	1,498	(8,848)	0.03	(0.15)	90	5,964	16.64	-4%	21%	18%
Cotton	overhead	low	2,500	58,600	47,170	879	10,346	58,395	10,551	205	0.22	0.00	212	13,113	49.77	-23%	0%	0%
Wheat	overhead	med	6,500	71,500	44,400	479	10,346	55,225	26,621	16,275	0.59	0.29	20	1,680	1,331.05	-41%	-25%	-23%
Wheat	overhead	low	5,500	60,500	40,965	405	10,346	51,716	19,130	8,784	0.46	0.17	19	1,596	1,006.84	-35%	-16%	-15%
Maize	overhead	high	8,000	46,080	40,349	276	10,346	50,971	5,455	(4,891)	0.13	(0.10)	50	4,200	109.10	-14%	13%	11%
Maize	overhead	med	7,000	40,320	37,577	242	10,346	48,165	2,501	(7,845)	0.07	(0.16)	45	3,780	55.58	-8%	24%	20%
Export veg - baby corn	drip line	high	950	49,638	37,674	-	10,275	47,949	11,964	1,689	0.32	0.04	190	13,440	62.97	-24%	-3%	-3%
Cotton	no	high	2,300	51,129	38,137	767	5,841	44,745	12,225	6,384	0.31	0.14	198	12,367	61.74	-31%	-16%	-13%
Maize	overhead	low	6,000	34,560	33,936	207	10,346	44,489	417	(9,929)	0.01	(0.22)	30	2,520	13.90	-1%	35%	29%
Soybeans	overhead	high	3,400	42,500	32,282	285	10,346	42,913	9,933	(413)	0.31	(0.01)	24	2,016	413.88	-26%	1%	1%
Soybeans	overhead	med	2,900	36,250	30,900	243	10,346	41,489	5,107	(5,239)	0.16	(0.13)	23	1,932	222.04	-16%	16%	15%
Groundnuts	no	high	2,800	46,620	34,245	466	5,841	40,552	11,909	6,068	0.34	0.15	83	5,499	143.48	-31%	-16%	-13%
Cotton	no	med	1,900	42,237	33,696	634	5,841	40,171	7,907	2,066	0.23	0.05	172	10,873	45.97	-25%	-6%	-5%
Soybeans	overhead	low	2,400	30,000	28,886	201	10,346	39,433	913	(9,433)	0.03	(0.24)	22	1,848	41.50	-3%	35%	32%
Groundnuts	no	med	2,300	38,295	31,138	383	5,841	37,362	6,774	933	0.21	0.02	68	4,463	99.62	-21%	-3%	-2%
Cotton	no	low	1,500	33,345	30,040	500	5,841	36,381	2,805	(3,036)	0.09	(0.08)	145	9,380	19.34	-11%	12%	9%
Maize	no	high	5,500	31,680	27,522	190	5,841	33,553	3,968	(1,873)	0.14	(0.06)	27	2,268	146.96	-16%	8%	6%
Groundnuts	no	low	1,800	29,970	27,152	300	5,841	33,293	2,518	(3,323)	0.09	(0.10)	57	3,847	44.18	-10%	13%	11%
Soybeans	no	high	2,600	32,500	24,816	218	5,841	30,875	7,466	1,625	0.30	0.05	14	1,176	533.29	-25%	-6%	-5%
Maize	no	med	4,500	25,920	23,564	156	5,841	29,561	2,200	(3,641)	0.09	(0.12)	23	1,932	95.65	-11%	18%	14%
Soybeans	no	med	2,100	26,250	23,434	176	5,841	29,451	2,640	(3,201)	0.11	(0.11)	13	1,092	203.08	-11%	13%	12%
Soybeans	no	low	1,600	20,000	21,420	134	5,841	27,395	(1,554)	(7,395)	(0.07)	(0.27)	12	1,008	(129.50)	9%	41%	37%
Maize	no	low	3,500	20,160	20,875	121	5,841	26,837	(836)	(6,677)	(0.04)	(0.25)	19	1,596	(44.00)	5%	43%	34%

LARGE SCALE COMMERCIAL SECTOR: Enterprises sorted by gross profit.

Return to cash costs measured as gross profit/total cash costs; return to total costs measured as net profit/total production costs (excl. family labour).

For roses, yield is per 1,000 stems and management varies according to marketing arrangement (100% auction sales vs. blended sales for consortium by auction and direct contract).

					Production Costs (ZWD/ha)				Farmer Income (ZWD/ha)				Labour			Sensitivity Indicators		
Activity	**Irrigation**	**Mgt. Level**	**Yield (kg/ha)**	**Gross Revenue (ZWD/ha)**	Cash required before sale	Cash deductions after sale	Annual investment cost	Total production costs	Gross profit (gr. revenue - cash costs)	Net profit (gr. revenue - total cost)	Return to cash costs	Return to total costs	Hired labour (days)	Wage bill (ZWD/ha)	Gr. profit per day (ZWD/ha)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
Roses (long stem)	drip line	blend	1,100	14,467,391	8,002,433	419,554	1,565,291	9,987,278	6,045,404	4,480,113	0.72	0.45	9,360	786,240	645.88	-62%	-46%	-33%
Roses (medium stem)	drip line	blend	1,750	14,228,261	8,796,850	412,620	1,565,291	10,774,761	5,018,791	3,453,500	0.54	0.32	9,360	786,240	536.20	-58%	-40%	-24%
Roses (long stem)	drip line	auction	1,100	14,467,391	7,752,433	2,387,120	1,565,291	11,704,844	4,327,838	2,762,547	0.43	0.24	9,360	786,240	462.38	-56%	-36%	-24%
Roses (short stem)	drip line	blend	2,750	13,152,174	8,733,740	381,413	1,565,291	10,680,444	4,037,021	2,471,730	0.44	0.23	9,360	786,240	431.31	-32%	-19%	-20%
Roses (medium stem)	drip line	auction	1,750	14,228,261	8,546,850	2,347,663	1,565,291	12,459,804	3,333,748	1,768,457	0.31	0.14	9,360	786,240	356.17	-50%	-26%	-15%
Roses (short stem)	drip line	auction	2,750	13,152,174	8,483,740	2,170,109	1,565,291	12,219,140	2,498,325	933,034	0.23	0.08	9,360	786,240	266.92	-43%	-16%	-10%
Paprika	overhead	long	6,000	451,200	172,459	-	16,691	189,150	278,741	262,050	1.62	1.39	310	23,800	899.16	-66%	-62%	-58%
Tobacco, flue-cured	overhead	high	3,500	346,500	145,886	28,431	16,691	191,008	172,183	155,492	0.99	0.81	497	37,268	346.44	-60%	-54%	-47%
Coffee (USD 2,000mt)	drip line	high	2,500	275,000	132,784	1,367	28,297	162,448	140,849	112,552	1.05	0.69	375	24,915	375.60	-55%	-44%	-41%
Tobacco, flue-cured	overhead	med	3,100	301,785	140,504	24,927	16,691	182,122	136,354	119,663	0.82	0.66	482	36,428	282.89	-55%	-48%	-42%
Tobacco, flue-cured	no	high	2,800	275,660	126,311	22,668	12,186	161,165	126,681	114,495	0.85	0.71	437	33,208	289.89	-55%	-50%	-44%
Tobacco, flue-cured	overhead	low	2,800	261,800	135,718	21,979	16,691	174,388	104,103	87,412	0.66	0.50	462	35,308	225.33	-48%	-41%	-35%
Tobacco, flue-cured	no	med	2,500	242,000	120,002	20,034	12,186	152,222	101,964	89,778	0.73	0.59	415	31,976	245.70	-51%	-45%	-39%
Paprika	overhead	short	3,000	225,600	124,126	-	16,691	140,817	101,474	84,783	0.82	0.60	270	20,720	375.83	-49%	-41%	-38%
Coffee (USD 2,000mt)	drip line	med	2,000	220,000	121,397	1,097	28,297	150,791	97,506	69,209	0.80	0.46	321	21,713	303.76	-48%	-34%	-31%
Tobacco, flue-cured	no	low	2,200	204,490	113,454	17,209	12,186	142,849	73,827	61,641	0.57	0.43	382	30,128	193.26	-44%	-37%	-32%
Coffee (USD 1,500mt)	drip line	high	2,500	206,250	132,784	1,367	28,297	162,448	72,099	43,802	0.54	0.27	375	24,915	192.26	-38%	-23%	-21%
Coffee (USD 1,360mt)	drip line	high	2,500	187,000	132,784	1,367	28,297	162,448	52,849	24,552	0.39	0.15	375	24,915	140.93	-31%	-15%	-13%
Export veg - mange tout	drip line	high	4,000	121,000	68,641	-	10,275	78,916	52,359	42,084	0.76	0.53	295	20,020	177.49	-43%	-35%	-35%
Coffee (USD 1,500mt)	drip line	med	2,000	165,000	121,397	1,097	28,297	150,791	42,506	14,209	0.35	0.09	321	21,713	132.42	-28%	-9%	-9%
Export veg - baby carrots	drip line	high	3,800	104,500	66,500	-	10,275	76,775	38,000	27,725	0.57	0.36	275	18,900	138.18	-36%	-27%	-27%
Wheat	overhead	high	7,500	82,500	50,439	553	10,346	61,338	31,508	21,162	0.62	0.35	21	1,764	1,500.38	-43%	-29%	-26%
Coffee (USD 1,360mt)	drip line	med	2,000	149,600	121,397	1,097	28,297	150,791	27,106	(1,191)	0.22	(0.01)	321	21,713	84.44	-20%	1%	1%
Wheat	overhead	med	6,500	71,500	44,400	479	10,346	55,225	26,621	16,275	0.59	0.29	20	1,680	1,331.05	-41%	-25%	-23%
Cotton	overhead	high	3,500	82,040	54,713	1,231	10,346	66,290	26,096	15,750	0.47	0.24	278	16,847	93.87	-41%	-25%	-20%
Groundnuts	overhead	high	5,000	83,250	56,363	833	10,346	67,542	26,054	15,708	0.46	0.23	135	8,680	192.99	-38%	-23%	-19%
Marigold	overhead	high	14,000	81,620	56,934	-	10,346	67,280	24,686	14,340	0.43	0.21	136	10,024	181.51	-34%	-20%	-18%
Wheat	overhead	low	5,500	60,500	40,965	405	10,346	51,716	19,130	8,784	0.46	0.17	19	1,596	1,006.84	-35%	-16%	-15%
Cotton	overhead	med	3,000	70,320	50,176	1,055	10,346	61,577	19,089	8,743	0.37	0.14	245	14,980	77.91	-34%	-14%	-11%
Groundnuts	overhead	med	4,000	66,600	52,226	666	10,346	63,238	13,708	3,362	0.26	0.05	110	7,112	124.62	-25%	-6%	-5%
Cotton	no	high	2,300	51,129	38,137	767	5,841	44,745	12,225	6,384	0.31	0.14	198	12,367	61.74	-31%	-16%	-13%
Export veg - baby corn	drip line	high	950	49,638	37,674	-	10,275	47,949	11,964	1,689	0.32	0.04	190	13,440	62.97	-24%	-3%	-3%
Groundnuts	no	high	2,800	46,620	34,245	466	5,841	40,552	11,909	6,068	0.34	0.15	83	5,499	143.48	-31%	-16%	-13%
Cotton	overhead	low	2,500	58,600	47,170	879	10,346	58,395	10,551	205	0.22	0.00	212	13,113	49.77	-23%	0%	0%
Soybeans	overhead	high	3,400	42,500	32,282	285	10,346	42,913	9,933	(413)	0.31	(0.01)	24	2,016	413.88	-26%	1%	1%
Cotton	no	med	1,900	42,237	33,696	634	5,841	40,171	7,907	2,066	0.23	0.05	172	10,873	45.97	-25%	-6%	-5%
Soybeans	no	high	2,600	32,500	24,816	218	5,841	30,875	7,466	1,625	0.30	0.05	14	1,176	533.29	-25%	-6%	-5%
Groundnuts	no	med	2,300	38,295	31,138	383	5,841	37,362	6,774	933	0.21	0.02	68	4,463	99.62	-21%	-3%	-2%
Maize	overhead	high	8,000	46,080	40,349	276	10,346	50,971	5,455	(4,891)	0.13	(0.10)	50	4,200	109.10	-14%	13%	11%
Soybeans	overhead	med	2,900	36,250	30,900	243	10,346	41,489	5,107	(5,239)	0.16	(0.13)	23	1,932	222.04	-16%	16%	15%
Maize	no	high	5,500	31,680	27,522	190	5,841	33,553	3,968	(1,873)	0.14	(0.06)	27	2,268	146.96	-16%	8%	6%
Cotton	no	low	1,500	33,345	30,040	500	5,841	36,381	2,805	(3,036)	0.09	(0.08)	145	9,380	19.34	-11%	12%	9%
Soybeans	no	med	2,100	26,250	23,434	176	5,841	29,451	2,640	(3,201)	0.11	(0.11)	13	1,092	203.08	-11%	13%	12%
Groundnuts	no	low	1,800	29,970	27,152	300	5,841	33,293	2,518	(3,323)	0.09	(0.10)	57	3,847	44.18	-10%	13%	11%
Maize	overhead	med	7,000	40,320	37,577	242	10,346	48,165	2,501	(7,845)	0.07	(0.16)	45	3,780	55.58	-8%	24%	20%
Maize	no	med	4,500	25,920	23,564	156	5,841	29,561	2,200	(3,641)	0.09	(0.12)	23	1,932	95.65	-11%	18%	14%
Groundnuts	overhead	low	3,000	49,950	47,952	500	10,346	58,798	1,498	(8,848)	0.03	(0.15)	90	5,964	16.64	-4%	21%	18%
Soybeans	overhead	low	2,400	30,000	28,886	201	10,346	39,433	913	(9,433)	0.03	(0.24)	22	1,848	41.50	-3%	35%	32%
Maize	overhead	low	6,000	34,560	33,936	207	10,346	44,489	417	(9,929)	0.01	(0.22)	30	2,520	13.90	-1%	35%	29%
Maize	no	low	3,500	20,160	20,875	121	5,841	26,837	(836)	(6,677)	(0.04)	(0.25)	19	1,596	(44.00)	5%	43%	34%
Soybeans	no	low	1,600	20,000	21,420	134	5,841	27,395	(1,554)	(7,395)	(0.07)	(0.27)	12	1,008	(129.50)	9%	41%	37%

LARGE SCALE COMMERCIAL SECTOR: Enterprises sorted by net profit.

Return to cash costs measured as gross profit/total cash costs; return to total costs measured as net profit/total production costs (excl. family labour).

For roses, yield is per 1,000 stems and management varies according to marketing arrangement (100% auction sales vs. blended sales for consortium by auction and direct contract).

					Production Costs (ZWD/ha)				Farmer Income (ZWD/ha)				Labour			Sensitivity Indicators		
Activity	Irrigation	Mgt. Level	Yield (kg/ha)	Gross Revenue (ZWD/ha)	Cash required before sale	Cash deductions after sale	Annual investment cost	Total production costs	Gross profit (gr. revenue - cash costs)	Net profit (gr. revenue - total cost)	Return to cash costs	Return to total costs	Hired labour (days)	Wage bill (ZWD/ha)	Gr. profit per day (ZWD/ha)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
Roses (long stem)	drip line	blend	1,100	14,467,391	8,002,433	419,554	1,565,291	9,987,278	6,045,404	4,480,113	0.72	0.45	9,360	786,240	645.88	-62%	-46%	-33%
Roses (medium stem)	drip line	blend	1,750	14,228,261	8,796,850	412,620	1,565,291	10,774,761	5,018,791	3,453,500	0.54	0.32	9,360	786,240	536.20	-58%	-40%	-24%
Roses (long stem)	drip line	auction	1,100	14,467,391	7,752,433	2,387,120	1,565,291	11,704,844	4,327,838	2,762,547	0.43	0.24	9,360	786,240	462.38	-56%	-36%	-24%
Roses (short stem)	drip line	blend	2,750	13,152,174	8,733,740	381,413	1,565,291	10,680,444	4,037,021	2,471,730	0.44	0.23	9,360	786,240	431.31	-32%	-19%	-20%
Roses (medium stem)	drip line	auction	1,750	14,228,261	8,546,850	2,347,663	1,565,291	12,459,804	3,333,748	1,768,457	0.31	0.14	9,360	786,240	356.17	-50%	-26%	-15%
Roses (short stem)	drip line	auction	2,750	13,152,174	8,483,740	2,170,109	1,565,291	12,219,140	2,498,325	933,034	0.23	0.08	9,360	786,240	266.92	-43%	-16%	-10%
Paprika	overhead	long	6,000	451,200	172,459	-	16,691	189,150	278,741	262,050	1.62	1.39	310	23,800	899.16	-66%	-62%	-58%
Tobacco, flue-cured	overhead	high	3,500	346,500	145,886	28,431	16,691	191,008	172,183	155,492	0.99	0.81	497	37,268	346.44	-60%	-54%	-47%
Tobacco, flue-cured	overhead	med	3,100	301,785	140,504	24,927	16,691	182,122	136,354	119,663	0.82	0.66	482	36,428	282.89	-55%	-48%	-42%
Tobacco, flue-cured	no	high	2,800	275,660	126,311	22,668	12,186	161,165	126,681	114,495	0.85	0.71	437	33,208	289.89	-55%	-50%	-44%
Coffee (USD 2,000mt)	drip line	high	2,500	275,000	132,784	1,367	28,297	162,448	140,849	112,552	1.05	0.69	375	24,915	375.60	-55%	-44%	-41%
Tobacco, flue-cured	no	med	2,500	242,000	120,002	20,034	12,186	152,222	101,964	89,778	0.73	0.59	415	31,976	245.70	-51%	-45%	-39%
Tobacco, flue-cured	overhead	low	2,800	261,800	135,718	21,979	16,691	174,388	104,103	87,412	0.66	0.50	462	35,308	225.33	-48%	-41%	-35%
Paprika	overhead	short	3,000	225,600	124,126	-	16,691	140,817	101,474	84,783	0.82	0.60	270	20,720	375.83	-49%	-41%	-38%
Coffee (USD 2,000mt)	drip line	med	2,000	220,000	121,397	1,097	28,297	150,791	97,506	69,209	0.80	0.46	321	21,713	303.76	-48%	-34%	-31%
Tobacco, flue-cured	no	low	2,200	204,490	113,454	17,209	12,186	142,849	73,827	61,641	0.57	0.43	382	30,128	193.26	-44%	-37%	-32%
Coffee (USD 1,500mt)	drip line	high	2,500	206,250	132,784	1,367	28,297	162,448	72,099	43,802	0.54	0.27	375	24,915	192.26	-38%	-23%	-21%
Export veg - mange tout	drip line	high	4,000	121,000	68,641	-	10,275	78,916	52,359	42,084	0.76	0.53	295	20,020	177.49	-43%	-35%	-35%
Export veg - baby carrots	drip line	high	3,800	104,500	66,500	-	10,275	76,775	38,000	27,725	0.57	0.36	275	18,900	138.18	-36%	-27%	-27%
Coffee (USD 1,360mt)	drip line	high	2,500	187,000	132,784	1,367	28,297	162,448	52,849	24,552	0.39	0.15	375	24,915	140.93	-31%	-15%	-13%
Wheat	overhead	high	7,500	82,500	50,439	553	10,346	61,338	31,508	21,162	0.62	0.35	21	1,764	1,500.38	-43%	-29%	-26%
Wheat	overhead	med	6,500	71,500	44,400	479	10,346	55,225	26,621	16,275	0.59	0.29	20	1,680	1,331.05	-41%	-25%	-23%
Cotton	overhead	high	3,500	82,040	54,713	1,231	10,346	66,290	26,096	15,750	0.47	0.24	278	16,847	93.87	-41%	-25%	-20%
Groundnuts	overhead	high	5,000	83,250	56,363	833	10,346	67,542	26,054	15,708	0.46	0.23	135	8,680	192.99	-38%	-23%	-19%
Marigold	overhead	high	14,000	81,620	56,934	-	10,346	67,280	24,686	14,340	0.43	0.21	136	10,024	181.51	-34%	-20%	-18%
Coffee (USD 1,500mt)	drip line	med	2,000	165,000	121,397	1,097	28,297	150,791	42,506	14,209	0.35	0.09	321	21,713	132.42	-28%	-9%	-9%
Wheat	overhead	low	5,500	60,500	40,965	405	10,346	51,716	19,130	8,784	0.46	0.17	19	1,596	1,006.84	-35%	-16%	-15%
Cotton	overhead	med	3,000	70,320	50,176	1,055	10,346	61,577	19,089	8,743	0.37	0.14	245	14,980	77.91	-34%	-14%	-11%
Cotton	no	high	2,300	51,129	38,137	767	5,841	44,745	12,225	6,384	0.31	0.14	198	12,367	61.74	-31%	-16%	-13%
Groundnuts	no	high	2,800	46,620	34,245	466	5,841	40,552	11,909	6,068	0.34	0.15	83	5,499	143.48	-31%	-16%	-13%
Groundnuts	overhead	med	4,000	66,600	52,226	666	10,346	63,238	13,708	3,362	0.26	0.05	110	7,112	124.62	-25%	-6%	-5%
Cotton	no	med	1,900	42,237	33,696	634	5,841	40,171	7,907	2,066	0.23	0.05	172	10,873	45.97	-25%	-6%	-5%
Export veg - baby corn	drip line	high	950	49,638	37,674	-	10,275	47,949	11,964	1,689	0.32	0.04	190	13,440	62.97	-24%	-3%	-3%
Soybeans	no	high	2,600	32,500	24,816	218	5,841	30,875	7,466	1,625	0.30	0.05	14	1,176	533.29	-25%	-6%	-5%
Groundnuts	no	med	2,300	38,295	31,138	383	5,841	37,362	6,774	933	0.21	0.02	68	4,463	99.62	-21%	-3%	-2%
Cotton	overhead	low	2,500	58,600	47,170	879	10,346	58,395	10,551	205	0.22	0.00	212	13,113	49.77	-23%	0%	0%
Soybeans	overhead	high	3,400	42,500	32,282	285	10,346	42,913	9,933	(413)	0.31	(0.01)	24	2,016	413.88	-26%	1%	1%
Coffee (USD 1,360mt)	drip line	med	2,000	149,600	121,397	1,097	28,297	150,791	27,106	(1,191)	0.22	(0.01)	321	21,713	84.44	-20%	1%	1%
Maize	no	high	5,500	31,680	27,522	190	5,841	33,553	3,968	(1,873)	0.14	(0.06)	27	2,268	146.96	-16%	8%	6%
Cotton	no	low	1,500	33,345	30,040	500	5,841	36,381	2,805	(3,036)	0.09	(0.08)	145	9,380	19.34	-11%	12%	9%
Soybeans	no	med	2,100	26,250	23,434	176	5,841	29,451	2,640	(3,201)	0.11	(0.11)	13	1,092	203.08	-11%	13%	12%
Groundnuts	no	low	1,800	29,970	27,152	300	5,841	33,293	2,518	(3,323)	0.09	(0.10)	57	3,847	44.18	-10%	13%	11%
Maize	no	med	4,500	25,920	23,564	156	5,841	29,561	2,200	(3,641)	0.09	(0.12)	23	1,932	95.65	-11%	18%	14%
Maize	overhead	high	8,000	46,080	40,349	276	10,346	50,971	5,455	(4,891)	0.13	(0.10)	50	4,200	109.10	-14%	13%	11%
Soybeans	overhead	med	2,900	36,250	30,900	243	10,346	41,489	5,107	(5,239)	0.16	(0.13)	23	1,932	222.04	-16%	16%	15%
Maize	no	low	3,500	20,160	20,875	121	5,841	26,837	(836)	(6,677)	(0.04)	(0.25)	19	1,596	(44.00)	5%	43%	34%
Soybeans	no	low	1,600	20,000	21,420	134	5,841	27,395	(1,554)	(7,395)	(0.07)	(0.27)	12	1,008	(129.50)	9%	41%	37%
Maize	overhead	med	7,000	40,320	37,577	242	10,346	48,165	2,501	(7,845)	0.07	(0.16)	45	3,780	55.58	-8%	24%	20%
Groundnuts	overhead	low	3,000	49,950	47,952	500	10,346	58,798	1,498	(8,848)	0.03	(0.15)	90	5,964	16.64	-4%	21%	18%
Soybeans	overhead	low	2,400	30,000	28,886	201	10,346	39,433	913	(9,433)	0.03	(0.24)	22	1,848	41.50	-3%	35%	32%
Maize	overhead	low	6,000	34,560	33,936	207	10,346	44,489	417	(9,929)	0.01	(0.22)	30	2,520	13.90	-1%	35%	29%

LARGE SCALE COMMERCIAL SECTOR: Enterprises sorted by return to cash (gross profit/total cash costs).

Return to cash costs measured as gross profit/total cash costs; return to total costs measured as net profit/total production costs (excl. family labour).

For roses, yield is per 1,000 stems and management varies according to marketing arrangement (100% auction sales vs. blended sales for consortium by auction and direct contract).

					Production Costs (ZWD/ha)				Farmer Income (ZWD/ha)				Labour			Sensitivity Indicators		
Activity	Irrigation	Mgt. Level	Yield (kg/ha)	Gross Revenue (ZWD/ha)	Cash required before sale	Cash deductions after sale	Annual investment cost	Total production costs	Gross profit (gr. revenue - cash costs)	Net profit (gr. revenue - total cost)	Return to cash costs	Return to total costs	Hired labour (days)	Wage bill (ZWD/ha)	Gr. profit per day (ZWD/ha)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
Paprika	overhead	long	6,000	451,200	172,459	-	16,691	189,150	278,741	262,050	1.62	1.39	310	23,800	899.16	-66%	-62%	-58%
Coffee (USD 2,000mt)	drip line	high	2,500	275,000	132,784	1,367	28,297	162,448	140,849	112,552	1.05	0.69	375	24,915	375.60	-55%	-44%	-41%
Tobacco, flue-cured	overhead	high	3,500	346,500	145,886	28,431	16,691	191,008	172,183	155,492	0.99	0.81	497	37,268	346.44	-60%	-54%	-47%
Tobacco, flue-cured	no	high	2,800	275,660	126,311	22,668	12,186	161,165	126,681	114,495	0.85	0.71	437	33,208	289.89	-55%	-50%	-44%
Tobacco, flue-cured	overhead	med	3,100	301,785	140,504	24,927	16,691	182,122	136,354	119,663	0.82	0.66	482	36,428	282.89	-55%	-48%	-42%
Paprika	overhead	short	3,000	225,600	124,126	-	16,691	140,817	101,474	84,783	0.82	0.60	270	20,720	375.83	-49%	-41%	-38%
Coffee (USD 2,000mt)	drip line	med	2,000	220,000	121,397	1,097	28,297	150,791	97,506	69,209	0.80	0.46	321	21,713	303.76	-48%	-34%	-31%
Export veg - mange tout	drip line	high	4,000	121,000	68,641	-	10,275	78,916	52,359	42,084	0.76	0.53	295	20,020	177.49	-43%	-35%	-35%
Tobacco, flue-cured	no	med	2,500	242,000	120,002	20,034	12,186	152,222	101,964	89,778	0.73	0.59	415	31,976	245.70	-51%	-45%	-39%
Roses (long stem)	drip line	blend	1,100	14,467,391	8,002,433	419,554	1,565,291	9,987,278	6,045,404	4,480,113	0.72	0.45	9,360	786,240	645.88	-62%	-46%	-33%
Tobacco, flue-cured	overhead	low	2,800	261,800	135,718	21,979	16,691	174,388	104,103	87,412	0.66	0.50	462	35,308	225.33	-48%	-41%	-35%
Wheat	overhead	high	7,500	82,500	50,439	553	10,346	61,338	31,508	21,162	0.62	0.35	21	1,764	1,500.38	-43%	-29%	-26%
Wheat	overhead	med	6,500	71,500	44,400	479	10,346	55,225	26,621	16,275	0.59	0.29	20	1,680	1,331.05	-41%	-25%	-23%
Export veg - baby carrots	drip line	high	3,800	104,500	66,500	-	10,275	76,775	38,000	27,725	0.57	0.36	275	18,900	138.18	-36%	-27%	-27%
Tobacco, flue-cured	no	low	2,200	204,490	113,454	17,209	12,186	142,849	73,827	61,641	0.57	0.43	382	30,128	193.26	-44%	-37%	-32%
Roses (medium stem)	drip line	blend	1,750	14,228,261	8,796,850	412,620	1,565,291	10,774,761	5,018,791	3,453,500	0.54	0.32	9,360	786,240	536.20	-58%	-40%	-24%
Coffee (USD 1,500mt)	drip line	high	2,500	206,250	132,784	1,367	28,297	162,448	72,099	43,802	0.54	0.27	375	24,915	192.26	-38%	-23%	-21%
Cotton	overhead	high	3,500	82,040	54,713	1,231	10,346	66,290	26,096	15,750	0.47	0.24	278	16,847	93.87	-41%	-25%	-20%
Wheat	overhead	low	5,500	60,500	40,965	405	10,346	51,716	19,130	8,784	0.46	0.17	19	1,596	1,006.84	-35%	-16%	-15%
Groundnuts	overhead	high	5,000	83,250	56,363	833	10,346	67,542	26,054	15,708	0.46	0.23	135	8,680	192.99	-38%	-23%	-19%
Roses (short stem)	drip line	blend	2,750	13,152,174	8,733,740	381,413	1,565,291	10,680,444	4,037,021	2,471,730	0.44	0.23	9,360	786,240	431.31	-32%	-19%	-20%
Marigold	overhead	high	14,000	81,620	56,934	-	10,346	67,280	24,686	14,340	0.43	0.21	136	10,024	181.51	-34%	-20%	-18%
Roses (long stem)	drip line	auction	1,100	14,467,391	7,752,433	2,387,120	1,565,291	11,704,844	4,327,838	2,762,547	0.43	0.24	9,360	786,240	462.38	-56%	-36%	-24%
Coffee (USD 1,360mt)	drip line	high	2,500	187,000	132,784	1,367	28,297	162,448	52,849	24,552	0.39	0.15	375	24,915	140.93	-31%	-15%	-13%
Cotton	overhead	med	3,000	70,320	50,176	1,055	10,346	61,577	19,089	8,743	0.37	0.14	245	14,980	77.91	-34%	-14%	-11%
Coffee (USD 1,500mt)	drip line	med	2,000	165,000	121,397	1,097	28,297	150,791	42,506	14,209	0.35	0.09	321	21,713	132.42	-28%	-9%	-9%
Groundnuts	no	high	2,800	46,620	34,245	466	5,841	40,552	11,909	6,068	0.34	0.15	83	5,499	143.48	-31%	-16%	-13%
Export veg - baby corn	drip line	high	950	49,638	37,674	-	10,275	47,949	11,964	1,689	0.32	0.04	190	13,440	62.97	-24%	-3%	-3%
Cotton	no	high	2,300	51,129	38,137	767	5,841	44,745	12,225	6,384	0.31	0.14	198	12,367	61.74	-31%	-16%	-13%
Roses (medium stem)	drip line	auction	1,750	14,228,261	8,546,850	2,347,663	1,565,291	12,459,804	3,333,748	1,768,457	0.31	0.14	9,360	786,240	356.17	-50%	-26%	-15%
Soybeans	overhead	high	3,400	42,500	32,282	285	10,346	42,913	9,933	(413)	0.31	(0.01)	24	2,016	413.88	-26%	1%	1%
Soybeans	no	high	2,600	32,500	24,816	218	5,841	30,875	7,466	1,625	0.30	0.05	14	1,176	533.29	-25%	-6%	-5%
Groundnuts	overhead	med	4,000	66,600	52,226	666	10,346	63,238	13,708	3,362	0.26	0.05	110	7,112	124.62	-25%	-6%	-5%
Roses (short stem)	drip line	auction	2,750	13,152,174	8,483,740	2,170,109	1,565,291	12,219,140	2,498,325	933,034	0.23	0.08	9,360	786,240	266.92	-43%	-16%	-10%
Cotton	no	med	1,900	42,237	33,696	634	5,841	40,171	7,907	2,066	0.23	0.05	172	10,873	45.97	-25%	-6%	-5%
Coffee (USD 1,360mt)	drip line	med	2,000	149,600	121,397	1,097	28,297	150,791	27,106	(1,191)	0.22	(0.01)	321	21,713	84.44	-20%	1%	1%
Cotton	overhead	low	2,500	58,600	47,170	879	10,346	58,395	10,551	205	0.22	0.00	212	13,113	49.77	-23%	0%	0%
Groundnuts	no	med	2,300	38,295	31,138	383	5,841	37,362	6,774	933	0.21	0.02	68	4,463	99.62	-21%	-3%	-2%
Soybeans	overhead	med	2,900	36,250	30,900	243	10,346	41,489	5,107	(5,239)	0.16	(0.13)	23	1,932	222.04	-16%	16%	15%
Maize	no	high	5,500	31,680	27,522	190	5,841	33,553	3,968	(1,873)	0.14	(0.06)	27	2,268	146.96	-16%	8%	6%
Maize	overhead	high	8,000	46,080	40,349	276	10,346	50,971	5,455	(4,891)	0.13	(0.10)	50	4,200	109.10	-14%	13%	11%
Soybeans	no	med	2,100	26,250	23,434	176	5,841	29,451	2,640	(3,201)	0.11	(0.11)	13	1,092	203.08	-11%	13%	12%
Maize	no	med	4,500	25,920	23,564	156	5,841	29,561	2,200	(3,641)	0.09	(0.12)	23	1,932	95.65	-11%	18%	14%
Cotton	no	low	1,500	33,345	30,040	500	5,841	36,381	2,805	(3,036)	0.09	(0.08)	145	9,380	19.34	-11%	12%	9%
Groundnuts	no	low	1,800	29,970	27,152	300	5,841	33,293	2,518	(3,323)	0.09	(0.10)	57	3,847	44.18	-10%	13%	11%
Maize	overhead	med	7,000	40,320	37,577	242	10,346	48,165	2,501	(7,845)	0.07	(0.16)	45	3,780	55.58	-8%	24%	20%
Soybeans	overhead	low	2,400	30,000	28,886	201	10,346	39,433	913	(9,433)	0.03	(0.24)	22	1,848	41.50	-3%	35%	32%
Groundnuts	overhead	low	3,000	49,950	47,952	500	10,346	58,798	1,498	(8,848)	0.03	(0.15)	90	5,964	16.64	-4%	21%	18%
Maize	overhead	low	6,000	34,560	33,936	207	10,346	44,489	417	(9,929)	0.01	(0.22)	30	2,520	13.90	-1%	35%	29%
Maize	no	low	3,500	20,160	20,875	121	5,841	26,837	(836)	(6,677)	(0.04)	(0.25)	19	1,596	(44.00)	5%	43%	34%
Soybeans	no	low	1,600	20,000	21,420	134	5,841	27,395	(1,554)	(7,395)	(0.07)	(0.27)	12	1,008	(129.50)	9%	41%	37%

LARGE SCALE COMMERCIAL SECTOR: Enterprises sorted by return to total costs (net profit/total production costs).

Return to cash costs measured as gross profit/total cash costs; return to total costs measured as net profit/total production costs (excl. family labour).

For roses, yield is per 1,000 stems and management varies according to marketing arrangement (100% auction sales vs. blended sales for consortium by auction and direct contract).

					Production Costs (ZWD/ha)				Farmer Income (ZWD/ha)				Labour			Sensitivity Indicators		
Activity	**Irrigation**	**Mgt. Level**	**Yield (kg/ha)**	**Gross Revenue (ZWD/ha)**	Cash required before sale	Cash deductions after sale	Annual investment cost	Total production costs	Gross profit (gr. revenue - cash costs)	Net profit (gr. revenue - total cost)	Return to cash costs	Return to total costs	Hired labour (days)	Wage bill (ZWD/ha)	Gr. profit per day (ZWD/ha)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
Paprika	overhead	long	6,000	451,200	172,459	-	16,691	189,150	278,741	262,050	1.62	1.39	310	23,800	899.16	-66%	-62%	-58%
Tobacco, flue-cured	overhead	high	3,500	346,500	145,886	28,431	16,691	191,008	172,183	155,492	0.99	0.81	497	37,268	346.44	-60%	-54%	-47%
Tobacco, flue-cured	no	high	2,800	275,660	126,311	22,668	12,186	161,165	126,681	114,495	0.85	0.71	437	33,208	289.89	-55%	-50%	-44%
Coffee (USD 2,000mt)	drip line	high	2,500	275,000	132,784	1,367	28,297	162,448	140,849	112,552	1.05	0.69	375	24,915	375.60	-55%	-44%	-41%
Tobacco, flue-cured	overhead	med	3,100	301,785	140,504	24,927	16,691	182,122	136,354	119,663	0.82	0.66	482	36,428	282.89	-55%	-48%	-42%
Paprika	overhead	short	3,000	225,600	124,126	-	16,691	140,817	101,474	84,783	0.82	0.60	270	20,720	375.83	-49%	-41%	-38%
Tobacco, flue-cured	no	med	2,500	242,000	120,002	20,034	12,186	152,222	101,964	89,778	0.73	0.59	415	31,976	245.70	-51%	-45%	-39%
Export veg - mange tout	drip line	high	4,000	121,000	68,641	-	10,275	78,916	52,359	42,084	0.76	0.53	295	20,020	177.49	-43%	-35%	-35%
Tobacco, flue-cured	overhead	low	2,800	261,800	135,718	21,979	16,691	174,388	104,103	87,412	0.66	0.50	462	35,308	225.33	-48%	-41%	-35%
Coffee (USD 2,000mt)	drip line	med	2,000	220,000	121,397	1,097	28,297	150,791	97,506	69,209	0.80	0.46	321	21,713	303.76	-48%	-34%	-31%
Roses (long stem)	drip line	blend	1,100	14,467,391	8,002,433	419,554	1,565,291	9,987,278	6,045,404	4,480,113	0.72	0.45	9,360	786,240	645.88	-62%	-46%	-33%
Tobacco, flue-cured	no	low	2,200	204,490	113,454	17,209	12,186	142,849	73,827	61,641	0.57	0.43	382	30,128	193.26	-44%	-37%	-32%
Export veg - baby carrots	drip line	high	3,800	104,500	66,500	-	10,275	76,775	38,000	27,725	0.57	0.36	275	18,900	138.18	-36%	-27%	-27%
Wheat	overhead	high	7,500	82,500	50,439	553	10,346	61,338	31,508	21,162	0.62	0.35	21	1,764	1,500.38	-43%	-29%	-26%
Roses (medium stem)	drip line	blend	1,750	14,228,261	8,796,850	412,620	1,565,291	10,774,761	5,018,791	3,453,500	0.54	0.32	9,360	786,240	536.20	-58%	-40%	-24%
Wheat	overhead	med	6,500	71,500	44,400	479	10,346	55,225	26,621	16,275	0.59	0.29	20	1,680	1,331.05	-41%	-25%	-23%
Coffee (USD 1,500mt)	drip line	high	2,500	206,250	132,784	1,367	28,297	162,448	72,099	43,802	0.54	0.27	375	24,915	192.26	-38%	-23%	-21%
Cotton	overhead	high	3,500	82,040	54,713	1,231	10,346	66,290	26,096	15,750	0.47	0.24	278	16,847	93.87	-41%	-25%	-20%
Roses (long stem)	drip line	auction	1,100	14,467,391	7,752,433	2,387,120	1,565,291	11,704,844	4,327,838	2,762,547	0.43	0.24	9,360	786,240	462.38	-56%	-36%	-24%
Groundnuts	overhead	high	5,000	83,250	56,363	833	10,346	67,542	26,054	15,708	0.46	0.23	135	8,680	192.99	-38%	-23%	-19%
Roses (short stem)	drip line	blend	2,750	13,152,174	8,733,740	381,413	1,565,291	10,680,444	4,037,021	2,471,730	0.44	0.23	9,360	786,240	431.31	-32%	-19%	-20%
Marigold	overhead	high	14,000	81,620	56,934	-	10,346	67,280	24,686	14,340	0.43	0.21	136	10,024	181.51	-34%	-20%	-18%
Wheat	overhead	low	5,500	60,500	40,965	405	10,346	51,716	19,130	8,784	0.46	0.17	19	1,596	1,006.84	-35%	-16%	-15%
Coffee (USD 1,360mt)	drip line	high	2,500	187,000	132,784	1,367	28,297	162,448	52,849	24,552	0.39	0.15	375	24,915	140.93	-31%	-15%	-13%
Groundnuts	no	high	2,800	46,620	34,245	466	5,841	40,552	11,909	6,068	0.34	0.15	83	5,499	143.48	-31%	-16%	-13%
Cotton	no	high	2,300	51,129	38,137	767	5,841	44,745	12,225	6,384	0.31	0.14	198	12,367	61.74	-31%	-16%	-13%
Cotton	overhead	med	3,000	70,320	50,176	1,055	10,346	61,577	19,089	8,743	0.37	0.14	245	14,980	77.91	-34%	-14%	-11%
Roses (medium stem)	drip line	auction	1,750	14,228,261	8,546,850	2,347,663	1,565,291	12,459,804	3,333,748	1,768,457	0.31	0.14	9,360	786,240	356.17	-50%	-26%	-15%
Coffee (USD 1,500mt)	drip line	med	2,000	165,000	121,397	1,097	28,297	150,791	42,506	14,209	0.35	0.09	321	21,713	132.42	-28%	-9%	-9%
Roses (short stem)	drip line	auction	2,750	13,152,174	8,483,740	2,170,109	1,565,291	12,219,140	2,498,325	933,034	0.23	0.08	9,360	786,240	266.92	-43%	-16%	-10%
Groundnuts	overhead	med	4,000	66,600	52,226	666	10,346	63,238	13,708	3,362	0.26	0.05	110	7,112	124.62	-25%	-6%	-5%
Soybeans	no	high	2,600	32,500	24,816	218	5,841	30,875	7,466	1,625	0.30	0.05	14	1,176	533.29	-25%	-6%	-5%
Cotton	no	med	1,900	42,237	33,696	634	5,841	40,171	7,907	2,066	0.23	0.05	172	10,873	45.97	-25%	-6%	-5%
Export veg - baby corn	drip line	high	950	49,638	37,674	-	10,275	47,949	11,964	1,689	0.32	0.04	190	13,440	62.97	-24%	-3%	-3%
Groundnuts	no	med	2,300	38,295	31,138	383	5,841	37,362	6,774	933	0.21	0.02	68	4,463	99.62	-21%	-3%	-2%
Cotton	overhead	low	2,500	58,600	47,170	879	10,346	58,395	10,551	205	0.22	0.00	212	13,113	49.77	-23%	0%	0%
Coffee (USD 1,360mt)	drip line	med	2,000	149,600	121,397	1,097	28,297	150,791	27,106	(1,191)	0.22	(0.01)	321	21,713	84.44	-20%	1%	1%
Soybeans	overhead	high	3,400	42,500	32,282	285	10,346	42,913	9,933	(413)	0.31	(0.01)	24	2,016	413.88	-26%	1%	1%
Maize	no	high	5,500	31,680	27,522	190	5,841	33,553	3,968	(1,873)	0.14	(0.06)	27	2,268	146.96	-16%	8%	6%
Cotton	no	low	1,500	33,345	30,040	500	5,841	36,381	2,805	(3,036)	0.09	(0.08)	145	9,380	19.34	-11%	12%	9%
Maize	overhead	high	8,000	46,080	40,349	276	10,346	50,971	5,455	(4,891)	0.13	(0.10)	50	4,200	109.10	-14%	13%	11%
Groundnuts	no	low	1,800	29,970	27,152	300	5,841	33,293	2,518	(3,323)	0.09	(0.10)	57	3,847	44.18	-10%	13%	11%
Soybeans	no	med	2,100	26,250	23,434	176	5,841	29,451	2,640	(3,201)	0.11	(0.11)	13	1,092	203.08	-11%	13%	12%
Maize	no	med	4,500	25,920	23,564	156	5,841	29,561	2,200	(3,641)	0.09	(0.12)	23	1,932	95.65	-11%	18%	14%
Soybeans	overhead	med	2,900	36,250	30,900	243	10,346	41,489	5,107	(5,239)	0.16	(0.13)	23	1,932	222.04	-16%	16%	15%
Groundnuts	overhead	low	3,000	49,950	47,952	500	10,346	58,798	1,498	(8,848)	0.03	(0.15)	90	5,964	16.64	-4%	21%	18%
Maize	overhead	med	7,000	40,320	37,577	242	10,346	48,165	2,501	(7,845)	0.07	(0.16)	45	3,780	55.58	-8%	24%	20%
Maize	overhead	low	6,000	34,560	33,936	207	10,346	44,489	417	(9,929)	0.01	(0.22)	30	2,520	13.90	-1%	35%	29%
Soybeans	overhead	low	2,400	30,000	28,886	201	10,346	39,433	913	(9,433)	0.03	(0.24)	22	1,848	41.50	-3%	35%	32%
Maize	no	low	3,500	20,160	20,875	121	5,841	26,837	(836)	(6,677)	(0.04)	(0.25)	19	1,596	(44.00)	5%	43%	34%
Soybeans	no	low	1,600	20,000	21,420	134	5,841	27,395	(1,554)	(7,395)	(0.07)	(0.27)	12	1,008	(129.50)	9%	41%	37%

LARGE SCALE COMMERCIAL SECTOR: Enterprises sorted by labour requirement.

Return to cash costs measured as gross profit/total cash costs; return to total costs measured as net profit/total production costs (excl. family labour).

For roses, yield is per 1,000 stems and management varies according to marketing arrangement (100% auction sales vs. blended sales for consortium by auction and direct contract).

					Production Costs (ZWD/ha)				Farmer Income (ZWD/ha)				Labour			Sensitivity Indicators		
Activity	Irrigation	Mgt. Level	Yield (kg/ha)	Gross Revenue (ZWD/ha)	Cash required before sale	Cash deductions after sale	Annual investment cost	Total production costs	Gross profit (gr. revenue - cash costs)	Net profit (gr. revenue - total cost)	Return to cash costs	Return to total costs	Hired labour (days)	Wage bill (ZWD/ha)	Gr. profit per day (ZWD/ha)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
Roses (long stem)	drip line	blend	1,100	14,467,391	8,002,433	419,554	1,565,291	9,987,278	6,045,404	4,480,113	0.72	0.45	9,360	786,240	645.88	-62%	-46%	-33%
Roses (medium stem)	drip line	blend	1,750	14,228,261	8,796,850	412,620	1,565,291	10,774,761	5,018,791	3,453,500	0.54	0.32	9,360	786,240	536.20	-58%	-40%	-24%
Roses (long stem)	drip line	auction	1,100	14,467,391	7,752,433	2,387,120	1,565,291	11,704,844	4,327,838	2,762,547	0.43	0.24	9,360	786,240	462.38	-56%	-36%	-24%
Roses (short stem)	drip line	blend	2,750	13,152,174	8,733,740	381,413	1,565,291	10,680,444	4,037,021	2,471,730	0.44	0.23	9,360	786,240	431.31	-32%	-19%	-20%
Roses (medium stem)	drip line	auction	1,750	14,228,261	8,546,850	2,347,663	1,565,291	12,459,804	3,333,748	1,768,457	0.31	0.14	9,360	786,240	356.17	-50%	-26%	-15%
Roses (short stem)	drip line	auction	2,750	13,152,174	8,483,740	2,170,109	1,565,291	12,219,140	2,498,325	933,034	0.23	0.08	9,360	786,240	266.92	-43%	-16%	-10%
Tobacco, flue-cured	overhead	high	3,500	346,500	145,886	28,431	16,691	191,008	172,183	155,492	0.99	0.81	497	37,268	346.44	-60%	-54%	-47%
Tobacco, flue-cured	overhead	med	3,100	301,785	140,504	24,927	16,691	182,122	136,354	119,663	0.82	0.66	482	36,428	282.89	-55%	-48%	-42%
Tobacco, flue-cured	overhead	low	2,800	261,800	135,718	21,979	16,691	174,388	104,103	87,412	0.66	0.50	462	35,308	225.33	-48%	-41%	-35%
Tobacco, flue-cured	no	high	2,800	275,660	126,311	22,668	12,186	161,165	126,681	114,495	0.85	0.71	437	33,208	289.89	-55%	-50%	-44%
Tobacco, flue-cured	no	med	2,500	242,000	120,002	20,034	12,186	152,222	101,964	89,778	0.73	0.59	415	31,976	245.70	-51%	-45%	-39%
Tobacco, flue-cured	no	low	2,200	204,490	113,454	17,209	12,186	142,849	73,827	61,641	0.57	0.43	382	30,128	193.26	-44%	-37%	-32%
Coffee (USD 2,000mt)	drip line	high	2,500	275,000	132,784	1,367	28,297	162,448	140,849	112,552	1.05	0.69	375	24,915	375.60	-55%	-44%	-41%
Coffee (USD 1,500mt)	drip line	high	2,500	206,250	132,784	1,367	28,297	162,448	72,099	43,802	0.54	0.27	375	24,915	192.26	-38%	-23%	-21%
Coffee (USD 1,360mt)	drip line	high	2,500	187,000	132,784	1,367	28,297	162,448	52,849	24,552	0.39	0.15	375	24,915	140.93	-31%	-15%	-13%
Coffee (USD 2,000mt)	drip line	med	2,000	220,000	121,397	1,097	28,297	150,791	97,506	69,209	0.80	0.46	321	21,713	303.76	-48%	-34%	-31%
Coffee (USD 1,500mt)	drip line	med	2,000	165,000	121,397	1,097	28,297	150,791	42,506	14,209	0.35	0.09	321	21,713	132.42	-28%	-9%	-9%
Coffee (USD 1,360mt)	drip line	med	2,000	149,600	121,397	1,097	28,297	150,791	27,106	(1,191)	0.22	(0.01)	321	21,713	84.44	-20%	1%	1%
Paprika	overhead	long	6,000	451,200	172,459	-	16,691	189,150	278,741	262,050	1.62	1.39	310	23,800	899.16	-66%	-62%	-58%
Export veg - mange tout	drip line	high	4,000	121,000	68,641	-	10,275	78,916	52,359	42,084	0.76	0.53	295	20,020	177.49	-43%	-35%	-35%
Cotton	overhead	high	3,500	82,040	54,713	1,231	10,346	66,290	26,096	15,750	0.47	0.24	278	16,847	93.87	-41%	-25%	-20%
Export veg - baby carrots	drip line	high	3,800	104,500	66,500	-	10,275	76,775	38,000	27,725	0.57	0.36	275	18,900	138.18	-36%	-27%	-27%
Paprika	overhead	short	3,000	225,600	124,126	-	16,691	140,817	101,474	84,783	0.82	0.60	270	20,720	375.83	-49%	-41%	-38%
Cotton	overhead	med	3,000	70,320	50,176	1,055	10,346	61,577	19,089	8,743	0.37	0.14	245	14,980	77.91	-34%	-14%	-11%
Cotton	overhead	low	2,500	58,600	47,170	879	10,346	58,395	10,551	205	0.22	0.00	212	13,113	49.77	-23%	0%	0%
Cotton	no	high	2,300	51,129	38,137	767	5,841	44,745	12,225	6,384	0.31	0.14	198	12,367	61.74	-31%	-16%	-13%
Export veg - baby corn	drip line	high	950	49,638	37,674	-	10,275	47,949	11,964	1,689	0.32	0.04	190	13,440	62.97	-24%	-3%	-3%
Cotton	no	med	1,900	42,237	33,696	634	5,841	40,171	7,907	2,066	0.23	0.05	172	10,873	45.97	-25%	-6%	-5%
Cotton	no	low	1,500	33,345	30,040	500	5,841	36,381	2,805	(3,036)	0.09	(0.08)	145	9,380	19.34	-11%	12%	9%
Marigold	overhead	high	14,000	81,620	56,934	-	10,346	67,280	24,686	14,340	0.43	0.21	136	10,024	181.51	-34%	-20%	-18%
Groundnuts	overhead	high	5,000	83,250	56,363	833	10,346	67,542	26,054	15,708	0.46	0.23	135	8,680	192.99	-38%	-23%	-19%
Groundnuts	overhead	med	4,000	66,600	52,226	666	10,346	63,238	13,708	3,362	0.26	0.05	110	7,112	124.62	-25%	-6%	-5%
Groundnuts	overhead	low	3,000	49,950	47,952	500	10,346	58,798	1,498	(8,848)	0.03	(0.15)	90	5,964	16.64	-4%	21%	18%
Groundnuts	no	high	2,800	46,620	34,245	466	5,841	40,552	11,909	6,068	0.34	0.15	83	5,499	143.48	-31%	-16%	-13%
Groundnuts	no	med	2,300	38,295	31,138	383	5,841	37,362	6,774	933	0.21	0.02	68	4,463	99.62	-21%	-3%	-2%
Groundnuts	no	low	1,800	29,970	27,152	300	5,841	33,293	2,518	(3,323)	0.09	(0.10)	57	3,847	44.18	-10%	13%	11%
Maize	overhead	high	8,000	46,080	40,349	276	10,346	50,971	5,455	(4,891)	0.13	(0.10)	50	4,200	109.10	-14%	13%	11%
Maize	overhead	med	7,000	40,320	37,577	242	10,346	48,165	2,501	(7,845)	0.07	(0.16)	45	3,780	55.58	-8%	24%	20%
Maize	overhead	low	6,000	34,560	33,936	207	10,346	44,489	417	(9,929)	0.01	(0.22)	30	2,520	13.90	-1%	35%	29%
Maize	no	high	5,500	31,680	27,522	190	5,841	33,553	3,968	(1,873)	0.14	(0.06)	27	2,268	146.96	-16%	8%	6%
Soybeans	overhead	high	3,400	42,500	32,282	285	10,346	42,913	9,933	(413)	0.31	(0.01)	24	2,016	413.88	-26%	1%	1%
Maize	no	med	4,500	25,920	23,564	156	5,841	29,561	2,200	(3,641)	0.09	(0.12)	23	1,932	95.65	-11%	18%	14%
Soybeans	overhead	med	2,900	36,250	30,900	243	10,346	41,489	5,107	(5,239)	0.16	(0.13)	23	1,932	222.04	-16%	16%	15%
Soybeans	overhead	low	2,400	30,000	28,886	201	10,346	39,433	913	(9,433)	0.03	(0.24)	22	1,848	41.50	-3%	35%	32%
Wheat	overhead	high	7,500	82,500	50,439	553	10,346	61,338	31,508	21,162	0.62	0.35	21	1,764	1,500.38	-43%	-29%	-26%
Wheat	overhead	med	6,500	71,500	44,400	479	10,346	55,225	26,621	16,275	0.59	0.29	20	1,680	1,331.05	-41%	-25%	-23%
Wheat	overhead	low	5,500	60,500	40,965	405	10,346	51,716	19,130	8,784	0.46	0.17	19	1,596	1,006.84	-35%	-16%	-15%
Maize	no	low	3,500	20,160	20,875	121	5,841	26,837	(836)	(6,677)	(0.04)	(0.25)	19	1,596	(44.00)	5%	43%	34%
Soybeans	no	high	2,600	32,500	24,816	218	5,841	30,875	7,466	1,625	0.30	0.05	14	1,176	533.29	-25%	-6%	-5%
Soybeans	no	med	2,100	26,250	23,434	176	5,841	29,451	2,640	(3,201)	0.11	(0.11)	13	1,092	203.08	-11%	13%	12%
Soybeans	no	low	1,600	20,000	21,420	134	5,841	27,395	(1,554)	(7,395)	(0.07)	(0.27)	12	1,008	(129.50)	9%	41%	37%

LARGE SCALE COMMERCIAL SECTOR: Enterprises sorted by return per day labour.

Return to cash costs measured as gross profit/total cash costs; return to total costs measured as net profit/total production costs (excl. family labour).

For roses, yield is per 1,000 stems and management varies according to marketing arrangement (100% auction sales vs. blended sales for consortium by auction and direct contract).

					Production Costs (ZWD/ha)				Farmer Income (ZWD/ha)				Labour			Sensitivity Indicators		
Activity	Irrigation	Mgt. Level	Yield (kg/ha)	Gross Revenue (ZWD/ha)	Cash required before sale	Cash deductions after sale	Annual investment cost	Total production costs	Gross profit (gr. revenue - cash costs)	Net profit (gr. revenue - total cost)	Return to cash costs	Return to total costs	Hired labour (days)	Wage bill (ZWD/ha)	Gr. profit per day (ZWD/ha)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
Wheat	overhead	high	7,500	82,500	50,439	553	10,346	61,338	31,508	21,162	0.62	0.35	21	1,764	1,500.38	-43%	-29%	-26%
Wheat	overhead	med	6,500	71,500	44,400	479	10,346	55,225	26,621	16,275	0.59	0.29	20	1,680	1,331.05	-41%	-25%	-23%
Wheat	overhead	low	5,500	60,500	40,965	405	10,346	51,716	19,130	8,784	0.46	0.17	19	1,596	1,006.84	-35%	-16%	-15%
Paprika	overhead	long	6,000	451,200	172,459	-	16,691	189,150	278,741	262,050	1.62	1.39	310	23,800	899.16	-66%	-62%	-58%
Roses (long stem)	drip line	blend	1,100	14,467,391	8,002,433	419,554	1,565,291	9,987,278	6,045,404	4,480,113	0.72	0.45	9,360	786,240	645.88	-62%	-46%	-33%
Roses (medium stem)	drip line	blend	1,750	14,228,261	8,796,850	412,620	1,565,291	10,774,761	5,018,791	3,453,500	0.54	0.32	9,360	786,240	536.20	-58%	-40%	-24%
Soybeans	no	high	2,600	32,500	24,816	218	5,841	30,875	7,466	1,625	0.30	0.05	14	1,176	533.29	-25%	-6%	-5%
Roses (long stem)	drip line	auction	1,100	14,467,391	7,752,433	2,387,120	1,565,291	11,704,844	4,327,838	2,762,547	0.43	0.24	9,360	786,240	462.38	-56%	-36%	-24%
Roses (short stem)	drip line	blend	2,750	13,152,174	8,733,740	381,413	1,565,291	10,680,444	4,037,021	2,471,730	0.44	0.23	9,360	786,240	431.31	-32%	-19%	-20%
Soybeans	overhead	high	3,400	42,500	32,282	285	10,346	42,913	9,933	(413)	0.31	(0.01)	24	2,016	413.88	-26%	1%	1%
Paprika	overhead	short	3,000	225,600	124,126	-	16,691	140,817	101,474	84,783	0.82	0.60	270	20,720	375.83	-49%	-41%	-38%
Coffee (USD 2,000mt)	drip line	high	2,500	275,000	132,784	1,367	28,297	162,448	140,849	112,552	1.05	0.69	375	24,915	375.60	-55%	-44%	-41%
Roses (medium stem)	drip line	auction	1,750	14,228,261	8,546,850	2,347,663	1,565,291	12,459,804	3,333,748	1,768,457	0.31	0.14	9,360	786,240	356.17	-50%	-26%	-15%
Tobacco, flue-cured	overhead	high	3,500	346,500	145,886	28,431	16,691	191,008	172,183	155,492	0.99	0.81	497	37,268	346.44	-60%	-54%	-47%
Coffee (USD 2,000mt)	drip line	med	2,000	220,000	121,397	1,097	28,297	150,791	97,506	69,209	0.80	0.46	321	21,713	303.76	-48%	-34%	-31%
Tobacco, flue-cured	no	high	2,800	275,660	126,311	22,668	12,186	161,165	126,681	114,495	0.85	0.71	437	33,208	289.89	-55%	-50%	-44%
Tobacco, flue-cured	overhead	med	3,100	301,785	140,504	24,927	16,691	182,122	136,354	119,663	0.82	0.66	482	36,428	282.89	-55%	-48%	-42%
Roses (short stem)	drip line	auction	2,750	13,152,174	8,483,740	2,170,109	1,565,291	12,219,140	2,498,325	933,034	0.23	0.08	9,360	786,240	266.92	-43%	-16%	-10%
Tobacco, flue-cured	no	med	2,500	242,000	120,002	20,034	12,186	152,222	101,964	89,778	0.73	0.59	415	31,976	245.70	-51%	-45%	-39%
Tobacco, flue-cured	overhead	low	2,800	261,800	135,718	21,979	16,691	174,388	104,103	87,412	0.66	0.50	462	35,308	225.33	-48%	-41%	-35%
Soybeans	overhead	med	2,900	36,250	30,900	243	10,346	41,489	5,107	(5,239)	0.16	(0.13)	23	1,932	222.04	-16%	16%	15%
Soybeans	no	med	2,100	26,250	23,434	176	5,841	29,451	2,640	(3,201)	0.11	(0.11)	13	1,092	203.08	-11%	13%	12%
Tobacco, flue-cured	no	low	2,200	204,490	113,454	17,209	12,186	142,849	73,827	61,641	0.57	0.43	382	30,128	193.26	-44%	-37%	-32%
Groundnuts	overhead	high	5,000	83,250	56,363	833	10,346	67,542	26,054	15,708	0.46	0.23	135	8,680	192.99	-38%	-23%	-19%
Coffee (USD 1,500mt)	drip line	high	2,500	206,250	132,784	1,367	28,297	162,448	72,099	43,802	0.54	0.27	375	24,915	192.26	-38%	-23%	-21%
Marigold	overhead	high	14,000	81,620	56,934	-	10,346	67,280	24,686	14,340	0.43	0.21	136	10,024	181.51	-34%	-20%	-18%
Export veg - mange tout	drip line	high	4,000	121,000	68,641	-	10,275	78,916	52,359	42,084	0.76	0.53	295	20,020	177.49	-43%	-35%	-35%
Maize	no	high	5,500	31,680	27,522	190	5,841	33,553	3,968	(1,873)	0.14	(0.06)	27	2,268	146.96	-16%	8%	6%
Groundnuts	no	high	2,800	46,620	34,245	466	5,841	40,552	11,909	6,068	0.34	0.15	83	5,499	143.48	-31%	-16%	-13%
Coffee (USD 1,360mt)	drip line	high	2,500	187,000	132,784	1,367	28,297	162,448	52,849	24,552	0.39	0.15	375	24,915	140.93	-31%	-15%	-13%
Export veg - baby carrots	drip line	high	3,800	104,500	66,500	-	10,275	76,775	38,000	27,725	0.57	0.36	275	18,900	138.18	-36%	-27%	-27%
Coffee (USD 1,500mt)	drip line	med	2,000	165,000	121,397	1,097	28,297	150,791	42,506	14,209	0.35	0.09	321	21,713	132.42	-28%	-9%	-9%
Groundnuts	overhead	med	4,000	66,600	52,226	666	10,346	63,238	13,708	3,362	0.26	0.05	110	7,112	124.62	-25%	-6%	-5%
Maize	overhead	high	8,000	46,080	40,349	276	10,346	50,971	5,455	(4,891)	0.13	(0.10)	50	4,200	109.10	-14%	13%	11%
Groundnuts	no	med	2,300	38,295	31,138	383	5,841	37,362	6,774	933	0.21	0.02	68	4,463	99.62	-21%	-3%	-2%
Maize	no	med	4,500	25,920	23,564	156	5,841	29,561	2,200	(3,641)	0.09	(0.12)	23	1,932	95.65	-11%	18%	14%
Cotton	overhead	high	3,500	82,040	54,713	1,231	10,346	66,290	26,096	15,750	0.47	0.24	278	16,847	93.87	-41%	-25%	-20%
Coffee (USD 1,360mt)	drip line	med	2,000	149,600	121,397	1,097	28,297	150,791	27,106	(1,191)	0.22	(0.01)	321	21,713	84.44	-20%	1%	1%
Cotton	overhead	med	3,000	70,320	50,176	1,055	10,346	61,577	19,089	8,743	0.37	0.14	245	14,980	77.91	-34%	-14%	-11%
Export veg - baby corn	drip line	high	950	49,638	37,674	-	10,275	47,949	11,964	1,689	0.32	0.04	190	13,440	62.97	-24%	-3%	-3%
Cotton	no	high	2,300	51,129	38,137	767	5,841	44,745	12,225	6,384	0.31	0.14	198	12,367	61.74	-31%	-16%	-13%
Maize	overhead	med	7,000	40,320	37,577	242	10,346	48,165	2,501	(7,845)	0.07	(0.16)	45	3,780	55.58	-8%	24%	20%
Cotton	overhead	low	2,500	58,600	47,170	879	10,346	58,395	10,551	205	0.22	0.00	212	13,113	49.77	-23%	0%	0%
Cotton	no	med	1,900	42,237	33,696	634	5,841	40,171	7,907	2,066	0.23	0.05	172	10,873	45.97	-25%	-6%	-5%
Groundnuts	no	low	1,800	29,970	27,152	300	5,841	33,293	2,518	(3,323)	0.09	(0.10)	57	3,847	44.18	-10%	13%	11%
Soybeans	overhead	low	2,400	30,000	28,886	201	10,346	39,433	913	(9,433)	0.03	(0.24)	22	1,848	41.50	-3%	35%	32%
Cotton	no	low	1,500	33,345	30,040	500	5,841	36,381	2,805	(3,036)	0.09	(0.08)	145	9,380	19.34	-11%	12%	9%
Groundnuts	overhead	low	3,000	49,950	47,952	500	10,346	58,798	1,498	(8,848)	0.03	(0.15)	90	5,964	16.64	-4%	21%	18%
Maize	overhead	low	6,000	34,560	33,936	207	10,346	44,489	417	(9,929)	0.01	(0.22)	30	2,520	13.90	-1%	35%	29%
Maize	no	low	3,500	20,160	20,875	121	5,841	26,837	(836)	(6,677)	(0.04)	(0.25)	19	1,596	(44.00)	5%	43%	34%
Soybeans	no	low	1,600	20,000	21,420	134	5,841	27,395	(1,554)	(7,395)	(0.07)	(0.27)	12	1,008	(129.50)	9%	41%	37%

LARGE SCALE COMMERCIAL SECTOR: Enterprises sorted by vulnerability to price (percent change in price to net profit = 0).

Return to cash costs measured as gross profit/total cash costs; return to total costs measured as net profit/total production costs (excl. family labour).

For roses, yield is per 1,000 stems and management varies according to marketing arrangement (100% auction sales vs. blended sales for consortium by auction and direct contract).

					Production Costs (ZWD/ha)				Farmer Income (ZWD/ha)				Labour			Sensitivity Indicators		
Activity	**Irrigation**	**Mgt. Level**	**Yield (kg/ha)**	**Gross Revenue (ZWD/ha)**	Cash required before sale	Cash deductions after sale	Annual investment cost	Total production costs	Gross profit (gr. revenue - cash costs)	Net profit (gr. revenue - total cost)	Return to cash costs	Return to total costs	Hired labour (days)	Wage bill (ZWD/ha)	Gr. profit per day (ZWD/ha)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
Paprika	overhead	long	6,000	451,200	172,459	-	16,691	189,150	278,741	262,050	1.62	1.39	310	23,800	899.16	-66%	-62%	-58%
Tobacco, flue-cured	overhead	high	3,500	346,500	145,886	28,431	16,691	191,008	172,183	155,492	0.99	0.81	497	37,268	346.44	-60%	-54%	-47%
Tobacco, flue-cured	no	high	2,800	275,660	126,311	22,668	12,186	161,165	126,681	114,495	0.85	0.71	437	33,208	289.89	-55%	-50%	-44%
Tobacco, flue-cured	overhead	med	3,100	301,785	140,504	24,927	16,691	182,122	136,354	119,663	0.82	0.66	482	36,428	282.89	-55%	-48%	-42%
Roses (long stem)	drip line	blend	1,100	14,467,391	8,002,433	419,554	1,565,291	9,987,278	6,045,404	4,480,113	0.72	0.45	9,360	786,240	645.88	-62%	-46%	-33%
Tobacco, flue-cured	no	med	2,500	242,000	120,002	20,034	12,186	152,222	101,964	89,778	0.73	0.59	415	31,976	245.70	-51%	-45%	-39%
Coffee (USD 2,000mt)	drip line	high	2,500	275,000	132,784	1,367	28,297	162,448	140,849	112,552	1.05	0.69	375	24,915	375.60	-55%	-44%	-41%
Paprika	overhead	short	3,000	225,600	124,126	-	16,691	140,817	101,474	84,783	0.82	0.60	270	20,720	375.83	-49%	-41%	-38%
Tobacco, flue-cured	overhead	low	2,800	261,800	135,718	21,979	16,691	174,388	104,103	87,412	0.66	0.50	462	35,308	225.33	-48%	-41%	-35%
Roses (medium stem)	drip line	blend	1,750	14,228,261	8,796,850	412,620	1,565,291	10,774,761	5,018,791	3,453,500	0.54	0.32	9,360	786,240	536.20	-58%	-40%	-24%
Tobacco, flue-cured	no	low	2,200	204,490	113,454	17,209	12,186	142,849	73,827	61,641	0.57	0.43	382	30,128	193.26	-44%	-37%	-32%
Roses (long stem)	drip line	auction	1,100	14,467,391	7,752,433	2,387,120	1,565,291	11,704,844	4,327,838	2,762,547	0.43	0.24	9,360	786,240	462.38	-56%	-36%	-24%
Export veg - mange tout	drip line	high	4,000	121,000	68,641	-	10,275	78,916	52,359	42,084	0.76	0.53	295	20,020	177.49	-43%	-35%	-35%
Coffee (USD 2,000mt)	drip line	med	2,000	220,000	121,397	1,097	28,297	150,791	97,506	69,209	0.80	0.46	321	21,713	303.76	-48%	-34%	-31%
Wheat	overhead	high	7,500	82,500	50,439	553	10,346	61,338	31,508	21,162	0.62	0.35	21	1,764	1,500.38	-43%	-29%	-26%
Export veg - baby carrots	drip line	high	3,800	104,500	66,500	-	10,275	76,775	38,000	27,725	0.57	0.36	275	18,900	138.18	-36%	-27%	-27%
Roses (medium stem)	drip line	auction	1,750	14,228,261	8,546,850	2,347,663	1,565,291	12,459,804	3,333,748	1,768,457	0.31	0.14	9,360	786,240	356.17	-50%	-26%	-15%
Wheat	overhead	med	6,500	71,500	44,400	479	10,346	55,225	26,621	16,275	0.59	0.29	20	1,680	1,331.05	-41%	-25%	-23%
Cotton	overhead	high	3,500	82,040	54,713	1,231	10,346	66,290	26,096	15,750	0.47	0.24	278	16,847	93.87	-41%	-25%	-20%
Coffee (USD 1,500mt)	drip line	high	2,500	206,250	132,784	1,367	28,297	162,448	72,099	43,802	0.54	0.27	375	24,915	192.26	-38%	-23%	-21%
Groundnuts	overhead	high	5,000	83,250	56,363	833	10,346	67,542	26,054	15,708	0.46	0.23	135	8,680	192.99	-38%	-23%	-19%
Marigold	overhead	high	14,000	81,620	56,934	-	10,346	67,280	24,686	14,340	0.43	0.21	136	10,024	181.51	-34%	-20%	-18%
Roses (short stem)	drip line	blend	2,750	13,152,174	8,733,740	381,413	1,565,291	10,680,444	4,037,021	2,471,730	0.44	0.23	9,360	786,240	431.31	-32%	-19%	-20%
Wheat	overhead	low	5,500	60,500	40,965	405	10,346	51,716	19,130	8,784	0.46	0.17	19	1,596	1,006.84	-35%	-16%	-15%
Groundnuts	no	high	2,800	46,620	34,245	466	5,841	40,552	11,909	6,068	0.34	0.15	83	5,499	143.48	-31%	-16%	-13%
Cotton	no	high	2,300	51,129	38,137	767	5,841	44,745	12,225	6,384	0.31	0.14	198	12,367	61.74	-31%	-16%	-13%
Roses (short stem)	drip line	auction	2,750	13,152,174	8,483,740	2,170,109	1,565,291	12,219,140	2,498,325	933,034	0.23	0.08	9,360	786,240	266.92	-43%	-16%	-10%
Coffee (USD 1,360mt)	drip line	high	2,500	187,000	132,784	1,367	28,297	162,448	52,849	24,552	0.39	0.15	375	24,915	140.93	-31%	-15%	-13%
Cotton	overhead	med	3,000	70,320	50,176	1,055	10,346	61,577	19,089	8,743	0.37	0.14	245	14,980	77.91	-34%	-14%	-11%
Coffee (USD 1,500mt)	drip line	med	2,000	165,000	121,397	1,097	28,297	150,791	42,506	14,209	0.35	0.09	321	21,713	132.42	-28%	-9%	-9%
Groundnuts	overhead	med	4,000	66,600	52,226	666	10,346	63,238	13,708	3,362	0.26	0.05	110	7,112	124.62	-25%	-6%	-5%
Soybeans	no	high	2,600	32,500	24,816	218	5,841	30,875	7,466	1,625	0.30	0.05	14	1,176	533.29	-25%	-6%	-5%
Cotton	no	med	1,900	42,237	33,696	634	5,841	40,171	7,907	2,066	0.23	0.05	172	10,873	45.97	-25%	-6%	-5%
Export veg - baby corn	drip line	high	950	49,638	37,674	-	10,275	47,949	11,964	1,689	0.32	0.04	190	13,440	62.97	-24%	-3%	-3%
Groundnuts	no	med	2,300	38,295	31,138	383	5,841	37,362	6,774	933	0.21	0.02	68	4,463	99.62	-21%	-3%	-2%
Cotton	overhead	low	2,500	58,600	47,170	879	10,346	58,395	10,551	205	0.22	0.00	212	13,113	49.77	-23%	0%	0%
Coffee (USD 1,360mt)	drip line	med	2,000	149,600	121,397	1,097	28,297	150,791	27,106	(1,191)	0.22	(0.01)	321	21,713	84.44	-20%	1%	1%
Soybeans	overhead	high	3,400	42,500	32,282	285	10,346	42,913	9,933	(413)	0.31	(0.01)	24	2,016	413.88	-26%	1%	1%
Maize	no	high	5,500	31,680	27,522	190	5,841	33,553	3,968	(1,873)	0.14	(0.06)	27	2,268	146.96	-16%	8%	6%
Cotton	no	low	1,500	33,345	30,040	500	5,841	36,381	2,805	(3,036)	0.09	(0.08)	145	9,380	19.34	-11%	12%	9%
Maize	overhead	high	8,000	46,080	40,349	276	10,346	50,971	5,455	(4,891)	0.13	(0.10)	50	4,200	109.10	-14%	13%	11%
Groundnuts	no	low	1,800	29,970	27,152	300	5,841	33,293	2,518	(3,323)	0.09	(0.10)	57	3,847	44.18	-10%	13%	11%
Soybeans	no	med	2,100	26,250	23,434	176	5,841	29,451	2,640	(3,201)	0.11	(0.11)	13	1,092	203.08	-11%	13%	12%
Soybeans	overhead	med	2,900	36,250	30,900	243	10,346	41,489	5,107	(5,239)	0.16	(0.13)	23	1,932	222.04	-16%	16%	15%
Maize	no	med	4,500	25,920	23,564	156	5,841	29,561	2,200	(3,641)	0.09	(0.12)	23	1,932	95.65	-11%	18%	14%
Groundnuts	overhead	low	3,000	49,950	47,952	500	10,346	58,798	1,498	(8,848)	0.03	(0.15)	90	5,964	16.64	-4%	21%	18%
Maize	overhead	med	7,000	40,320	37,577	242	10,346	48,165	2,501	(7,845)	0.07	(0.16)	45	3,780	55.58	-8%	24%	20%
Maize	overhead	low	6,000	34,560	33,936	207	10,346	44,489	417	(9,929)	0.01	(0.22)	30	2,520	13.90	-1%	35%	29%
Soybeans	overhead	low	2,400	30,000	28,886	201	10,346	39,433	913	(9,433)	0.03	(0.24)	22	1,848	41.50	-3%	35%	32%
Soybeans	no	low	1,600	20,000	21,420	134	5,841	27,395	(1,554)	(7,395)	(0.07)	(0.27)	12	1,008	(129.50)	9%	41%	37%
Maize	no	low	3,500	20,160	20,875	121	5,841	26,837	(836)	(6,677)	(0.04)	(0.25)	19	1,596	(44.00)	5%	43%	34%

LARGE SCALE COMMERCIAL SECTOR: Irrigated and dryland enterprises sorted by total production costs.

Return to cash costs measured as gross profit/total cash costs; return to total costs measured as net profit/total production costs (excl. family labour).

For roses, yield is per 1,000 stems and management varies according to marketing arrangement (100% auction sales vs. blended sales for consortium by auction and direct contract).

					Production Costs (ZWD/ha)				Farmer Income (ZWD/ha)				Labour			Sensitivity Indicators		
Activity	**Irrigation**	**Mgt. Level**	**Yield (kg/ha)**	**Gross Revenue (ZWD/ha)**	Cash required before sale	Cash deductions after sale	Annual investment cost	Total production costs	Gross profit (gr. revenue - cash costs)	Net profit (gr. revenue - total cost)	Return to cash costs	Return to total costs	Hired labour (days)	Wage bill (ZWD/ha)	Gr. profit per day (ZWD/ha)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
IRRIGATED CROPS																		
Roses (medium stem)	drip line	auction	1,750	14,228,261	8,546,850	2,347,663	1,565,291	12,459,804	3,333,748	1,768,457	0.31	0.14	9,360	786,240	356.17	-50%	-26%	-15%
Roses (short stem)	drip line	auction	2,750	13,152,174	8,483,740	2,170,109	1,565,291	12,219,140	2,498,325	933,034	0.23	0.08	9,360	786,240	266.92	-43%	-16%	-10%
Roses (long stem)	drip line	auction	1,100	14,467,391	7,752,433	2,387,120	1,565,291	11,704,844	4,327,838	2,762,547	0.43	0.24	9,360	786,240	462.38	-56%	-36%	-24%
Roses (medium stem)	drip line	blend	1,750	14,228,261	8,796,850	412,620	1,565,291	10,774,761	5,018,791	3,453,500	0.54	0.32	9,360	786,240	536.20	-58%	-40%	-24%
Roses (short stem)	drip line	blend	2,750	13,152,174	8,733,740	381,413	1,565,291	10,680,444	4,037,021	2,471,730	0.44	0.23	9,360	786,240	431.31	-32%	-19%	-20%
Roses (long stem)	drip line	blend	1,100	14,467,391	8,002,433	419,554	1,565,291	9,987,278	6,045,404	4,480,113	0.72	0.45	9,360	786,240	645.88	-62%	-46%	-33%
Tobacco, flue-cured	overhead	high	3,500	346,500	145,886	28,431	16,691	191,008	172,183	155,492	0.99	0.81	497	37,268	346.44	-60%	-54%	-47%
Paprika	overhead	long	6,000	451,200	172,459	-	16,691	189,150	278,741	262,050	1.62	1.39	310	23,800	899.16	-66%	-62%	-58%
Tobacco, flue-cured	overhead	med	3,100	301,785	140,504	24,927	16,691	182,122	136,354	119,663	0.82	0.66	482	36,428	282.89	-55%	-48%	-42%
Tobacco, flue-cured	overhead	low	2,800	261,800	135,718	21,979	16,691	174,388	104,103	87,412	0.66	0.50	462	35,308	225.33	-48%	-41%	-35%
Coffee (USD 2,000mt)	drip line	high	2,500	275,000	132,784	1,367	28,297	162,448	140,849	112,552	1.05	0.69	375	24,915	375.60	-55%	-44%	-41%
Coffee (USD 1,500mt)	drip line	high	2,500	206,250	132,784	1,367	28,297	162,448	72,099	43,802	0.54	0.27	375	24,915	192.26	-38%	-23%	-21%
Coffee (USD 1,360mt)	drip line	high	2,500	187,000	132,784	1,367	28,297	162,448	52,849	24,552	0.39	0.15	375	24,915	140.93	-31%	-15%	-13%
Coffee (USD 2,000mt)	drip line	med	2,000	220,000	121,397	1,097	28,297	150,791	97,506	69,209	0.80	0.46	321	21,713	303.76	-48%	-34%	-31%
Coffee (USD 1,500mt)	drip line	med	2,000	165,000	121,397	1,097	28,297	150,791	42,506	14,209	0.35	0.09	321	21,713	132.42	-28%	-9%	-9%
Coffee (USD 1,360mt)	drip line	med	2,000	149,600	121,397	1,097	28,297	150,791	27,106	(1,191)	0.22	(0.01)	321	21,713	84.44	-20%	1%	1%
Paprika	overhead	short	3,000	225,600	124,126	-	16,691	140,817	101,474	84,783	0.82	0.60	270	20,720	375.83	-49%	-41%	-38%
Export veg - mange tout	drip line	high	4,000	121,000	68,641	-	10,275	78,916	52,359	42,084	0.76	0.53	295	20,020	177.49	-43%	-35%	-35%
Export veg - baby carrots	drip line	high	3,800	104,500	66,500	-	10,275	76,775	38,000	27,725	0.57	0.36	275	18,900	138.18	-36%	-27%	-27%
Groundnuts	overhead	high	5,000	83,250	56,363	833	10,346	67,542	26,054	15,708	0.46	0.23	135	8,680	192.99	-38%	-23%	-19%
Marigold	overhead	high	14,000	81,620	56,934	-	10,346	67,280	24,686	14,340	0.43	0.21	136	10,024	181.51	-34%	-20%	-18%
Cotton	overhead	high	3,500	82,040	54,713	1,231	10,346	66,290	26,096	15,750	0.47	0.24	278	16,847	93.87	-41%	-25%	-20%
Groundnuts	overhead	med	4,000	66,600	52,226	666	10,346	63,238	13,708	3,362	0.26	0.05	110	7,112	124.62	-25%	-6%	-5%
Cotton	overhead	med	3,000	70,320	50,176	1,055	10,346	61,577	19,089	8,743	0.37	0.14	245	14,980	77.91	-34%	-14%	-11%
Wheat	overhead	high	7,500	82,500	50,439	553	10,346	61,338	31,508	21,162	0.62	0.35	21	1,764	1,500.38	-43%	-29%	-26%
Groundnuts	overhead	low	3,000	49,950	47,952	500	10,346	58,798	1,498	(8,848)	0.03	(0.15)	90	5,964	16.64	-4%	21%	18%
Cotton	overhead	low	2,500	58,600	47,170	879	10,346	58,395	10,551	205	0.22	0.00	212	13,113	49.77	-23%	0%	0%
Wheat	overhead	med	6,500	71,500	44,400	479	10,346	55,225	26,621	16,275	0.59	0.29	20	1,680	1,331.05	-41%	-25%	-23%
Wheat	overhead	low	5,500	60,500	40,965	405	10,346	51,716	19,130	8,784	0.46	0.17	19	1,596	1,006.84	-35%	-16%	-15%
Maize	overhead	high	8,000	46,080	40,349	276	10,346	50,971	5,455	(4,891)	0.13	(0.10)	50	4,200	109.10	-14%	13%	11%
Maize	overhead	med	7,000	40,320	37,577	242	10,346	48,165	2,501	(7,845)	0.07	(0.16)	45	3,780	55.58	-8%	24%	20%
Export veg - baby corn	drip line	high	950	49,638	37,674	-	10,275	47,949	11,964	1,689	0.32	0.04	190	13,440	62.97	-24%	-3%	-3%
Maize	overhead	low	6,000	34,560	33,936	207	10,346	44,489	417	(9,929)	0.01	(0.22)	30	2,520	13.90	-1%	35%	29%
Soybeans	overhead	high	3,400	42,500	32,282	285	10,346	42,913	9,933	(413)	0.31	(0.01)	24	2,016	413.88	-26%	1%	1%
Soybeans	overhead	med	2,900	36,250	30,900	243	10,346	41,489	5,107	(5,239)	0.16	(0.13)	23	1,932	222.04	-16%	16%	15%
Soybeans	overhead	low	2,400	30,000	28,886	201	10,346	39,433	913	(9,433)	0.03	(0.24)	22	1,848	41.50	-3%	35%	32%
DRYLAND CROPS																		
Tobacco, flue-cured	no	high	2,800	275,660	126,311	22,668	12,186	161,165	126,681	114,495	0.85	0.71	437	33,208	289.89	-55%	-50%	-44%
Tobacco, flue-cured	no	med	2,500	242,000	120,002	20,034	12,186	152,222	101,964	89,778	0.73	0.59	415	31,976	245.70	-51%	-45%	-39%
Tobacco, flue-cured	no	low	2,200	204,490	113,454	17,209	12,186	142,849	73,827	61,641	0.57	0.43	382	30,128	193.26	-44%	-37%	-32%
Cotton	no	high	2,300	51,129	38,137	767	5,841	44,745	12,225	6,384	0.31	0.14	198	12,367	61.74	-31%	-16%	-13%
Groundnuts	no	high	2,800	46,620	34,245	466	5,841	40,552	11,909	6,068	0.34	0.15	83	5,499	143.48	-31%	-16%	-13%
Cotton	no	med	1,900	42,237	33,696	634	5,841	40,171	7,907	2,066	0.23	0.05	172	10,873	45.97	-25%	-6%	-5%
Groundnuts	no	med	2,300	38,295	31,138	383	5,841	37,362	6,774	933	0.21	0.02	68	4,463	99.62	-21%	-3%	-2%
Cotton	no	low	1,500	33,345	30,040	500	5,841	36,381	2,805	(3,036)	0.09	(0.08)	145	9,380	19.34	-11%	12%	9%
Maize	no	high	5,500	31,680	27,522	190	5,841	33,553	3,968	(1,873)	0.14	(0.06)	27	2,268	146.96	-16%	8%	6%
Groundnuts	no	low	1,800	29,970	27,152	300	5,841	33,293	2,518	(3,323)	0.09	(0.10)	57	3,847	44.18	-10%	13%	11%
Soybeans	no	high	2,600	32,500	24,816	218	5,841	30,875	7,466	1,625	0.30	0.05	14	1,176	533.29	-25%	-6%	-5%
Maize	no	med	4,500	25,920	23,564	156	5,841	29,561	2,200	(3,641)	0.09	(0.12)	23	1,932	95.65	-11%	18%	14%
Soybeans	no	med	2,100	26,250	23,434	176	5,841	29,451	2,640	(3,201)	0.11	(0.11)	13	1,092	203.08	-11%	13%	12%
Soybeans	no	low	1,600	20,000	21,420	134	5,841	27,395	(1,554)	(7,395)	(0.07)	(0.27)	12	1,008	(129.50)	9%	41%	37%
Maize	no	low	3,500	20,160	20,875	121	5,841	26,837	(836)	(6,677)	(0.04)	(0.25)	19	1,596	(44.00)	5%	43%	34%

LARGE SCALE COMMERCIAL SECTOR: Irrigated and dryland enterprises sorted by net profit.

Return to cash costs measured as gross profit/total cash costs; return to total costs measured as net profit/total production costs (excl. family labour).

For roses, yield is per 1,000 stems and management varies according to marketing arrangement (100% auction sales vs. blended sales for consortium by auction and direct contract).

					Production Costs (ZWD/ha)				Farmer Income (ZWD/ha)				Labour			Sensitivity Indicators		
Activity	Irrigation	Mgt. Level	Yield (kg/ha)	Gross Revenue (ZWD/ha)	Cash required before sale	Cash deductions after sale	Annual investment cost	Total production costs	Gross profit (gr. revenue - cash costs)	Net profit (gr. revenue - total cost)	Return to cash costs	Return to total costs	Hired labour (days)	Wage bill (ZWD/ha)	Gr. profit per day (ZWD/ha)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
IRRIGATED CROPS																		
Roses (long stem)	drip line	blend	1,100	14,467,391	8,002,433	419,554	1,565,291	9,987,278	6,045,404	4,480,113	0.72	0.45	9,360	786,240	645.88	-62%	-46%	-33%
Roses (medium stem)	drip line	blend	1,750	14,228,261	8,796,850	412,620	1,565,291	10,774,761	5,018,791	3,453,500	0.54	0.32	9,360	786,240	536.20	-58%	-40%	-24%
Roses (long stem)	drip line	auction	1,100	14,467,391	7,752,433	2,387,120	1,565,291	11,704,844	4,327,838	2,762,547	0.43	0.24	9,360	786,240	462.38	-56%	-36%	-24%
Roses (short stem)	drip line	blend	2,750	13,152,174	8,733,740	381,413	1,565,291	10,680,444	4,037,021	2,471,730	0.44	0.23	9,360	786,240	431.31	-32%	-19%	-20%
Roses (medium stem)	drip line	auction	1,750	14,228,261	8,546,850	2,347,663	1,565,291	12,459,804	3,333,748	1,768,457	0.31	0.14	9,360	786,240	356.17	-50%	-26%	-15%
Roses (short stem)	drip line	auction	2,750	13,152,174	8,483,740	2,170,109	1,565,291	12,219,140	2,498,325	933,034	0.23	0.08	9,360	786,240	266.92	-43%	-16%	-10%
Paprika	overhead	long	6,000	451,200	172,459	-	16,691	189,150	278,741	262,050	1.62	1.39	310	23,800	899.16	-66%	-62%	-58%
Tobacco, flue-cured	overhead	high	3,500	346,500	145,886	28,431	16,691	191,008	172,183	155,492	0.99	0.81	497	37,268	346.44	-60%	-54%	-47%
Tobacco, flue-cured	overhead	med	3,100	301,785	140,504	24,927	16,691	182,122	136,354	119,663	0.82	0.66	482	36,428	282.89	-55%	-48%	-42%
Coffee (USD 2,000mt)	drip line	high	2,500	275,000	132,784	1,367	28,297	162,448	140,849	112,552	1.05	0.69	375	24,915	375.60	-55%	-44%	-41%
Tobacco, flue-cured	overhead	low	2,800	261,800	135,718	21,979	16,691	174,388	104,103	87,412	0.66	0.50	462	35,308	225.33	-48%	-41%	-35%
Paprika	overhead	short	3,000	225,600	124,126	-	16,691	140,817	101,474	84,783	0.82	0.60	270	20,720	375.83	-49%	-41%	-38%
Coffee (USD 2,000mt)	drip line	med	2,000	220,000	121,397	1,097	28,297	150,791	97,506	69,209	0.80	0.46	321	21,713	303.76	-48%	-34%	-31%
Coffee (USD 1,500mt)	drip line	high	2,500	206,250	132,784	1,367	28,297	162,448	72,099	43,802	0.54	0.27	375	24,915	192.26	-38%	-23%	-21%
Export veg - mange tout	drip line	high	4,000	121,000	68,641	-	10,275	78,916	52,359	42,084	0.76	0.53	295	20,020	177.49	-43%	-35%	-35%
Export veg - baby carrots	drip line	high	3,800	104,500	66,500	-	10,275	76,775	38,000	27,725	0.57	0.36	275	18,900	138.18	-36%	-27%	-27%
Coffee (USD 1,360mt)	drip line	high	2,500	187,000	132,784	1,367	28,297	162,448	52,849	24,552	0.39	0.15	375	24,915	140.93	-31%	-15%	-13%
Wheat	overhead	high	7,500	82,500	50,439	553	10,346	61,338	31,508	21,162	0.62	0.35	21	1,764	1,500.38	-43%	-29%	-26%
Wheat	overhead	med	6,500	71,500	44,400	479	10,346	55,225	26,621	16,275	0.59	0.29	20	1,680	1,331.05	-41%	-25%	-23%
Cotton	overhead	high	3,500	82,040	54,713	1,231	10,346	66,290	26,096	15,750	0.47	0.24	278	16,847	93.87	-41%	-25%	-20%
Groundnuts	overhead	high	5,000	83,250	56,363	833	10,346	67,542	26,054	15,708	0.46	0.23	135	8,680	192.99	-38%	-23%	-19%
Marigold	overhead	high	14,000	81,620	56,934	-	10,346	67,280	24,686	14,340	0.43	0.21	136	10,024	181.51	-34%	-20%	-18%
Coffee (USD 1,500mt)	drip line	med	2,000	165,000	121,397	1,097	28,297	150,791	42,506	14,209	0.35	0.09	321	21,713	132.42	-28%	-9%	-9%
Wheat	overhead	low	5,500	60,500	40,965	405	10,346	51,716	19,130	8,784	0.46	0.17	19	1,596	1,006.84	-35%	-16%	-15%
Cotton	overhead	med	3,000	70,320	50,176	1,055	10,346	61,577	19,089	8,743	0.37	0.14	245	14,980	77.91	-34%	-14%	-11%
Groundnuts	overhead	med	4,000	66,600	52,226	666	10,346	63,238	13,708	3,362	0.26	0.05	110	7,112	124.62	-25%	-6%	-5%
Export veg - baby corn	drip line	high	950	49,638	37,674	-	10,275	47,949	11,964	1,689	0.32	0.04	190	13,440	62.97	-24%	-3%	-3%
Cotton	overhead	low	2,500	58,600	47,170	879	10,346	58,395	10,551	205	0.22	0.00	212	13,113	49.77	-23%	0%	0%
Soybeans	overhead	high	3,400	42,500	32,282	285	10,346	42,913	9,933	(413)	0.31	(0.01)	24	2,016	413.88	-26%	1%	1%
Coffee (USD 1,360mt)	drip line	med	2,000	149,600	121,397	1,097	28,297	150,791	27,106	(1,191)	0.22	(0.01)	321	21,713	84.44	-20%	1%	1%
Maize	overhead	high	8,000	46,080	40,349	276	10,346	50,971	5,455	(4,891)	0.13	(0.10)	50	4,200	109.10	-14%	13%	11%
Soybeans	overhead	med	2,900	36,250	30,900	243	10,346	41,489	5,107	(5,239)	0.16	(0.13)	23	1,932	222.04	-16%	16%	15%
Maize	overhead	med	7,000	40,320	37,577	242	10,346	48,165	2,501	(7,845)	0.07	(0.16)	45	3,780	55.58	-8%	24%	20%
Groundnuts	overhead	low	3,000	49,950	47,952	500	10,346	58,798	1,498	(8,848)	0.03	(0.15)	90	5,964	16.64	-4%	21%	18%
Soybeans	overhead	low	2,400	30,000	28,886	201	10,346	39,433	913	(9,433)	0.03	(0.24)	22	1,848	41.50	-3%	35%	32%
Maize	overhead	low	6,000	34,560	33,936	207	10,346	44,489	417	(9,929)	0.01	(0.22)	30	2,520	13.90	-1%	35%	29%
DRYLAND CROPS																		
Tobacco, flue-cured	no	high	2,800	275,660	126,311	22,668	12,186	161,165	126,681	114,495	0.85	0.71	437	33,208	289.89	-55%	-50%	-44%
Tobacco, flue-cured	no	med	2,500	242,000	120,002	20,034	12,186	152,222	101,964	89,778	0.73	0.59	415	31,976	245.70	-51%	-45%	-39%
Tobacco, flue-cured	no	low	2,200	204,490	113,454	17,209	12,186	142,849	73,827	61,641	0.57	0.43	382	30,128	193.26	-44%	-37%	-32%
Cotton	no	high	2,300	51,129	38,137	767	5,841	44,745	12,225	6,384	0.31	0.14	198	12,367	61.74	-31%	-16%	-13%
Groundnuts	no	high	2,800	46,620	34,245	466	5,841	40,552	11,909	6,068	0.34	0.15	83	5,499	143.48	-31%	-16%	-13%
Cotton	no	med	1,900	42,237	33,696	634	5,841	40,171	7,907	2,066	0.23	0.05	172	10,873	45.97	-25%	-6%	-5%
Soybeans	no	high	2,600	32,500	24,816	218	5,841	30,875	7,466	1,625	0.30	0.05	14	1,176	533.29	-25%	-6%	-5%
Groundnuts	no	med	2,300	38,295	31,138	383	5,841	37,362	6,774	933	0.21	0.02	68	4,463	99.62	-21%	-3%	-2%
Maize	no	high	5,500	31,680	27,522	190	5,841	33,553	3,968	(1,873)	0.14	(0.06)	27	2,268	146.96	-16%	8%	6%
Cotton	no	low	1,500	33,345	30,040	500	5,841	36,381	2,805	(3,036)	0.09	(0.08)	145	9,380	19.34	-11%	12%	9%
Soybeans	no	med	2,100	26,250	23,434	176	5,841	29,451	2,640	(3,201)	0.11	(0.11)	13	1,092	203.08	-11%	13%	12%
Groundnuts	no	low	1,800	29,970	27,152	300	5,841	33,293	2,518	(3,323)	0.09	(0.10)	57	3,847	44.18	-10%	13%	11%
Maize	no	med	4,500	25,920	23,564	156	5,841	29,561	2,200	(3,641)	0.09	(0.12)	23	1,932	95.65	-11%	18%	14%
Maize	no	low	3,500	20,160	20,875	121	5,841	26,837	(836)	(6,677)	(0.04)	(0.25)	19	1,596	(44.00)	5%	43%	34%
Soybeans	no	low	1,600	20,000	21,420	134	5,841	27,395	(1,554)	(7,395)	(0.07)	(0.27)	12	1,008	(129.50)	9%	41%	37%

LARGE SCALE COMMERCIAL SECTOR: Irrigated and dryland enterprises sorted by return to total costs (net profit/total production costs).

Return to cash costs measured as gross profit/total cash costs; return to total costs measured as net profit/total production costs (excl. family labour).

For roses, yield is per 1,000 stems and management varies according to marketing arrangement (100% auction sales vs. blended sales for consortium by auction and direct contract).

					Production Costs (ZWD/ha)				Farmer Income (ZWD/ha)				Labour			Sensitivity Indicators		
Activity	Irrigation	Mgt. Level	Yield (kg/ha)	Gross Revenue (ZWD/ha)	Cash required before sale	Cash deductions after sale	Annual investment cost	Total production costs	Gross profit (gr. revenue - cash costs)	Net profit (gr. revenue - total cost)	Return to cash costs	Return to total costs	Hired labour (days)	Wage bill (ZWD/ha)	Gr. profit per day (ZWD/ha)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
IRRIGATED CROPS																		
Paprika	overhead	long	6,000	451,200	172,459	-	16,691	189,150	278,741	262,050	1.62	1.39	310	23,800	899.16	-66%	-62%	-58%
Tobacco, flue-cured	overhead	high	3,500	346,500	145,886	28,431	16,691	191,008	172,183	155,492	0.99	0.81	497	37,268	346.44	-60%	-54%	-47%
Coffee (USD 2,000mt)	drip line	high	2,500	275,000	132,784	1,367	28,297	162,448	140,849	112,552	1.05	0.69	375	24,915	375.60	-55%	-44%	-41%
Tobacco, flue-cured	overhead	med	3,100	301,785	140,504	24,927	16,691	182,122	136,354	119,663	0.82	0.66	482	36,428	282.89	-55%	-48%	-42%
Paprika	overhead	short	3,000	225,600	124,126	-	16,691	140,817	101,474	84,783	0.82	0.60	270	20,720	375.83	-49%	-41%	-38%
Export veg - mange tout	drip line	high	4,000	121,000	68,641	-	10,275	78,916	52,359	42,084	0.76	0.53	295	20,020	177.49	-43%	-35%	-35%
Tobacco, flue-cured	overhead	low	2,800	261,800	135,718	21,979	16,691	174,388	104,103	87,412	0.66	0.50	462	35,308	225.33	-48%	-41%	-35%
Coffee (USD 2,000mt)	drip line	med	2,000	220,000	121,397	1,097	28,297	150,791	97,506	69,209	0.80	0.46	321	21,713	303.76	-48%	-34%	-31%
Roses (long stem)	drip line	blend	1,100	14,467,391	8,002,433	419,554	1,565,291	9,987,278	6,045,404	4,480,113	0.72	0.45	9,360	786,240	645.88	-62%	-46%	-33%
Export veg - baby carrots	drip line	high	3,800	104,500	66,500	-	10,275	76,775	38,000	27,725	0.57	0.36	275	18,900	138.18	-36%	-27%	-27%
Wheat	overhead	high	7,500	82,500	50,439	553	10,346	61,338	31,508	21,162	0.62	0.35	21	1,764	1,500.38	-43%	-29%	-26%
Roses (medium stem)	drip line	blend	1,750	14,228,261	8,796,850	412,620	1,565,291	10,774,761	5,018,791	3,453,500	0.54	0.32	9,360	786,240	536.20	-58%	-40%	-24%
Wheat	overhead	med	6,500	71,500	44,400	479	10,346	55,225	26,621	16,275	0.59	0.29	20	1,680	1,331.05	-41%	-25%	-23%
Coffee (USD 1,500mt)	drip line	high	2,500	206,250	132,784	1,367	28,297	162,448	72,099	43,802	0.54	0.27	375	24,915	192.26	-38%	-23%	-21%
Cotton	overhead	high	3,500	82,040	54,713	1,231	10,346	66,290	26,096	15,750	0.47	0.24	278	16,847	93.87	-41%	-25%	-20%
Roses (long stem)	drip line	auction	1,100	14,467,391	7,752,433	2,387,120	1,565,291	11,704,844	4,327,838	2,762,547	0.43	0.24	9,360	786,240	462.38	-56%	-36%	-24%
Groundnuts	overhead	high	5,000	83,250	56,363	833	10,346	67,542	26,054	15,708	0.46	0.23	135	8,680	192.99	-38%	-23%	-19%
Roses (short stem)	drip line	blend	2,750	13,152,174	8,733,740	381,413	1,565,291	10,680,444	4,037,021	2,471,730	0.44	0.23	9,360	786,240	431.31	-32%	-19%	-20%
Marigold	overhead	high	14,000	81,620	56,934	-	10,346	67,280	24,686	14,340	0.43	0.21	136	10,024	181.51	-34%	-20%	-18%
Wheat	overhead	low	5,500	60,500	40,965	405	10,346	51,716	19,130	8,784	0.46	0.17	19	1,596	1,006.84	-35%	-16%	-15%
Coffee (USD 1,360mt)	drip line	high	2,500	187,000	132,784	1,367	28,297	162,448	52,849	24,552	0.39	0.15	375	24,915	140.93	-31%	-15%	-13%
Cotton	overhead	med	3,000	70,320	50,176	1,055	10,346	61,577	19,089	8,743	0.37	0.14	245	14,980	77.91	-34%	-14%	-11%
Roses (medium stem)	drip line	auction	1,750	14,228,261	8,546,850	2,347,663	1,565,291	12,459,804	3,333,748	1,768,457	0.31	0.14	9,360	786,240	356.17	-50%	-26%	-15%
Coffee (USD 1,500mt)	drip line	med	2,000	165,000	121,397	1,097	28,297	150,791	42,506	14,209	0.35	0.09	321	21,713	132.42	-28%	-9%	-9%
Roses (short stem)	drip line	auction	2,750	13,152,174	8,483,740	2,170,109	1,565,291	12,219,140	2,498,325	933,034	0.23	0.08	9,360	786,240	266.92	-43%	-16%	-10%
Groundnuts	overhead	med	4,000	66,600	52,226	666	10,346	63,238	13,708	3,362	0.26	0.05	110	7,112	124.62	-25%	-6%	-5%
Export veg - baby corn	drip line	high	950	49,638	37,674	-	10,275	47,949	11,964	1,689	0.32	0.04	190	13,440	62.97	-24%	-3%	-3%
Cotton	overhead	low	2,500	58,600	47,170	879	10,346	58,395	10,551	205	0.22	0.00	212	13,113	49.77	-23%	0%	0%
Coffee (USD 1,360mt)	drip line	med	2,000	149,600	121,397	1,097	28,297	150,791	27,106	(1,191)	0.22	(0.01)	321	21,713	84.44	-20%	1%	1%
Soybeans	overhead	high	3,400	42,500	32,282	285	10,346	42,913	9,933	(413)	0.31	(0.01)	24	2,016	413.88	-26%	1%	1%
Maize	overhead	high	8,000	46,080	40,349	276	10,346	50,971	5,455	(4,891)	0.13	(0.10)	50	4,200	109.10	-14%	13%	11%
Soybeans	overhead	med	2,900	36,250	30,900	243	10,346	41,489	5,107	(5,239)	0.16	(0.13)	23	1,932	222.04	-16%	16%	15%
Groundnuts	overhead	low	3,000	49,950	47,952	500	10,346	58,798	1,498	(8,848)	0.03	(0.15)	90	5,964	16.64	-4%	21%	18%
Maize	overhead	med	7,000	40,320	37,577	242	10,346	48,165	2,501	(7,845)	0.07	(0.16)	45	3,780	55.58	-8%	24%	20%
Maize	overhead	low	6,000	34,560	33,936	207	10,346	44,489	417	(9,929)	0.01	(0.22)	30	2,520	13.90	-1%	35%	29%
Soybeans	overhead	low	2,400	30,000	28,886	201	10,346	39,433	913	(9,433)	0.03	(0.24)	22	1,848	41.50	-3%	35%	32%
DRYLAND CROPS																		
Tobacco, flue-cured	no	high	2,800	275,660	126,311	22,668	12,186	161,165	126,681	114,495	0.85	0.71	437	33,208	289.89	-55%	-50%	-44%
Tobacco, flue-cured	no	med	2,500	242,000	120,002	20,034	12,186	152,222	101,964	89,778	0.73	0.59	415	31,976	245.70	-51%	-45%	-39%
Tobacco, flue-cured	no	low	2,200	204,490	113,454	17,209	12,186	142,849	73,827	61,641	0.57	0.43	382	30,128	193.26	-44%	-37%	-32%
Groundnuts	no	high	2,800	46,620	34,245	466	5,841	40,552	11,909	6,068	0.34	0.15	83	5,499	143.48	-31%	-16%	-13%
Cotton	no	high	2,300	51,129	38,137	767	5,841	44,745	12,225	6,384	0.31	0.14	198	12,367	61.74	-31%	-16%	-13%
Soybeans	no	high	2,600	32,500	24,816	218	5,841	30,875	7,466	1,625	0.30	0.05	14	1,176	533.29	-25%	-6%	-5%
Cotton	no	med	1,900	42,237	33,696	634	5,841	40,171	7,907	2,066	0.23	0.05	172	10,873	45.97	-25%	-6%	-5%
Groundnuts	no	med	2,300	38,295	31,138	383	5,841	37,362	6,774	933	0.21	0.02	68	4,463	99.62	-21%	-3%	-2%
Maize	no	high	5,500	31,680	27,522	190	5,841	33,553	3,968	(1,873)	0.14	(0.06)	27	2,268	146.96	-16%	8%	6%
Cotton	no	low	1,500	33,345	30,040	500	5,841	36,381	2,805	(3,036)	0.09	(0.08)	145	9,380	19.34	-11%	12%	9%
Groundnuts	no	low	1,800	29,970	27,152	300	5,841	33,293	2,518	(3,323)	0.09	(0.10)	57	3,847	44.18	-10%	13%	11%
Soybeans	no	med	2,100	26,250	23,434	176	5,841	29,451	2,640	(3,201)	0.11	(0.11)	13	1,092	203.08	-11%	13%	12%
Maize	no	med	4,500	25,920	23,564	156	5,841	29,561	2,200	(3,641)	0.09	(0.12)	23	1,932	95.65	-11%	18%	14%
Maize	no	low	3,500	20,160	20,875	121	5,841	26,837	(836)	(6,677)	(0.04)	(0.25)	19	1,596	(44.00)	5%	43%	34%
Soybeans	no	low	1,600	20,000	21,420	134	5,841	27,395	(1,554)	(7,395)	(0.07)	(0.27)	12	1,008	(129.50)	9%	41%	37%

LARGE SCALE COMMERCIAL SECTOR: Enterprises sorted by management level and total production cost.

Return to cash costs measured as gross profit/total cash costs; return to total costs measured as net profit/total production costs (excl. family labour).

For roses, yield is per 1,000 stems and management varies according to marketing arrangement (100% auction sales vs. blended sales for consortium by auction and direct contract).

					Production Costs (ZWD/ha)				Farmer Income (ZWD/ha)				Labour			Sensitivity Indicators		
Activity	**Irrigation**	**Mgt. Level**	**Yield (kg/ha)**	**Gross Revenue (ZWD/ha)**	Cash required before sale	Cash deductions after sale	Annual investment cost	Total production costs	Gross profit (gr. revenue - cash costs)	Net profit (gr. revenue - total cost)	Return to cash costs	Return to total costs	Hired labour (days)	Wage bill (ZWD/ha)	Gr. profit per day (ZWD/ha)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
LOW MANAGEMENT																		
Tobacco, flue-cured	overhead	low	2,800	261,800	135,718	21,979	16,691	174,388	104,103	87,412	0.66	0.50	462	35,308	225.33	-48%	-41%	-35%
Tobacco, flue-cured	no	low	2,200	204,490	113,454	17,209	12,186	142,849	73,827	61,641	0.57	0.43	382	30,128	193.26	-44%	-37%	-32%
Groundnuts	overhead	low	3,000	49,950	47,952	500	10,346	58,798	1,498	(8,848)	0.03	(0.15)	90	5,964	16.64	-4%	21%	18%
Cotton	overhead	low	2,500	58,600	47,170	879	10,346	58,395	10,551	205	0.22	0.00	212	13,113	49.77	-23%	0%	0%
Wheat	overhead	low	5,500	60,500	40,965	405	10,346	51,716	19,130	8,784	0.46	0.17	19	1,596	1,006.84	-35%	-16%	-15%
Maize	overhead	low	6,000	34,560	33,936	207	10,346	44,489	417	(9,929)	0.01	(0.22)	30	2,520	13.90	-1%	35%	29%
Soybeans	overhead	low	2,400	30,000	28,886	201	10,346	39,433	913	(9,433)	0.03	(0.24)	22	1,848	41.50	-3%	35%	32%
Cotton	no	low	1,500	33,345	30,040	500	5,841	36,381	2,805	(3,036)	0.09	(0.08)	145	9,380	19.34	-11%	12%	9%
Groundnuts	no	low	1,800	29,970	27,152	300	5,841	33,293	2,518	(3,323)	0.09	(0.10)	57	3,847	44.18	-10%	13%	11%
Soybeans	no	low	1,600	20,000	21,420	134	5,841	27,395	(1,554)	(7,395)	(0.07)	(0.27)	12	1,008	(129.50)	9%	41%	37%
Maize	no	low	3,500	20,160	20,875	121	5,841	26,837	(836)	(6,677)	(0.04)	(0.25)	19	1,596	(44.00)	5%	43%	34%
MEDIUM MANAGEMENT																		
Tobacco, flue-cured	overhead	med	3,100	301,785	140,504	24,927	16,691	182,122	136,354	119,663	0.82	0.66	482	36,428	282.89	-55%	-48%	-42%
Tobacco, flue-cured	no	med	2,500	242,000	120,002	20,034	12,186	152,222	101,964	89,778	0.73	0.59	415	31,976	245.70	-51%	-45%	-39%
Coffee (USD 2,000mt)	drip line	med	2,000	220,000	121,397	1,097	28,297	150,791	97,506	69,209	0.80	0.46	321	21,713	303.76	-48%	-34%	-31%
Coffee (USD 1,500mt)	drip line	med	2,000	165,000	121,397	1,097	28,297	150,791	42,506	14,209	0.35	0.09	321	21,713	132.42	-28%	-9%	-9%
Coffee (USD 1,360mt)	drip line	med	2,000	149,600	121,397	1,097	28,297	150,791	27,106	(1,191)	0.22	(0.01)	321	21,713	84.44	-20%	1%	1%
Paprika	overhead	short	3,000	225,600	124,126	-	16,691	140,817	101,474	84,783	0.82	0.60	270	20,720	375.83	-49%	-41%	-38%
Groundnuts	overhead	med	4,000	66,600	52,226	666	10,346	63,238	13,708	3,362	0.26	0.05	110	7,112	124.62	-25%	-6%	-5%
Cotton	overhead	med	3,000	70,320	50,176	1,055	10,346	61,577	19,089	8,743	0.37	0.14	245	14,980	77.91	-34%	-14%	-11%
Wheat	overhead	med	6,500	71,500	44,400	479	10,346	55,225	26,621	16,275	0.59	0.29	20	1,680	1,331.05	-41%	-25%	-23%
Maize	overhead	med	7,000	40,320	37,577	242	10,346	48,165	2,501	(7,845)	0.07	(0.16)	45	3,780	55.58	-8%	24%	20%
Soybeans	overhead	med	2,900	36,250	30,900	243	10,346	41,489	5,107	(5,239)	0.16	(0.13)	23	1,932	222.04	-16%	16%	15%
Cotton	no	med	1,900	42,237	33,696	634	5,841	40,171	7,907	2,066	0.23	0.05	172	10,873	45.97	-25%	-6%	-5%
Groundnuts	no	med	2,300	38,295	31,138	383	5,841	37,362	6,774	933	0.21	0.02	68	4,463	99.62	-21%	-3%	-2%
Maize	no	med	4,500	25,920	23,564	156	5,841	29,561	2,200	(3,641)	0.09	(0.12)	23	1,932	95.65	-11%	18%	14%
Soybeans	no	med	2,100	26,250	23,434	176	5,841	29,451	2,640	(3,201)	0.11	(0.11)	13	1,092	203.08	-11%	13%	12%
HIGH MANAGEMENT																		
Tobacco, flue-cured	overhead	high	3,500	346,500	145,886	28,431	16,691	191,008	172,183	155,492	0.99	0.81	497	37,268	346.44	-60%	-54%	-47%
Paprika	overhead	long	6,000	451,200	172,459	-	16,691	189,150	278,741	262,050	1.62	1.39	310	23,800	899.16	-66%	-62%	-58%
Coffee (USD 2,000mt)	drip line	high	2,500	275,000	132,784	1,367	28,297	162,448	140,849	112,552	1.05	0.69	375	24,915	375.60	-55%	-44%	-41%
Coffee (USD 1,500mt)	drip line	high	2,500	206,250	132,784	1,367	28,297	162,448	72,099	43,802	0.54	0.27	375	24,915	192.26	-38%	-23%	-21%
Coffee (USD 1,360mt)	drip line	high	2,500	187,000	132,784	1,367	28,297	162,448	52,849	24,552	0.39	0.15	375	24,915	140.93	-31%	-15%	-13%
Tobacco, flue-cured	no	high	2,800	275,660	126,311	22,668	12,186	161,165	126,681	114,495	0.85	0.71	437	33,208	289.89	-55%	-50%	-44%
Export veg - mange tout	drip line	high	4,000	121,000	68,641	-	10,275	78,916	52,359	42,084	0.76	0.53	295	20,020	177.49	-43%	-35%	-35%
Export veg - baby carrots	drip line	high	3,800	104,500	66,500	-	10,275	76,775	38,000	27,725	0.57	0.36	275	18,900	138.18	-36%	-27%	-27%
Groundnuts	overhead	high	5,000	83,250	56,363	833	10,346	67,542	26,054	15,708	0.46	0.23	135	8,680	192.99	-38%	-23%	-19%
Marigold	overhead	high	14,000	81,620	56,934	-	10,346	67,280	24,686	14,340	0.43	0.21	136	10,024	181.51	-34%	-20%	-18%
Cotton	overhead	high	3,500	82,040	54,713	1,231	10,346	66,290	26,096	15,750	0.47	0.24	278	16,847	93.87	-41%	-25%	-20%
Wheat	overhead	high	7,500	82,500	50,439	553	10,346	61,338	31,508	21,162	0.62	0.35	21	1,764	1,500.38	-43%	-29%	-26%
Maize	overhead	high	8,000	46,080	40,349	276	10,346	50,971	5,455	(4,891)	0.13	(0.10)	50	4,200	109.10	-14%	13%	11%
Export veg - baby corn	drip line	high	950	49,638	37,674	-	10,275	47,949	11,964	1,689	0.32	0.04	190	13,440	62.97	-24%	-3%	-3%
Cotton	no	high	2,300	51,129	38,137	767	5,841	44,745	12,225	6,384	0.31	0.14	198	12,367	61.74	-31%	-16%	-13%
Soybeans	overhead	high	3,400	42,500	32,282	285	10,346	42,913	9,933	(413)	0.31	(0.01)	24	2,016	413.88	-26%	1%	1%
Groundnuts	no	high	2,800	46,620	34,245	466	5,841	40,552	11,909	6,068	0.34	0.15	83	5,499	143.48	-31%	-16%	-13%
Maize	no	high	5,500	31,680	27,522	190	5,841	33,553	3,968	(1,873)	0.14	(0.06)	27	2,268	146.96	-16%	8%	6%
Soybeans	no	high	2,600	32,500	24,816	218	5,841	30,875	7,466	1,625	0.30	0.05	14	1,176	533.29	-25%	-6%	-5%
EXPORT ROSES																		
Roses (medium stem)	drip line	auction	1,750	14,228,261	8,546,850	2,347,663	1,565,291	12,459,804	3,333,748	1,768,457	0.31	0.14	9,360	786,240	356.17	-50%	-26%	-15%
Roses (short stem)	drip line	auction	2,750	13,152,174	8,483,740	2,170,109	1,565,291	12,219,140	2,498,325	933,034	0.23	0.08	9,360	786,240	266.92	-43%	-16%	-10%
Roses (long stem)	drip line	auction	1,100	14,467,391	7,752,433	2,387,120	1,565,291	11,704,844	4,327,838	2,762,547	0.43	0.24	9,360	786,240	462.38	-56%	-36%	-24%
Roses (medium stem)	drip line	blend	1,750	14,228,261	8,796,850	412,620	1,565,291	10,774,761	5,018,791	3,453,500	0.54	0.32	9,360	786,240	536.20	-58%	-40%	-24%
Roses (short stem)	drip line	blend	2,750	13,152,174	8,733,740	381,413	1,565,291	10,680,444	4,037,021	2,471,730	0.44	0.23	9,360	786,240	431.31	-32%	-19%	-20%
Roses (long stem)	drip line	blend	1,100	14,467,391	8,002,433	419,554	1,565,291	9,987,278	6,045,404	4,480,113	0.72	0.45	9,360	786,240	645.88	-62%	-46%	-33%

LARGE SCALE COMMERCIAL SECTOR: Enterprises sorted by management level and net profit.

Return to cash costs measured as gross profit/total cash costs; return to total costs measured as net profit/total production costs (excl. family labour).

For roses, yield is per 1,000 stems and management varies according to marketing arrangement (100% auction sales vs. blended sales for consortium by auction and direct contract).

					Production Costs (ZWD/ha)				Farmer Income (ZWD/ha)				Labour			Sensitivity Indicators		
Activity	**Irrigation**	**Mgt. Level**	**Yield (kg/ha)**	**Gross Revenue (ZWD/ha)**	Cash required before sale	Cash deductions after sale	Annual investment cost	Total production costs	Gross profit (gr. revenue - cash costs)	Net profit (gr. revenue - total cost)	Return to cash costs	Return to total costs	Hired labour (days)	Wage bill (ZWD/ha)	Gr. profit per day (ZWD/ha)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
LOW MANAGEMENT																		
Tobacco, flue-cured	overhead	low	2,800	261,800	135,718	21,979	16,691	174,388	104,103	87,412	0.66	0.50	462	35,308	225.33	-48%	-41%	-35%
Tobacco, flue-cured	no	low	2,200	204,490	113,454	17,209	12,186	142,849	73,827	61,641	0.57	0.43	382	30,128	193.26	-44%	-37%	-32%
Wheat	overhead	low	5,500	60,500	40,965	405	10,346	51,716	19,130	8,784	0.46	0.17	19	1,596	1,006.84	-35%	-16%	-15%
Cotton	overhead	low	2,500	58,600	47,170	879	10,346	58,395	10,551	205	0.22	0.00	212	13,113	49.77	-23%	0%	0%
Cotton	no	low	1,500	33,345	30,040	500	5,841	36,381	2,805	(3,036)	0.09	(0.08)	145	9,380	19.34	-11%	12%	9%
Groundnuts	no	low	1,800	29,970	27,152	300	5,841	33,293	2,518	(3,323)	0.09	(0.10)	57	3,847	44.18	-10%	13%	11%
Maize	no	low	3,500	20,160	20,875	121	5,841	26,837	(836)	(6,677)	(0.04)	(0.25)	19	1,596	(44.00)	5%	43%	34%
Soybeans	no	low	1,600	20,000	21,420	134	5,841	27,395	(1,554)	(7,395)	(0.07)	(0.27)	12	1,008	(129.50)	9%	41%	37%
Groundnuts	overhead	low	3,000	49,950	47,952	500	10,346	58,798	1,498	(8,848)	0.03	(0.15)	90	5,964	16.64	-4%	21%	18%
Soybeans	overhead	low	2,400	30,000	28,886	201	10,346	39,433	913	(9,433)	0.03	(0.24)	22	1,848	41.50	-3%	35%	32%
Maize	overhead	low	6,000	34,560	33,936	207	10,346	44,489	417	(9,929)	0.01	(0.22)	30	2,520	13.90	-1%	35%	29%
MEDIUM MANAGEMENT																		
Tobacco, flue-cured	overhead	med	3,100	301,785	140,504	24,927	16,691	182,122	136,354	119,663	0.82	0.66	482	36,428	282.89	-55%	-48%	-42%
Tobacco, flue-cured	no	med	2,500	242,000	120,002	20,034	12,186	152,222	101,964	89,778	0.73	0.59	415	31,976	245.70	-51%	-45%	-39%
Paprika	overhead	short	3,000	225,600	124,126	-	16,691	140,817	101,474	84,783	0.82	0.60	270	20,720	375.83	-49%	-41%	-38%
Coffee (USD 2,000mt)	drip line	med	2,000	220,000	121,397	1,097	28,297	150,791	97,506	69,209	0.80	0.46	321	21,713	303.76	-48%	-34%	-31%
Wheat	overhead	med	6,500	71,500	44,400	479	10,346	55,225	26,621	16,275	0.59	0.29	20	1,680	1,331.05	-41%	-25%	-23%
Coffee (USD 1,500mt)	drip line	med	2,000	165,000	121,397	1,097	28,297	150,791	42,506	14,209	0.35	0.09	321	21,713	132.42	-28%	-9%	-9%
Cotton	overhead	med	3,000	70,320	50,176	1,055	10,346	61,577	19,089	8,743	0.37	0.14	245	14,980	77.91	-34%	-14%	-11%
Groundnuts	overhead	med	4,000	66,600	52,226	666	10,346	63,238	13,708	3,362	0.26	0.05	110	7,112	124.62	-25%	-6%	-5%
Cotton	no	med	1,900	42,237	33,696	634	5,841	40,171	7,907	2,066	0.23	0.05	172	10,873	45.97	-25%	-6%	-5%
Groundnuts	no	med	2,300	38,295	31,138	383	5,841	37,362	6,774	933	0.21	0.02	68	4,463	99.62	-21%	-3%	-2%
Coffee (USD 1,360mt)	drip line	med	2,000	149,600	121,397	1,097	28,297	150,791	27,106	(1,191)	0.22	(0.01)	321	21,713	84.44	-20%	1%	1%
Soybeans	no	med	2,100	26,250	23,434	176	5,841	29,451	2,640	(3,201)	0.11	(0.11)	13	1,092	203.08	-11%	13%	12%
Maize	no	med	4,500	25,920	23,564	156	5,841	29,561	2,200	(3,641)	0.09	(0.12)	23	1,932	95.65	-11%	18%	14%
Soybeans	overhead	med	2,900	36,250	30,900	243	10,346	41,489	5,107	(5,239)	0.16	(0.13)	23	1,932	222.04	-16%	16%	15%
Maize	overhead	med	7,000	40,320	37,577	242	10,346	48,165	2,501	(7,845)	0.07	(0.16)	45	3,780	55.58	-8%	24%	20%
HIGH MANAGEMENT																		
Paprika	overhead	long	6,000	451,200	172,459	-	16,691	189,150	278,741	262,050	1.62	1.39	310	23,800	899.16	-66%	-62%	-58%
Tobacco, flue-cured	overhead	high	3,500	346,500	145,886	28,431	16,691	191,008	172,183	155,492	0.99	0.81	497	37,268	346.44	-60%	-54%	-47%
Tobacco, flue-cured	no	high	2,800	275,660	126,311	22,668	12,186	161,165	126,681	114,495	0.85	0.71	437	33,208	289.89	-55%	-50%	-44%
Coffee (USD 2,000mt)	drip line	high	2,500	275,000	132,784	1,367	28,297	162,448	140,849	112,552	1.05	0.69	375	24,915	375.60	-55%	-44%	-41%
Coffee (USD 1,500mt)	drip line	high	2,500	206,250	132,784	1,367	28,297	162,448	72,099	43,802	0.54	0.27	375	24,915	192.26	-38%	-23%	-21%
Export veg - mange tout	drip line	high	4,000	121,000	68,641	-	10,275	78,916	52,359	42,084	0.76	0.53	295	20,020	177.49	-43%	-35%	-35%
Export veg - baby carrots	drip line	high	3,800	104,500	66,500	-	10,275	76,775	38,000	27,725	0.57	0.36	275	18,900	138.18	-36%	-27%	-27%
Coffee (USD 1,360mt)	drip line	high	2,500	187,000	132,784	1,367	28,297	162,448	52,849	24,552	0.39	0.15	375	24,915	140.93	-31%	-15%	-13%
Wheat	overhead	high	7,500	82,500	50,439	553	10,346	61,338	31,508	21,162	0.62	0.35	21	1,764	1,500.38	-43%	-29%	-26%
Cotton	overhead	high	3,500	82,040	54,713	1,231	10,346	66,290	26,096	15,750	0.47	0.24	278	16,847	93.87	-41%	-25%	-20%
Groundnuts	overhead	high	5,000	83,250	56,363	833	10,346	67,542	26,054	15,708	0.46	0.23	135	8,680	192.99	-38%	-23%	-19%
Marigold	overhead	high	14,000	81,620	56,934	-	10,346	67,280	24,686	14,340	0.43	0.21	136	10,024	181.51	-34%	-20%	-18%
Cotton	no	high	2,300	51,129	38,137	767	5,841	44,745	12,225	6,384	0.31	0.14	198	12,367	61.74	-31%	-16%	-13%
Groundnuts	no	high	2,800	46,620	34,245	466	5,841	40,552	11,909	6,068	0.34	0.15	83	5,499	143.48	-31%	-16%	-13%
Export veg - baby corn	drip line	high	950	49,638	37,674	-	10,275	47,949	11,964	1,689	0.32	0.04	190	13,440	62.97	-24%	-3%	-3%
Soybeans	no	high	2,600	32,500	24,816	218	5,841	30,875	7,466	1,625	0.30	0.05	14	1,176	533.29	-25%	-6%	-5%
Soybeans	overhead	high	3,400	42,500	32,282	285	10,346	42,913	9,933	(413)	0.31	(0.01)	24	2,016	413.88	-26%	1%	1%
Maize	no	high	5,500	31,680	27,522	190	5,841	33,553	3,968	(1,873)	0.14	(0.06)	27	2,268	146.96	-16%	8%	6%
Maize	overhead	high	8,000	46,080	40,349	276	10,346	50,971	5,455	(4,891)	0.13	(0.10)	50	4,200	109.10	-14%	13%	11%
EXPORT ROSES																		
Roses (long stem)	drip line	blend	1,100	14,467,391	8,002,433	419,554	1,565,291	9,987,278	6,045,404	4,480,113	0.72	0.45	9,360	786,240	645.88	-62%	-46%	-33%
Roses (medium stem)	drip line	blend	1,750	14,228,261	8,796,850	412,620	1,565,291	10,774,761	5,018,791	3,453,500	0.54	0.32	9,360	786,240	536.20	-58%	-40%	-24%
Roses (long stem)	drip line	auction	1,100	14,467,391	7,752,433	2,387,120	1,565,291	11,704,844	4,327,838	2,762,547	0.43	0.24	9,360	786,240	462.38	-56%	-36%	-24%
Roses (short stem)	drip line	blend	2,750	13,152,174	8,733,740	381,413	1,565,291	10,680,444	4,037,021	2,471,730	0.44	0.23	9,360	786,240	431.31	-32%	-19%	-20%
Roses (medium stem)	drip line	auction	1,750	14,228,261	8,546,850	2,347,663	1,565,291	12,459,804	3,333,748	1,768,457	0.31	0.14	9,360	786,240	356.17	-50%	-26%	-15%
Roses (short stem)	drip line	auction	2,750	13,152,174	8,483,740	2,170,109	1,565,291	12,219,140	2,498,325	933,034	0.23	0.08	9,360	786,240	266.92	-43%	-16%	-10%

LARGE SCALE COMMERCIAL SECTOR: Enterprises sorted by management level and return to total costs (net profit/total production costs).

Return to cash costs measured as gross profit/total cash costs; return to total costs measured as net profit/total production costs (excl. family labour).

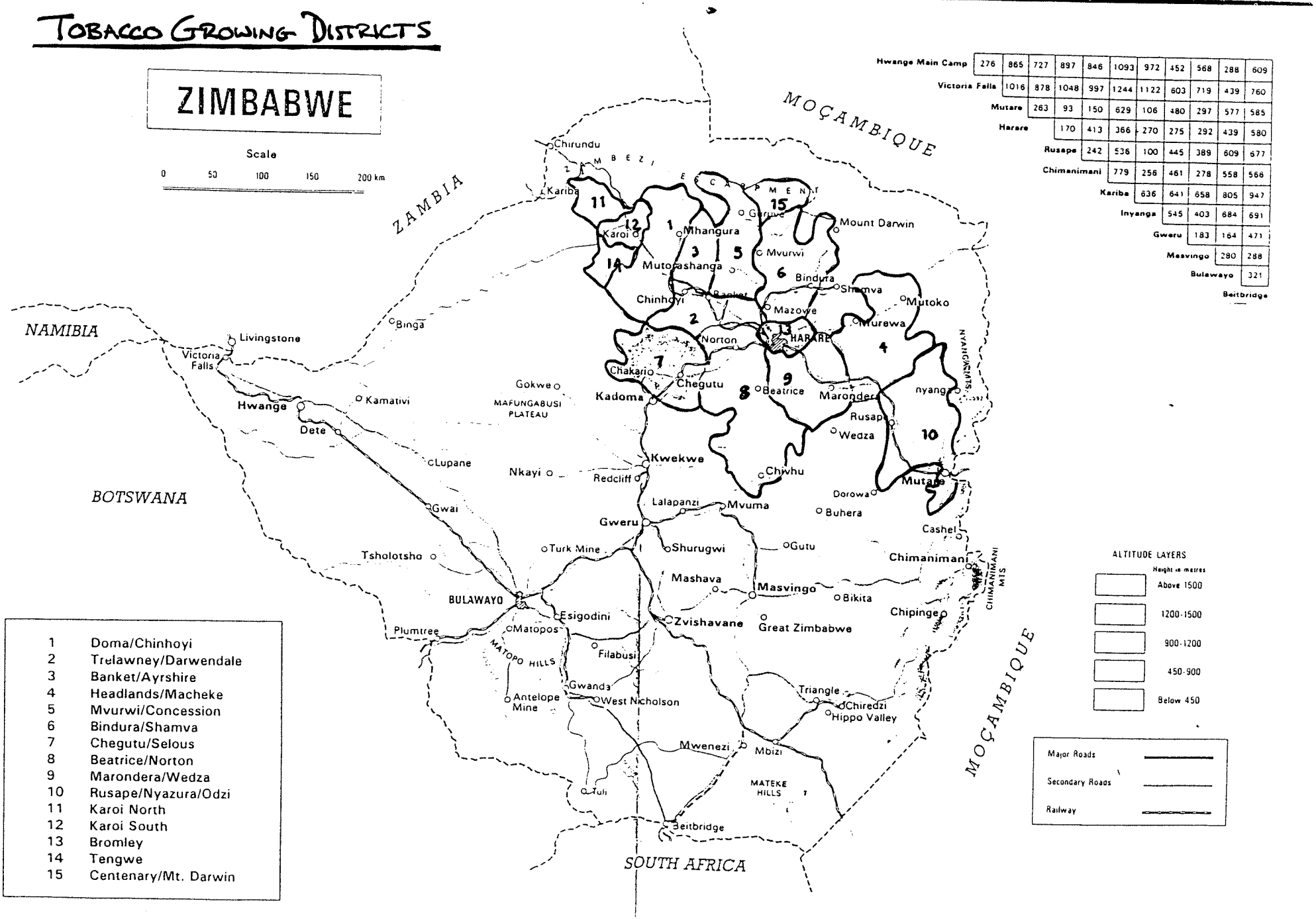
For roses, yield is per 1,000 stems and management varies according to marketing arrangement (100% auction sales vs. blended sales for consortium by auction and direct contract).

					Production Costs (ZWD/ha)				Farmer Income (ZWD/ha)				Labour			Sensitivity Indicators		
Activity	**Irrigation**	**Mgt. Level**	**Yield (kg/ha)**	**Gross Revenue (ZWD/ha)**	Cash required before sale	Cash deductions after sale	Annual investment cost	Total production costs	Gross profit (gr. revenue - cash costs)	Net profit (gr. revenue - total cost)	Return to cash costs	Return to total costs	Hired labour (days)	Wage bill (ZWD/ha)	Gr. profit per day (ZWD/ha)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
LOW MANAGEMENT																		
Tobacco, flue-cured	overhead	low	2,800	261,800	135,718	21,979	16,691	174,388	104,103	87,412	0.66	0.50	462	35,308	225.33	-48%	-41%	-35%
Tobacco, flue-cured	no	low	2,200	204,490	113,454	17,209	12,186	142,849	73,827	61,641	0.57	0.43	382	30,128	193.26	-44%	-37%	-32%
Wheat	overhead	low	5,500	60,500	40,965	405	10,346	51,716	19,130	8,784	0.46	0.17	19	1,596	1,006.84	-35%	-16%	-15%
Cotton	overhead	low	2,500	58,600	47,170	879	10,346	58,395	10,551	205	0.22	0.00	212	13,113	49.77	-23%	0%	0%
Cotton	no	low	1,500	33,345	30,040	500	5,841	36,381	2,805	(3,036)	0.09	(0.08)	145	9,380	19.34	-11%	12%	9%
Groundnuts	no	low	1,800	29,970	27,152	300	5,841	33,293	2,518	(3,323)	0.09	(0.10)	57	3,847	44.18	-10%	13%	11%
Groundnuts	overhead	low	3,000	49,950	47,952	500	10,346	58,798	1,498	(8,848)	0.03	(0.15)	90	5,964	16.64	-4%	21%	18%
Maize	overhead	low	6,000	34,560	33,936	207	10,346	44,489	417	(9,929)	0.01	(0.22)	30	2,520	13.90	-1%	35%	29%
Soybeans	overhead	low	2,400	30,000	28,886	201	10,346	39,433	913	(9,433)	0.03	(0.24)	22	1,848	41.50	-3%	35%	32%
Maize	no	low	3,500	20,160	20,875	121	5,841	26,837	(836)	(6,677)	(0.04)	(0.25)	19	1,596	(44.00)	5%	43%	34%
Soybeans	no	low	1,600	20,000	21,420	134	5,841	27,395	(1,554)	(7,395)	(0.07)	(0.27)	12	1,008	(129.50)	9%	41%	37%
MEDIUM MANAGEMENT																		
Tobacco, flue-cured	overhead	med	3,100	301,785	140,504	24,927	16,691	182,122	136,354	119,663	0.82	0.66	482	36,428	282.89	-55%	-48%	-42%
Paprika	overhead	short	3,000	225,600	124,126	-	16,691	140,817	101,474	84,783	0.82	0.60	270	20,720	375.83	-49%	-41%	-38%
Tobacco, flue-cured	no	med	2,500	242,000	120,002	20,034	12,186	152,222	101,964	89,778	0.73	0.59	415	31,976	245.70	-51%	-45%	-39%
Coffee (USD 2,000mt)	drip line	med	2,000	220,000	121,397	1,097	28,297	150,791	97,506	69,209	0.80	0.46	321	21,713	303.76	-48%	-34%	-31%
Wheat	overhead	med	6,500	71,500	44,400	479	10,346	55,225	26,621	16,275	0.59	0.29	20	1,680	1,331.05	-41%	-25%	-23%
Cotton	overhead	med	3,000	70,320	50,176	1,055	10,346	61,577	19,089	8,743	0.37	0.14	245	14,980	77.91	-34%	-14%	-11%
Coffee (USD 1,500mt)	drip line	med	2,000	165,000	121,397	1,097	28,297	150,791	42,506	14,209	0.35	0.09	321	21,713	132.42	-28%	-9%	-9%
Groundnuts	overhead	med	4,000	66,600	52,226	666	10,346	63,238	13,708	3,362	0.26	0.05	110	7,112	124.62	-25%	-6%	-5%
Cotton	no	med	1,900	42,237	33,696	634	5,841	40,171	7,907	2,066	0.23	0.05	172	10,873	45.97	-25%	-6%	-5%
Groundnuts	no	med	2,300	38,295	31,138	383	5,841	37,362	6,774	933	0.21	0.02	68	4,463	99.62	-21%	-3%	-2%
Coffee (USD 1,360mt)	drip line	med	2,000	149,600	121,397	1,097	28,297	150,791	27,106	(1,191)	0.22	(0.01)	321	21,713	84.44	-20%	1%	1%
Soybeans	no	med	2,100	26,250	23,434	176	5,841	29,451	2,640	(3,201)	0.11	(0.11)	13	1,092	203.08	-11%	13%	12%
Maize	no	med	4,500	25,920	23,564	156	5,841	29,561	2,200	(3,641)	0.09	(0.12)	23	1,932	95.65	-11%	18%	14%
Soybeans	overhead	med	2,900	36,250	30,900	243	10,346	41,489	5,107	(5,239)	0.16	(0.13)	23	1,932	222.04	-16%	16%	15%
Maize	overhead	med	7,000	40,320	37,577	242	10,346	48,165	2,501	(7,845)	0.07	(0.16)	45	3,780	55.58	-8%	24%	20%
HIGH MANAGEMENT																		
Paprika	overhead	long	6,000	451,200	172,459	-	16,691	189,150	278,741	262,050	1.62	1.39	310	23,800	899.16	-66%	-62%	-58%
Tobacco, flue-cured	overhead	high	3,500	346,500	145,886	28,431	16,691	191,008	172,183	155,492	0.99	0.81	497	37,268	346.44	-60%	-54%	-47%
Tobacco, flue-cured	no	high	2,800	275,660	126,311	22,668	12,186	161,165	126,681	114,495	0.85	0.71	437	33,208	289.89	-55%	-50%	-44%
Coffee (USD 2,000mt)	drip line	high	2,500	275,000	132,784	1,367	28,297	162,448	140,849	112,552	1.05	0.69	375	24,915	375.60	-55%	-44%	-41%
Export veg - mange tout	drip line	high	4,000	121,000	68,641	-	10,275	78,916	52,359	42,084	0.76	0.53	295	20,020	177.49	-43%	-35%	-35%
Export veg - baby carrots	drip line	high	3,800	104,500	66,500	-	10,275	76,775	38,000	27,725	0.57	0.36	275	18,900	138.18	-36%	-27%	-27%
Wheat	overhead	high	7,500	82,500	50,439	553	10,346	61,338	31,508	21,162	0.62	0.35	21	1,764	1,500.38	-43%	-29%	-26%
Coffee (USD 1,500mt)	drip line	high	2,500	206,250	132,784	1,367	28,297	162,448	72,099	43,802	0.54	0.27	375	24,915	192.26	-38%	-23%	-21%
Cotton	overhead	high	3,500	82,040	54,713	1,231	10,346	66,290	26,096	15,750	0.47	0.24	278	16,847	93.87	-41%	-25%	-20%
Groundnuts	overhead	high	5,000	83,250	56,363	833	10,346	67,542	26,054	15,708	0.46	0.23	135	8,680	192.99	-38%	-23%	-19%
Marigold	overhead	high	14,000	81,620	56,934	-	10,346	67,280	24,686	14,340	0.43	0.21	136	10,024	181.51	-34%	-20%	-18%
Coffee (USD 1,360mt)	drip line	high	2,500	187,000	132,784	1,367	28,297	162,448	52,849	24,552	0.39	0.15	375	24,915	140.93	-31%	-15%	-13%
Groundnuts	no	high	2,800	46,620	34,245	466	5,841	40,552	11,909	6,068	0.34	0.15	83	5,499	143.48	-31%	-16%	-13%
Cotton	no	high	2,300	51,129	38,137	767	5,841	44,745	12,225	6,384	0.31	0.14	198	12,367	61.74	-31%	-16%	-13%
Soybeans	no	high	2,600	32,500	24,816	218	5,841	30,875	7,466	1,625	0.30	0.05	14	1,176	533.29	-25%	-6%	-5%
Export veg - baby corn	drip line	high	950	49,638	37,674	-	10,275	47,949	11,964	1,689	0.32	0.04	190	13,440	62.97	-24%	-3%	-3%
Soybeans	overhead	high	3,400	42,500	32,282	285	10,346	42,913	9,933	(413)	0.31	(0.01)	24	2,016	413.88	-26%	1%	1%
Maize	no	high	5,500	31,680	27,522	190	5,841	33,553	3,968	(1,873)	0.14	(0.06)	27	2,268	146.96	-16%	8%	6%
Maize	overhead	high	8,000	46,080	40,349	276	10,346	50,971	5,455	(4,891)	0.13	(0.10)	50	4,200	109.10	-14%	13%	11%
EXPORT ROSES																		
Roses (long stem)	drip line	blend	1,100	14,467,391	8,002,433	419,554	1,565,291	9,987,278	6,045,404	4,480,113	0.72	0.45	9,360	786,240	645.88	-62%	-46%	-33%
Roses (medium stem)	drip line	blend	1,750	14,228,261	8,796,850	412,620	1,565,291	10,774,761	5,018,791	3,453,500	0.54	0.32	9,360	786,240	536.20	-58%	-40%	-24%
Roses (long stem)	drip line	auction	1,100	14,467,391	7,752,433	2,387,120	1,565,291	11,704,844	4,327,838	2,762,547	0.43	0.24	9,360	786,240	462.38	-56%	-36%	-24%
Roses (short stem)	drip line	blend	2,750	13,152,174	8,733,740	381,413	1,565,291	10,680,444	4,037,021	2,471,730	0.44	0.23	9,360	786,240	431.31	-32%	-19%	-20%
Roses (medium stem)	drip line	auction	1,750	14,228,261	8,546,850	2,347,663	1,565,291	12,459,804	3,333,748	1,768,457	0.31	0.14	9,360	786,240	356.17	-50%	-26%	-15%
Roses (short stem)	drip line	auction	2,750	13,152,174	8,483,740	2,170,109	1,565,291	12,219,140	2,498,325	933,034	0.23	0.08	9,360	786,240	266.92	-43%	-16%	-10%

APPENDIX 1

MAP SECTION

TOBACCO GROWING DISTRICTS

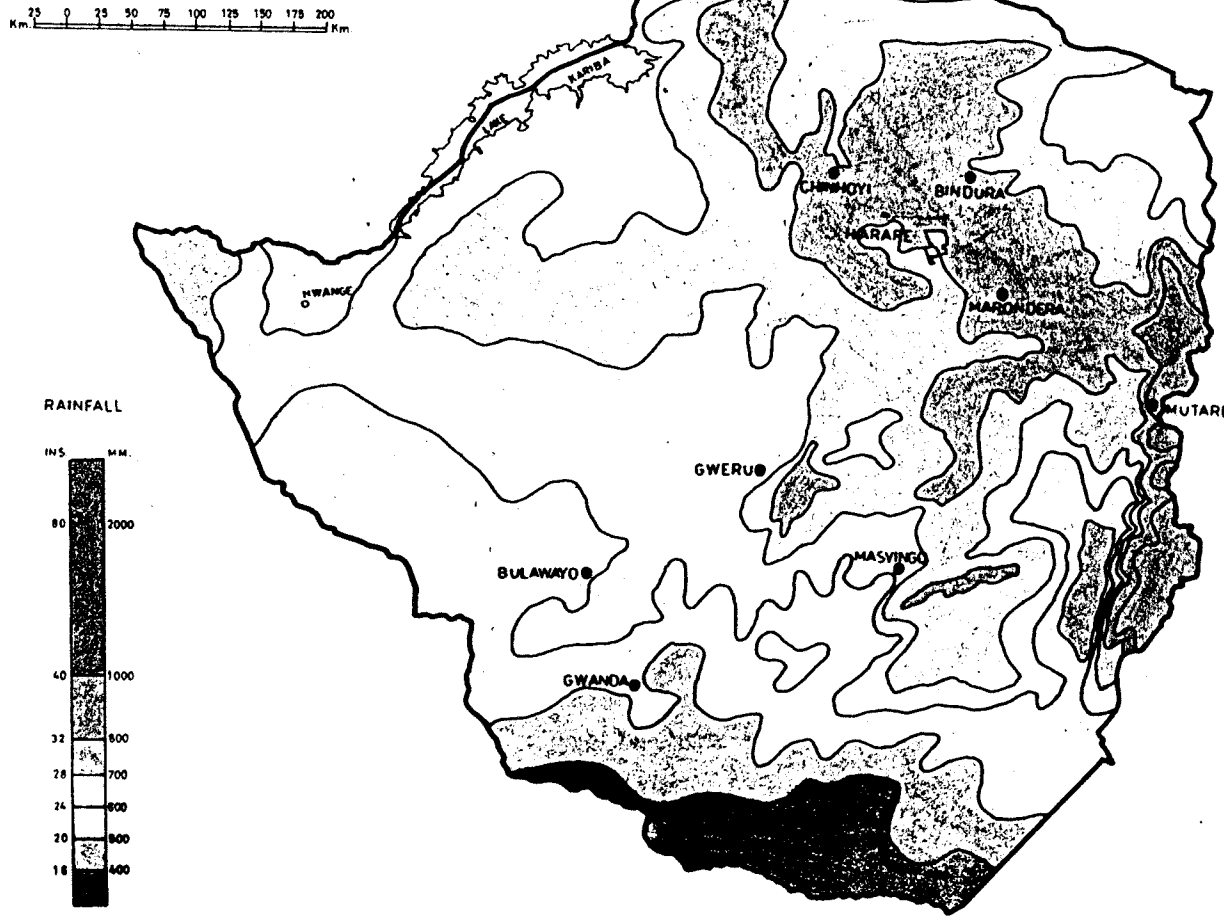


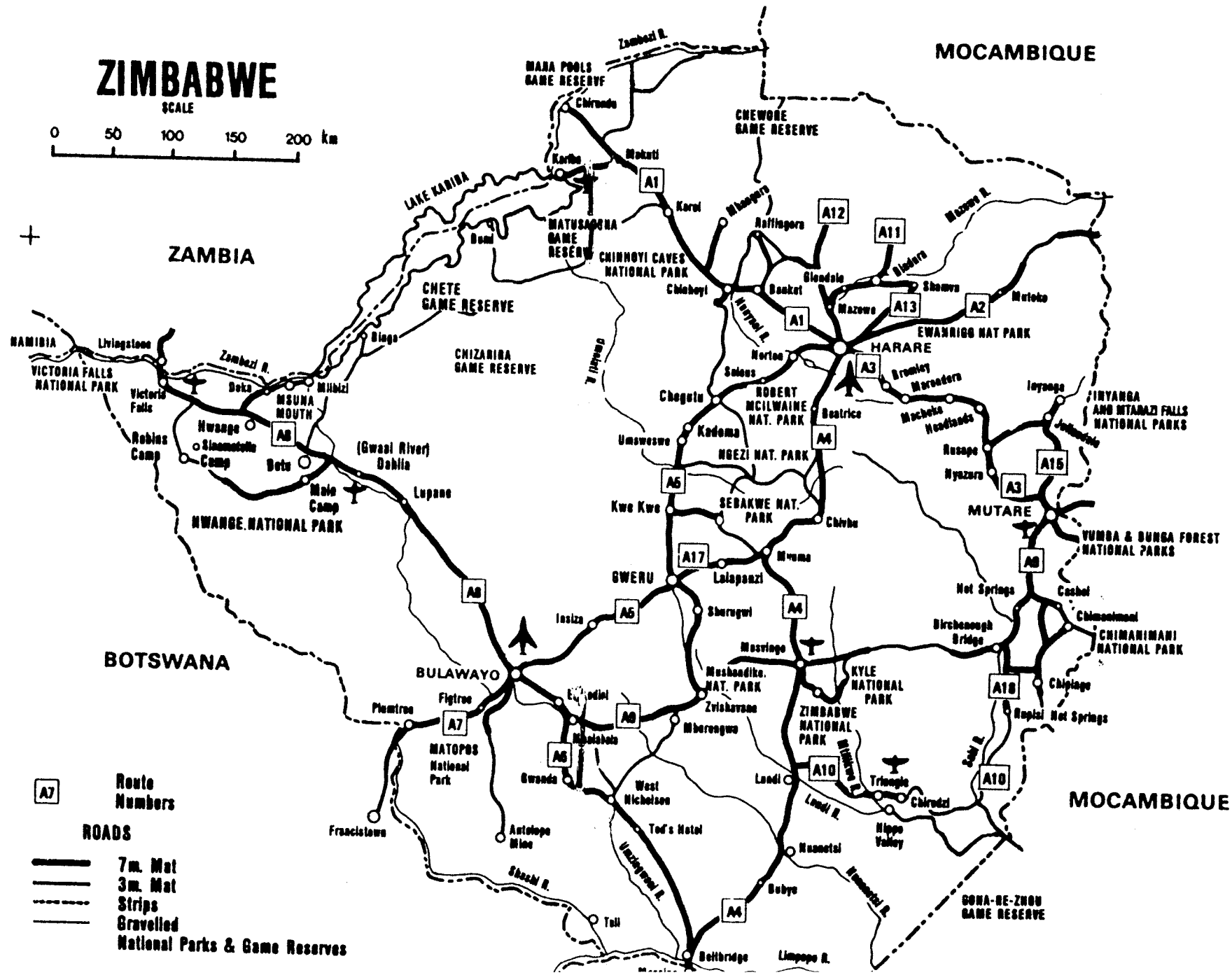
Hwange Main Camp	276	865	727	897	846	1093	972	452	568	288	609
Victoria Falls	1016	878	1048	997	1244	1122	603	719	439	760	
Mutare	263	93	150	629	106	480	297	577	585		
Harare	170	413	366	270	275	292	439	580			
Rusape	242	536	100	445	389	609	677				
Chimanimani	779	256	461	278	558	566					
Kariba	636	641	658	805	947						
Inyanga	545	403	684	691							
Gweru	183	164	471								
Masvingo	280	288									
Bulawayo	321										
Beitbridge											


ZIMBABWE
NATURAL REGIONS & FARMING AREAS
25 0 25 50 75 100 125 150 175 200
K.M. K.M
Kariba
Lake
MASH CENTRAL
MASH. WEST
MASH. EAST
HARARE
MARONDERA
KADOMA
HWANGE
MANICALAND
MUTARE
MAT. NORTH
MIDLANDS
GWERU
BULAWAYO
MASVINGO
MASVINGO
GWANDA
CHIREDZI
MAT. SOUTH
KEY :-
RELATED FARMING REGIONS
I SPECIALIZED DIVERSIFIED FARMING REGION
II INTENSIVE FARMING REGION
III SEMI-INTENSIVE FARMING REGION
IV SEMI-INTENSIVE FARMING REGION
V EXTENSIVE FARMING REGION

ZIMBABWE

MEAN ANNUAL RAINFALL




ZIMBABWE
SCALE
0 50 100 150 200 km
MOCAMBIQUE
ZAMBIA
BOTSWANA
MOCAMBIQUE
MANA POOLS GAME RESERVE
CHEWORE GAME RESERVE
LAKE KARIBA
MATUSADONA GAME RESERVE
CHINHOYI CAVES NATIONAL PARK
CHETE GAME RESERVE
CHIZARIRA GAME RESERVE
NAMIBIA
VICTORIA FALLS NATIONAL PARK
MSUNA MOUTH
ROBERT MCILWAINE NAT. PARK
HARARE
EWANRIGG NAT PARK
NYANGA AND NYANGARA FALLS NATIONAL PARKS
NGEZI NAT. PARK
SEBAKWE NAT. PARK
MUTARE
VUMBA & BUNGA FOREST NATIONAL PARKS
NWANGE NATIONAL PARK
GWERU
BULAWAYO
MATOPOS National Park
KYLE NATIONAL PARK
ZIMBABWE NATIONAL PARK
MUSHANDIKE NAT. PARK
CHIMANIMANI NATIONAL PARK
GONA-RE-ZHOU GAME RESERVE
Route Numbers
ROADS
7m. Mat
3m. Mat
Strips
Gravelled
National Parks & Game Reserves

APPENDIX 2

BASIC AGRICULTURAL DATA

Land Classification by Sector - 1989 Data ('000 hectares).

	I	II	III	IV	V	Total
LSC	200	3 690	2 410	2 430	2 490	11 220
SSC	10	240	530	500	100	1 380
Communal	140	1 270	2 820	7 340	4 780	16 350
Resettlement	30	590	1 240	810	620	3 290
Parks & Forests	310	60	130	3 649	2 190	6 339
Other	10	10	160	60	260	500
Total	**700**	**5 860**	**7 290**	**14 789**	**10 440**	**39 079**

Source: Ministry of Agriculture (2000). *Statistical Bulletin 2000*, Harare.

Area Planted by Crop and Natural Region, LSC Farmers - 1999 Data (hectares).

	I	II	III	IV	V	Total
Tobacco						
Flue-cured	56	75 611	2 182	26		77 875
Burley	709	1 066	45			1 820
Oriental	25	273	5	2		305
Traditional Field Crops						
Maize for grain	1 185	99 466	17 586	3 251	135	121 623
Cotton	65	16 783	1 995	52	2 195	21 090
Groundnuts	3	694	204	51	2	954
Soybeans	5	44 736	2 439	231	885	48 296
Wheat	28	40 568	3 210	151	3 483	47 440
Non-Traditional Crops						
Coffee - productive	4 255	1 112	60	34	41	5 502
Paprika	5	2 494	699	251	15	3 464
Horticulture						
Vegetables	4	2 649	816	350	248	4 067
Flower & veg. seeds	3	302	54			359
Other Crops						
Seed maize		8 349	309	47	45	8 750
Barley	2	1 647	1 494	20		3 163
Red sorghum	2	3 934	1 019	516	5	5 476
Sunflower	37	813	505	39	25	1 419
Pasture - fertilised	601	8 198	794	178	45	9 816
Pasture - not fertilised	867	21 775	1 719	7	7	24 375

Source: CSO (1999). *Crop Production on Large Scale Commercial Farms*, Harare.
Note: Vegetable crops not specified if for export.

Area Planted by Crop and Natural Region, Communal Farmers - 1999 Data (hectares).

	I	II	III	IV	V	Total
Tobacco						
Flue-cured		1 458	298			1 756
Burley	190	2 294				2 484
Oriental		12	20			32
Traditional Field Crops						
White maize	23 051	207 074	335 341	519 740	127 170	1 212 376
Cotton	190	28 008	95 975	110 017	18 442	252 632
Groundnuts	105	15 033	28 121	49 735	14 307	107 301
Soybeans		915	1 974	117		3 006
Non-Traditional Crops						
Paprika		1 174	78	335		1 587
Other Crops						
Red Sorghum		309	3 649	11 034	22 116	37 108
White Sorghum		140	1 240	32 176	62 026	95 582
Rapoko (millet)	15	2 725	5 238	18 949	2 207	29 134
Sunflower		2 522	2 660	8 055	1 485	14 722
Sweet potatoes	18	310	218	490		1 036
Edible dry beans		2 347	1 123	4 437	1 749	9 656

Source: CSO (1999). *Agriculture and Livestock Survey in Communal Lands*, Harare.

ZIMBABWE TOBACCO ASSOCIATION (MARKETING DEPARTMENT) Ref : DOMSTATS.wk4

DOMESTIC TOBACCO STATISTICS : 1938 - 1999

Year	Number of Growers	Area Planted (ha)	Mass Sold (kgs)	Yield per ha (kgs)	Value Sold (Z$)	Average Price (Zc/kg)	Return per ha. (Z$/ha)	No. Sales Days	Ave. Daily Mass Sold (kgs)	No. of Bales Sold	Ave. Bale Mass (kgs)	Seasonal Wastage (%)	Average Price USc/kg
1938	493	18,477	11,388,526	616	2,150,322	18.88	116	92	123,788	182,801	62.30	5.00	
1939	638	24,156	9,801,630	406	1,764,792	18.01	73	87	112,662	147,615	66.40	5.00	
1940	638	24,264	15,615,876	644	3,496,358	22.39	144	87	179,493	211,597	73.80	5.00	
1941	693	25,686	15,711,449	612	4,451,784	28.33	173	88	178,539	214,637	73.20	5.00	
1942	756	31,000	20,850,189	673	5,708,802	27.38	184	109	191,286	265,269	78.60	5.00	
1943	741	25,179	13,737,045	546	4,513,980	32.86	179	93	147,710	187,408	73.30	5.00	
1944	713	24,502	13,880,689	567	5,517,722	39.75	225	86	161,403	191,194	72.60	5.00	
1945	796	28,752	21,192,959	737	7,712,862	36.39	268	114	185,903	258,766	81.90	5.00	
1946	862	30,118	18,888,397	627	11,201,636	59.30	372	100	188,884	238,791	79.10	5.00	
1947	1,158	36,729	26,054,036	709	13,915,622	53.41	379	120	217,117	333,598	78.10	5.00	
1948	1,460	45,571	33,874,916	743	20,247,650	59.77	444	125	270,999	411,603	82.30	5.00	
1949	1,178	50,979	37,069,196	727	21,700,320	58.54	426	120	308,910	466,866	79.40	5.00	
1950	2,100	61,180	47,293,607	773	32,696,360	69.13	534	140	337,811	605,551	78.10	5.00	
1951	2,349	67,990	40,585,298	597	25,771,274	63.50	379	122	332,666	517,010	78.50	5.00	
1952	2,546	76,549	43,907,642	574	34,471,574	78.51	450	129	340,369	559,333	78.50	5.00	
1953	2,460	71,669	47,696,873	666	34,790,018	72.94	485	132	361,340	621,053	76.80	5.00	
1954	2,526	68,161	54,545,870	800	38,425,312	70.45	564	138	395,260	733,143	74.40	5.00	
1955	2,529	69,511	54,685,522	787	40,652,954	74.34	585	135	405,078	733,049	74.60	5.00	
1956	2,836	82,569	77,870,132	943	47,158,492	60.56	571	167	466,288	1,045,236	74.50	5.00	
1957	2,723	73,741	65,471,922	888	47,368,904	72.35	642	144	454,666	879,998	74.40	5.00	
1958	2,821	83,733	69,289,366	828	46,399,986	66.97	554	142	487,953	980,047	70.70	12.00	
1959	2,964	87,415	86,772,723	993	54,902,460	63.27	628	139	624,264	1,190,297	72.90	14.47	
1960	2,924	85,892	99,031,000	1,153	62,024,932	62.63	722	132	750,235	1,306,477	75.80	13.44	
1961	2,911	90,936	106,069,000	1,166	65,759,048	62.00	723	135	785,696	1,295,103	81.90	16.52	
1962	2,890	91,375	104,904,890	1,148	67,245,972	64.10	736	125	839,239	1,293,525	81.10	13.52	
1963	2,970	99,255	88,537,431	892	67,559,210	76.31	681	110	804,886	1,191,620	74.30	12.61	
1964	3,054	114,270	147,198,100	1,288	70,004,634	47.56	613	159	925,774	1,744,053	84.40	15.87	
1965	2,927	91,360	111,812,990	1,224	67,560,670	60.42	739	131	853,534	1,348,769	82.90	22.07	
1966	2,592	82,770	110,950,730	1,340	49,273,548	44.41	595	147	754,767	1,368,073	81.10	7.63	
1967	2,318	59,893	82,783,681	1,382	42,495,624	51.33	710	123	673,038	1,099,385	75.30	10.64	
1968	1,726	40,953	52,355,772	1,278	26,875,964	51.33	656	121	432,692	708,468	73.90	10.76	
1969	1,592	41,240	56,089,600	1,360	23,743,664	42.33	576	115	487,736	775,789	72.30	8.81	
1970	1,602	41,197	51,506,609	1,250	21,722,399	42.17	527	118	436,497	719,366	71.60	8.64	
1971	1,668	41,327	59,866,077	1,449	27,934,708	46.66	676	148	404,501	820,083	73.00	10.23	
1972	1,569	44,548	60,892,451	1,367	29,952,996	49.19	672	135	451,055	826,220	73.70	18.74	
1973	1,519	45,201	67,979,630	1,504	37,130,473	54.62	821	145	468,825	900,392	75.50	12.68	
1974	1,642	56,562	71,600,741	1,266	56,056,220	78.29	991	129	555,045	933,516	76.70	16.45	
1975	1,731	65,834	83,919,914	1,275	57,736,900	68.80	877	127	660,787	1,022,167	82.10	18.80	
1976	1,696	66,290	110,533,041	1,667	76,046,732	68.80	1,147	154	717,747	1,306,537	84.60	17.46	
1977	1,638	56,993	83,373,667	1,463	61,085,618	73.27	1,072	154	541,387	982,022	84.90	20.73	
1978	1,612	54,939	82,968,508	1,510	81,994,257	98.83	1,492	132	628,549	988,897	83.90	21.10	
1979	1,556	59,631	111,686,415	1,873	92,023,469	82.39	1,543	144	775,600	1,250,688	89.30	21.66	
1980	1,547	64,310	122,571,366	1,906	97,436,871	79.49	1,515	154	795,918	1,352,885	90.60	22.10	
1981	1,145	38,899	67,356,019	1,732	123,774,273	183.76	3,182	114	590,842	755,960	89.10	18.94	
1982	1,255	46,394	89,387,652	1,927	149,562,951	167.32	3,224	146	612,244	907,194	98.53	13.05	215.82
1983	1,155	46,225	94,295,739	2,040	177,797,693	188.55	3,846	132	714,362	935,381	100.81	9.45	183.74
1984	1,186	50,486	119,636,157	2,370	247,119,275	206.56	4,895	137	873,257	1,192,968	100.28	14.27	161.15
1985	1,300	52,464	105,555,659	2,012	283,393,884	268.48	5,402	136	776,145	1,074,329	98.25	22.47	166.45
1986	1,426	57,313	114,311,258	1,995	358,218,051	313.37	6,250	118	968,739	1,170,093	97.69	19.19	184.91
1987	1,519	63,536	127,996,176	2,015	278,937,575	217.93	4,390	148	864,839	1,275,600	100.34	31.75	131.94
1988	1,486	59,178	119,912,584	2,026	471,836,501	393.48	7,973	130	922,404	1,216,311	98.59	15.75	214.00
1989	1,448	57,660	129,960,308	2,254	558,459,315	429.72	9,685	125	1,039,682	1,317,162	98.67	15.66	201.00
1990	1,493	59,425	133,866,041	2,253	868,180,220	648.54	14,610	122	1,097,263	1,030,916	129.85	11.94	260.61
1991	1,746	66,927	170,149,851	2,542	1,969,134,908	1,157.29	29,422	137	1,241,970	1,670,616	101.85	8.77	305.11
1992	2,630	80,012	201,161,921	2,514	1,630,161,796	810.37	20,374	155	1,297,819	1,999,731	100.59	12.94	162.05
1993	3,071	83,209	218,374,332	2,624	1,752,685,015	802.62	21,064	147	1,485,540	2,192,460	99.60	16.68	123.77
1994	2,338	67,416	169,218,196	2,510	2,335,875,441	1,380.39	34,649	127	1,332,427	1,696,085	99.77	12.43	172.56
1995	2,526	74,692	198,751,924	2,661	3,584,709,576	1,803.61	47,993	115	1,728,278	1,988,139	99.97	9.62	212.13
1996	2,917	81,348	201,630,567	2,479	5,848,775,079	2,901.91	71,898	116	1,738,195	2,034,737	99.09	10.22	294.29
1997	5,538	92,117	184,847,738	2,007	4,946,000,000	2,660.00	53,693	112	1,650,426	1,970,000	93.83	14.56	233.40
1998	8,304	95,613	215,983,208	2,259	7,502,362,215	3,474.00	78,466	124	1,741,800	2,209,685	97.74	14.30	172.46
1999	7,192	84,874	192,142,327	2,264	12,727,507,740	6,623.27	149,958	113	1,700,375	1,952,805	98.39	13.77	174.11
2000	8,531	83,600	236,715,481	2,832	19,252,577,585	8,132.53	230,275	138	1,715,330	2,325,297	101.80	12.58	167.00

ZTAST012

ZIMBABWE TOBACCO ASSOCIATION
STATISTICAL ANALYSIS OF GROWER PERFORMANCE 1999/00

DISTRIBUTION OF COMMERCIAL GROWERS > 8 HECTARES BY AVERAGE YIELD (KG/HA) BY DISTRICT*

% ARIATION FROM MEAN	CLASS INTERVALS % TERMS	AVERAGE YIELD	D I S T R I C T S 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL PER C/I	% OF TOTAL
+ 100	+ 95 TO + 105	5852 TO 6152																0	0.0
+ 90	+ 85 TO + 95	5552 TO 5852																0	0.0
+ 80	+ 75 TO + 85	5252 TO 5552																0	0.0
+ 70	+ 65 TO + 75	4952 TO 5252																0	0.0
+ 60	+ 55 TO + 65	4652 TO 4952			1										1			2	0.1
+ 50	+ 45 TO + 55	4352 TO 4652		3				1	1		4	1		1				11	0.7
+ 40	+ 35 TO + 45	4052 TO 4352	1	5		2	7	2	1	3	10	1		1	1		2	36	2.2
+ 30	+ 25 TO + 35	3752 TO 4052	7	9	12	10	12	11	5	5	23		3	3	6	5	5	116	6.9
+ 20	+ 15 TO + 25	3452 TO 3752	21	18	12	16	31	14	6	18	23	6	11	12	14	3	18	223	13.3
+ 10	+ 5 TO + 15	3152 TO 3452	30	31	23	18	42	18	20	19	24	8	17	25	14	9	21	319	19.1
+ 0	- 5 TO + 5	2852 TO 3152	22	40	23	26	25	7	12	9	21	19	16	14	14	17	18	283	16.9
- 10	- 15 TO - 5	2552 TO 2852	15	20	14	18	19	3	10	13	25	26	8	12	11	8	9	211	12.6
- 20	- 25 TO - 15	2252 TO 2552	9	10	17	6	14		18	11	11	19	3	6	9	6	5	144	8.6
- 30	- 35 TO - 25	1952 TO 2252	4	7	7	5	4	6	18	10	11	13	4	6	3	3	3	104	6.2
- 40	- 45 TO - 35	1652 TO 1952	3	5	1	5	3	2	4	7	6	11	3	3	6	1	3	63	3.8
- 50	- 55 TO - 45	1352 TO 1652	4	3		2	5		10	3	5	11	3	4	2			52	3.1
- 60	- 65 TO - 55	1052 TO 1352	1	2	1		1	1	3	5	6	5	2	1	1		2	31	1.9
- 70	- 75 TO - 65	752 TO 1052	1			2	2	2	3	5	5	6		1			2	29	1.7
- 80	- 85 TO - 75	452 TO 752				2		3	3	2	1	3	3	2	1	2	1	23	1.4
- 90	- 95 TO - 85	152 TO 452	1			1	3	2	2	2	5	2	2	2				22	1.3
-100	-105 TO - 95	0 TO 152			1			1							1			3	0.2
OTALS			119	153	112	113	168	73	116	112	180	131	75	93	84	54	89	1672	100.0

ATIONAL MEAN (KG/HA) 3001.9 STANDARD DEVIATION 726.75 (24.2%)
UMBER ABOVE AND EQUAL TO MEAN 858 (51.3%) NUMBER BELOW MEAN 814 (48.6%)

* SEE MAP OF TOBACCO GROWING DISTRICTS (Appendix 1) FOR LOCATION.

ZTAST015

ZIMBABWE TOBACCO ASSOCIATION
STATISTICAL ANALYSIS OF GROWER PERFORMANCE 1999/00

DISTRIBUTION OF COMMERCIAL GROWERS > 8 HECTARES BY AVERAGE PRICE (USC/KG) BY DISTRICT*

CLASS INTERVALS % TERMS	US CENTS PER KILOGRAM	DISTRICTS 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL PER C/I	% OF TOTAL
+ 40 TO + 44	238.3 TO 245.1							1	1								2	0.1
+ 36 TO + 40	231.5 TO 238.3		1		1	1			3		1		1				8	0.5
+ 32 TO + 36	224.7 TO 231.5								4		1						5	0.3
+ 28 TO + 32	217.9 TO 224.7		1	1		2		1	3	4			1	1		3	17	1.0
+ 24 TO + 28	211.1 TO 217.9		4	3	1	3		2	5				2	1			21	1.3
+ 20 TO + 24	204.3 TO 211.1	1	3	3	2	1	1	3	2	3	4	1	3	3	1	2	33	2.0
+ 16 TO + 20	197.5 TO 204.3		7	3	5	12	3	5	8	14	9	3	3	2	2	4	80	4.8
+ 12 TO + 16	190.7 TO 197.5	5	12	2	7	12	5	2	11	13	13	3	8	4	2	5	104	6.2
+ 8 TO + 12	183.9 TO 190.7	10	16	5	10	13	8	7	6	14	10	3	7	13	3	10	135	8.1
+ 4 TO + 8	177.1 TO 183.9	12	24	19	11	21	9	10	7	23	10	4	7	11	10	13	191	11.4
+ 0 TO + 4	170.3 TO 177.1	8	17	20	11	24	3	10	14	24	16	4	12	6	4	9	182	10.9
- 4 TO + 0	163.5 TO 170.3	12	20	11	18	13	6	14	5	15	11	15	9	5	8	11	173	10.3
- 8 TO - 4	156.7 TO 163.5	17	10	14	15	16	5	11	7	17	18	5	7	9	4	6	161	9.6
- 12 TO - 8	149.9 TO 156.7	16	11	6	10	14	7	9	6	16	6	5	4	8	7	10	135	8.1
- 16 TO - 12	143.1 TO 149.9	8	5	10	8	10	8	10	10	10	5	11	8	4		6	113	6.8
- 20 TO - 16	136.3 TO 143.1	12	4	10	5	7	4	10	4	5	6	3	5	3	3	2	83	5.0
- 24 TO - 20	129.5 TO 136.3	9	6	1	4	5	1	6	3	9	5	4	4	1	3	4	65	3.9
- 28 TO - 24	122.7 TO 129.5	4	5	2	1	7	3	2	2	3	7	5	3	4		1	49	2.9
- 32 TO - 28	115.9 TO 122.7		2	1	2	1	2	3	4	4	4	3	5	3	5	2	41	2.5
- 36 TO - 32	109.1 TO 115.9	2	2		1	2	2	4	3	4	1	2	3	1			27	1.6
- 40 TO - 36	102.3 TO 109.1	2			1	1	1	2	1		3	2		2			15	0.9
- 44 TO - 40	0.0 TO 102.3	1	3	1		3	5	4	3	2	1	2	1	3	2	1	32	1.9
TOTALS		119	153	112	113	168	73	116	112	180	131	75	93	84	54	89	1672	100.0

NATIONAL MEAN (USC/KG) 170.3 STANDARD DEVIATION 34.24 (20.1%)
NUMBER ABOVE AND EQUAL TO MEAN 778 (46.5%) NUMBER BELOW MEAN 894 (53.4%)

SEE MAP OF TOBACCO GROWING DISTRICTS (A ... 7) FOR LOCATION

APPENDIX 3

YIELD AND COST ASSUMPTIONS

YIELD AND FERTILISER ASSUMPTIONS

Sources: CSO (various); Ministry of Lands, Agriculture and Rural Resettlement, Statistical Bulletin 2000; TIMB 2000 Annual Statistical Report; ZTA Statistical Analysis of Gower Performance 1999/2000, CFU Crop Budgets, Agritex Crop Budgets and personal discussions.

Notes: Fertiliser use expressed as 50kg bags basal/ha x 50kg bags top dressing (usually A/N) per ha. Depending on crop requirements, farmers may also apply muriate of potash (MOP) and/or gypsum. In most cases, LSC farmers are assumed to apply 250kg (5 bags) lime per ha in order to maintain soil pH balance. SSC farmers also use lime in some cases. Additional factors included in the crop budgets that have an impact on crop yields include chemical use, timeliness of planting and attention to weed control. Other factors beyond a farmers control include rainfall, sunshine and soil type.

Large Scale Commercial Farmers

		Dryland Crops			Irrigated Crops		
	Unit	Low	Medium	High	Low	Medium	High
Tobacco							
Flue-cured	kg/ha	2,200 (12x1.5)	2,500 (14x1.5)	2,800 (16x2)	2,800 (14x1.5)	3,100 (15x1.5)	3,500 (11x1.5)
Traditional Field Crops							
Maize	kg/ha	3,500 (5x5)	4,500 (6x6)	5,500 (8x6)	6,000 (6x6)	7,000 (7x7)	8,000 (8x8)
Groundnuts (unshelled)	kg/ha	1,800 (3x4)	2,300 (4x6)	2,800 (5x8)	3,000 (5x8)	4,000 (7x8)	5,000 (8x8)
Cotton	kg/ha	1,500 (4x3)	1,900 (5x3)	2,300 (5x5)	2,500 (7x5)	3,000 (7x6)	3,500 (7x6)
Soybeans	kg/ha	1,600 (4x0)	2,100 (5x0)	2,600 (6x0)	2,400 (4x0)	2,900 (5x0)	3,400 (6x0)
Wheat	kg/ha	-		-	5,500 (7x4)	6,500 (9x4)	7,500 (12x6)
Non-Traditional Field Crops							
Coffee	kg/ha	-	-	-	-	2,000 (40x12)	2,500 (45x12)
Paprika - short season	kg/ha	-	-	-	-	-	3,000 (10x8)
Paprika - long season	kg/ha	-	-	-	-	-	6,000 (18x10)
Marigold (wet)	kg/ha					-	14,000 (7x5)
Roses							
Sort stem	stems/ha	-	-	-	-	2,750,000	-
Medium stem	stems/ha	-	-	-	-	1,750,000	-
Long stem	stems/ha	-	-	-	-	1,100,000	-
Vegetable Exports							
Mange tout (peak season)	kg/ha	-	-	-	-	4,000	-
Mange tout (off peak)	kg/ha	-	-	-	-	1,000	-
Baby carrots	kg/ha	-	-	-	-	3,000	-
Baby corn	kg/ha	-	-	-	-	950	-

Smallholder Farmers

		Communal and Resettlement			Small Scale Commercial (SSC)		
	Unit	Low	Medium	High	Low	Medium	High
Tobacco							
Flue-cured (virginia)	kg/ha	650 (4x1)	800 (6x1)	1,050 (8x1)	1,100 (8x1)	1,500 (10x1.5)	1,800 (12x2)
Burley	kg/ha	700 (4x2)	1,000 (6x3)	1,300 (8x4)	1,100 (6x3)	1,300 (8x4)	1,500 (10x4)
Traditional Field Crops							
Maize*	kg/ha	825 (0x0)	1,250 (2x1)	2,000 (4x2)	1,700 (2x2)	2,500 (4x3)	3,900 (6x4)
Groundnuts (unshelled)	kg/ha	550 (0x0)	825 (1x1)	-	-	-	1,100 (2x2)
Cotton	kg/ha	700 (0x0)	1,200 (2x2)	-	-	-	1,500 (3x3)
Soybeans	kg/ha	700 (0x0)	1,000 (1x0)	-	-	-	1,300 (2x0)
Non-Traditional Field Crops							
Coffee	kg/ha	150 (0x0)	450 (4x2)	-	-	-	800 (6x2)
Paprika	kg/ha	800 (4x2)	1,000 (5x2)	-	-	-	1,800 (10x5)

Note: For most crops, low and medium management is attributed to communal and resettlement farmers and high management is for SSC farmers. This distinction is primarily because of how annualised investment costs are calculated for each farm sector and the overall management system could generally be employed by any type of smallholder farmer.

* assume communal and resettlement farmers plant local maize with low management (recycled seed); hybrid maize at all other levels.

FARMGATE PRICE ASSUMPTIONS

Flue-cured tobacco

	ZWD/kg			USD/kg		
	Low	Medium	High	Low	Medium	High
Large Scale Commercial (LSC)						
Dryland tobacco	92.95	96.80	98.45	1.69	1.76	1.79
Irrigated tobacco	93.50	97.35	99.00	1.70	1.77	1.80
Small Scale Commercial (SSC)						
Dryland tobacco	86.90	92.40	94.60	1.58	1.68	1.72
Communal & Resettlement						
Dryland tobacco	79.75	83.05	85.25	1.45	1.51	1.55

Source: ZTA Statistical Analysis of Grower Performance 1999/00.

Burley tobacco

	ZWD/kg			USD/kg		
	Low	Medium	High	Low	Medium	High
Small Scale Commercial (SSC)	46.75	52.25	53.90	0.85	0.95	0.98
Communal & Resettlement	48.95	53.90	56.10	0.89	0.98	1.02

Source: TIMB data.

Other crops

	Unit	ZWD	USD
Maize			
Sell after harvest	kg	5.76	0.10
Buy 10 months later	kg	8.85	0.16
Groundnuts (unshelled)			
All farmers	kg	16.65	0.30
Cotton			
LSC - dryland	kg	22.23	0.40
LSC - irrigated	kg	23.44	0.43
SSC	kg	21.02	0.38
Communal, resettlement	kg	19.81	0.36
Soybeans			
LSC (w/ artificial drying)	kg	12.50	0.23
Smallholder	kg	11.70	0.21
Wheat			
LSC	kg	11.00	0.20
Coffee			
Current price	kg	74.80	1.36
Moderate improvement	kg	82.50	1.50
Long-run norm	kg	110.00	2.00
Paprika			
LSC	kg	75.20	1.37
SSC	kg	65.00	1.18
Communal, resettlement	kg	58.00	1.05
Marigold (wet)			
LSC	kg	5.83	0.11
Roses			
Short stem	stem	4.78	0.09
Medium stem	stem	8.13	0.15
Long stem	stem	13.15	0.24
Mange tout			
LSC Outgrower (in season)	kg - HRE	30.25	0.55
Exporter (in season)	kg - LON	259.88	4.73
Exporter (off season)	kg - LON	288.75	5.25
Baby carrots			
LSC Outgrower (in season)	kg - HRE	27.50	0.50
Exporter (in season)	kg - LON	255.75	4.65
Baby corn			
LSC Outgrower (in season)	kg - HRE	52.25	0.95
Exporter (in season)	kg - LON	309.38	5.63

DERIVATION OF ANNUAL INVESTMENT COSTS - LSC Farmers

Capital Recovery Factor (CRF)

Assume real interest on savings = 3%

CRF = (((1+i)^n)*i)/((1+i)^n-1) where i = interest on savings; n = number of years in the implement's useful life.

Cost per ha = value new * CRF * per ha share of use.

For basic model, assume 300 ha arable land of which 80 ha are irrigated and therefore double cropped. This gives the equivalent of a 380ha farm and a per hectare share of use for each implement equal to 1/380 or 0.0026.

Basic Equipment & Buildings (excluding tobacco specific items)

		Value New			Share of	Annual Cost/ha	
	Life (yrs)	USD	ZWD	CRF	Use	USD	ZWD
Tractor (90hp) - 1	8	36,500	2,007,500	0.1425	0.0026	13.68	753
Tractor (70hp) - 2	8	65,600	3,608,000	0.1425	0.0026	24.59	1,353
Tractor (45hp) - 2	8	22,560	1,240,800	0.1425	0.0026	8.46	465
Truck (7mt)	10	57,300	3,151,500	0.1172	0.0026	17.68	972
Pickup trucks - 2	7	31,600	1,738,000	0.1605	0.0026	13.35	734
Motorbikes - 4	5	8,000	440,000	0.2184	0.0026	4.60	253
Trailers - 2	10	4,010	220,550	0.1172	0.0026	1.24	68
Ploughs (3 disc reversible) - 1	10	2,450	134,750	0.1172	0.0026	0.76	42
Cultivator (5-tyne)	10	2,250	123,750	0.1172	0.0026	0.69	38
Levelling disc harrow - 2	10	1,915	105,325	0.1172	0.0026	0.59	32
16 Row seed drill	10	6,940	381,700	0.1172	0.0026	2.14	118
Fertiliser spreader - 1	10	4,080	224,400	0.1172	0.0026	1.26	69
Lime box	15	2,200	121,000	0.0838	0.0026	0.48	27
Rotary slasher	8	2,295	126,225	0.1425	0.0026	0.86	47
Boom sprayer (9m)	8	1,200	66,000	0.1425	0.0026	0.45	25
ULV Mist blower	8	2,740	150,700	0.1425	0.0026	1.03	56
Knapsack/ULV+ sprayer - 4	5	120	6,600	0.2184	0.0026	0.07	4
Backpack fertiliser distributor - 4	5	120	6,600	0.2184	0.0026	0.07	4
Miscellaneous tools	8	2,500	137,500	0.1425	0.0026	0.94	52
Workshop & office complex	30	20,000	1,100,000	0.0510	0.0026	2.69	148
Store room, other buildings	20	15,000	825,000	0.0672	0.0026	2.65	146
Staff housing (60 units @ USD 500 each)	12	30,000	1,650,000	0.1005	0.0026	7.93	436
Total basic equipment & buildings						**106.20**	**5,841**

Irrigation Equipment (80ha system)

		Value New			Share of	Annual Cost/ha	
	Life (yrs)	USD	ZWD	CRF	Use	USD	ZWD
Pump (70 kW)	12	16,300	896,500	0.1005	0.0063	10.23	563
Pump house (incl. electrification)	20	5,000	275,000	0.0672	0.0063	2.10	116
Pipes & sprinkler heads	18	110,000	6,050,000	0.0727	0.0063	49.99	2,749
Fittings	18	15,000	825,000	0.0727	0.0063	6.82	375
Bore hole const.	40	3,500	192,500	0.0433	0.0063	0.95	52
Reservoir	40	10,000	550,000	0.0433	0.0063	2.70	149
Concrete pipes	40	25,000	1,375,000	0.0433	0.0063	6.76	372
Switch gear	15	4,500	247,500	0.0838	0.0063	2.36	130
Total irrigation equipment						**81.90**	**4,505**

Will double crop the 80ha covered by irrigation giving a per ha share of use for each crop equal to 1/160 or 0.0063.

Tobacco Equipment (60ha)

		Value New			Share of	Annual Cost/ha	
	Life (yrs)	USD	ZWD	CRF	Use	USD	ZWD
Tractor (45hp) - 1	8	11,280	620,400	0.1425	0.0026	4.23	233
Double row ridger	10	1,390	76,450	0.1172	0.0026	0.43	24
Ploughs (3 disc reversible) - 1	10	2,450	134,750	0.1172	0.0026	0.76	42
Flue barns - 35 (USD 2,500 each)	20	87,500	4,812,500	0.0672	0.0167	98.02	5,391
Modro trailers - 2	10	3,400	187,000	0.1172	0.0167	6.64	365
Ordinary trailers - 4	10	8,020	441,100	0.1172	0.0026	2.47	136
Grading shed	20	12,000	660,000	0.0672	0.0026	2.12	117
Baling equipment	15	1,000	55,000	0.0838	0.0026	0.22	12
Specialised tools	5	800	44,000	0.2184	0.0026	0.46	25
Total tobacco equipment						**115.36**	**6,345**

Incremental items for tobacco only; other basic equipment and buildings also required plus irrigation if applied.

Rose Unit (2ha)

		Value New			Share of	Annual Cost/ha	
	Life (yrs)	USD	ZWD	CRF	Use	USD	ZWD
Greenhouse (2ha)	18	130,000	7,150,000	0.0727	0.5	4,726.07	259,934
Cold room	20	9,000	495,000	0.0672	0.25	151.24	8,318
Grading shed	20	12,000	660,000	0.0672	0.25	201.65	11,091
Electrification	40	2,500	137,500	0.0433	0.25	27.04	1,487
Fertigation system (pumps & filters)	15	41,000	2,255,017	0.0838	0.25	858.61	47,224
Fertigation system (drip lines - 2ha)	8	7,600	418,019	0.1425	0.5	541.36	29,775
Reservoir	40	7,000	385,000	0.0433	0.25	75.71	4,164
Horticultural equipment	15	2,500	137,500	0.0838	0.25	52.35	2,879
Insulated truck	7	23,000	1,265,000	0.1605	0.25	922.91	50,760
Rose bushes (2ha)	5	86,000	4,729,998	0.2184	0.5	9,389.24	516,408
Royalties (2ha)	5	103,304	5,681,739	0.2184	0.5	11,278.49	620,317
Protective clothing	2	900	49,500	0.5226	0.5	235.17	12,935
Total rose unit						**28,459.84**	**1,565,291**

Costs for a 2ha starter project that will be expanded to 4ha. Some items only sufficient for 2ha (share of use 0.5); others are suitable for a 4ha project (share of use 0.25).

Export Vegetables - Outgrower/Producer (20ha)

		Value New			Share of	Annual Cost/ha	
	Life (yrs)	USD	ZWD	CRF	Use	USD	ZWD
Pump (70 kW)	12	16,300	896,500	0.1005	0.0167	27.29	1,501
Pump house (incl. electrification)	20	5,000	275,000	0.0672	0.0167	5.60	308
Pipes & sprinkler heads	18	23,750	1,306,250	0.0727	0.0167	28.78	1,583
Fittings	18	5,000	275,000	0.0727	0.0167	6.06	333
Bore hole const.	40	3,000	165,000	0.0433	0.0167	2.16	119
Reservoir	40	2,100	115,500	0.0433	0.0167	1.51	83
Concrete pipes	40	6,000	330,000	0.0433	0.0167	4.33	238
Switch gear	15	3,500	192,500	0.0838	0.0167	4.89	269
Total outgrower costs						**80.62**	**4,434**

20ha production unit where land is triple cropped giving a single crop per ha share of use equal to 1/60 or 0.0167.

Export Vegetables - Export Agent

		Value New			Share of	Annual Cost/ha	
	Life (yrs)	USD	ZWD	CRF	Use	USD	ZWD
Collection points (shed, sm. office)	10	10,000	550,000	0.1172	0.002	2.34	129
Pack shed & office space	20	60,000	3,300,000	0.0672	0.002	8.07	444
Cold room (large)	20	18,000	990,000	0.0672	0.002	2.42	133
Electrification	40	2,500	137,500	0.0433	0.002	0.22	12
Horticultural equipment	15	5,000	275,000	0.0838	0.002	0.84	46
Insulated trucks - 5	6	115,000	6,325,000	0.1846	0.002	42.46	2,335
Refrigerated truck (large)	8	85,000	4,675,000	0.1425	0.002	24.22	1,332
Total export agent costs						**80.56**	**4,431**

Equipment sufficient to manage collections and packing from 500ha total production.

Coffee Equipment and Irrigation (60ha)

		Value New			Share of	Annual Cost/ha	
	Life (yrs)	USD	ZWD	CRF	Use	USD	ZWD
Nursery shelter & equipment	5	700	38,500	0.2184	0.0167	2.55	140
Pulpery (pulping unit and tanks)	15	8,000	440,000	0.0838	0.0167	11.17	614
Pump (45 kW)	12	10,500	577,500	0.1005	0.0167	17.58	967
Pump house (incl. electrification)	40	5,000	275,000	0.0433	0.0167	3.61	198
Drip lines & switch gear	12	78,000	4,290,000	0.1005	0.0167	130.60	7,183
Drying racks	5	2,500	137,500	0.2184	0.0167	9.10	500
Misc. tools & equip	5	1,500	82,500	0.2184	0.0167	5.46	300
Total coffee equipment and irrigation						**180.06**	**9,903**

Coffee Plantation Establishment (Yrs. 0 - 3) per ha

		Value New			Share of	Annual Cost/ha	
	Life (yrs)	USD	ZWD	CRF	Use	USD	ZWD
Nursery	8	259	14,231	0.1425	1.00	36.86	2,027
Year 1	7	977	53,718	0.1605	1.00	156.77	8,622
Year 2	6	337	18,535	0.1846	1.00	62.21	3,422
Year 3	5	(126)	(6,951)	0.2184	1.00	(27.60)	(1,518)
Total establishment costs						**228.24**	**12,553**

Based on CFU data for gross margin in each year prior to full establishment; revenue in Year 3 appears as a negative cost.

DERIVATION OF ANNUAL INVESTMENT COSTS - SSC Farmers

Capital Recovery Factor (CRF)
Assume real interest on savings = 3%
CRF = (((1+i)^n)*i)/((1+i)^n-1) where i = interest on savings; n = number of years in the implement's useful life.
Cost per ha = value new * CRF * per ha share of use.

For basic model, assume 10 ha total (arable) of which 6ha are cultivated each year (3ha tobacco, 3ha other crops, 4ha fallow).

Basic Equipment (excluding tobacco specific items)

		Value New			Share of	Annual Cost/ha	
	Life (yrs)	USD	ZWD	CRF	Use	USD	ZWD
Ox cart	15	250	13,750	0.0838	0.10	2.09	115
Ox plough - 2	10	350	19,250	0.1172	0.10	4.10	226
Ox cultivator	10	150	8,250	0.1172	0.10	1.76	97
Small tools	10	250	13,750	0.1172	0.10	2.93	161
Bicycle	6	75	4,125	0.1846	0.10	1.38	76
Storage shed	15	350	19,250	0.0838	0.10	2.93	161
Total basic equipment						**15.20**	**836**

Oxen not included since their value at the end of their useful life as meat is greater than the purchase price.

Tobacco Equipment (3ha)

		Value New			Share of	Annual Cost/ha	
	Life (yrs)	USD	ZWD	CRF	Use	USD	ZWD
Knapsack sprayers - 2	6	60	3,300	0.1846	0.33	3.69	203
Watering cans, other tools	5	25	1,375	0.2184	0.33	1.82	100
Grading shed	20	350	19,250	0.0672	0.33	7.84	431
Baling equipment	10	250	13,750	0.1172	0.33	9.77	537
Flue barn (to handle 3ha of tobacco)							
Flue pipes	6	40	2,200	0.1846	0.33	2.46	135
T-pipes	6	80	4,400	0.1846	0.33	4.92	271
Elbow joint	6	160	8,800	0.1846	0.33	9.85	541
Empty drums	10	80	4,400	0.1172	0.33	3.13	172
Thermometers	10	20	1,100	0.1172	0.33	0.78	43
Building materials	20	1,200	66,000	0.0672	0.33	26.89	1,479
Hired labour (90 days)	20	65	3,600	0.0672	0.33	1.47	81
Total tobacco equipment						**72.61**	**3,994**

Burley barn and buildings (1ha)

		Value New			Share of	Annual Cost/ha	
	Life (yrs)	USD	ZWD	CRF	Use	USD	ZWD
Grading shed	15	250	13,750	0.0838	0.20	4.19	230
Building materials - barn	3	50	2,750	0.3535	1.00	17.68	972
Hired labour (55 days)	3	40	2,200	0.3535	1.00	14.14	778
Total burley barn and buildings						**36.01**	**1,980**

DERIVATION OF ANNUAL INVESTMENT COSTS - Communal and Resettlement Farmers

Capital Recovery Factor (CRF)

Assume real interest on savings = 3%

CRF = (((1+i)^n)*i)/((1+i)^n-1) where i = interest on savings; n = number of years in the implement's useful life.

Cost per ha = value new * CRF * per ha share of use.

For basic model, assume 5 ha total (arable) of which 3ha are cultivated each year (1ha tobacco, 2ha other crops, 2ha fallow).

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Basic Equipment (excluding tobacco specific items)

		Value New			Share of	Annual Cost/ha	
	Life (yrs)	USD	ZWD	CRF	Use	USD	ZWD
Small tools	10	150	8,250	0.1172	0.20	3.52	193
Bicycle	6	75	4,125	0.1846	0.20	2.77	152
Knapsack sprayer	6	30	1,650	0.1846	0.20	1.11	61
Watering cans, other tools	5	25	1,375	0.2184	0.20	1.09	60
Total basic equipment						**8.49**	**467**

Assume use hired ox team for cultivation (ZWD 950/ha)

Flue barn and buildings (1ha)

		Value New			Share of	Annual Cost/ha	
	Life (yrs)	USD	ZWD	CRF	Use	USD	ZWD
Grading shed	15	350	19,250	0.0838	0.20	5.86	323
Flue pipes	6	13	733	0.1846	1.00	2.46	135
T-pipes	6	27	1,467	0.1846	1.00	4.92	271
Elbow joint	6	53	2,933	0.1846	1.00	9.85	541
Empty drums	10	27	1,467	0.1172	1.00	3.13	172
Thermometer	10	7	367	0.1172	1.00	0.78	43
Building materials	15	400	22,000	0.0838	1.00	33.51	1,843
Hired labour (45 days)	15	33	1,800	0.0838	1.00	2.74	151
Total flue barn and buildings						**63.25**	**3,479**

Assume use hired bale press (ZWD 40/bale)

Burley barn and buildings (1ha)

		Value New			Share of	Annual Cost/ha	
	Life (yrs)	USD	ZWD	CRF	Use	USD	ZWD
Grading shed	15	250	13,750	0.0838	0.20	4.19	230
Building materials - barn	3	50	2,750	0.3535	1.00	17.68	972
Hired labour (55 days)	3	40	2,200	0.3535	1.00	14.14	778
Total burley barn and buildings						**36.01**	**1,980**

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