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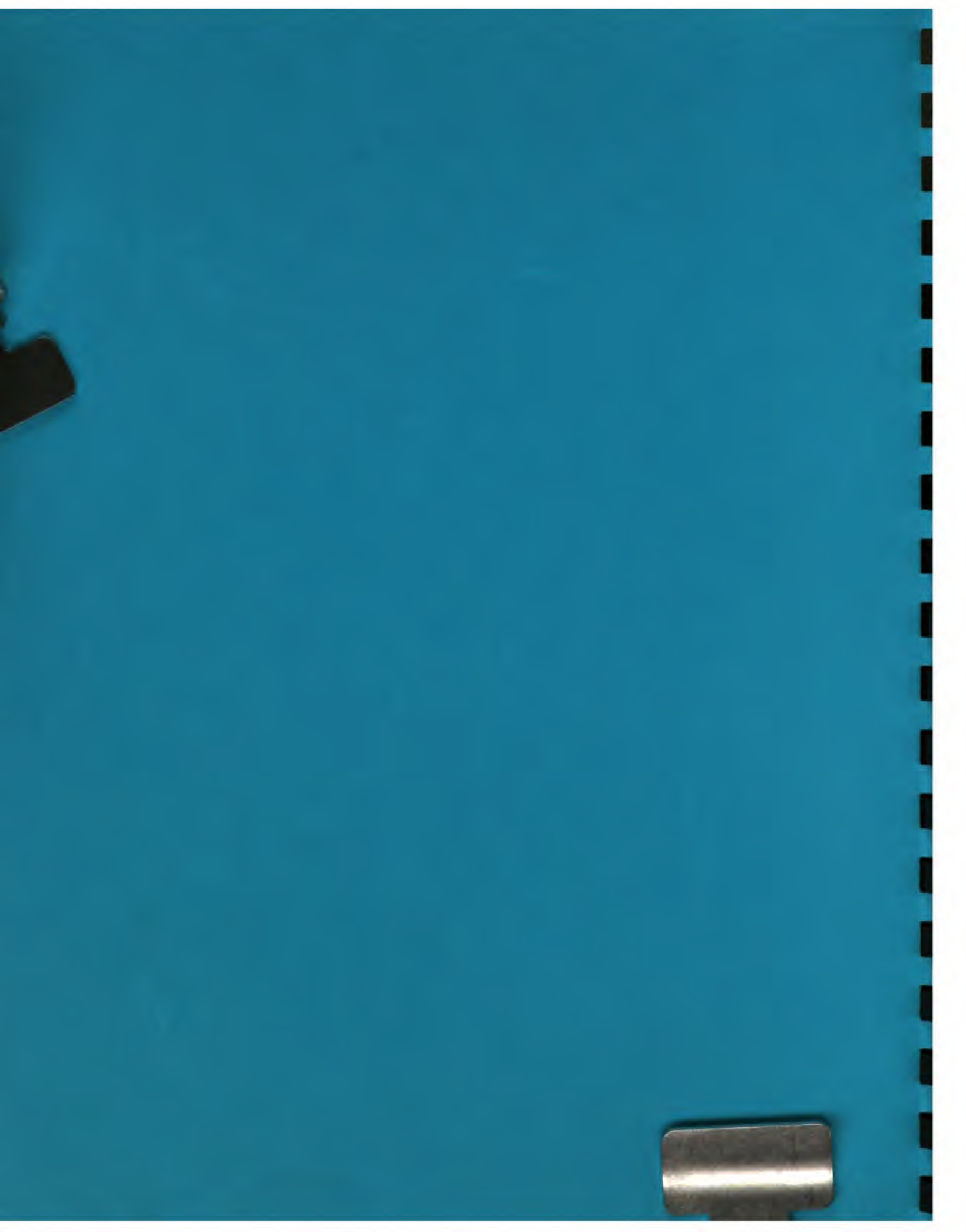
OECS
AGRICULTURE DIVERSIFICATION
CO-ORDINATING UNIT

Competitiveness of the Non-Traditional Agricultural Sector in the OECS: a Diagnostic Analysis

Volume I

*Prepared for the Organisation of Eastern Caribbean States (OECS)
Agriculture Diversification Co-ordinating Unit (ADCU)
with
Joint Funding from USAID Project No.538-0163
and
the Inter-American Institute for Co-operation on Agriculture*

November, 1993



***Competitiveness of the Non-Traditional
Agricultural Sector in the OECS :
a Diagnostic Analysis***

Volume I

by

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Executive Summary

Interest in the commercialization of non-traditional (fresh tropical fruits and vegetables) commodities gained considerable impetus in the Organization of Eastern Caribbean States (OECS) sub-region during the 1980's as a result of the agricultural diversification initiative. This interest was spawned by a number of factors including the desire of these countries to pursue economic policies aimed at improving nutrition, increasing employment through import substitution and stimulating economic growth through increased trade. The Caribbean Basin Economic Recovery Act (CBERA) enacted by the U.S. Congress in 1984 also provided some stimulus as did the potential opportunities of a unified European market from 1992.

Reorientation of production and trade through an emphasis on increased non-traditional exports is of particular significance for the sensitive OECS agricultural sector given the potential elimination of preferential access for traditional commodities to the markets of industrialized countries. It is hoped that these new non-traditional export crops will augment, if not replace, the contribution to gross domestic product, employment and producers incomes of the traditional banana and sugar exports.

This study assessed the competitiveness and foreign exchange earning capabilities of thirty one commodities across eight OECS territories, on the basis of prevailing prices, costs, agricultural policies and market conditions. Of the many factors commonly advanced as justification for the development of an export oriented agriculture in the island states of the Caribbean, the limited size of domestic and regional markets is perhaps the most convincing. Indeed, the 1970s and 1980s, which witnessed the emergence of regional import substitution policies, indicate that in small developing countries maintenance of an outward orientation is a "sine qua non" for sustained economic growth.

This study departs from previous analyses of the export potential of non-traditional commodities produced in the OECS sub-region by employing the Domestic Resource Cost (DRC) measure to assess the relative economic efficiency of non-traditional agricultural commodities in the OECS. In so doing many of the shortcomings of previous initiatives are addressed. Additionally, the study interprets the estimated DRCs against trends in the U.S market to determine the commodities which appear best suited for promotion as foreign exchange earners.

The analysis is useful to policy makers, planners, producer organizations and international financing agencies interested in engaging in or facilitating non-traditional agricultural exports from the OECS sub-region. The analysis will also help to provide policy makers with guidelines of real and financial costs and returns of pursuing various policy alternatives.

The results of the DRC analysis by commodity indicated that the OECS countries in general possessed a strong potential competitive advantage in the production of certain tropical

fruits, root crops and tubers. Results for cut flowers and temperate vegetables were somewhat less encouraging. Of equal importance is the finding that this competitive advantage varied both across countries and commodities.

Except for the commodities which were classified as being moderately competitive with the DRC measure, there was generally low sensitivity of the results to variations in the cost of labour. This implied that individually, minor variations in labour costs will have a relatively small impact on the commodities which are presently competitive.

The sensitivity of the DRC results to variations in yields can be taken to be an indication of the importance of productivity-based factors in determining the competitiveness for OECS non-traditional products. Conversely, the massive improvements in yields for many of the commodities which are not presently competitive constitute an incontrovertible indicator of the difficulty which member states of the OECS will encounter in developing export competitiveness for said commodities. For individual roots and tubers as well as for tropical products, the results suggest that yields do not constitute a substantial barrier to the attainment of competitiveness in the short-run. Another finding was that extreme volatility in the non-intervention prices for specialty products is likely to impact adversely on the export competitiveness of OECS non-traditional products. The low sensitivity of the DRC coefficients to observed historic variations in the non-intervention price however, suggests that the results are fairly robust to moderate variation in price.

We hasten to emphasize that the economic analysis conducted in this study should not be the only basis for encouraging or discouraging non-traditional crop production in member countries of the OECS. The existence of socio-economic and political objectives should be considered in the application of the empirical results presented. By considering social and private costs, as well as the effects of market distortions, however, the economic analysis presented here makes the opportunity costs of such modifications more transparent. In this regard, the present study provides a strong objective basis for policy evaluation of agricultural diversification programmes in the OECS sub-region.

List of Acronyms

ADCU	Agriculture Diversification Co-ordinating Unit
AGSYS	Technical Production Budget Generator
APHIS	Animal and Plant Health Inspection Service
BVI	British Virgin Islands
CARDI	Caribbean Agricultural Research and Development Institute
CARICOM	Caribbean Common Market
CBERA	Caribbean Basin Economic Recovery Act
CBI	Caribbean Basin Initiative
CDB	Caribbean Development Bank
CF	Conversion Factor
CIF	Cost, Insurance and Freight
DRC	Domestic Resource Cost
DDRC	Direct Domestic Resource Cost
EMP	Probability of Employment
FOB	Free on Board
IICA	Inter-American Institute for Co-operation on Agriculture
LIAT	Leeward Islands Air Transport
NAFTA	North American Free Trade Agreement
NIP	Non-Intervention Price
OECS	Organisation of Eastern Caribbean States
OECS-CCP	OECS Council on Competitiveness and Productivity
SCF	Standard Conversion Factor
SWR	Shadow Wage Rate
TDRC	Total Domestic Resource Cost
TROPRO	Tropical Products Support Project
UF	University of Florida
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
UWI	University of the West Indies
WACC	Weighted Average Cost of Capital



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INTRODUCTION

Of the many factors commonly advanced as adequate justification for the development of an export oriented agriculture in the island states of the Caribbean, the limited size of domestic and regional markets is perhaps the most convincing. Indeed, the 1970s and 1980s, which witnessed the emergence of regional import substitution policies, indicate that in small developing countries maintenance of an outward orientation is a "sine qua non" for sustained economic growth.

Such an export thrust is of particular significance for sensitive sectors such as agriculture, where the potential elimination of preferential access to the markets of industrialized countries has initiated the search for alternatives to traditional agricultural exports. It is hoped that these new non-traditional export crops will augment, if not entirely replace, the contribution to gross domestic product, employment and producers incomes of traditional banana and sugar exports. The significant contribution which sugar and bananas make to foreign exchange earnings along with the obvious negative economic repercussions caused by reduced preferential market access, constitute the primary impetus for renewed interest in agricultural diversification programmes in many countries of the region.

Typical of such agricultural diversification initiatives throughout the Caribbean, interest in the commercialization of non-traditional (fresh tropical fruits and vegetables) commodities has gained considerable impetus in the Organization of Eastern Caribbean States (OECS) sub-region during the 1980's. This interest was spawned by a number of factors including the desire of OECS countries to pursue economic policies aimed at improving nutrition, increasing employment through import substitution and stimulating economic growth through increased trade. The Caribbean Basin Economic Recovery Act (CBERA) enacted by the U.S. Congress in 1984 also provided some stimulus as did the potential opportunities of a unified European market from 1992.

The interrelationship between a country's macroeconomic policies and producer/exporter decisions at the micro-economic level is highly complex and difficult to analyse. This relationship however, is central to the identification of both inter- and intra-country competitiveness. Ranking commodities in terms of their ability to generate or save foreign exchange constitutes a particularly inciteful means of assessing competitiveness. Measuring competitiveness in terms of foreign exchange earning abilities directly links the economic analysis to the objectives of the OECS Diversification Programme.

The divergence between the private and social costs of production as well as the distortions which may be inherent in product and input price data generally preclude the simple comparison of costs and returns in determining the net foreign exchange earning abilities of alternative non-traditional production initiatives. To date, studies of agricultural diversification undertaken in the OECS which attempt to evaluate crops in terms of their foreign exchange earning potential have been carried out on a fairly arbitrary basis. Indeed, in these previous

studies the economic feasibility of producing a given specialty crop, be it for domestic, regional or international markets, was based primarily on cost of production. The heavy reliance on such generic cost of production data, as well as other methodological shortcomings raise serious questions about the validity of the commodity rankings upon which they are based.

This study represents a significant departure from previous analyses of the export potential of non-traditional commodities produced in the OECS sub-region by employing the Domestic Resource Cost (DRC) measure to assess the relative economic efficiency of non-traditional agricultural commodities in the OECS. In so doing the many of the shortcomings of previous initiatives are addressed. Additionally, the study interprets the estimated DRCs against trends in the U.S market to determine the commodities which appear best suited for promotion as foreign exchange earners.

The analysis is useful to policy makers, planners, producer organizations and international financing agencies interested in engaging in or facilitating non-traditional agricultural exports from the OECS sub-region. Sensitivity results on key parameters such as yields, prices and labour costs, will give an indication of the feasibility of pursuing export oriented projects for certain commodities which may not presently be competitive in international trade. The analysis will also help to provide policy makers with guidelines of the real and financial costs and returns of pursuing various policy alternatives.

It should be emphasized that the economic analysis conducted in this study should not be the only basis for encouraging or discouraging non-traditional crop production in member countries of the OECS. The existence of socio-economic and political objectives should be considered in the application of the empirical results presented. By considering social and private costs, as well as the effects of market distortions, however, the economic analysis presented here makes the opportunity costs of such modifications more transparent. In this regard, the present study provides a strong objective basis for policy evaluation of agricultural diversification programmes in the OECS sub-region.

There are, however, important caveats to this analysis which should be borne in mind. The first is that the study is not intended, nor does it purport to provide a definitive listing of the alternative crops which should be grown in each OECS territory. As such, no attempt will be made to identify the crop combinations or the acreage which should be cultivated on a country by country basis.

Secondly, the study assesses competitiveness and foreign exchange earning capabilities on the basis of prices, costs, agricultural policies and market conditions that prevailed during 1992-93. In interpreting the results it is important to remember that while the basic economic conditions underlying the results of the study are not likely to be significantly altered in the immediate future (e.g. 1993-94 crop season), wholesale acceptance of the results beyond this time limitation, is not advisable without a reevaluation of the model.

In short, the analysis is not intended to provide a long term blueprint for agricultural diversification in member countries of the OECS, but rather a short term basis for the formulation of market based policy initiatives. Indeed, use of the results of this analysis as an indicator of the best allocation of individual country resources to achieve net foreign exchange earnings will greatly enhance the probability of attaining the objectives of agricultural diversification.

The study is presented in two volumes. In the following section of the present volume, the concept of competitiveness is clearly defined and the DRC methodology is detailed. Additionally, various institutional and infrastructural elements critical to achieving and sustaining competitive position in regional and international markets for non-traditional agricultural commodities are presented. The third section presents the empirical results of the study on both a commodity by commodity basis and across countries. The final section of Volume I, contains the conclusions and recommendations implied by the empirical results of the study. Volume II contains individual crop summaries including trade and market data, and the technical data used in the estimating the DRC estimates.



METHODOLOGY

Introduction

Competitiveness has become a buzz word of the 1990's in both economic and political circles. Whether one considers large industrialized countries such as the United States, or small island states such as those that comprise the OECS, discussions of national and international competitiveness abound. Given the prevalence of such discussions, it is surprising that no unified definition of the term exists. In fact, a recent survey of the relevant literature revealed over 156 differing definitions of competitiveness.

Perhaps more surprising is the fact that many, if not most, definitions fail to place in proper context the concept of competitiveness. This is most prevalent in discussions concerning "national competitiveness" where broad statements concerning one nation vis-a-vis another are commonplace. Oftentimes, competitiveness is considered to be a state of attainment, rather than being correctly interpreted as a transient economic state. Treating competitiveness as a mere state of attainment ignores the importance of sustainability and the role that competitiveness plays in fostering economic growth.

To place the concept of competitiveness into its proper context, it is not sufficient to merely address the question "is this enterprise competitive" but rather the question, "with what is this enterprise competitive" must be asked. In this regard, and of special relevance to the ex ante appraisal of competitiveness which constitutes the focus of the present study, there are three distinct contexts within which competitiveness may be analyzed.

The first relates to the competitiveness of a given enterprise within the domestic economy. Here, the relevant question is, "whether or not a given enterprise is competitive with other enterprises which seek to utilize the same resources within the domestic economy." All productive activities compete for the domestic resources with which a country is endowed. The analysis of competitiveness in this regard seeks to assess whether the economic value generated by one enterprise exceeds that which must be given up by some other enterprise as domestic resources are reallocated. In this regard the concept of competitiveness is closely related to that of comparative advantage which is the focal point of classical trade theory.

The remaining two contexts derive from what has come to be the fairly broadly defined area of international competitiveness. The "object" of international competitiveness is often defined only as foreign producers. However, for the purpose of precise discussion and analysis, it is necessary to distinguish the markets in which competitiveness is being considered. Failure to do so can lead to misdirected or ineffective policy prescriptions.

International competition can occur in either the domestic country's markets or in the foreign country's markets. In the former case, competitiveness must be analyzed in terms of the ability of domestic enterprises to compete with foreign imports. In this context, the relevant

issue is whether or not domestic producers of a given commodity are competitive with foreign importers. The assessment of competitiveness within this context is of special relevance to OECS countries where discussions concerning import substitution and food-security are prevalent, and policies attempting to effect such substitution are commonplace.

Competitiveness may also be analyzed within the context of foreign, or export, markets. This is, perhaps, the context within which international competitiveness is most often, implicitly considered. The relevant question here is, whether or not domestic producers are competitive in a given export market. Competitiveness within this context is of relevance to OECS countries, since the search for nontraditional agricultural commodities with "export potential" has been fundamental to the region's agricultural diversification goals.

While placing the analysis in the proper context(s) is critical to proper assessment of competitiveness, so too is the recognition that competitiveness is a transient economic state. In this regard, competitiveness must be viewed from a dynamic rather than static standpoint. This suggests that it is not sufficient to merely determine that some enterprise is "competitive" in a given market at one point in time, but to also identify the determinants of competitiveness. Only when such determinants are known can analysis and discussion of the factors that ensure a competitive position proceed. An understanding of these dynamics is critical to ensuring that a static competitive advantage is translated into economic growth.

Given the preceding discussion, it is clear that proper empirical analysis of competitiveness must begin with a clear and precise definition that is dynamic and attempts to place the analysis in the proper context. To this end, competitiveness is defined in the present study as:

The sustained ability of a given firm to participate profitably in a given domestic or foreign market.

While seemingly simplistic, this definition, which follows Antoine (1992), allows for the analysis of competitiveness to proceed in a manner consistent with the concepts previously discussed. The definition makes clear that competitiveness is a dynamic state that must be sustained, and that it must be defined in terms of a given foreign or domestic market.

By defining competitiveness in terms of profitability, the definition is moved away from traditional cost based measures which assess only absolute competitiveness and toward the direction of the traditional concept of comparative advantage. Furthermore, the use of profitability provides a firm theoretical foundation for the use of domestic resource cost as an empirical measure of competitiveness. Domestic resource cost, as will be demonstrated not only provides a theoretically consistent measure of the competitive position of an enterprise in a given market, but also permits the identification and analysis of factors influencing the ability of an enterprise to sustain or improve its competitive position.

Empirical Measures of Competitiveness

To some extent, all empirically based measures of competitiveness find their origin in the principle of comparative advantage. Within the theory of international trade, there have been several explanations offered in regard to the origins of comparative, and hence competitive advantage. Classical trade economists such as Ricardo argued that comparative advantage was based on differential labour productivity between countries. In the mid-twentieth century, the Heckscher-Ohlin-Samuelson model, which argued that comparative advantage was the result of differing factor endowments among countries, gained favor. More recent explanations of the origins of comparative advantage range from "neo-technology" models which advance that less developed countries enjoy comparative advantages in commodities in which the technology has become standardized, to what has been termed the "new trade theory" which advances the role of imperfect markets and economies of scale.

The view that comparative advantage will translate into a competitive advantage presupposes the existence of an equilibrium exchange rate and the complete absence of market distortions. Clearly such conditions are not reflective of the real world. As a result, numerous empirical measures of competitiveness have been employed.

Comparative Cost Analysis

The use of comparative costs remain central to the assessment of competitiveness. However, Van Duren et al (1992), recently argued that, although the theory of comparative costs remains central to the theory of comparative advantage, there are no studies of competitiveness which apply the theory correctly. Several studies have utilized differences in costs as an indicator of competitiveness. Such an approach is flawed, however, since cost differentials permit little to be inferred about competitiveness. Indeed, a country with an absolute cost disadvantage in all commodities could still trade successfully (i.e. be competitive in international markets) by concentrating on the products where its absolute cost disadvantage is least. This is because the opportunity cost of doing so is less than in other countries.

In many instances, inferences on competitiveness based on comparative cost analyses are further confounded by comparing only the differences in the costs of selected inputs. Labour cost differentials, costs of intermediate materials or capital have been primary partial cost measures used in these types of analyses.

It should be noted that the majority of studies which purport to measure competitiveness in CARICOM or OECS agriculture fall into this category. As such these studies are fundamentally flawed, since they stand at variance with economic theory.

Productivity Based Measures

Various productivity-based measures have also been used in the measurement of agricultural competitiveness. Such measures are predicated on the incipient role of comparative costs in the determination of competitiveness. Of the studies which employ variants of the productivity measurement in the analysis of international competitiveness, few do so correctly. The majority of such studies employ partial productivity, as opposed to the more appropriate and theoretically consistent multi-factor productivity measure. In addition to the inappropriateness of partial productivity measures, empirical applications of these measures is further complicated by the highly restrictive assumptions upon which they are based. In practical applications, it is often difficult to satisfy the conditions inherent in the theory.

Revealed Competitiveness Measures

Revealed competitiveness measures based on observed trade flows constitute perhaps the most prevalent method currently being employed to assess competitiveness. These measures utilize observed trade data, generally in the form of export and import shares, and attempt to make inferences concerning changes in competitiveness as revealed by changes in trade patterns. While several variants of these measures have been used for assessing competitiveness for various categories of manufactured goods, relatively few attempts have been made to use them to evaluate competitiveness among agricultural products.

The most common variant of revealed competitiveness measures uses growth in export market share as an indicator of competitiveness. Another commonly used variant, advanced by authors such as Porter and West, and Hunt and Vollrath emphasizes net export performance as a measure of competitiveness. One of the difficulties with this type of measure is that increasing export market shares are not always indicative of increasing competitiveness. Hence these measures can be potentially misleading. The use of actual export market share data in conjunction with changes in the total size of the market provide a superior indicator of competitiveness.

Revealed competitiveness measures also suffer from an additional limitation which is of particular significance to the present study. Their dependence on historical trade data allows only ex-post analysis of competitiveness and precludes analysis of commodities for which inadequate trade data exist. Therefore, for ex-ante analysis, revealed competitiveness measures cannot be used.

Domestic Resource Cost Measures

The use of technical production coefficients and data obtained from surveys on the private and social costs of producing a commodity has been advanced as one methodology that permits the assessment of competitiveness to proceed in a manner most consistent with the theoretical concept of comparative advantage. A measure that is firmly entrenched with this type of methodology is the domestic resource cost (DRC). Originally proposed by Bruno (1972), and

subsequently refined by others (e.g. Pearson and Meyer, 1974; Nishimizu and Page, 1986) the DRC is consistent with the definition of competitiveness adopted in this study and facilitates the analysis in a manner that is both comprehensive and theoretically consistent with the concept of competitive analysis previously discussed in this chapter.

The DRC measures competitiveness of a given enterprise by simultaneously evaluating two distinct criteria: social profitability (presently defined) and net foreign exchange earning potential. If based on the calculated DRC, an enterprise is revealed to be socially profitable and generates positive net earnings of foreign exchange, that enterprise is considered to be competitive with a given market. If either of these two criteria are not satisfied, the enterprise is deemed non-competitive.

In heuristic terms, the DRC is defined as

$$\text{DRC} = \frac{\text{shadow value of total domestic resources}}{\text{value added at world prices}} \quad (1)$$

where all values are expressed in domestic currency units. To appreciate the meaning of the DRC, it must be understood that the resources available in an economy for producing goods and services at any point in time may be placed into three distinct categories: 1) primary factor endowments (land, labour and capital); 2) domestically produced intermediate materials and; 3) imported intermediate materials. A country's domestic resources are those factors in the first two categories.

The numerator in the above expression measures the cost of domestic resources required to produce one unit of a given product. However, the cost of the various domestic inputs, rather than being evaluated at market prices, are valued at their shadow (opportunity) cost, or equivalently the value lost to the economy as a result of reallocating these factors from their most efficient alternative use to the enterprise being evaluated. It is important to emphasize, that in an economy with perfectly functioning markets and no market intervention, market prices and shadow prices will be identical. However, in reality, markets do not function perfectly, and market intervention abounds. As a result, market prices and shadow prices diverge, oftentimes, substantially.

The denominator of the expression represents the value added to domestic resources when combined with imported factors of production to produce one unit of output. In contrast to the numerator, which values domestic resources in terms of their shadow value, imported inputs and output are valued at world prices (expressed in domestic currency units) adjusted for all distortions and government interventions such as tariffs, duties and so forth. World prices adjusted in such a manner may be termed non-intervention prices.

Given these definitions, the DRC provides a clear quantitative measure of competitiveness. If, for a given enterprise, the shadow cost of domestic resources exceeds the value added to these resources, then the calculated value of the DRC will be greater than 1. While the enterprise is profitable when evaluated at non-intervention prices, there is a net loss of foreign exchange. In this case, the enterprise is deemed non-competitive as the second of the two criteria for competitiveness is not satisfied.

If, for a given enterprise, the social cost of domestic factors is less than the value added to these factors, the calculated value of the DRC will be less than 1, the enterprise is then judged to be competitive. Both of the requisite criteria are satisfied. The enterprise is both profitable at non-intervention prices and results in net foreign exchange earnings.

The case where DRC is less than zero, clearly indicates that a given enterprise is non-competitive. In this instance, the enterprise when evaluated at non-intervention prices returns a loss to domestic factors. Neither criteria for competitiveness has therefore been met. There is clearly a loss of foreign exchange and the enterprise imposes an efficiency loss on the economy.

Estimation of Domestic Resource Costs

While the above expression provides the basis for an heuristic understanding of DRC, empirical implementation of the measure requires a more precise analytical definition. Such a definition is given by:

$$DRC_i = \frac{\sum_{j=k+1}^n a_{ij} V_j}{P_i^f - \sum_{j=1}^k a_{ij} P_j^f} \quad (2)$$

Where p_i^f denotes the foreign price of the output; P_j^f the foreign price of the input; a_{ij} , $j = 1$ to k , the amount of input j , required to produce one unit of product i ; a_{ij} , $j = k+1$ to n , the coefficient for domestic resources and non-traded intermediary inputs; and v_j represents the shadow price of domestic resources or non-traded inputs.

The DRC as defined in equation (1) only constitutes a measure of comparative advantage when production and other costs are computed in terms of the domestic primary factor content (Lucas, 1981). A modified formulation of DRC as a measure of comparative advantage is the total domestic resource cost (TDRC) by Kruger (1966) and Bruno (1967). This formulation measures the cost of intermediate goods domestically in terms of their primary factor content. The TDRC was compared to the Direct Domestic Resource Cost (DDRC) measure, popularized by Balassa and Schydlofsky,(1968), which evaluated all intermediates at world prices converted

by the shadow price of foreign exchange. Lucas (1981) found that only when no prior restrictions on trade existed were the DDRC and TDRRC approaches equivalent. In instances where an activity utilizes domestically produced inputs under protection, the DDRC should be used since protection artificially inflates the domestic value added component of the inefficient input producing activity, which is included in the numerator of the TDRRC.

The credibility of the DDRC as a measure of comparative advantage is however hinged on the absence of distortions, a condition not likely to exist in reality. When no distortions exist DDRC is a measure of absolute competitiveness in that it ranks commodities according to their ability to earn/save foreign exchange.

However it is the concept of relative as opposed to absolute competitiveness that is required for the analysis of inter-country commodity competitiveness. It can be shown that a relative measure of competitiveness may be defined using the DRC. This measure is represented by:

$$DRC^*_{I,II} = \frac{\frac{\sum_{j=k+1}^n a_{ij}^I V_j^I}{P_i^* - \sum_{j=1}^k a_{ij}^I P_j^{I'}}}{\frac{\sum_{j=k+1}^n a_{ij}^{II} V_j^{II}}{P_i^* - \sum_{j=1}^k a_{ij}^{II} P_j^{II'}}} \quad (3)$$

where superscripts I and II denotes country I and II, respectively.

If $DRC^*_{I,II} > 1$, then it can be argued that production is more competitive in Country II than in Country I. It is only in this sense that DRC can be argued to be a measure of international competitiveness. In the case where both countries have $DRC < 0$, it is still possible to have $DRC^*_{I,II} > 0$, however while country I will be competitive relative to country II, neither will be competitive with respect to domestic resource use. The DRC measure given in Equation (3) differs from Equation (2), because the denominator has been normalized on the official exchange rate, since this variable is common across OECS countries.¹ The modified measure given by $DRC^*_{I,II}$ is also more convenient for empirical analysis. The model has also been

¹ For the BVI which is the only OECS country operating on the U.S. dollar regime, the official exchange rate of U.S \$1.00 = E.C. \$2.70 was used to convert from private to social prices. This fixed parity between the U.S and E.C dollar and the absence of unofficial currency markets, justified this normalization.

modified to account for the non-existence of an active market for agricultural land in most OECS countries.

The appeal of the DRC methodology is that it can be computed in relatively data scarce environments and is not distorted by implicit subsidies, such as those which exist for a number of import-substituting products. In computing estimates of the competitiveness of each commodity, it is necessary to account for implicit subsidies that are paid by consumers where imports are prohibited or controlled, or where import tariffs and taxes are used to raise domestic producer prices. As OECS countries enter into a new era of trade liberalization, internal adjustments and rationalization of domestic policies, information on relative competitiveness performance is likely to become increasingly important. Another use to which the information gathered could be put is the identification of priority commodities for government assistance and support. Ideally regional governments should concentrate on assisting commodities with either a proven competitive advantage or commodities with the potential to be competitive within some reasonable time-frame.

Computation of Shadow Prices and Conversion Factors

For the purposes of this study, land, labour, capital, water and planting material (once they are propagated/produced domestically), are classified as domestic factors. Tradeables are here defined as goods which are traded or have the potential of being traded internationally. Such factors include agro-chemicals (fertilizers, pesticides, herbicides) plants (if imported), seeds, irrigation equipment, machinery, fuel and packing materials used in the production process.

A vector of shadow prices (social prices) corresponding to the factors utilized in the production process were constructed for each of the OECS countries.

Agricultural Land

The value of land in the production process should represent the discounted capitalized future stream of income generated by the services of land as well as its opportunity cost. The demand for land is also a derived demand, and the profitability of commodity production will be capitalized to varying extents in land values. To the knowledge of the authors, no defensible shadow valuation for land exists for any of the OECS countries. Complications with the shadow valuation of land is not unique to this study and partly accounts for the omission of this variable in most studies which apply the DRC methodology to the assessment of competitiveness in agriculture.

It is possible to show mathematically however, that exclusion of the land variable does not substantially impair the validity of the DRC measure. Equation (3) may be expressed as:

$$DRC^*_j = \frac{v_k K + v_m M + v_z Z + v_l L + \sum_{n=1}^N A_n}{P_w - v_{imp} W_{imp} - \sum_{m=1}^M A_m} \quad (4)$$

where v_k denotes the shadow price of capital; v_m the shadow price of material inputs; v_z the shadow price of land; v_l the shadow price of labour; v_{imp} the shadow price of imported inputs; $A_{n,i}$ the direct and indirect factor use by non-tradeable inputs used in the commodity production valued at shadow prices; A_i the direct and indirect tradeable inputs used by the non-tradeable inputs in the production of the commodity, valued at world prices, respectively, and W_{imp} , K , M , Z and L , represent the amount of imported inputs, capital, material inputs, land and labour used in producing the commodity.

Equation (4) can be rewritten as:

$$DRC^*_j = \frac{(P_w - v_{imp} W_{imp} - \sum_{m=1}^M A_m) - v_k K - v_m M - v_l L - \sum_{n=1}^N A_n}{Z} \geq v_z \quad (5)$$

By taking the left side of Equation (5) as a ratio of commodities I and II, and fixing $Z_1 = Z_2 =$ one acre, land becomes the numeraire and the DRC measure is changed slightly to reflect the net benefit from producing an extra unit of output per acre of land. Alternatively stated, the DRC measures the net benefit derived from using the same resources in competing agricultural enterprises.

Agricultural Labour

Two approaches were used to calculate the social wage rate (SWR) in agriculture. In the first approach (SWR₁), hourly agricultural wages based on a five hour work day, were compared to hourly wages in the manufacturing and service sectors. The SWR₁ is given by:

$$SWR_1 = \frac{\text{Marginal Wage in Agriculture}}{\{\min\} \text{ Marginal Wage in Manufacturing / Services}} \quad (6)$$

In the second approach (SWR_2), the opportunity cost of labour was estimated by the expected wage, defined as the wage rate for unskilled labour in manufacturing times the probability of employment (EMP). The proxy used for the probability of employment is one minus the unemployment rate. Thus, the effect of unemployment on the shadow wage rate is accounted for. The SWR_2 is given by:

$$SWR_2 = (1-EMP) * w_m \quad (7)$$

where W_m represents hourly wages for unskilled labour in manufacturing. For many of the OECS territories figures on unemployment are quite unreliable. SWR_2 was therefore used as a check of the social wage rate calculated via SWR_1 . For all eight OECS territories the social wage rates generated social conversion factors which were quite similar to estimates currently being utilized by the Caribbean Development Bank (CDB).

Real Cost of Foreign Borrowing

Development banks, special projects and Commodity Associations account for the largest proportion of credit to OECS agriculture. If loans for vehicle purchases are excluded from the analysis, the proportion of loans in agriculture to total lending declines to less than 2% for most OECS countries.² Based on 1992 data for Grenada, Dominica, St. Kitts/Nevis and the BVI, a weighted average cost of capital ($WACC_A$) was calculated for OECS agriculture. The $WACC_A$ ranged between 8.9% and 11.1%. The majority of credit was accounted for by consumer borrowing and loans to the distributive sector. Though loans to the agricultural sector were small in all OECS countries, it appeared that this was not the result of capital scarcity per se.

In general, the opportunity cost of capital was found to be less than the lending rate. The discount rate adjusted for inflation was calculated by:

$$\hat{r} = \left[\frac{(1 + WACC_A)}{(1 + \pi)} \right] - 1. \quad (8)$$

Where π denotes the inflation rate.

Computation of this expression resulted in an social conversion factor (SCF_C) which ranged from .60 to .70. Due to the improper treatment of the agricultural sector in existing studies of capital markets in the OECS and the associated complexities in imputing a value for risk, no adjustment was made for this factor in the present study.

²Based on-going work on agricultural incentives in the OECS.

Conversion Factors for Traded Factors

The conversion factors (CF) for traded inputs were based on their CIF or "FOB plus" price at the point of entry, net of consumption taxes, import duties, stamp duties, service charges, wharfage charges etc. Since most agricultural inputs are accorded duty-free entry in OECS member countries, the divergence between the private and the social prices was quite small. The social CF's were less than one in all cases, ranging from .89 to .97.

Conversion Factors for Professional Services

In the absence of any comprehensive study of labour markets and in the absence of any indications to the contrary, a CF for professional services of one was used throughout this study.

Conversion Factors for Traded Products

World reference prices were unavailable for most of the commodities covered in this study. As an alternative, non-intervention prices were calculated based on the most prevalent CIF price at the point of entry net of import duties, consumption taxes, tariffs, service charges, wharfage charges etc. The absence of long-term government support programmes for the fruit and vegetable industries in both the U.S and the Dominican Republic simplified the use of these prices as the benchmark in the analysis.³

Conversion Factors for Transport

The CF for transport was based on the difference between transport cost per unit of product given fuel prices "at the pump" (i.e. inclusive of import duties, consumption taxes and service charges) and the cost per unit of product computed on the basis of the CIF price for fuel at the point of entry. The labour component used in the provision of transport was converted to social prices via the CF for unskilled labour.

Conversion Factors for Packaging Material

Packaging material was decomposed into a labour and material component. The material inputs used in marketing were for the most part imported duty-free or at low rates of duty. Derivation of CF for material inputs was based on the difference between the CIF price of materials and the CIF-plus price actually paid by producer/exporters.

³ While there are indisputable government support programmes for many U.S produced agricultural commodities, support is concentrated on grains and oilseeds, beef, milk and milk based products etc.

The unit labour costs involved in packaging were estimated for the OECS. This labour component was converted to social prices via the CF for unskilled labour.

Domestic Prices and Border Measures

Domestic prices and border measures affecting trade for all the commodities covered in this study were collected with the assistance of the IICA country offices and with the Departments/Ministries of Agriculture and Trade for all eight OECS member states.

Choice of Variables for Sensitivity Analysis

Since the level of output, and non-intervention prices were mean values, sensitivity analysis was conducted to check the robustness of the DRC estimates. Non-intervention prices for import-competing products deviated between -7% and +15% of the "most prevalent" mean prices used as benchmark in the study. Sensitivity analysis for fruits and vegetables was based on the upper bound of the observed variation in non-intervention prices. For root crops and cotton in St. Kitts/Nevis sensitivity analysis was based on a 10% increase in the non-intervention price.

Unskilled Labour

Because the shadow price for labour is estimated, sensitivity analysis was undertaken on this variable to guard against estimation errors. The two lowest conversion factors observed for unskilled labour in Caribbean agriculture are for Trinidad and Tobago (.53-.60) and Jamaica (0.57). The labour sensitivity analysis for the OECS was therefore based on a CF of .57. The implicit hypothesis being tested is whether the DRC estimates and ranking of commodities would alter substantially, under the assumption that the labour productivity employed in OECS agriculture, was lower than is suggested by the respective country estimates of CF_L .⁴

Data

The data obtained by field work was used to create cost of production budgets on the AGSYS microcomputer budget generator developed at the University of Florida. AGSYS is designed to estimate cost of production through simulation of the production activities and decisions of an agricultural enterprise. The AGSYS program utilizes user created material and machinery data bases to calculate costs for all necessary production inputs such as agricultural chemicals, labour, machinery use, contracted services as well as less obvious costs such as

⁴ The desire to have sensitivity analysis performed on a lower value of the CF_L , also emerged as a recommendation from the one-day workshop held in St. Lucia.

overheads, depreciation, and interest on working capital. By constructing budgets through simulation of farm work plans and time tables, AGSYS offers the opportunity to determine the cost of production and to analyze numerous alternative management options.

Initial crop budgets were modified based on discussions at the UWI, IICA, the Ministries/Departments of Agriculture in all eight OECS member states, CARDI in St. Vincent, St. Lucia, Antigua and Grenada and with Fruit Crop Specialists at the University of Florida.

Transportation

Transport costs were calculated by weighting the cost of hire, container size and gasoline at the retail level, in each country in an index to reflect the per unit cost of transportation to and from the farm-gate. In the case of cut-flowers this was scaled appropriately to account for the fragile nature of the product in relation to the transport function.

Labour

Labour costs were estimated on the basis of an eight hour work day, using the wage rate in each OECS country. With the exception of St. Lucia, where wage rates showed more spatial and task-specific variation than elsewhere, the rates are calculated from standard daily rates paid in the agricultural sector. Based on the wage-rates paid by several producers of specialty agricultural commodities in St. Lucia, a rate of EC\$30.00 per day was used throughout the study. Where there were clear distinctions between tasks performed by men and women labour costs were expressed in manhours and womanhours, respectively. However where no clear distinctions existed, costs were given by either mandays or manday-equivalents. Manday-equivalents are used in the study to reflect tasks which may be performed by institutional and contractual arrangements other than the standard time based daily contracts.

Capital

A rate of interest of 10% was used throughout the study in relation to the user cost of capital. This rate was chosen to reflect the existence of project financing through farmers' organizations, development projects and other government financing windows. In addition, the rate was used to surmount the problem of variations in borrowing rates between producing agents and to facilitate cross-country comparisons of returns to production, which arguably is difficult to rationalize as being based on the efficiency of capital markets across countries.

Input Prices

All other inputs were valued in EC dollars at current market prices. In cases where 1993 prices were unavailable, the last quoted price for 1992 was used with an incremental 3% added to account for price increases between shipments. In the case of Antigua, wider variations in prices between shipments warranted the use of a 7% increment. The cost of water was also included in the budgets for Antigua and the BVI, to reflect the binding nature of this resource in the production process. The figure used in the study is the rate charged by the Water Authority for pipe-borne water supplied for agricultural purposes. In all other cases it was assumed that water was not a binding factor in production and that by and large production was non-irrigated (predominantly rain fed).

Land

Rent for the use of the land resource was not included in the study, as most producers seemed to be either owner-operators or to have access to land at terms which defied conventional economic principles. The study does not assume that land is free, but rather that returns to this fixed factor accrue to the owner-operator.

Supervision

A supervision rate of 7% was charged throughout. This was estimated on the basis of pre-harvest costs and is meant to be indicative of the salaries of the farm-manager. In principle if farms are owner-operated then this should be captured under returns to land and management, and should not be counted as a cost per se. However to facilitate comparison it is assumed that the enterprise is supervised by personnel other than the owner and that a salary is paid. It may be helpful to point out once again, the underlying assumption that the entity is a small commercial farm engaged in pure-stand production. All the technical costs of production budgets developed are for one acre in accordance with the modified DRC approach outlined above.

Institutional and Infrastructural Considerations

It is important to recognize that domestic resource cost represents only one piece of the puzzle that must be assembled to provide a comprehensive assessment of competitiveness within the OECS. Of equal, if not greater importance, is that the DRC be analyzed within the existing institutional and infrastructural characteristics of the market. While the DRC may suggest that the economic numbers "add up," other market characteristics may prevent potential competitive advantages as indicated by the estimated DRC from being realized. An estimated DRC of less than one therefore represents a necessary but not a sufficient condition for successful entrance and participation in the marketplace.

As noted in the foregoing discussion, within in the context of agricultural diversification in the OECS, the DRC provides insight into two fundamental dimensions of competitiveness:

1. **how does production of a given commodity compete for domestic resources within a given country as measured by value added, and**
2. **what is the competitive position of a given commodity in one country vis-a-vis another when measured in terms of the ability to earn/save foreign exchange.**

These are crucial informational elements that contribute to the process of identifying nontraditional commodities that have competitive potential in local, regional or international markets. These elements also suggest possible ex ante patterns of regional specialization. Of equal if not greater importance, however, is the identification and assessment of the "real world" factors that foster sustained competitiveness in the long run.

There are many factors that influence the ability of producers to sustain a competitive position. For purposes of exposition, however, these can be classified into two categories:

1. **economic infrastructure, and**
2. **operational institutions.**

Economic Infrastructure broadly refers to the environment in which economic activity occurs. For non-traditional agricultural commodities, this includes not only physical structures such as cold storage facilities and transportation networks, but also less tangible elements such as adequate credit mechanisms and market information systems.

Not only do these factors influence the competitiveness of market participants at all levels, but their importance grows as the assessment of competitiveness progresses from local to regional, and finally to international markets. Indeed, whereas production and marketing at the local level in domestic markets can (and in the case of the OECS often does) occur on an informal basis, in the absence of adequate economic infrastructure, such will not be the case in regional and international markets.

Operational Institutions refer to the subtleties and nuances that characterize the typical functioning of markets. Although operational institutions may be formal institutions, there are many informal institutions that are of extreme importance in understanding how markets actually function. This is especially true in markets for perishable horticultural products that generally comprise the nontraditional crops whose economic potential is being investigated in the OECS.

Economic Infrastructure

There are numerous elements that comprise the economic infrastructure which affects the ability of producers to sustain competitiveness. Within the context of agricultural diversification in the OECS, four of these assume importance:

1. **post-harvest handling systems**
2. **transportation systems**
3. **credit and financial systems, and**
4. **market information systems.**

Post-Harvest Handling Systems

Given the need to meet export quality standards, packing and grading facilities are the most obvious requisite element of infrastructure. Indeed, adequate facilities to grade and properly pack a product are essential to ensuring that quality suitable for export not only obtains at the farm, but also is maintained throughout transport to the market. While the need for such facilities is obvious, the importance of cost and scale within the overall context of economic feasibility is less so. In many cases, the requisite grading and packing facilities may be non-existent and hence, the investment cost to provide such structures must be incorporated into the analysis of economic feasibility. For specific commodities, a market window may well exist based on cost of production and marketing considerations alone, assuming the requisite grading and packing facilities exist. If they do not, the investment cost of such facilities, and who will bear the cost becomes an important issue.

Related to this, and of special significance to potential producers of nontraditional crops in the OECS, is the issue of scale economies. While the scale economies of grading and packing facilities are not large in an absolute sense, they can be large relative to the size of nontraditional farm enterprises. This suggests that investment in such infrastructure will only be justified for relatively large enterprises or through some other organizational arrangement such as cooperatives or public sector investment.

An additional physical infrastructure of importance to efficient post-harvest handling is the cold storage facility at transport embarkation points. Even if a product is properly graded and packed, quality will be compromised if adequate cold storage facilities do not exist to store products while awaiting shipment. As with grading and packing facilities, the key issue within the OECS is who should bear the cost of constructing such facilities. Recent research conducted by the TROPRO project suggests that cold storage facilities within the OECS are currently inadequate.

Transportation Systems

The importance of adequate transportation systems to sustained competitiveness becomes more apparent as the focus of agricultural diversification into nontraditional crops moves from local to regional to international markets. While local markets, which are often located near production areas, may be adequately accessed with minimal transportation infrastructure (i.e. passable roads), the movement of perishable agricultural commodities to regional or international markets requires the existence of more comprehensive and efficient transportation systems.

The two basic modes of transportation for moving nontraditional agricultural exports from the OECS to regional or international markets are by air and sea. Both modes are to some extent available to all countries in the OECS. However, being available to some extent and being available to a sufficient extent are two quite different concepts. As transportation can account for as much as 50% of the delivered (CIF) value of a crop, transportation costs impact the competitiveness of nontraditional agricultural exports.

There are three characteristics of transportation systems that affect the efficiency and hence the cost of transporting perishable products to regional or international markets:

1. route availability
2. route frequency, and
3. reliability.

Each of these factors are discussed below.

Route Availability

Transportation route alternatives are essential to the successful export of nontraditional agricultural crops. It is important that efficient routes to major distribution points exists for two interrelated reasons: market access and product quality.

The key element here is the efficiency of route alternatives which depend on the mode of transportation and the scale of shipments. For example, it will almost always be possible to move product from the Eastern Caribbean by air to regional or international markets. However the extent to which it may be done in a cost effective and efficient manner with minimum handling is the primary issue of concern.

In moving products to regional markets there is, in principle, adequate route availability through such carriers as LIAT. However, cargo capacity is limited and the absence of cold storage facilities at most regional airports inhibits the efficiency of moving products in this manner.

In terms of transportation to international markets, such as the U.S., adequate route availability exists. However, the extent to which these route alternatives admit to cost effective movement of product is dependent on numerous factors. Especially important is the number of different carriers or connecting flights required to reach the final destination. If numerous carriers are required, transportation costs may increase substantially as the need to change flights increases the probability of delayed shipments and increases the amount of handling required. Both of these can negatively impact product quality.

The existence of adequate routes can be especially problematic in cases where crops face enterability restrictions into the U.S. (e.g. North Atlantic ports only). In many cases, Canada is viewed as an alternative export market. However, APHIS quarantine restrictions limit the geographical points in the U.S. where such products can be transshipped. It is often the case that air shipping routes to Canada requires an excessive number of carrier changes making both the cost of shipment and risk of quality deterioration high.

Maritime route alternatives are considerably more limited than those available by air. Research recently conducted by TROPRO, suggests that the current regional sea transportation system is inadequate to support the efficient movement of perishable products intra-regionally. Ships are usually small and of questionable sea worthiness, and service tends to be unreliable.

There are adequate route alternatives for the movement of nontraditional crops to international markets. However, the problem lies in the frequency of transportation. Additionally, the small volumes expected to be exported from individual countries suggest that regional assembly points may be required to create adequate volumes for cost effective shipping via lines.

Route Frequency

It is often the case that U.S. buyers of specialty products require consistent volumes to satisfy customer demand. In attempting to minimize the number of firms (or individuals) with which they must deal, buyers place importance on the ability to obtain a consistent supply of product. If the frequency of transportation is not sufficient to ensure shipments for the duration and in the volumes required, producers may effectively be excluded from the market despite good product quality and competitive costs.

At present, most of the movement of nontraditional agricultural exports occurs on passenger carriers. This situation results from insufficient volumes of product to support dedicated air shipments via cargo carriers. It should however be noted that AmeriJet operating out of Miami has begun some limited cargo service to the region on an experimental basis.

The inability to support dedicated air cargo carrier service necessitates that commodity shipments conform to passenger oriented schedules. This creates inefficiencies that complicate production scheduling and can result in increased transportation costs.

Reliability

The paramount importance of product quality and the perishability of non-traditional agricultural exports make it necessary to have a carrier service that is both reliable and knowledgeable in the handling of fresh products and reliable. While such considerations may seem obvious, fairly often the transportation agencies modes connecting the small countries of the Eastern Caribbean to the U.S. are not experienced in handling perishable products such as tropical fruits and fresh vegetables. This lack of experience has often resulted in unfulfilled promises of cargo delivery and delayed delivery where it does occur. The ultimate effect of this on producers is usually reflected in price adjustments because of low quality product, or in the worst case scenario, rejection of the shipment. While the former is undesirable, the latter is disastrous.

Credit and Financial Systems

The importance of financing in export oriented nontraditional agriculture is well known. Because of the high degree of risk associated with the production of nontraditional crops for export, the acquisition of production financing through traditional commercial sources is often difficult. This is because financial institutions may either refuse to lend the funds in the amount required, or set collateral requirements so high that a large number of potential borrowers are excluded. As such, alternative financing arrangements either through government targeted loan programmes or the acquisition of foreign investment capital are required.

In developing such financial arrangements to fill the breach, it becomes necessary to maintain a long, or at least intermediate, term perspective. This is because it is somewhat of a standard "rule of thumb" that over a five year period producers of nontraditional crops can expect to lose money two years, breakeven once, make a little money in one year, and make huge returns in another. When viewed over the entire five year period, the enterprise may be economically attractive, however, any one year may be very good or very bad.

This implies that the ability to obtain capital financing for production on a short term basis may be insufficient to meet producer needs. Financial commitments must of sufficient duration to allow the gains from the good years\losses from the bad years to average out. This is even more critical in the case of new crop introduction, where the likelihood of early losses increases as producers begin moving along their learning curves.

Market Information Systems

The traditional economic definition of a market is a "place" where buyers and sellers exchange goods and services. It may be argued, however, that what is actually exchanged prior to goods and services is **information**. In the absence of the information on commodity supply and demand conditions, transactions cannot take place (or at least cannot occur in an economically rational manner) and in effect, a market cannot exist.

As regards agricultural diversification, the importance of market information grows when one examines local, regional, and finally to international markets. As already noted, many local markets for nontraditional commodities function informally and the need for market information is minimal. Often the only information which is often required is the day(s) of the week that the market is open and where it is located.

In considering participation in more geographically dispersed markets, information systems that supply current and historical data on the seasonal distribution of price, consumption, domestic production and imports and export shipments are critical to the successful development of nontraditional export markets. It is interesting to note that within the OECS, adequate market information exists in regard to the European and North American markets. The key issue to be resolved appears to be how best to distribute this information to member countries and their industry constituents.

In contrast, adequate information on nontraditional commodity markets within the OECS, and CARICOM for that matter, exists in only limited form. The absence of such information represents a significant constraint to the development of interregional trade in nontraditional crops within the OECS. It should be noted that initial work on a data collection and monitoring system for both regional and extra-regional trade flows was recently completed under the auspices of OECS/ADCU and the TROPRO project (Schwartz and Nurse, 1992). However, the system being developed seems to be directed more towards facilitating project evaluation than to providing information that can be used by market participants in a timely fashion.

Operational Institutions

Implicit in the ex-ante assessment of competitiveness through the use of measures such as DRC is the assumption that markets can in fact be accessed. While for many standardized and storable commodities such a presumption may be justifiable, the operational characteristics of fresh horticultural product markets, especially export markets such as the U.S., make this presumption untenable.

There are three primary factors that influence the ability of potential exporters to access the U.S. fresh horticultural products market:

- 1. Product Quality**
- 2. Consistency and Duration of Supply**
- 3. Phytosanitary Restrictions**

The first of these factors is related to consumer expectations and the degree of market sophistication. The second is tied to the manner by which transactions occur in the market. The third factor is sometimes used as a non-tariff barrier which can be the difficult to overcome.

Product Quality

Because of the perishable nature of many nontraditional crops, the need to understand and appreciate the concept of quality is critical. Indeed, perishability and product quality cause heightened importance to be placed on the efficient functioning of markets. This in turn requires that the requisite economic infrastructures exist, and that an understanding of the operational institutions of markets be complete.

Quality is often implicitly associated with good taste. For most fresh horticultural products, however, quality is generally defined in terms of two product characteristics: size and appearance (grade). Size as a measure of quality is directly related to buyer preference and commodity usage. It is important to know what the size preference of the market is and to therefore target production toward achieving this optimum size.

It is often the case that preferences regarding size vary across geographic regions within a country, across countries and even among various ethnic groups in a given location. As such, the optimum product size can vary across different markets. It is important that these differences are recognized so that production and post-harvest practices maximize the amount of product which meet the size requirements demanded by the market.

While there are some exceptions where internal quality standards are measured (e.g. oranges and grapes), grade is generally associated with appearance. There are several characteristics by which appearance is judged, however the two most important are colour and surface defects or blemishes.

The importance of appearance cannot be understated. Indeed, this importance is demonstrated by the experience of the Alar "scare." Following the broadcast of the American investigative television programme "Sixty Minutes" on minutes Alar, there was a sharp reduction in demand for apples as well as other fresh produce among consumers concerned about the dangers of pesticide residues. Commensurate with this was an increased interest in organically grown produce. Indeed, there were predictions that organic produce would assume a large position in produce markets. However, after a short lived increase in consumer interest, one is hard pressed to find organically grown products on major chain store shelves.

The was explained by the fact that while consumers stated concern over pesticide residues, organically grown products are characterized by poor appearance. This is not to say their taste was inferior, but rather that, their appearance was not to the standard that the U.S. consumer has come to expect.

When U.S. grade and size standards exist for a given commodity, export producers must meet these standards. In fact, discussions with exporters of non-traditional products indicate that they must satisfy more stringent quality standards. Attempts to achieve quality in non-traditional agricultural export crops have several dimensions.

Quality begins with production practices. It is important for producers to understand that a high proportion of their yield must be of export quality. While lower quality products may be marketed domestically, such markets in the OECS are small. Indeed, for many nontraditional crops, domestic markets are nonexistent.

A second factor with respect to ensuring quality involves skilled harvest labour. As the length of time from harvest to that time when a product reaches the market may be substantial, it is important that crops be harvested at the proper stage of maturity and in the correct sizes. This requires that harvest labour be trained to harvest products that meet export standards. The difficulty in developing such skills cannot be understated. It should be remembered, that in many countries, the importance of quality standards are not well understood, and training workers to have an adequate understanding of such factors may be a difficult and costly process. Additionally, the investment in such human capital development places a premium on retaining skilled harvest labour. This can increase labour cost through both higher wages and provide additional benefits such as medical care or housing.

Consistency and Duration of Supply

The perishability of non-traditional agricultural products and the importance of quality necessitate efficient movement through the marketing system. This has led to an environment where buyer-seller interactions within the market are based on personal relationships and trust between producers and buyers that ensures the timely and reliable supply of quality product. From the buyer's perspective there are strong incentives to minimize the number of producers with whom they must deal and to deal only with those who have a demonstrated capacity to deliver a quality product on a consistent basis. Similarly, from the perspective of producers, there are strong incentives to deal only with buyers who have demonstrated reliability in obtaining good market prices and in making prompt payments.

In terms of new or potential entrants to the U.S fresh horticultural product market, this creates several potential barriers to entry. First, it is difficult to establish a reputation as a consistent supplier of quality produce. Doing so may require that producers take price discounts or accept considerable price risk (e.g. marketing on a consignment basis) during the initial stages

of enterprise development. This may result in below normal profits or losses relative to those expected on the basis of ex ante analysis.

Secondly, the ability to successfully access the market requires that sufficient volumes be produced to attract the interest of buyers. The importance of quality creates a strong incentive for buyers to minimize the number of individuals from whom they purchase the product. As such, producers who can offer large volumes over extended periods of time have a distinct advantage over small scale producers such as those which typify the OECS, even though both may offer products of similar quality.

Phytosanitary Restrictions

The existence of phytosanitary restrictions for agricultural commodities is well known. As a means of protecting their domestic agricultural industries from pests and diseases, all countries establish certain restrictions. As regards the OECS and the production of non-traditional agricultural commodities, fruit fly infestation is perhaps the most significant potential phytosanitary barrier.

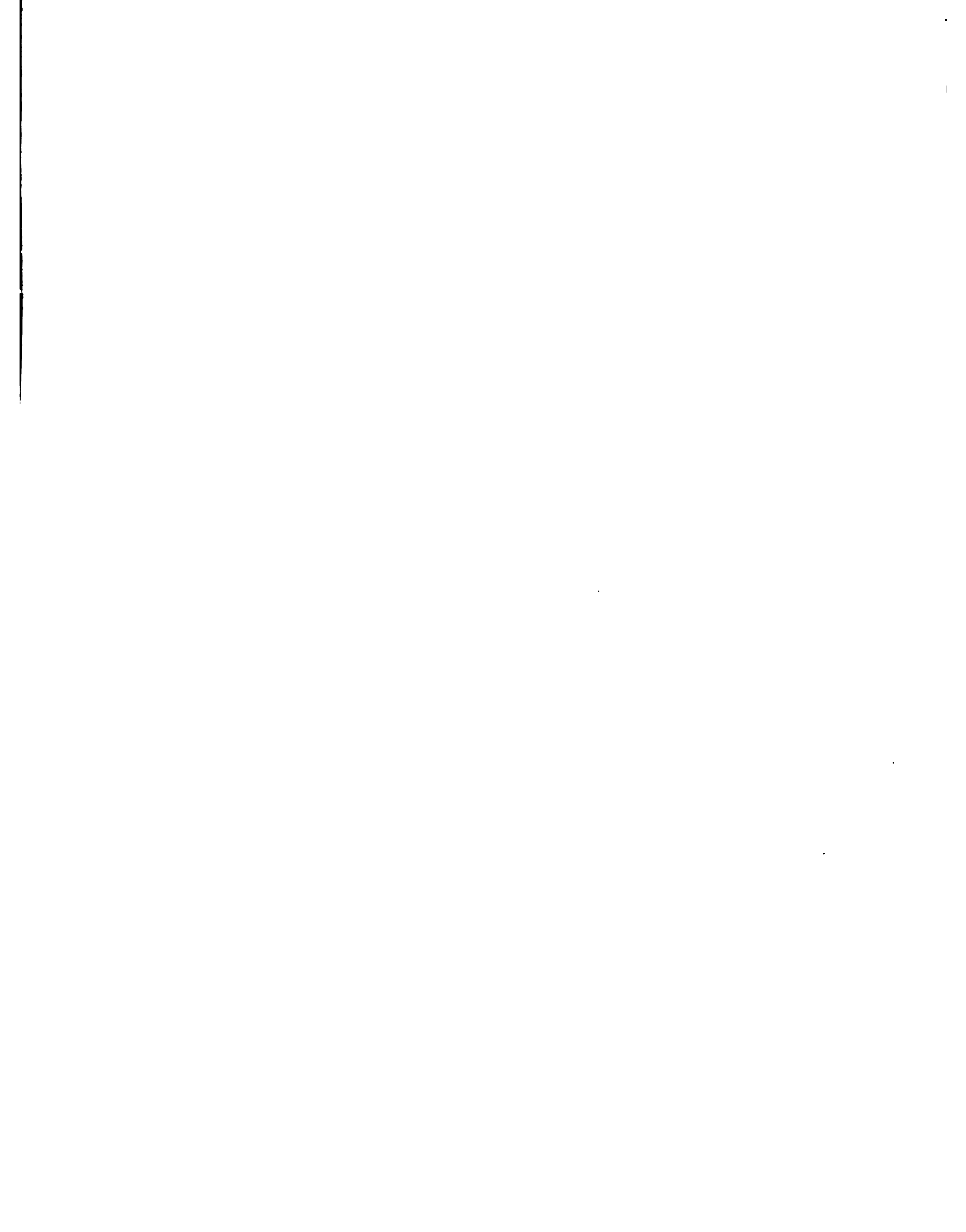
The importance of phytosanitary restrictions lies not in their existence, but rather in the difficulty of overcoming them. In this regard, producers in a given country must either establish that a given commodity is not a host for pest or diseases, or establish accepted post-harvest treatments. The difficulty in gaining enterability status for a given commodity should not be underestimated. The process not only involves establishing acceptable scientific protocols and conducting the requisite scientific analysis, but also lengthy political procedures as well. From first application, the process of gaining enterability can take as much as 3 to 6 years.

In cases where acceptable post-harvest treatments are established, implicit market barriers may still exist such as the cost of developing treatment facilities (e.g. hot water treatment for mangoes). For small economies such as those which typify the OECS, the cost of developing such treatment facilities may be prohibitive.

It should also be noted that phytosanitary restrictions can also convey competitive advantages when a country is designated to be free of certain pests or diseases. Within the OECS, such is the case for Grenada and St. Vincent, both of which enjoy "fruit-fly free" status. As a result these countries are able to export commodities such as mangoes to the U.S. without hot water treatment. This creates a potentially significant marketing advantage.



**Analysis of Competitiveness:
By Commodity**



ANTHURIUM

The results of the cross-country analysis in Figure 1.1 indicate that none of the three OECS countries currently possess competitive advantage in anthurium production. In terms of relative ranking, which continues to be the focus of this study, Dominica ranks above both Grenada and St. Vincent, as a result of its higher yield and lower costs of production. Based on yield sensitivity results presented in Figure 1.2, in order to be competitive, producers in Dominica will require an increase in yields of 22%, while increases of 136% and 53% are required for producers in Grenada and St. Vincent, respectively.

The sensitivity analysis results in Figure 1.3, suggest that an increase in the export price of 10% results in the production of pink anthuriums being competitive in Dominica. The sensitivity results also indicate however, that the production of red anthuriums remains uncompetitive in all three countries included in the study. The inability to compete internationally is symptomatic of a number of other weaknesses present at the national level. In the case of Grenada and St. Vincent, the high cost of planting material, as well as production in unsuitable areas, continue to be major constraints. The lack of a 'critical-minimum' core of producers, in the absence of large scale producing farms, is also an important constraint to the attainment of economies of scale and to the associated reductions in overall cost. In all three countries, the absence of market infrastructure, particularly the non-existence of a cost-effective and reliable air/sea transport service, appears to have negatively impacted their respective ability to compete.

While the analysis suggests that those factors outlined have impeded competitiveness in all three countries, the extent to which it may have impacted production varies. For instance, while poor transportation infrastructure is a general problem, it appears to be more of a constraint for Dominica and St. Vincent than for Grenada. Similarly low yields, and the cumulative manifestation of other factors already addressed, appear to be more of a problem for Grenada and St. Vincent, than for Dominica. That initiatives in ornamental horticulture are highly dependent on market demand is borne out by production in Dominica where marketable yields per plant increase with the growth in market demand. Conversely, the level of field husbandry and yields in Dominica declined with reductions in the market demand. These factors together suggest that while anthurium production is not currently competitive for any of the three countries included in the analysis, increased attention to very basic, yet critical factors could result in improvements and increases in private profits to producers with the potential that the enterprise may become competitive in international trade.

The results of the labour sensitivity analysis in Figure 1.4 indicate that, assuming the social cost of labour to be less than suggested under the base model, anthurium production remained uncompetitive in Dominica, St. Vincent and Grenada. These results confirm that labour costs alone cannot account for the inherent production inefficiencies and resource misallocations at the industry level. In addition to the factors already advanced as contributing to the lack of competitiveness, is the shift in demand away from the standard pinks, off-white and red varieties, to the more exotic colors and the associated reduction in the export price to which this is related. If OECS countries intend to seriously develop anthurium production, efforts will be required to acquire new hybrids early in the production cycle, while market demand and prices are strong, instead of at the tail end of the cycle as has become the norm.

The available export data appears to support the results of the DRC analysis. While the data for 1991 was not disaggregated enough to distinguish between cut flower exports at the individual commodity level, the data does indicate that in general, these exports were small, totalling less than US \$100,000. The data shows that Dominica's exports to the French Antilles, Antigua, the USA and UK outweighed exports from either Grenada or St. Vincent. The rankings according to the DRC analysis are thus consistent with those suggested by the available ex-post trade data for the three countries.

FIGURE 1.1. DOMESTIC RESOURCE COST - ANTHURIUM, 1992-93
 Selected OECS Countries

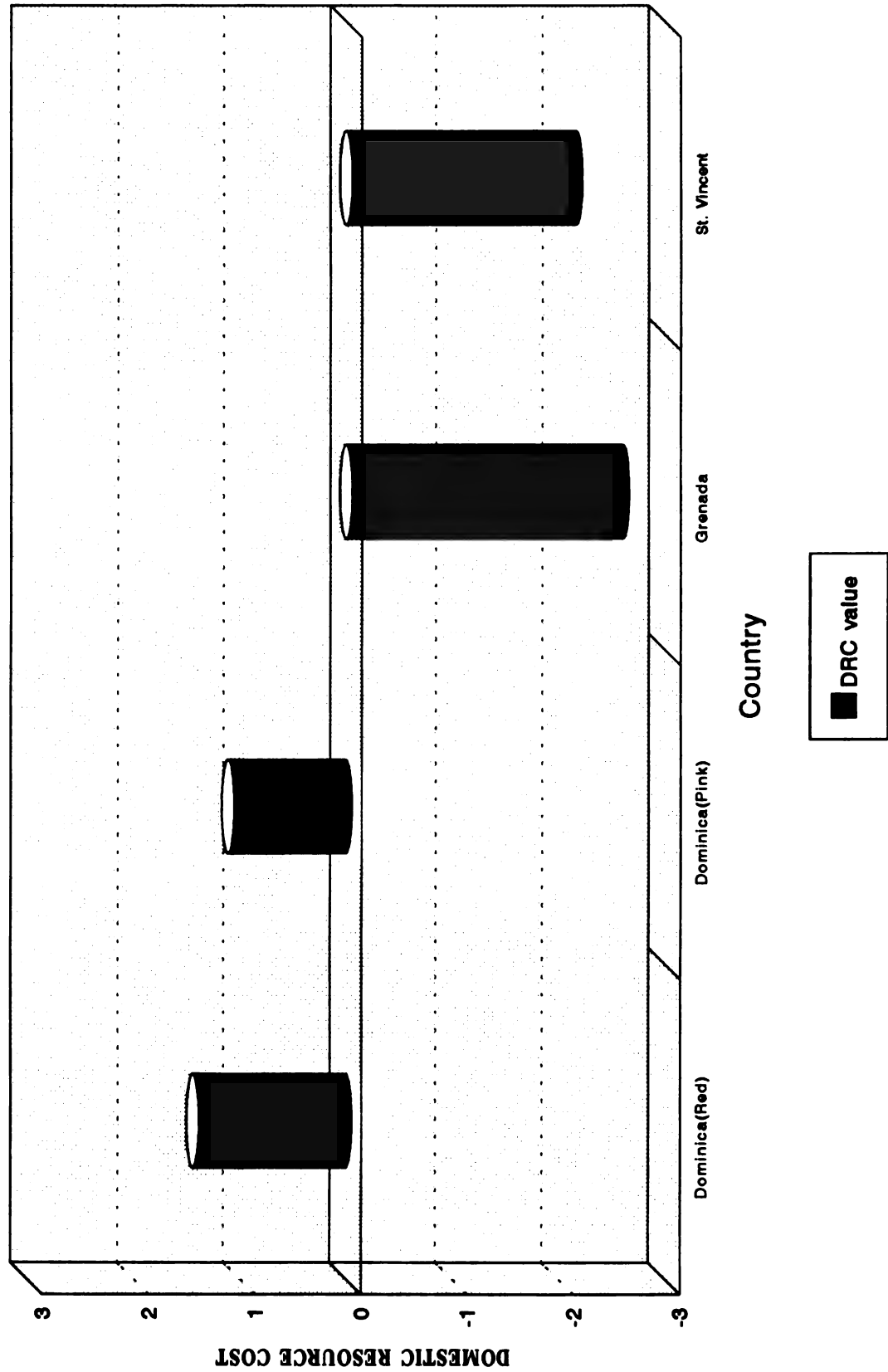


FIGURE 1.2 YIELD SENSITIVITY FOR ANTHURIUM, 1992-93
Selected OECS Countries

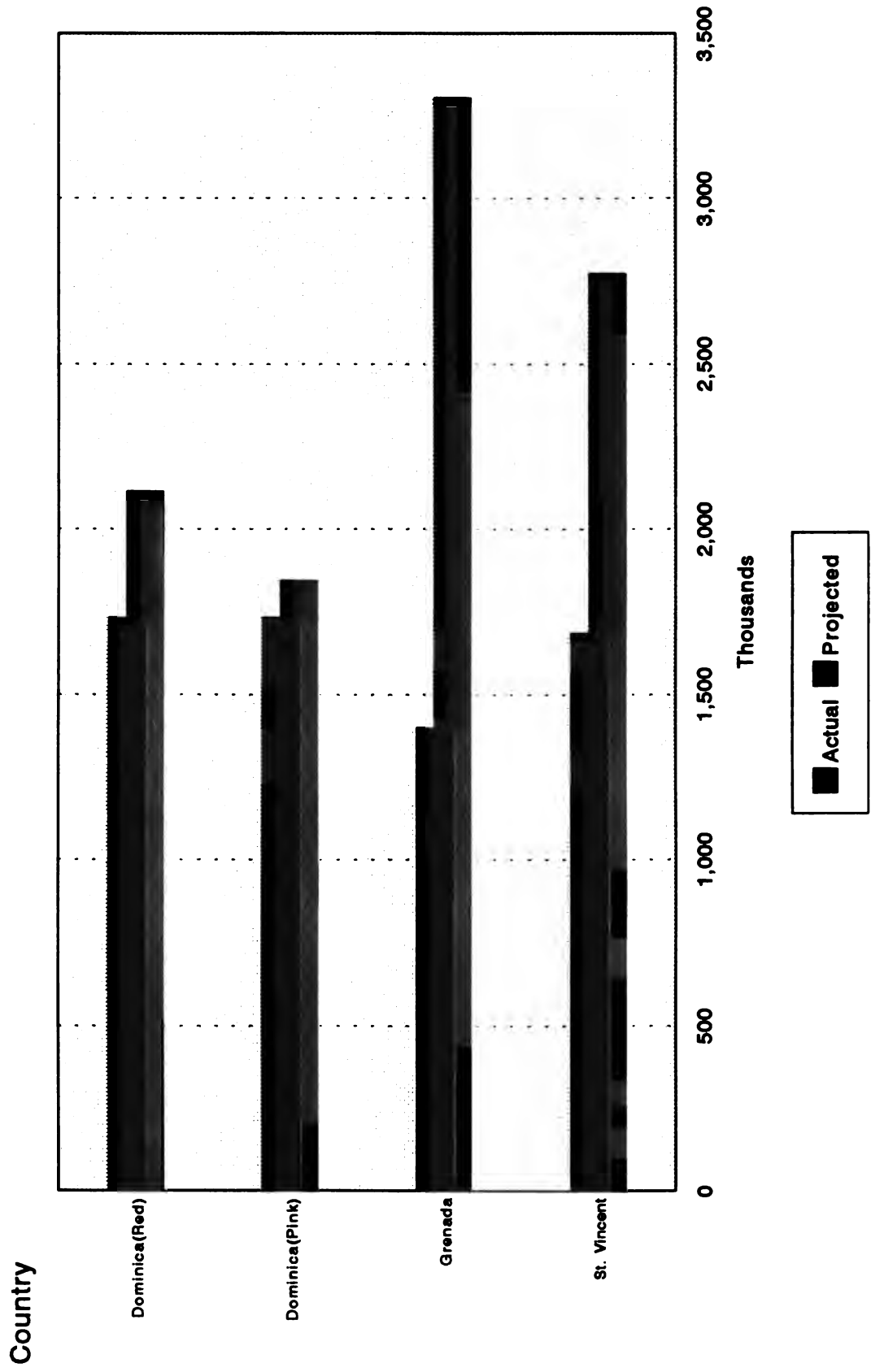


FIGURE 1.3. PRICE SENSITIVITY FOR ANTHURIUM, 1992-93
Selected OECS Countries

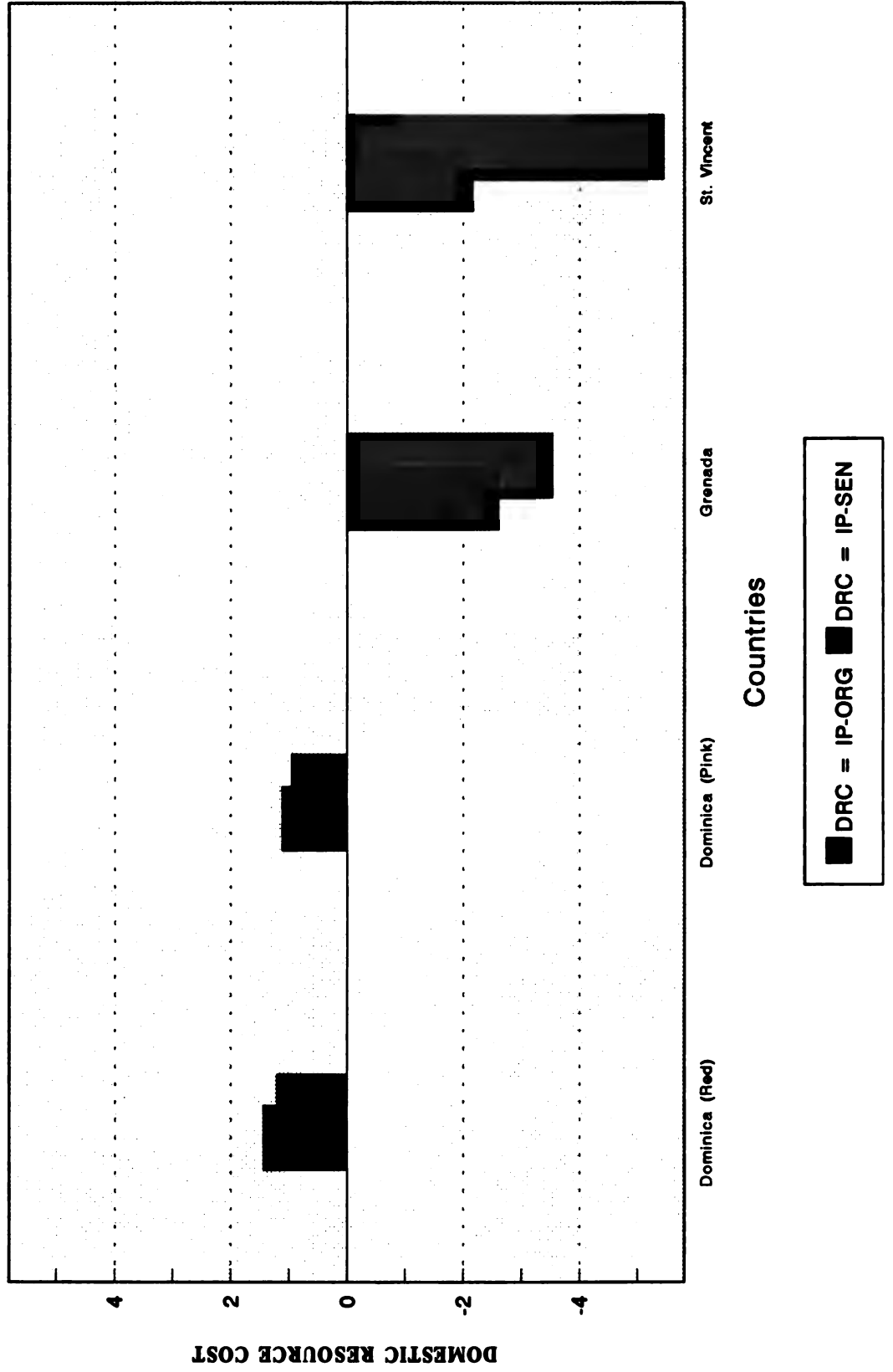
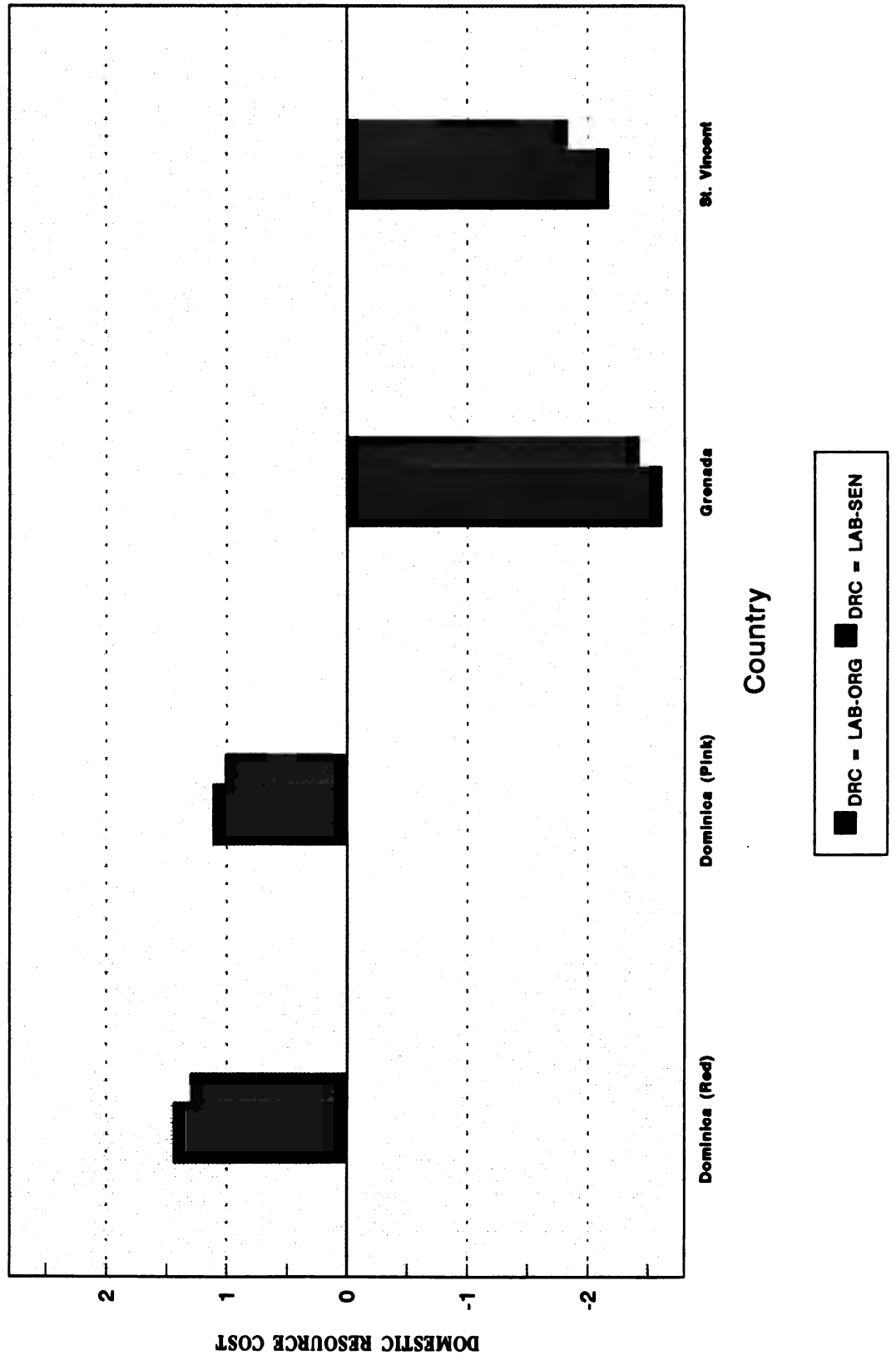


FIGURE 1.4. LABOUR SENSITIVITY FOR ANTHURIUM
Selected OECS Countries



AVOCADO

The estimated DRCs for avocado presented in Figure 2.1 indicate that five of the six countries have values which are less than unity. St. Vincent appears to have a competitive advantage over the other OECS member countries, though its advantage over Grenada and Dominica measured in terms of the estimated DRC is quite small. Antigua and St. Lucia also have estimated DRC coefficients of less than one, but the absolute value of the coefficient remains substantially higher than that of Dominica, St. Vincent and Grenada. In terms of relative competitiveness, St. Vincent ranks highest, followed by Grenada, Dominica and St. Lucia, Antigua and the BVI.

A primary factor enhancing the competitiveness of St. Vincent and Grenada is yield. Producers in St. Vincent achieve avocado yields which are approximately 15% higher than their counterparts in Grenada. However both countries exhibit yields of more than twice the levels obtained in Antigua, Dominica and St. Lucia and roughly three times those obtained by the British Virgin Islands. The relatively low yields obtained in Dominica can be attributed to the presence of '*foot rot*' and *anthracnose* infestations in major avocado producing areas.

Only the British Virgin Islands with an estimated DRC of -1.1, is clearly non-competitive. This implies that while production of avocado is socially unprofitable in the BVI, it remains privately profitable due to the distortions created by government grants and subsidies. Sensitivity analysis was undertaken to assess the improvement in yields and reductions in costs necessary to obtain a DRC coefficient of unity. According to the results in Figure 2.2, given the current structure of costs and the level of technology, an increase in typical marketable yield of as much as 253% (43,000 lbs), would be necessary to make avocado production competitive in the BVI.

As expected, increasing the non-intervention price (NIP) by 10% improves competitiveness for all the countries. As seen in Figure 2.3, the improvements were fairly uniform. While Antigua's position improved from 0.90 under the base model to 0.77 under the NIP simulation, the BVI with a DRC co-efficient of -1.20 still remained uncompetitive. Varying the shadow wage rate for labour produced similar results, as seen in Figure 2.4. While the estimated DRCs for all countries indicate improved competitiveness, (reduction in the absolute value of the DRCs), the relative ranking of countries remains unchanged.

The estimated DRCs shown in Figure 2.1, also indicate that the export of avocado from all the countries, with the exception of the BVI, would yield net foreign exchange earnings. In St. Vincent, for example, the generation of US\$1.00 from the avocado enterprise requires an expenditure of only EC\$0.41. The estimated cost of earning US\$1.00 in Grenada and Dominica are roughly similar at EC\$0.62 and EC\$0.68 respectively, while for St. Lucia and Antigua EC\$1.76 and EC\$2.43 respectively, are required. As the current exchange rate is EC\$2.70 to US\$1.00, it can be seen that avocado production provides the opportunity for significant foreign exchange earnings in these countries.

Trade data reported for 1988 through 1991 by Schwartz and Nurse⁵, indicated that Dominica, Grenada and St. Vincent all exported avocados over this time period. Based on that data, Dominica and St. Vincent were the predominant exporters. It should be noted, however, that the volume of avocado exports from Grenada (more competitive in avocado production than Dominica) have declined substantially since 1988 and that Antigua is a net importer of avocados. Volume of avocado originating from St. Lucia remains relatively low.

⁵ A Digest of OECS Non-Traditional Agricultural Exports (1988-1991) prepared for OECS/ADCU TROPRO, October 1992.

FIGURE 2.1. DOMESTIC RESOURCE COST - AVOCADO, 1992-93
Selected OECS Countries

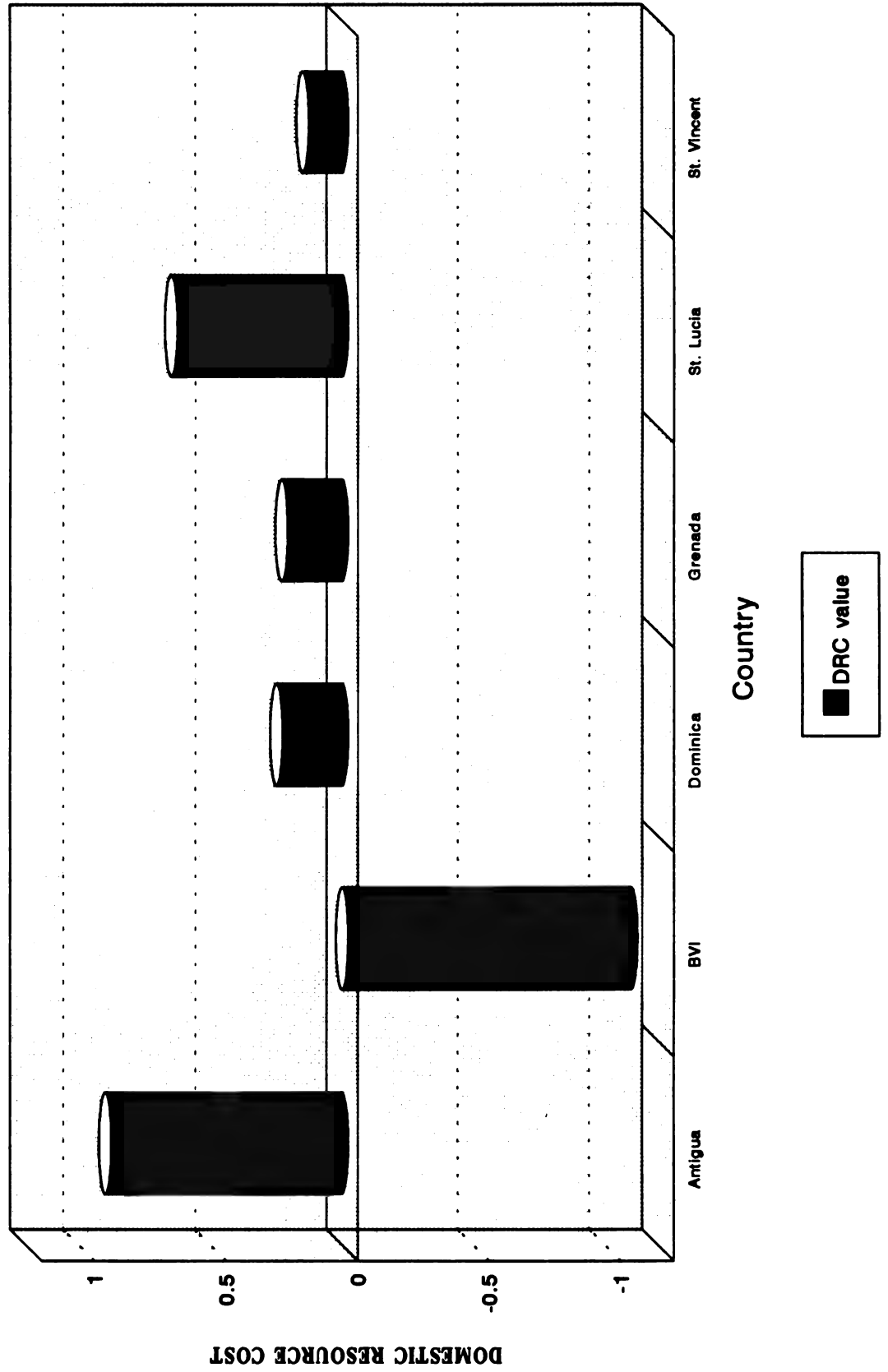


FIGURE 2.2. YIELD SENSITIVITY FOR AVOCADO, 1992-93
Selected OECs Countries

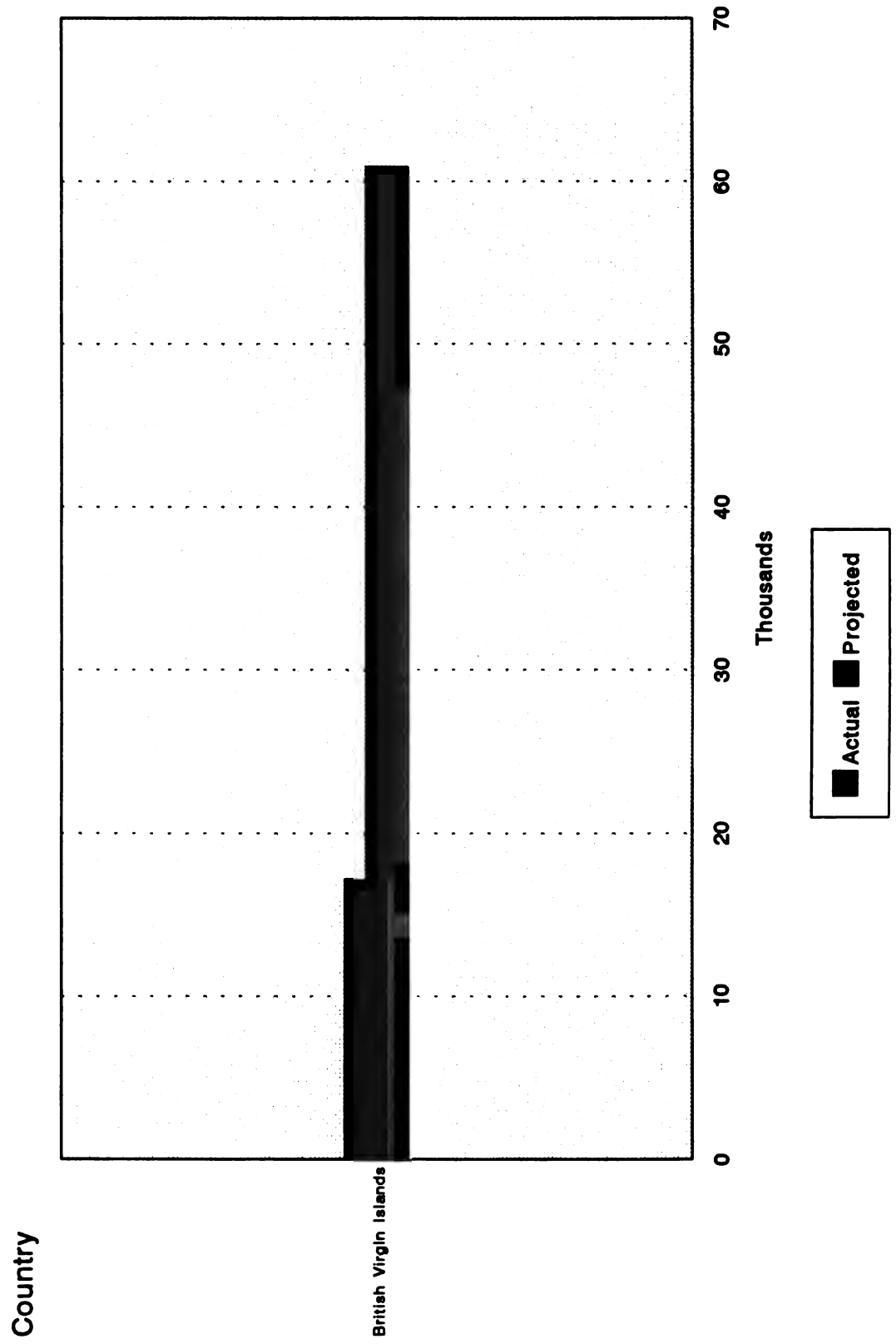


FIGURE 2.3. PRICE SENSITIVITY FOR AVOCADO, 1992-93
Selected OECS Countries

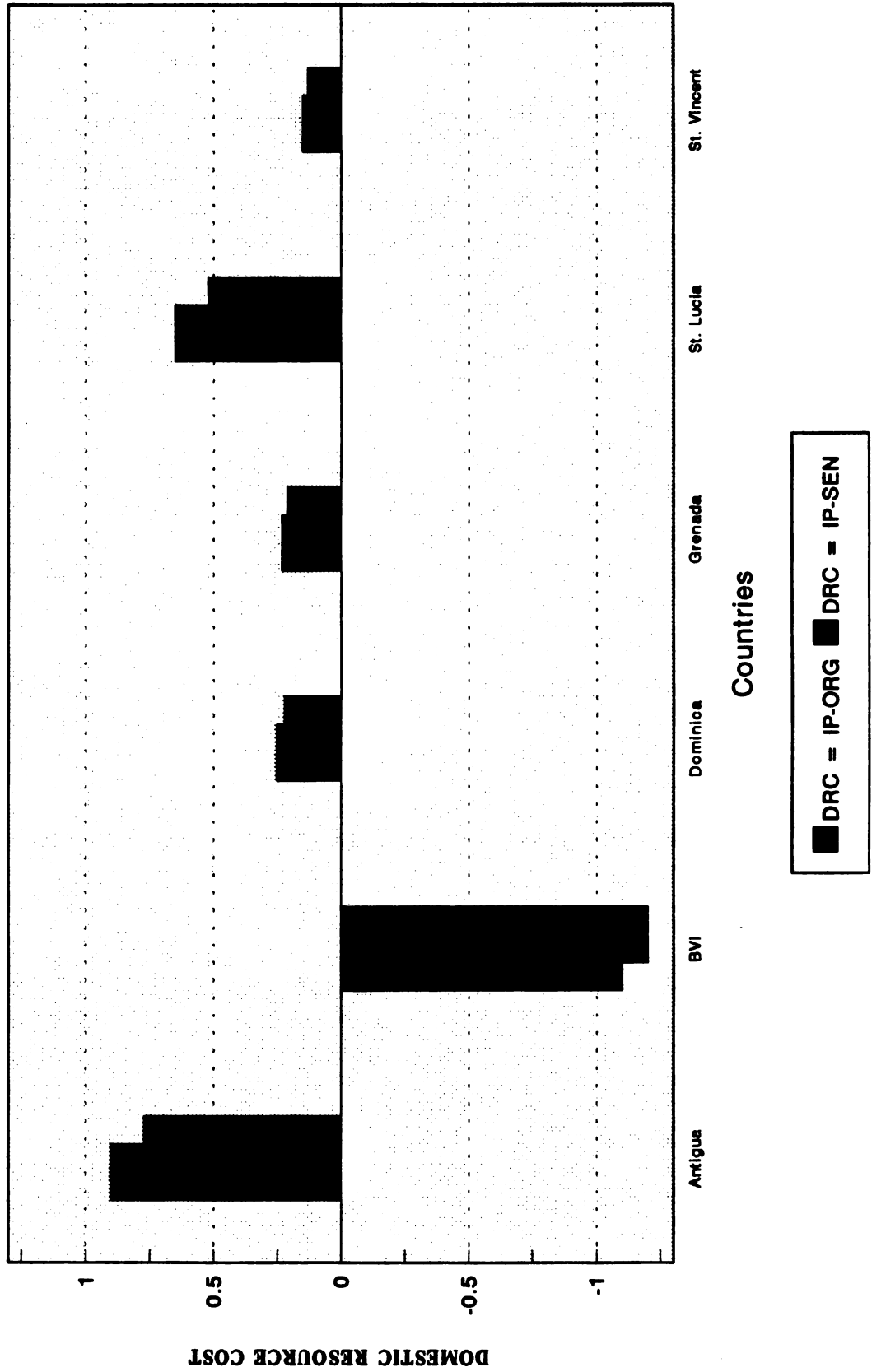
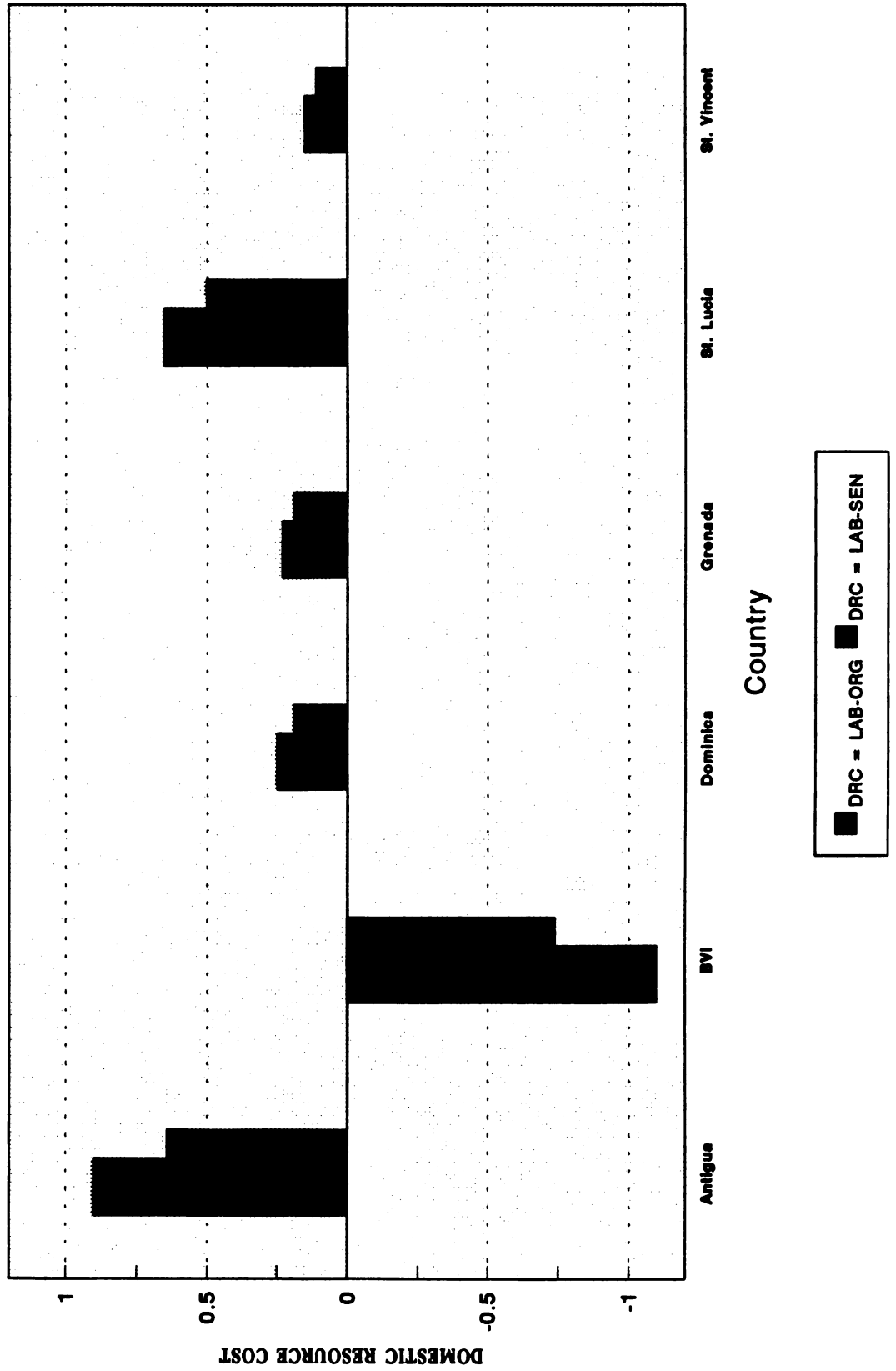


FIGURE 2.4. LABOUR SENSITIVITY FOR AVOCADO - 1992-93
Selected OECS Countries



BREADFRUIT

Unlike the majority of non-traditional crops included in this study, no large organized cultivations of breadfruit exist in the OECS countries. In Dominica, Grenada, St. Lucia and St. Vincent, 'groves' of trees have developed by self-propagation in the absence of strong competition. Individual trees grown in backyards and gardens are common and constitute a significant part of the total bearing tree population in these countries.

Breadfruit, relative to other tree crops, cannot be classified as a truly cultivated crop in the OECS. However, more recently, some organized planting has been undertaken. In this regard, the analysis for breadfruit was aimed at determining whether any decisive competitive advantage in breadfruit production existed for the four main OECS producers. If such an advantage exists then the analysis will assess whether the relative competitive rankings are based on unique factors related to the structure of production in individual countries, or whether competitiveness is based on the natural proliferation of breadfruit trees.

The results of the DRC analysis in Figure 3.1 indicate that the ratios for all four countries are less than one. This suggests that the breadfruit enterprise is an activity in which the OECS countries have a competitive advantage. That the DRCs are all less than 0.4, reflect the relatively low demand on domestic resources utilized in breadfruit production. Breadfruit, relative to other cultivated crops, has benefitted little from productivity-enhancing technology. This is borne out by the fact that very little is known about the response of breadfruit to fertilizer applications since mature trees are, more often than not, virtually unfertilized.

In terms of relative competitiveness, Dominica, ranks the highest, followed by St. Lucia, St. Vincent and Grenada (in descending order of competitiveness). The competitive advantage of Dominica and St. Lucia over their two other OECS counterparts is due in part, to relatively lower per unit costs of production, since their recorded yields are substantially lower than those which obtain in Grenada and St. Vincent. Given the present limited attention accorded to research, development and extension efforts, substantial opportunities may exist for improvements in tree management as well as other technologies aimed at increasing marketable yields, reducing harvest and post-harvest losses and increasing the shelf-life of the product. Some alteration in the current system of production may also be required if OECS countries intend to pursue serious development of the crop. In this regard, the DRC analysis suggests that increased investments in the area of research and development aimed at developing commercial acreage could result in net foreign exchange earnings.

In assessing whether the relative rankings across countries is affected by variations in the key technical parameters, sensitivity analysis was undertaken. If the competitive rankings prove to be robust to variations in the non-intervention price (NIP) and the assumptions underlying agricultural labour markets, then the results of the base model will appear more plausible.

The results of the sensitivity of the DRC ratios to a 10% variation in the NIP are shown in Figure 3.2. According to the results, increasing the NIP led to a decline in the absolute value

of the DRC coefficients. The cross-country rankings however, remain unchanged. The labour sensitivity reported in Figure 3.3 suggests that if the social cost of labour was less than indicated by the estimated value of the conversion factor (CF) for agricultural labour in these countries, then each country's competitiveness, as indicated by the DRC coefficient, would be more favorable than previously indicated under the base model. A noteworthy result of the labour sensitivity test is that the relative competitive advantage of Dominica vis-a-vis St.Lucia, was altered. St.Lucia, which ranked second to Dominica under the base model, reversed positions with Dominica, becoming slightly more competitive under the labour simulation.

The base model results of the DRC analysis indicate that Dominica is relatively more competitive in breadfruit production than its three OECS counterparts. However trade data suggests that breadfruit constitutes a relatively larger component in agricultural exports from St.Lucia than it does in exports from Dominica. The fact that under the base model, Dominica ranks slightly ahead of St.Lucia may be due to the relatively higher wage rates in the St.Lucian agricultural sector. In general, the results suggest that for all the countries, breadfruit is both socially and privately profitable since domestic production can result in foreign exchange earnings.

FIGURE 3.1. DOMESTIC RESOURCE COST - BREADFRUIT, 1992-93
Selected OECS Countries

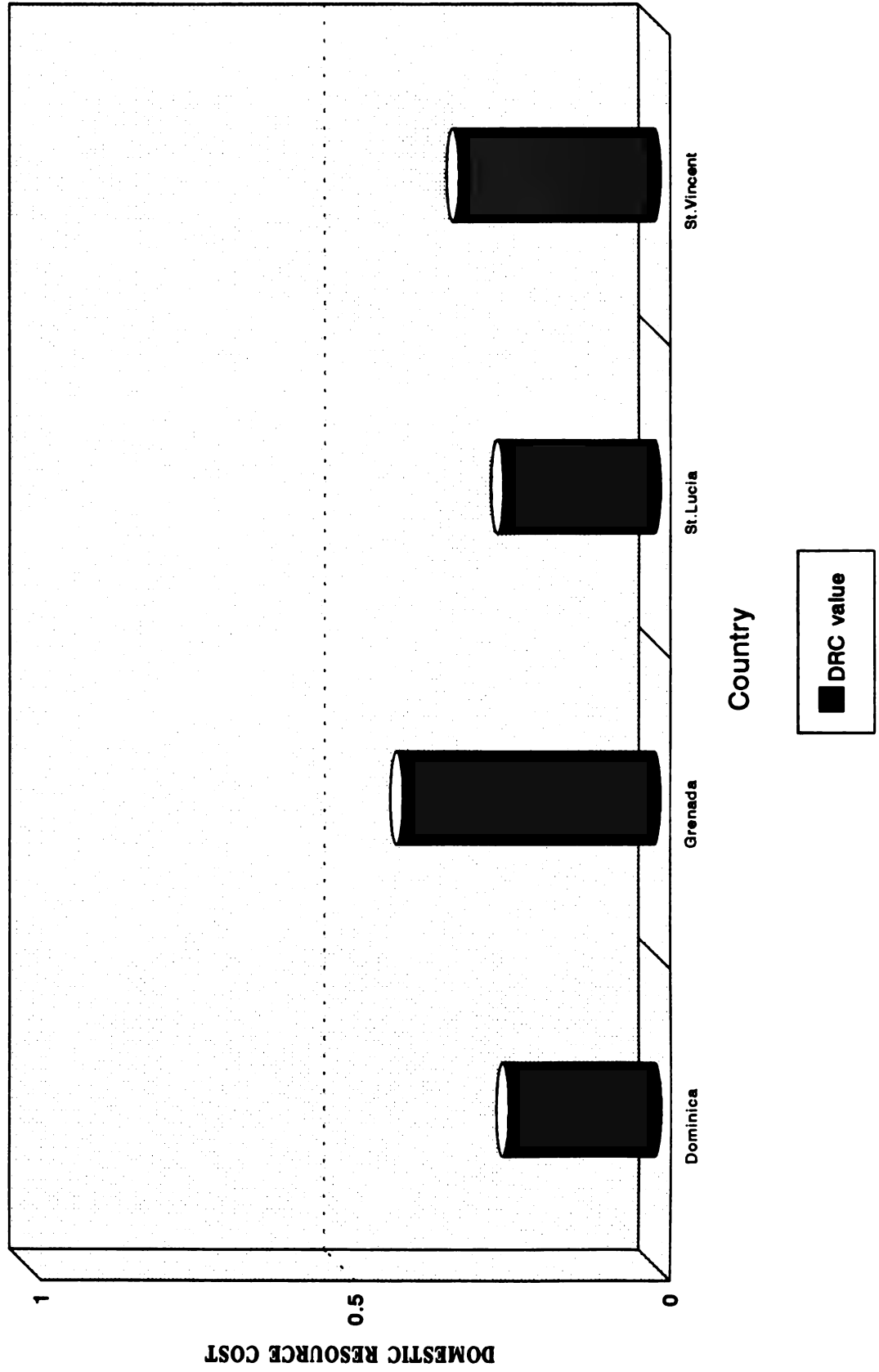


FIGURE 3.2. PRICE SENSITIVITY FOR BREADFRUIT, 1992-93
Selected OECS Countries

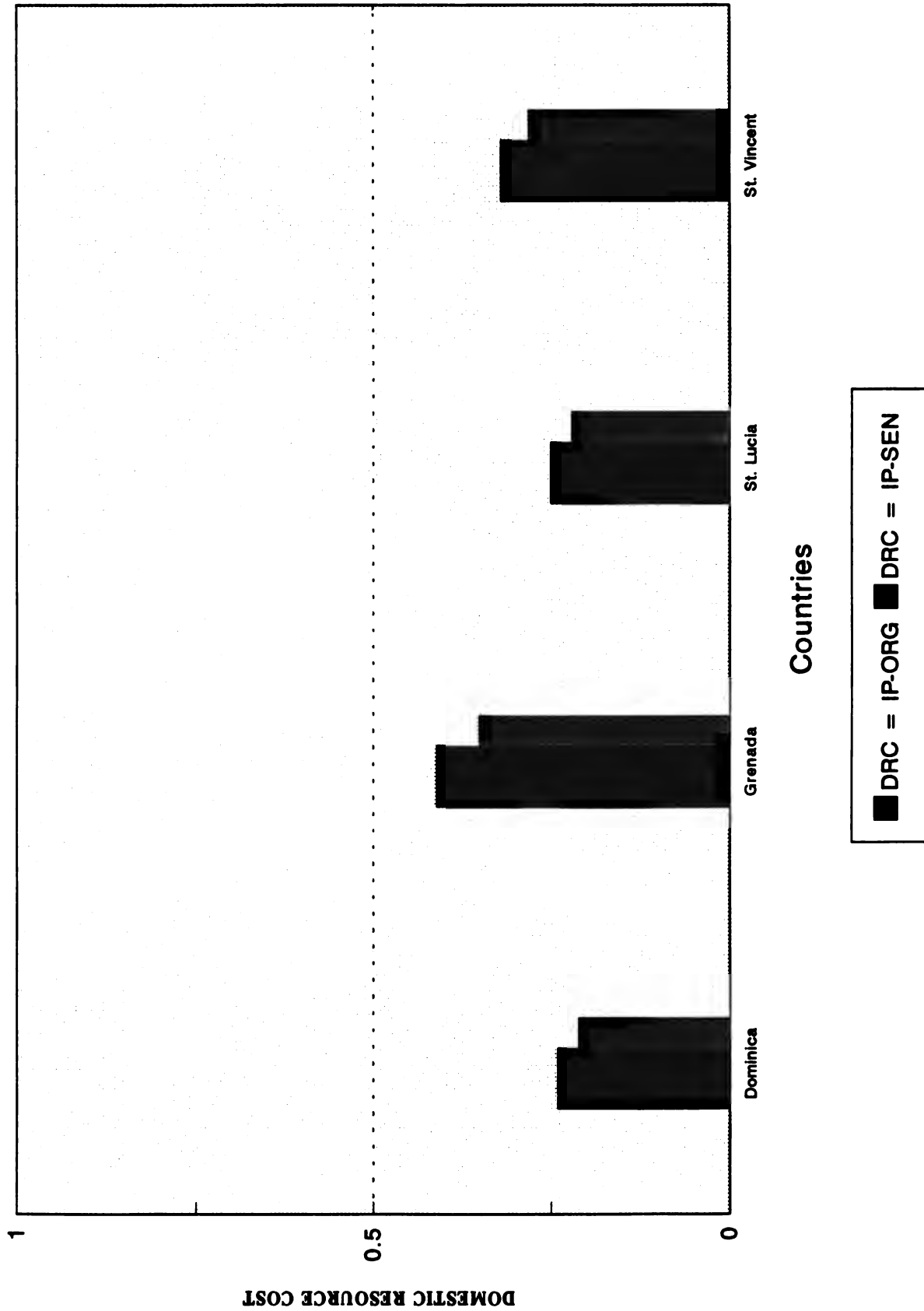
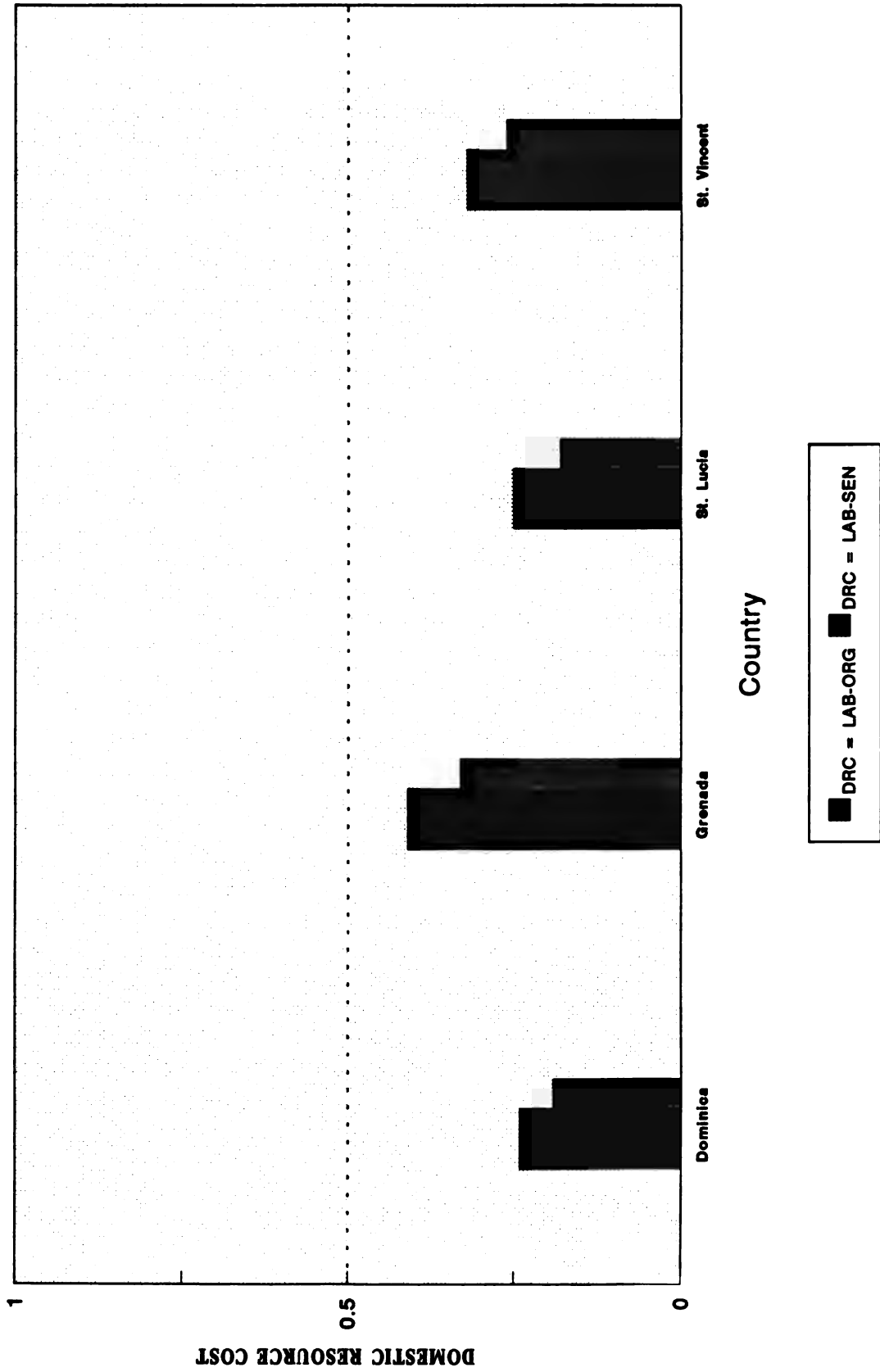


FIGURE 3.3. LABOUR SENSITIVITY FOR BREADFRUIT - 1992-93
Selected OECS Countries



CABBAGE

The estimated DRCs for cabbage produced in Montserrat and St. Kitts/Nevis are presented in Figure 4.1. As is evident, neither country is competitive in the production of cabbage. Indeed, the adverse values of the DRCs for both countries paint a pessimistic picture regarding their competitive potential in cabbage production. The high DRCs for Montserrat and St. Kitts/Nevis, suggest that these two OECS member states are not efficient producers of cabbage and that production is highly dependant on implicit government-induced support measures. While such protection allows private producers to realize positive rents, incremental production inflicts high social costs and will result in foreign exchange losses.

Low yields appear to be the factor which impinges on the competitiveness of cabbage production. The presence of the '*diamond back moth*' has also adversely affected cabbage productivity and pest control measures have led to increased per unit production costs in St. Kitts/Nevis. Figure 4.2 presents the results of the yield sensitivity analysis. Holding both the shadow prices used in the DRC computation and cost, constant, cabbage yields in Montserrat and St. Kitts/Nevis would have to increase by 84% and 95%, respectively, to bring the estimated DRCs to a value of one. Given the present structure of costs and the low level of technology currently existing among cabbage producers in Montserrat and St. Kitts/Nevis, clear evidence is needed that economies of scale and reductions in costs, resulting from the yield increases necessary to make production economically viable, will be attainable. Based on the magnitude of yield increases required to make cabbage production competitive, importation of the commodity would represent a more efficient use of domestic resources and would result in net foreign exchange savings.

As seen in Table 4.3, increasing the NIP by 10% causes an improvement in the estimated DRCs. Cabbage production in both countries however remains non-competitive with other domestic activities. Similar results are obtained in the labour sensitivity analysis. These results presented in Figure 4.4 suggest that if the divergence between the private and social cost of labour was greater than implied by the estimated conversion factor for agricultural labour in Montserrat and St. Kitts/Nevis, then the social costs to society of resource usage and hence the DRC coefficient would be smaller in absolute terms. While the estimated DRCs improve relative to the base scenario, cabbage production remains non-competitive with other domestic activities.

Country trade data indicated that St. Kitts/Nevis is a net importer of cabbage, spending on average over EC\$ 100,000 each year from 1987 to 1990 on cabbage imports. However the increasing output over the same period was not sufficient to offset the rising trend in imports.

FIGURE 4.1. DOMESTIC RESOURCE COST - CABBAGE, 1992-93
Selected OECS Countries

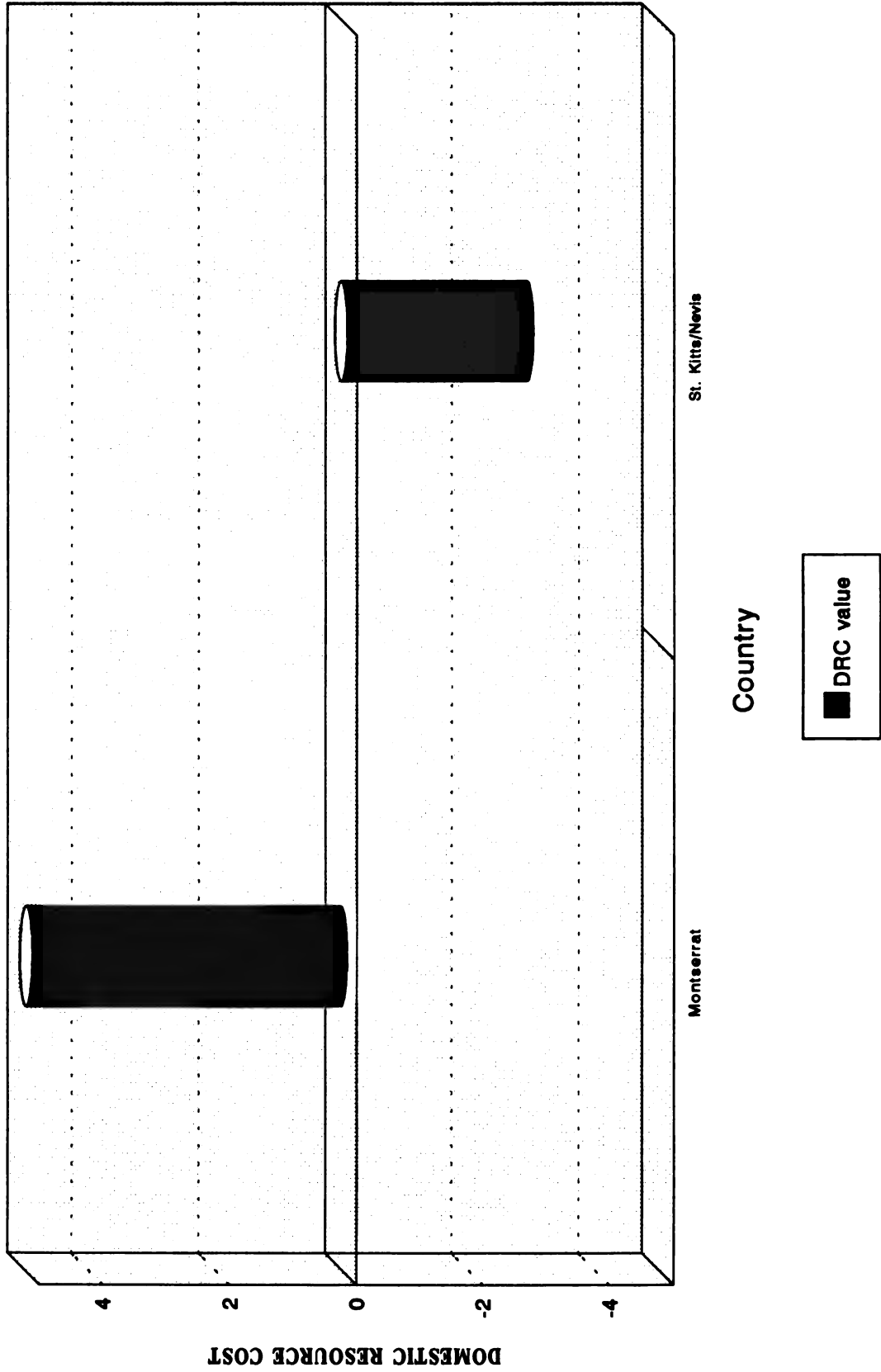


FIGURE 4.2. YIELD SENSITIVITY FOR CABBAGE, 1992-93
Selected OECS Countries

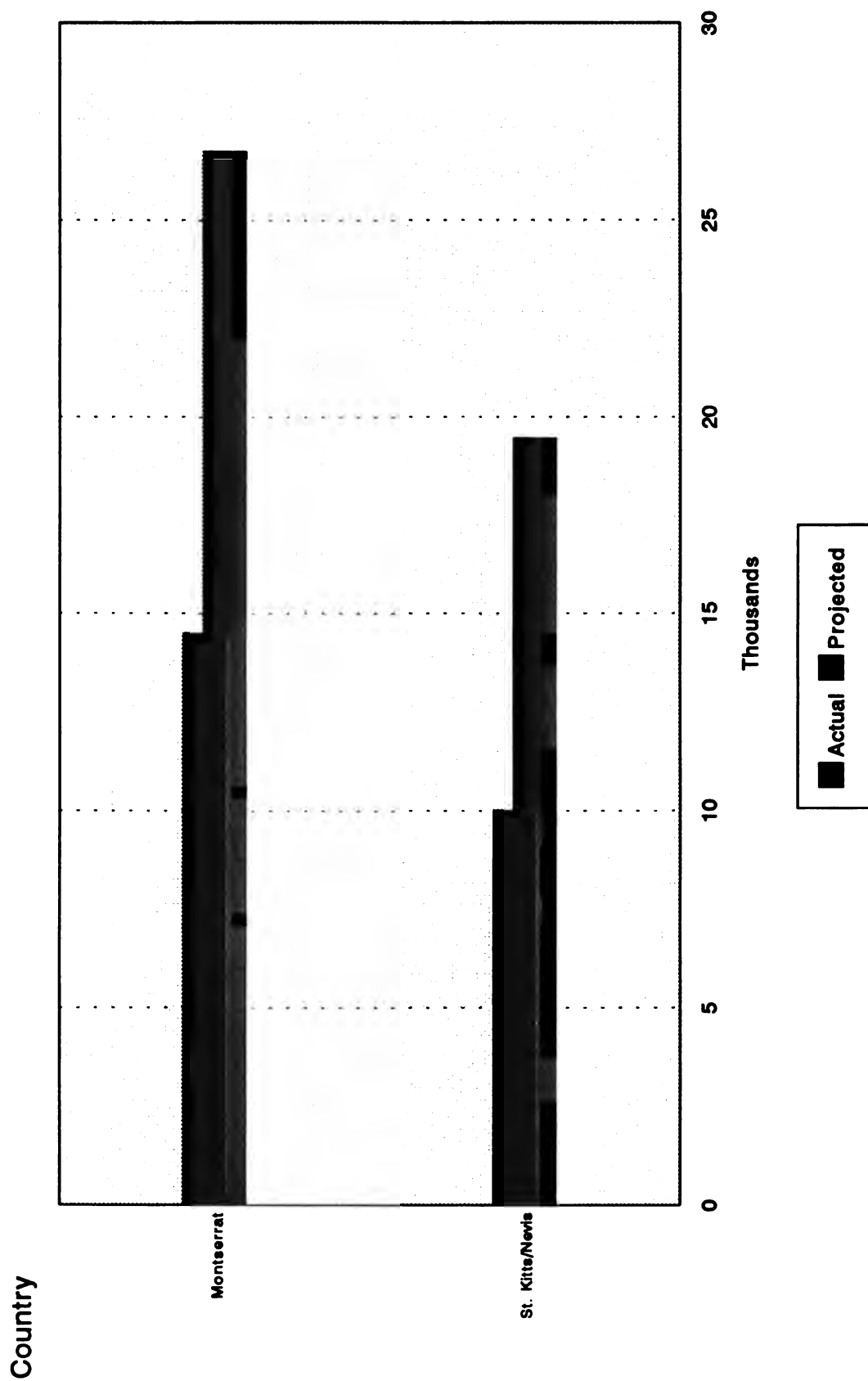


FIGURE 4.3. PRICE SENSITIVITY FOR CABBAGE, 1992-93
Selected OECS Countries

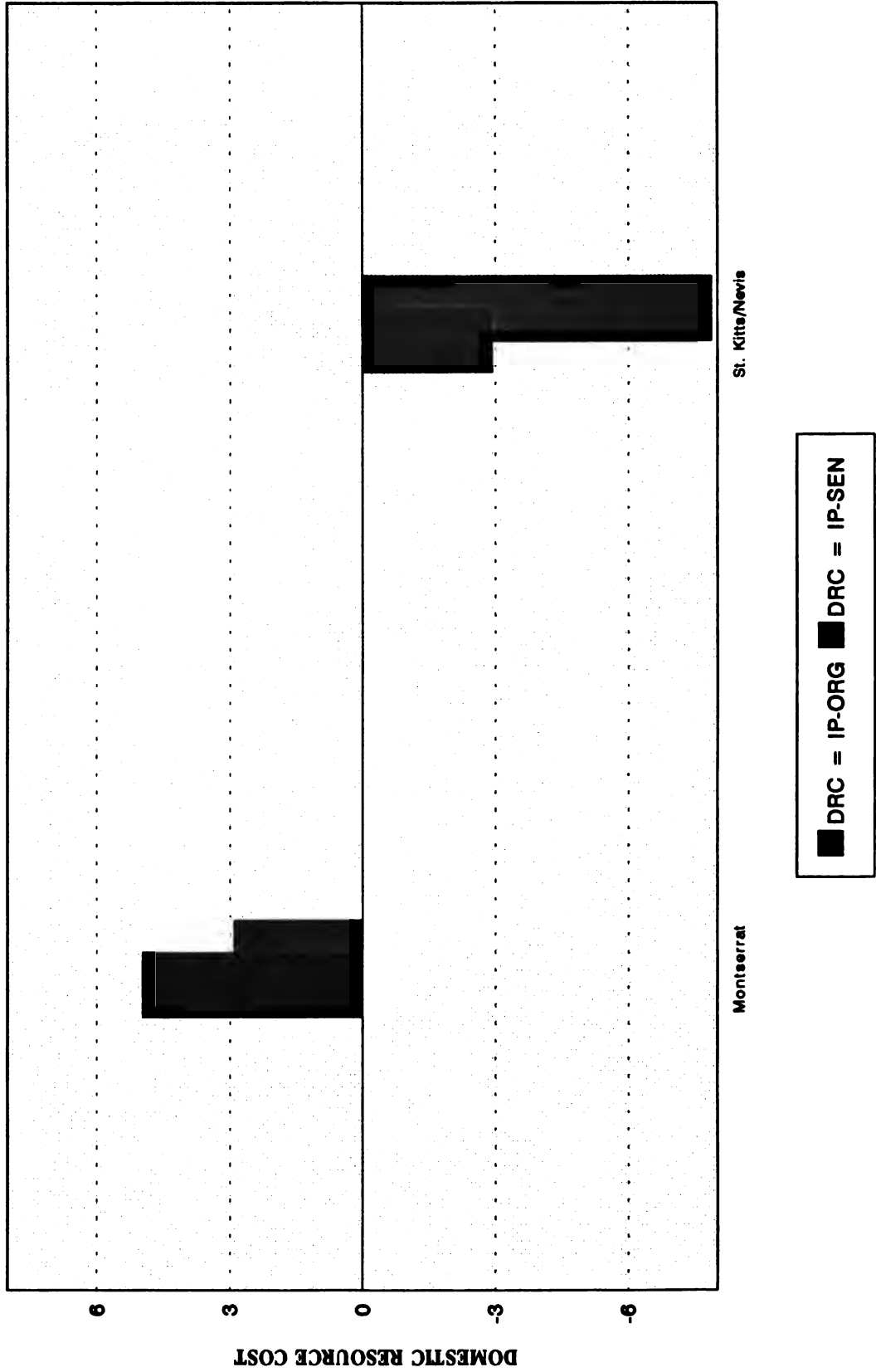
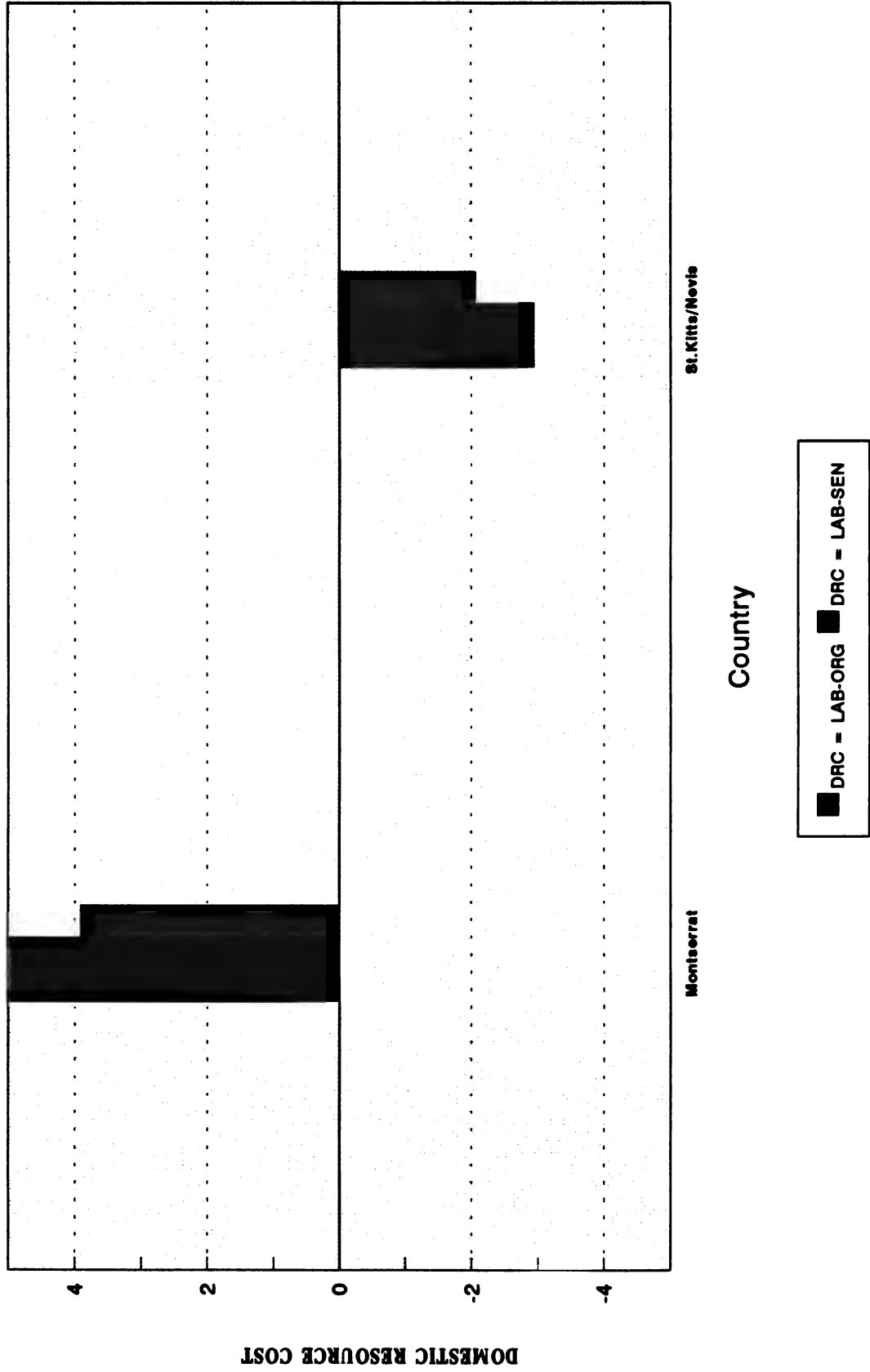


FIGURE 4.4. LABOUR SENSITIVITY FOR CABBAGE - 1992-93
Selected OECS Countries



CARROT

The results of the cross-country analysis in Figure 5.1 indicate that Montserrat and St.Kitts/Nevis are both competitive in carrot production. The results also indicate that production of carrots in both countries is characterized by an estimated DRC of less than one. As such, these two OECS member states are efficient producers and the resources employed in carrot production can compete favorably with other domestic enterprises in each country.

As seen from Figure 5.1, the estimated DRC for Montserrat is significantly lower than that for St. Kitts/Nevis, suggesting the former country has a relative competitive advantage. This implies that though both countries are liable to derive net foreign exchange earnings from the production and trade of this commodity, Montserrat possesses a higher foreign exchange earning capacity than does its OECS counterpart. Part of this advantage is attributable to the fact that carrot yields in Montserrat are 85% higher than in St. Kitts/Nevis. If foreign exchange savings (import displacement) is a major objective of the agricultural sector in these two OECS member states, then production of carrot constitutes an efficient use of domestic resources and a viable means of attaining the said objective.

Table 5.2 indicates that increasing the NIP by 15% improves the competitive position of carrot production in both countries. However, the relative ranking remains unchanged. As can be seen in Figure 5.3, similar results are obtained when the shadow wage of labour is varied. It should be noted that in both cases, while absolute competitiveness (based on the estimated DRC under each scenario relative to the base model DRC) improves, the relative competitive advantage of Montserrat vis-a-vis St.Kitts/Nevis is narrowed somewhat.

Given that the estimated DRCs are less than one in both countries, carrot production can be seen to be a potential net earner of foreign exchange. Specifically, the cost of earning US\$1.00 from carrot production in Montserrat is estimated to be EC\$1.51 while in St.Kitts/Nevis the cost is EC\$2.43. Both values compare to the market rate of exchange which stands at EC\$2.70 to US\$1.00.

Export data reported by Schwartz/Nurse indicate no carrot exports from either Montserrat or St.Kitts/Nevis during the 1988-1991 time period. Country data does indicate that St.Kitts/Nevis is a net importer of carrot. The Schwartz/Nurse trade data also indicates, that a small volume of carrots was exported from Antigua in 1990. US import data compiled by APHIS indicated that carrots from Montserrat and St.Kitts/Nevis to the US Virgin Islands on a sporadic basis over the 1983 to 1989 period.

FIGURE 5.1. DOMESTIC RESOURCE COST - CARROT, 1992-93
Selected OECS Countries

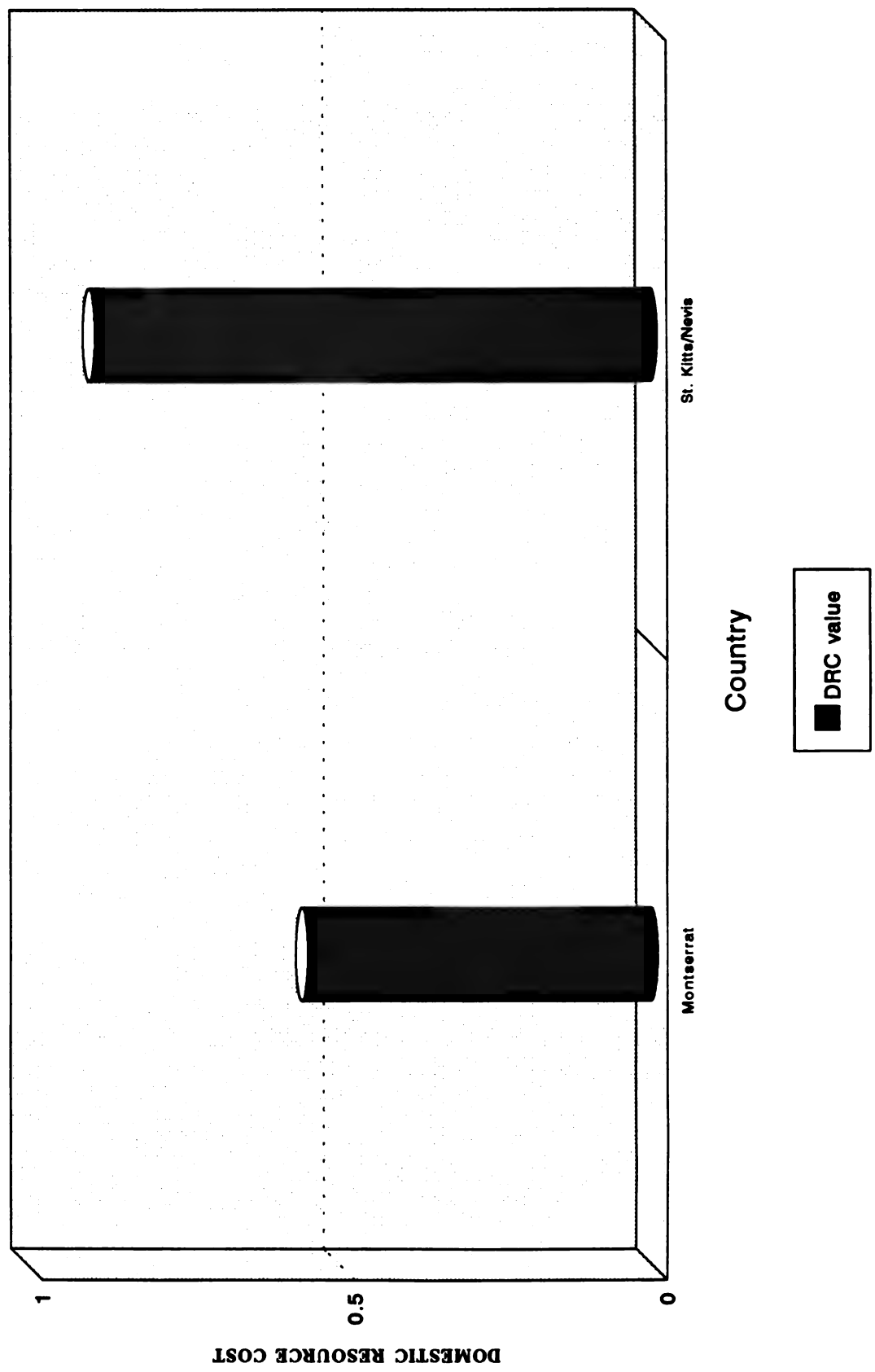


FIGURE 5.2. PRICE SENSITIVITY FOR CARROT, 1992-93
Selected OECS Countries

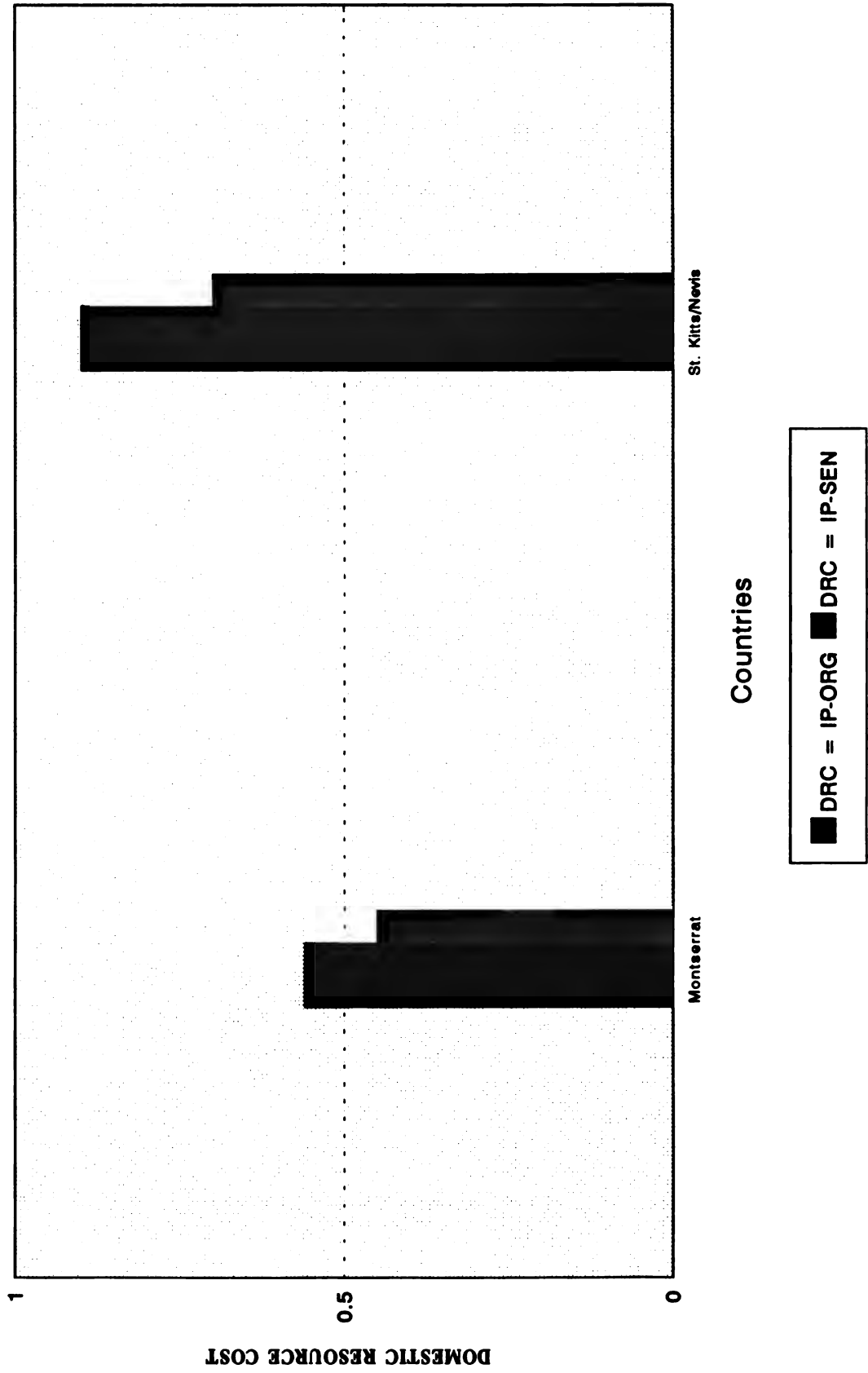
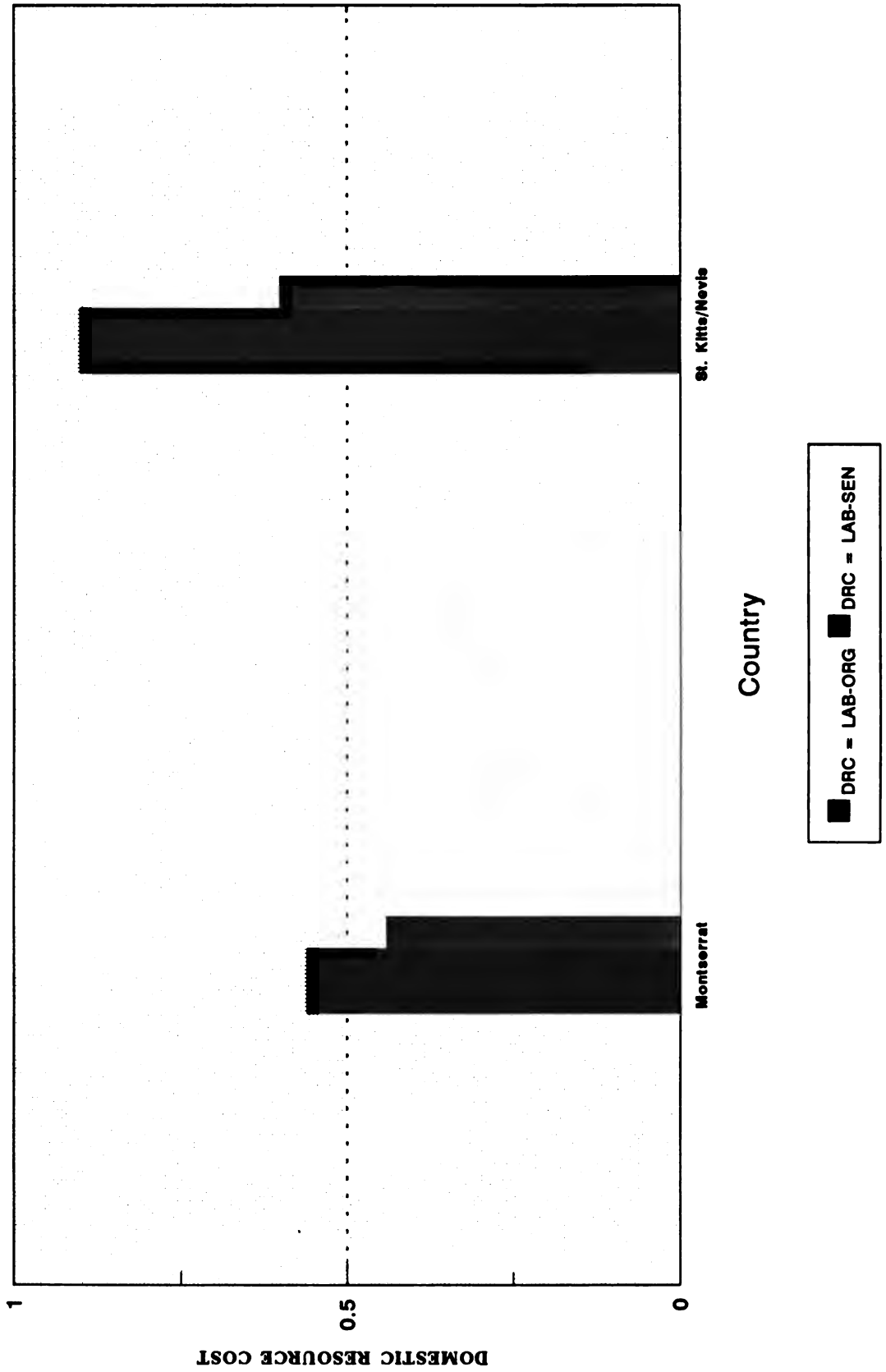


FIGURE 5.3. LABOUR SENSITIVITY FOR CARROT - 1992-93
Selected OECS Countries



CASHEW

As with breadfruit, there are no large cultivations of cashew in the OECS, or in the wider CARICOM region for that matter. Current realization of the export potential of this crop has stimulated interest in its production on a more organized and commercial basis. However a decision on the viability of cashew production should draw heavily on the DRC results as well as on the results of market demand analysis.

Reliable data on cashew production was available for Grenada, and as such the DRC analysis for that country only is presented. Interest lay in assessing whether the enterprise was competitive, vis-a-vis other agricultural enterprises, given the current level of technology, cost structure and prices. The results of the analysis in Figure 6.1 indicated that Grenada, with a coefficient of 1.55 was not an efficient producer of cashew. Since the domestic resource costs are greater than one, the country stands to lose foreign exchange from production of this commodity. The inefficiencies may be due to the relatively low productivity which results from poor tree husbandry and management practices.

The data reveals that presently, cashew yields are substantially lower than could be obtained. An increase of 30% in present cashew yields will be necessary if this enterprise is to become competitive. Figure 6.2 indicates that the magnitude of the increase required appears attainable, given the extremely low level of technology currently existing in cashew production in Grenada. However a DRC ratio of unity implies that the enterprise neither earns nor saves foreign exchange from production, and that resources could be more efficiently utilized in an alternative enterprise. Thus investment in cashew as a diversification enterprise should be based on whether yield increases in excess of 16% can be reasonably attained and at what cost.

An examination of variations in the costs of labour was employed to assess the sensitivity of the DRC ratios to assumptions made in regard to distortions in agricultural labour markets. The result in Figure 6.3, suggests that while assumptions of greater inefficiencies in agricultural labour markets improved competitiveness of the crop relative to the base model ratio, the enterprise remained uncompetitive. The NIP for cashew was increased by 10% reflecting the upper limit of price variations after accounting for marketing margins. The result of this simulation reported in Figure 6.4, indicates that the reduction in the DRC coefficient from 1.55 under the base model to 1.32 under the NIP simulation was not sufficient to make the enterprise competitive. These results confirm that labour costs as well as other cost factors will not ultimately generate the stimulus necessary to make cashew production efficient.

Generally the analysis indicates that cashew is a poor performer judged on the basis of its ability to utilize domestic resources efficiently and to generate net foreign exchange earnings in international trade. Grenada does not have a competitive advantage in cashew production and as such, should not invest in its production and expansion without radical changes in the structure of production and serious consideration to production fundamentals. While the crop is not presently competitive, if the requisite actions are initiated, including investment in research and extension capabilities to support crop development, there would seem to be no reason to suggest that the industry may not be competitive in due course. Presently however, in the absence of market protection and/or government support, survival prospects of the crop in a more liberalized environment appear dim.

FIGURE 6.1. DOMESTIC RESOURCE COST - CASHEW, 1992-93
Selected OECS Countries

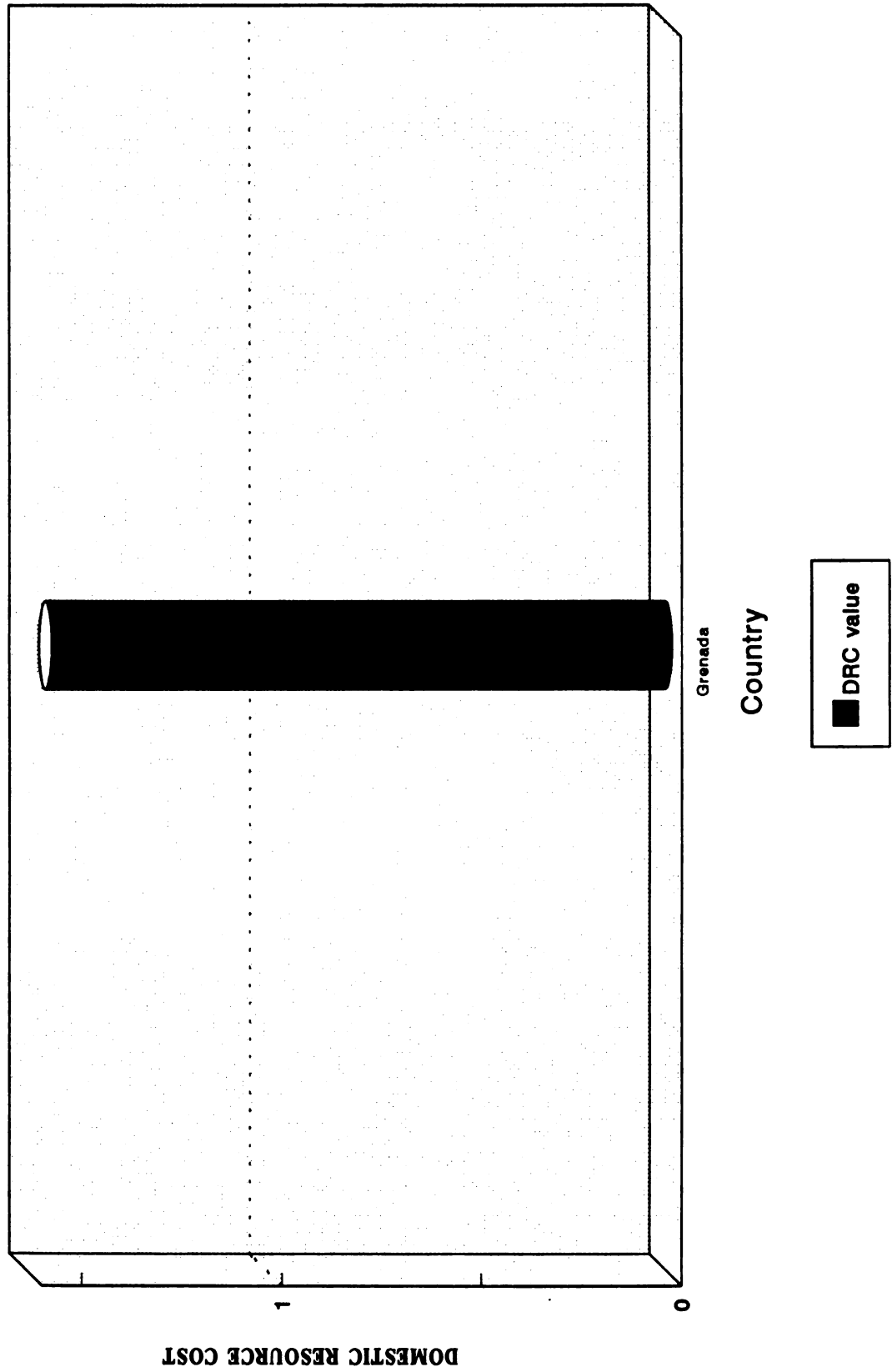


FIGURE 6.2. YIELD SENSITIVITY FOR CASHEW, 1992-93
Selected OECS Countries

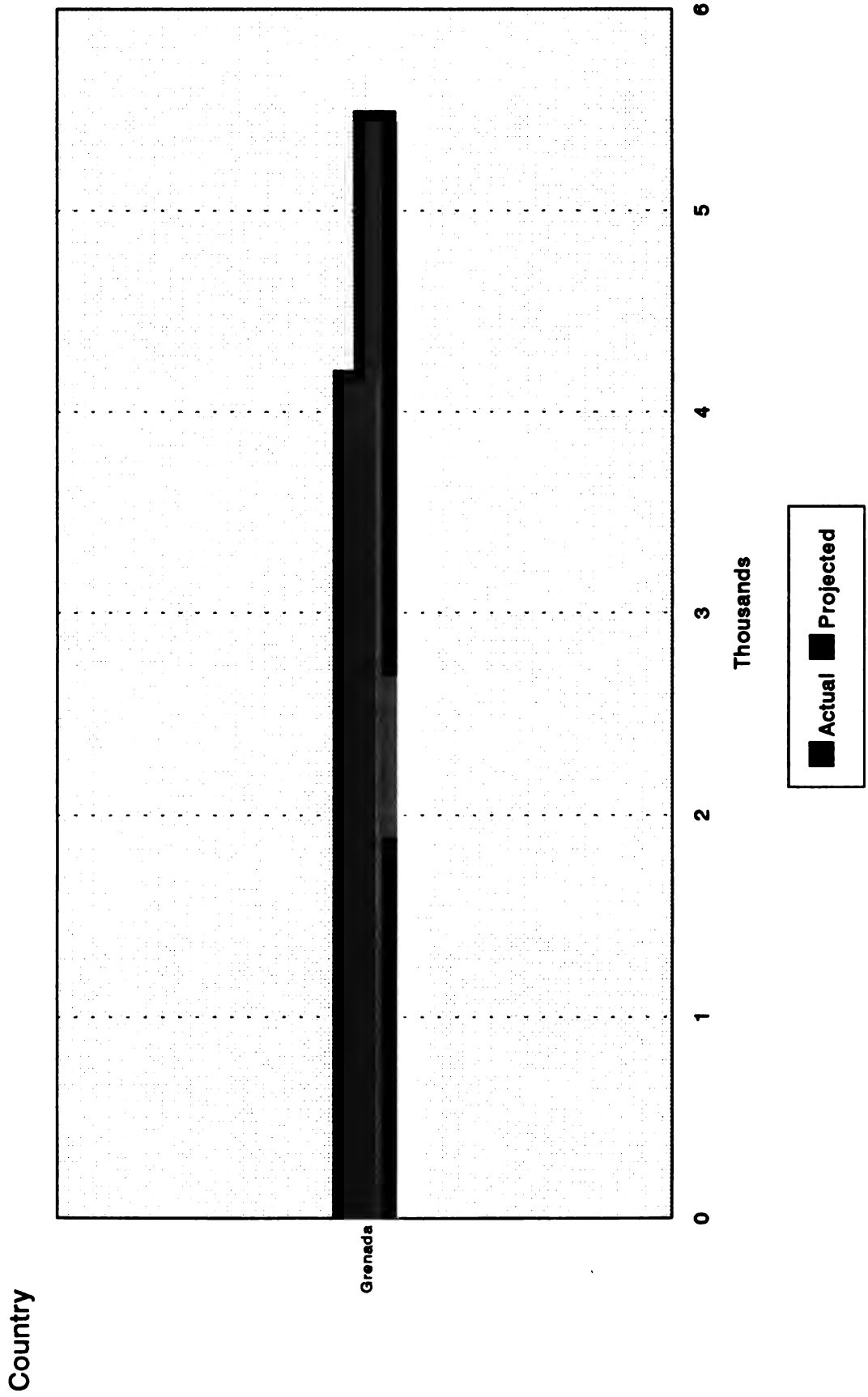


FIGURE 6.1. DOMESTIC RESOURCE COST - CASHEW, 1992-93
Selected OECS Countries

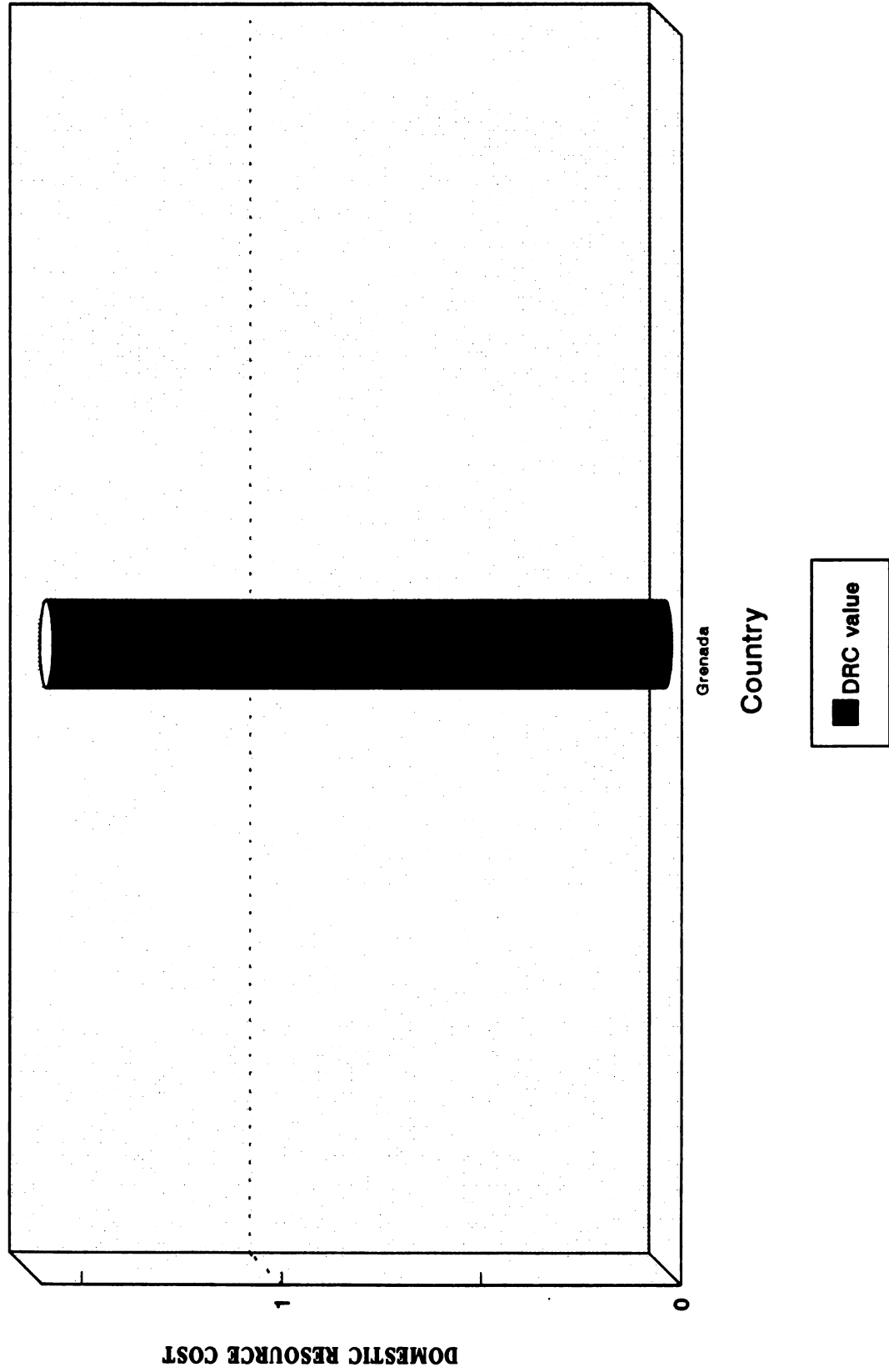


FIGURE 6.2. YIELD SENSITIVITY FOR CASHEW, 1992-93
Selected OECS Countries

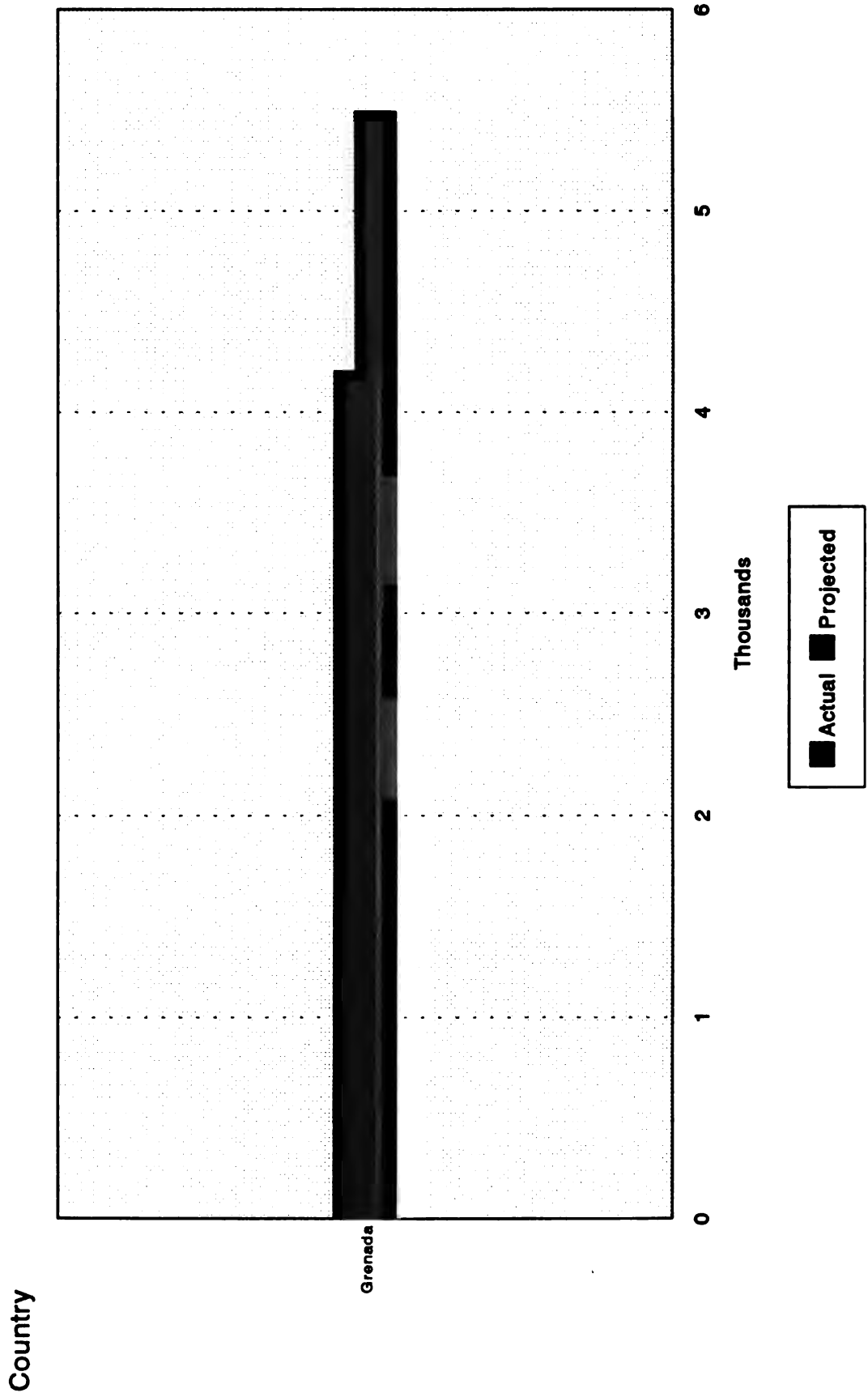


FIGURE 6.3. LABOUR SENSITIVITY FOR CASHEW - 1992-93
Selected OECS Countries

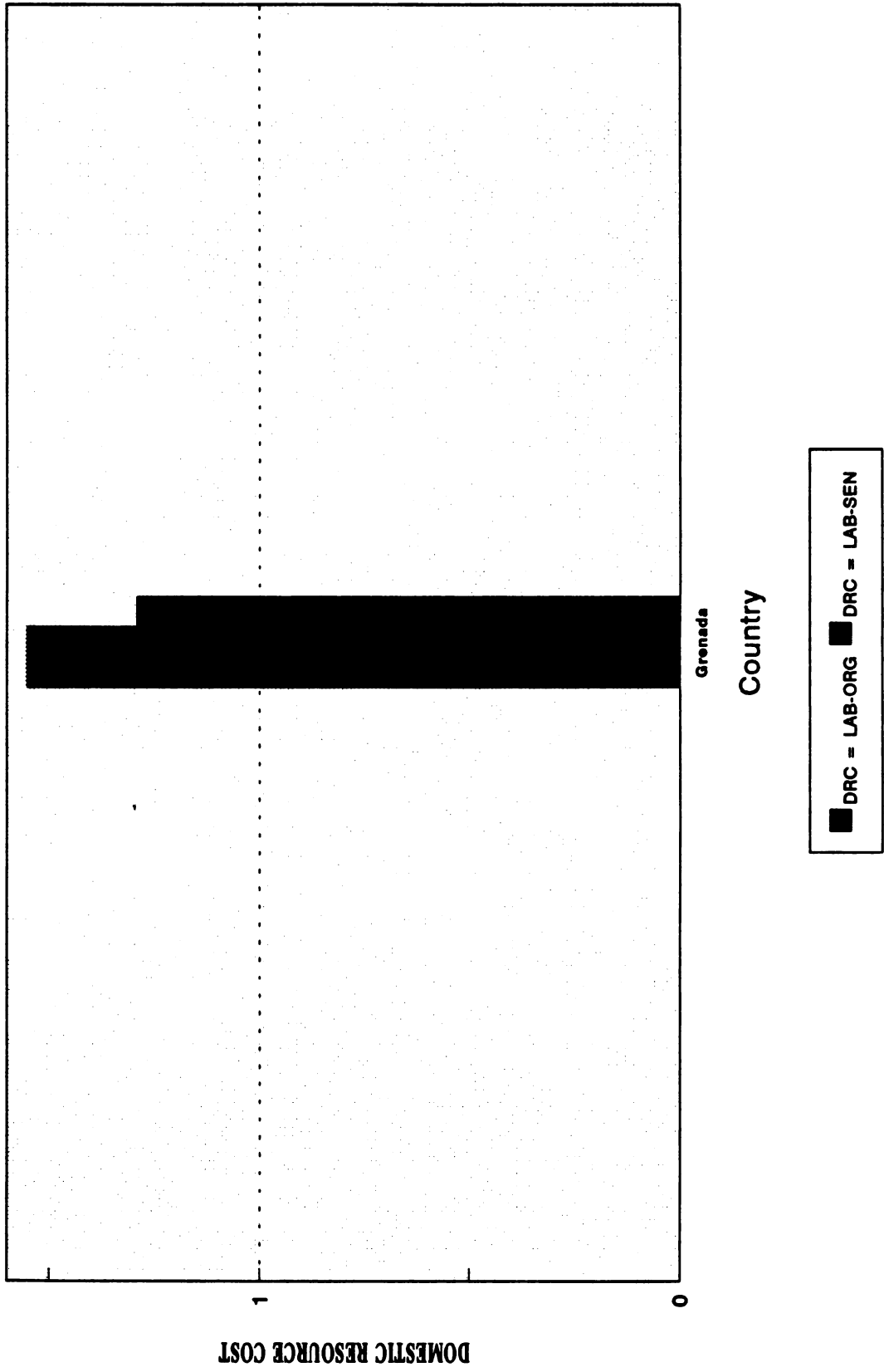
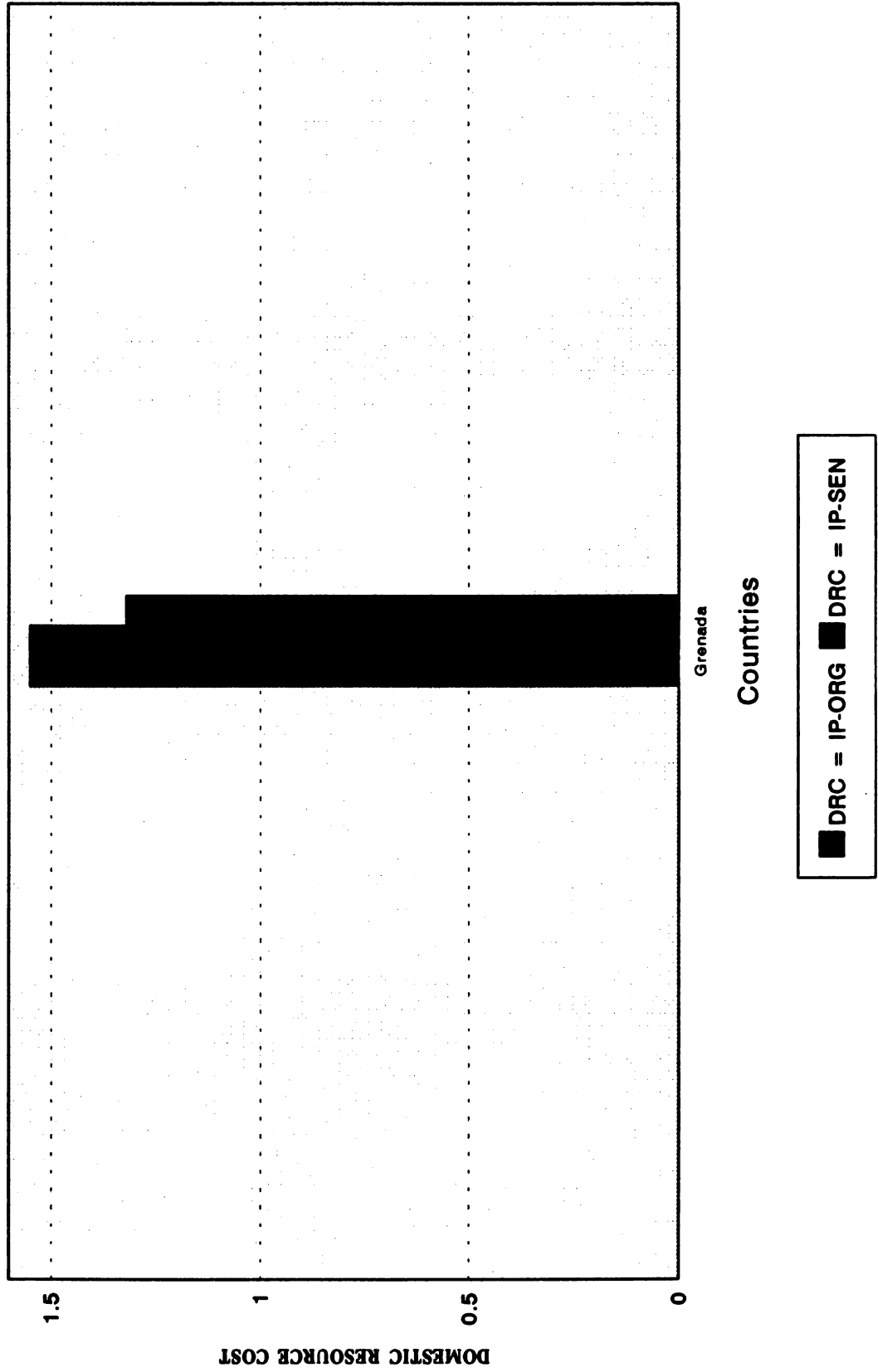


FIGURE 6.4. PRICE SENSITIVITY FOR CASHEW, 1992-93
Selected OECS Countries



CAULIFLOWER

The estimated DRC for cauliflower production in Montserrat is presented in Figure 7.1. The DRC coefficient of 4.12 indicates that production of this crop is not competitive and that more profitable alternatives exist for the domestic resources employed in cauliflower production. The high value of the DRC is indicative of production inefficiencies related to the relatively high cost structure, without corresponding high levels of productivity. These results imply that producers may be engaging in the enterprise because of their ability to earn private rents from the captive domestic market. However incremental production of cauliflower constitutes an expensive means of earning/saving foreign exchange.

Sensitivity analysis to determine the improvements in yield required to make the enterprise competitive was undertaken. The results, presented in Figure 7.2 indicate that assuming the non-intervention price as well as the shadow cost of production are held at their base model values, cauliflower yields would have to increase by about 67% in order to reach a DRC value of one. To the extent that such yield increases can be attained, a DRC of unity implies that the enterprise neither earns nor saves foreign exchange from production. Given the current cost and production structures existing in Montserrat, resources could be more efficiently utilized in an alternative activity with a current DRC ratio of less than unity.

The qualitative results obtained under the base model are robust to changes in the NIP and shadow wage rate for labour. The sensitivity analysis results in Figure 7.3 suggest that an increase in the export price of 15% reduces the estimated DRC for cauliflower production to 2.84. Cauliflower production however remains non-competitive. Similar results are obtained when the shadow wage rate is altered, as shown in Figure 7.4. These results confirm that product prices and labour costs by themselves cannot account for inherent production inefficiencies and resource misallocations. Thus more endemic factors are instrumental in constraining competitiveness in cauliflower production in Montserrat.

Given the non-competitive status of cauliflower production in Montserrat, it is not surprising that no exports of the commodity are reported from this country, nor any other OECS country in either the Schwartz/Nurse data or the APHIS data.

FIGURE 7.1. DOMESTIC RESOURCE COST - CAULIFLOWER, 1992-93
Selected OECS Countries

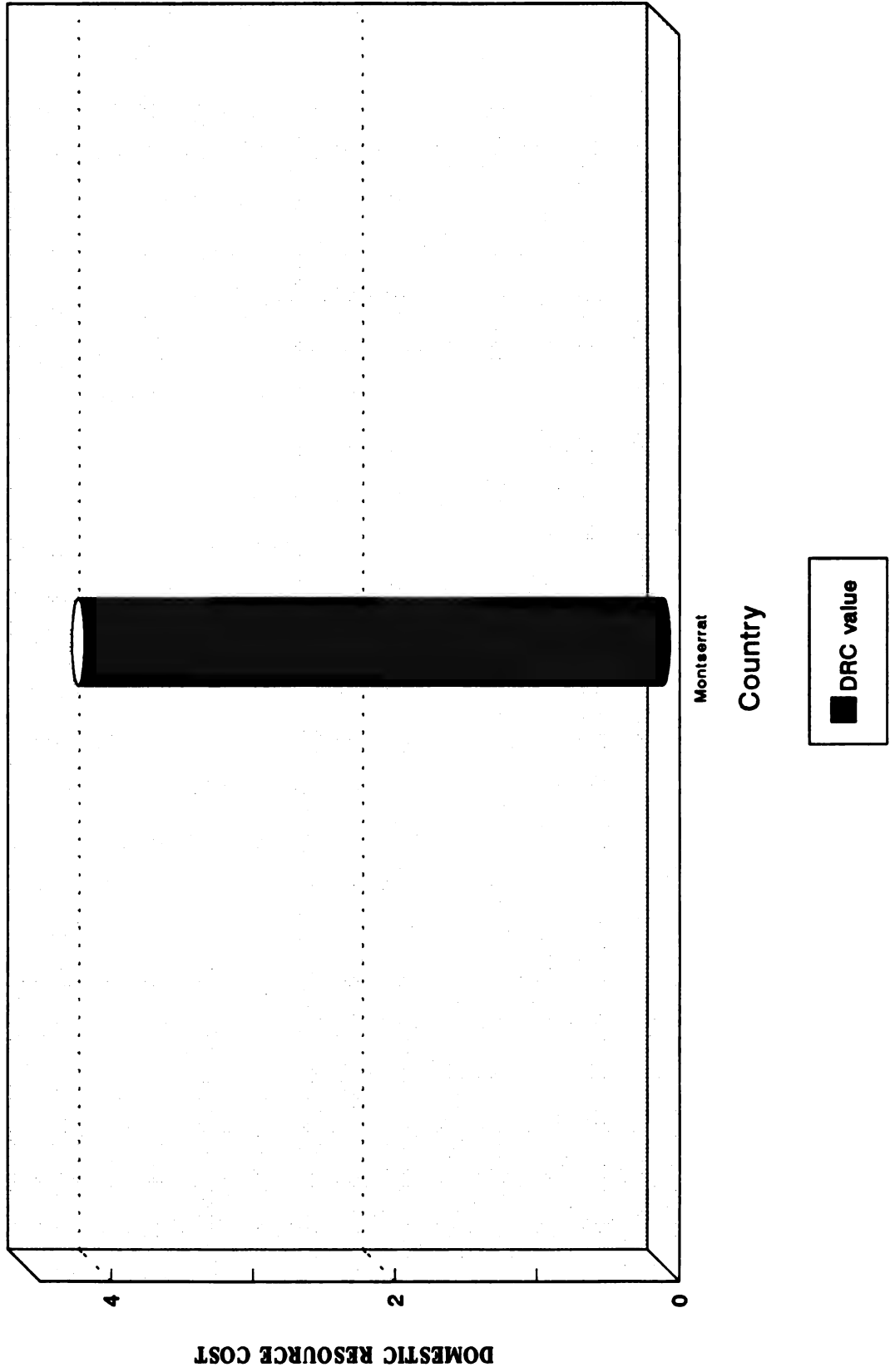


FIGURE 7.2. YIELD SENSITIVITY FOR CAULIFLOWER, 1992-93
Selected OECS Countries

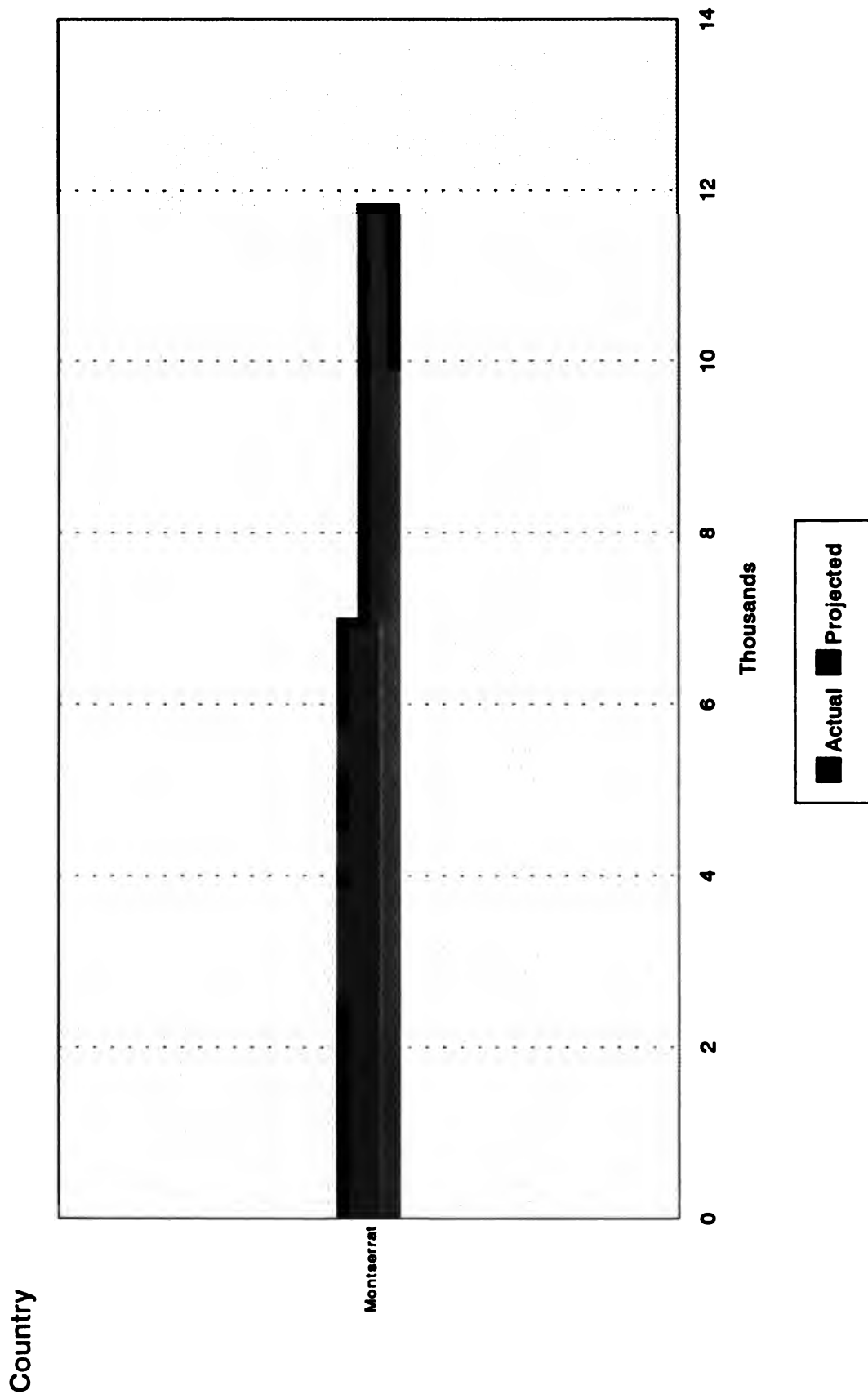


FIGURE 7.3. PRICE SENSITIVITY FOR CAULIFLOWER, 1992-93
Selected OECS Countries

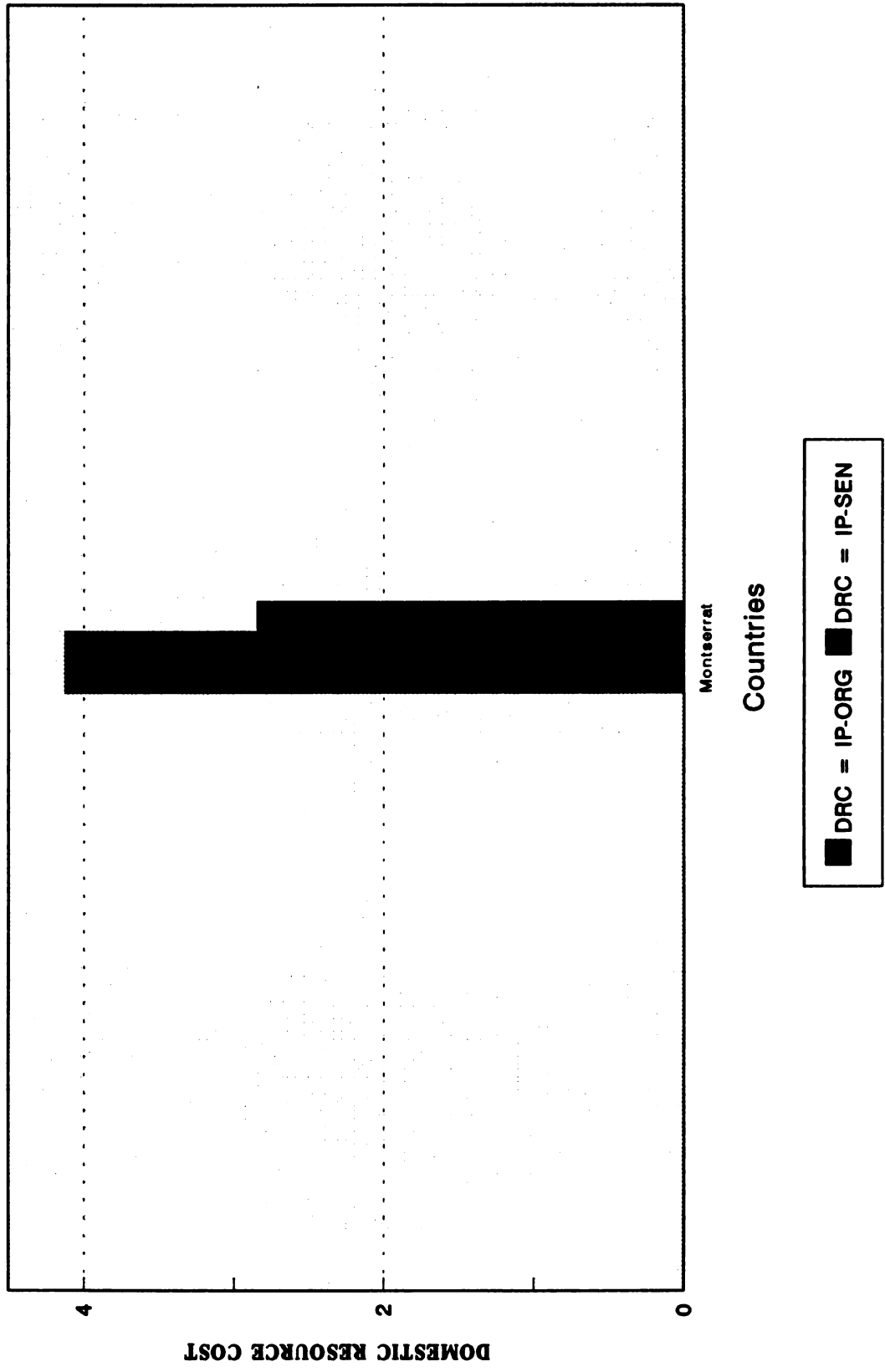
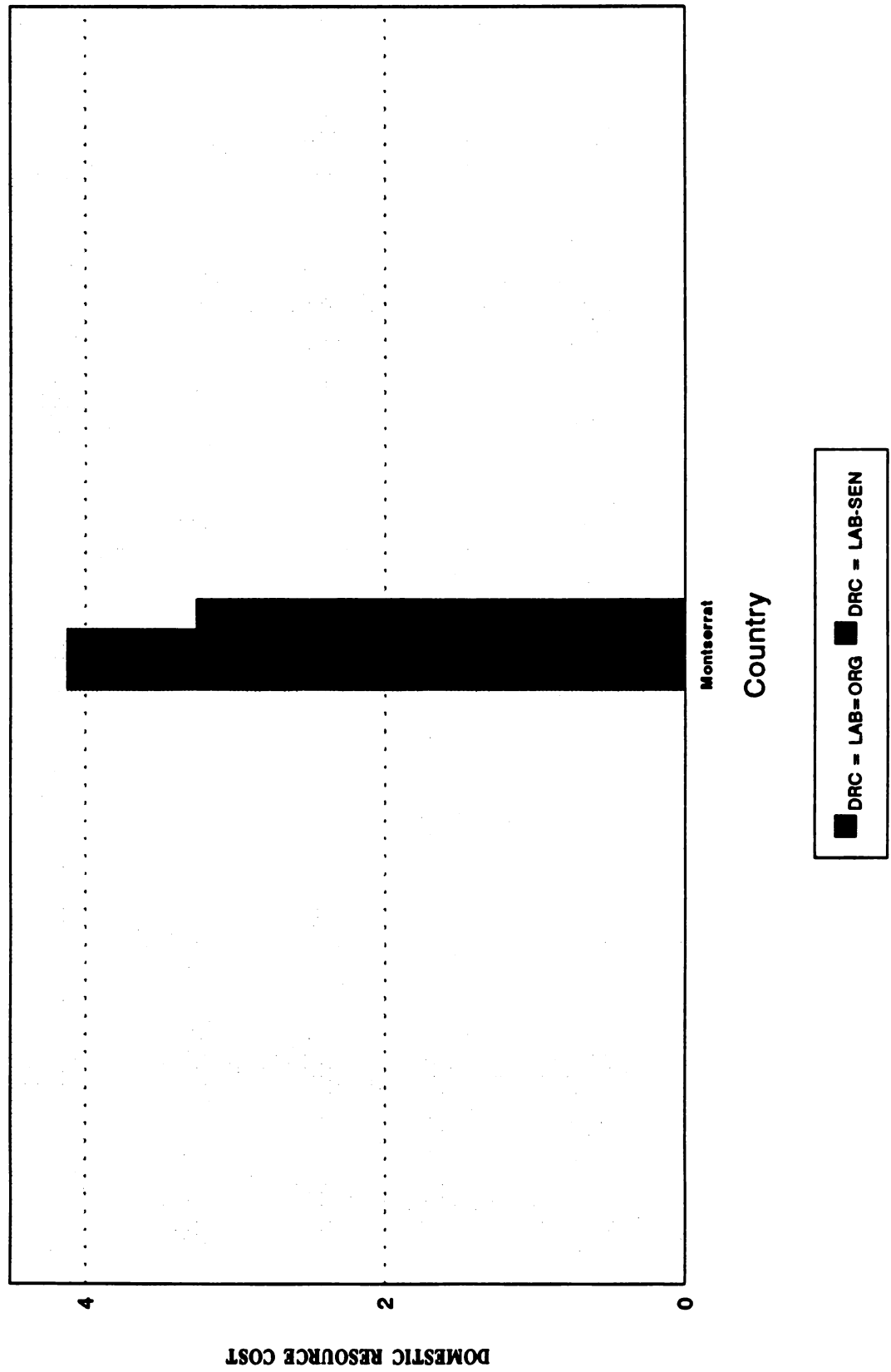


FIGURE 7.4. LABOUR SENSITIVITY FOR CAULIFLOWER - 1992-93
Selected OECS Countries



COTTON

The results of the DRC analysis for sea island cotton in St. Kitts/Nevis are presented in Figure 8.1. The results indicate that St. Kitts/Nevis has a competitive advantage in cotton production. This suggests that domestic resources are efficiently employed in production of this commodity, which appears to be a prime candidate for generating foreign exchange earnings. Competitiveness could be further enhanced through improvements in current yields and increased investments in research to develop technologies aimed at increasing productivity and product quality.

Several other factors could affect St. Kitts/Nevis in attaining its full potential in cotton production. While these factors have not been accounted for in the DRC analysis, they are nevertheless noteworthy. Among these factors, lack of a suitable cotton ginnery to transform cotton into lint along with poor marketing infrastructure are the two of the more important constraints. Notwithstanding the favorable DRC coefficient for cotton, achieving and sustaining competitiveness will continue to hinge critically on the resolution of these problems.

Cotton production in St. Kitts/Nevis remains fairly labour-intensive. This places particularly heavy demands on the small domestic agricultural labour force during harvesting periods, which coincide with the peak of the tourist season and with the harvesting of sugarcane. While these influences have been captured in the estimate of the conversion factor (CF) for agricultural labour, the proportionately greater cost share of labour in cotton production makes it prudent to undertake sensitivity analysis based on alternative assumptions regarding the nature of the agricultural labour markets.

The results of the labour sensitivity analysis assuming a greater divergence between the private and social cost of labour (i.e. that the social cost of labour employed in cotton production was lower than assumed under the base model) are given in Figure 8.2. The results indicate that assuming agricultural labour markets in St. Kitts/Nevis were indeed characterized by greater inefficiencies than the estimated value of the CF indicated, then the country's competitiveness in cotton production would be enhanced (DRC coefficient would be 0.08 instead of the 0.12) relative to the base model scenario.

Sensitivity analysis was also undertaken in regard to the non-intervention price of cotton which was assumed to increase by 10%. The results in Figure 8.3 also suggest that the country's competitive advantage improved slightly relative to the base model as a consequence of the increase in NIP.

The analysis for cotton is particularly interesting, since it establishes that the DRC measure constitutes a necessary though not a sufficient condition for the attainment of competitiveness. DRCs notwithstanding, the analysis has underscored the importance of other dimensions of equal importance which need to be addressed if the potential which St. Kitts/Nevis possesses in cotton production is to be realized. This analysis clearly indicates that investing

additional resources in cotton production given the present level of technology, costs and prices will result in net benefits to the country.⁶

⁶ Interested readers can refer to "The Generation and Transfer of Technology in Support of Cotton Production in the Caribbean", IICA, April 1993.

FIGURE 8.1. DOMESTIC RESOURCE COST - COTTON, 1992-93
Selected OECS Countries

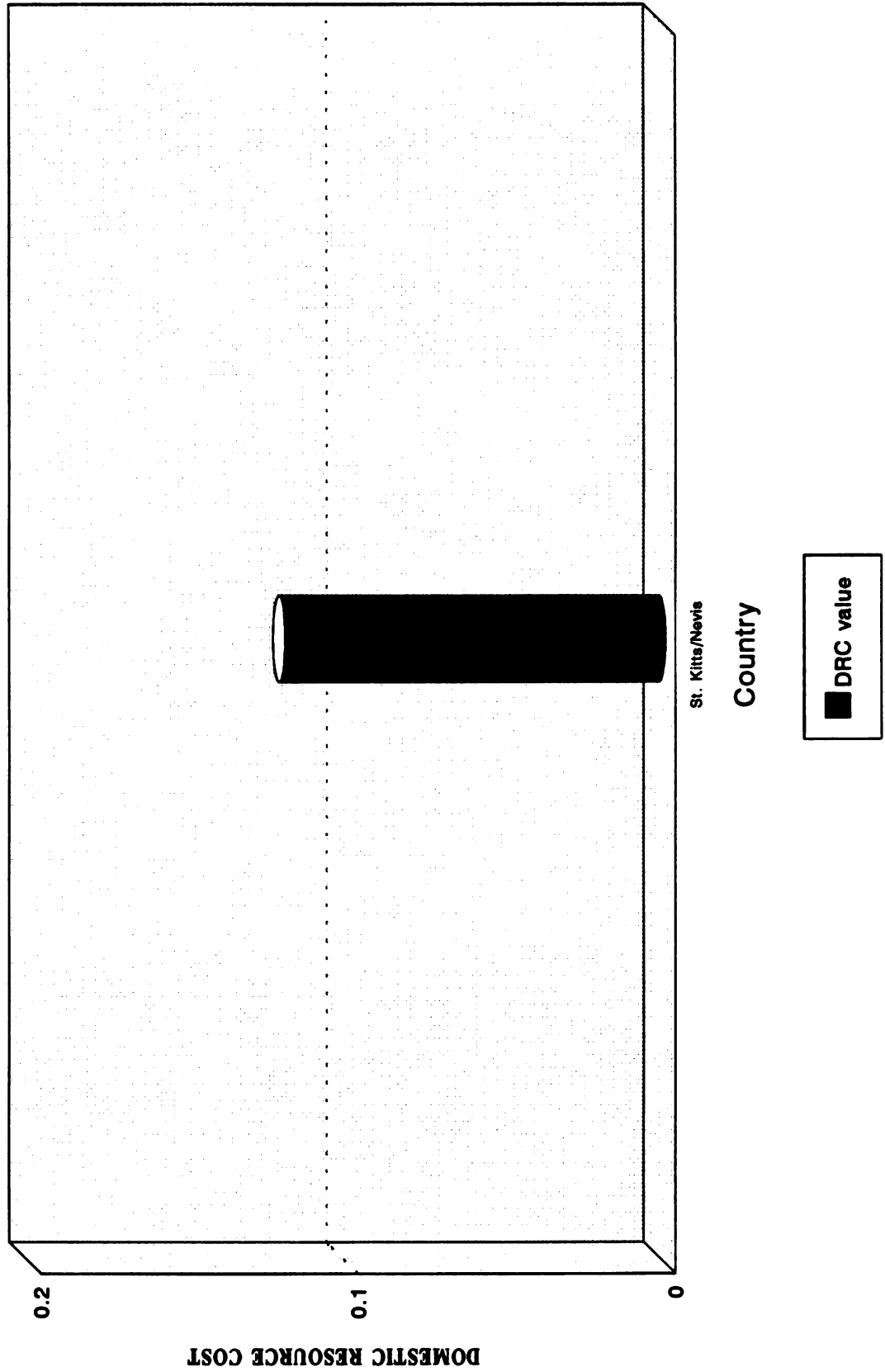


FIGURE 8.2. LABOUR SENSITIVITY FOR COTTON - 1992-93
Selected OECS Countries

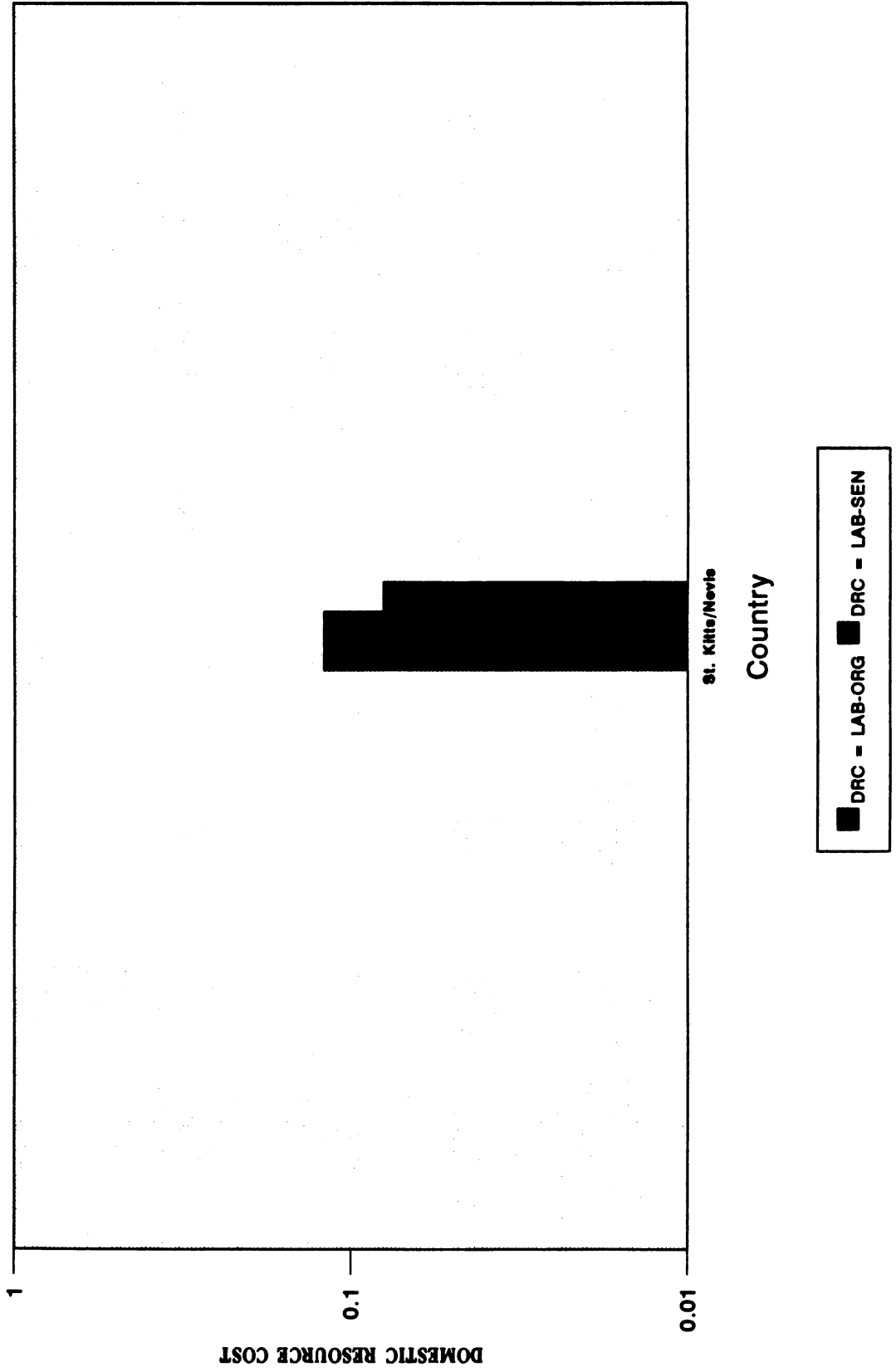
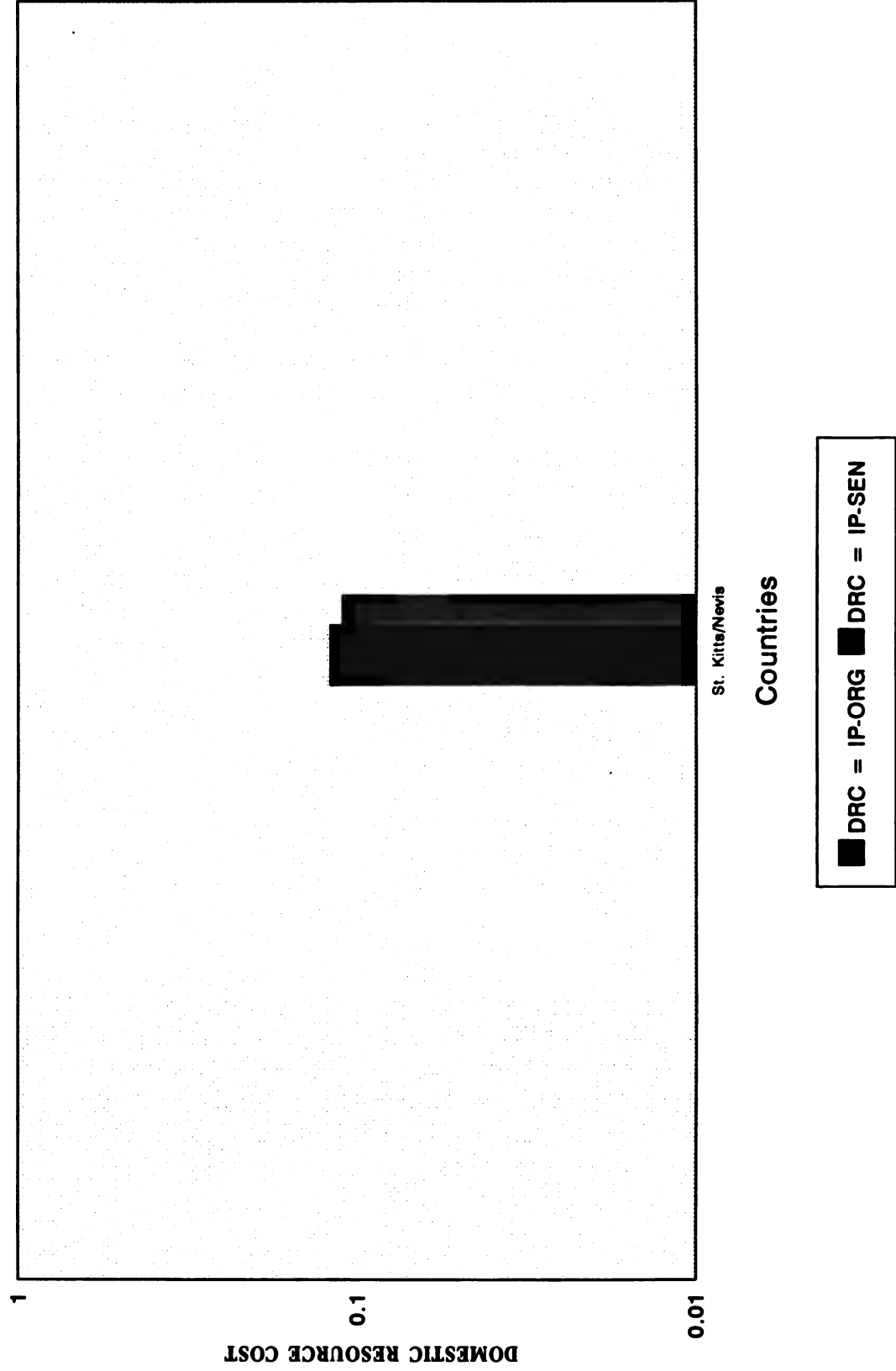


FIGURE 8.3. PRICE SENSITIVITY FOR COTTON, 1992-93
Selected OECS Countries



CUCUMBER

The results presented in Figure 9.1 indicate that the DRC ratios for cucumber production in Antigua and the British Virgin Islands fall outside the zero-to-unity range. This suggests that cucumber production in both countries is not competitive with other domestic activities and that the enterprise is not an appropriate one for either country. Since the domestic resource costs are greater than one (Antigua) and negative (British Virgin Islands), then the social cost of cucumber production exceeds the foreign exchange earnings/savings which may be gained from domestic production. While being socially unprofitable, cucumber production still results in private profits to producers due to implicit government protection.

The negative value of the DRC for the BVI indicates that this country is relatively less competitive than its counterpart in cucumber production. The DRC value is also indicative of the high level of imported inputs utilized in production given the level of yields, domestic inputs and the non-intervention price. Production is characterized by high inefficiencies and incremental production will result in foreign exchange losses since resources devoted to this enterprise have more profitable alternatives both within agriculture as well as in economy sectors in both countries.

Sensitivity analysis was undertaken to identify the improvement in yield levels necessary to make cucumber production competitive in both countries. The results presented in Figure 9.2 indicate that yields would have to increase by 68% in Antigua and over 800% in the BVI to attain a DRC of unity. While the improvements for Antigua do not appear to be unattainable, that which is required in the BVI appears to be more difficult to achieve. Given the lower levels of productivity and the relatively higher agricultural wage structure, the BVI can save foreign exchange from sourcing its requirements for this commodity from elsewhere.

The effect of increasing the non-intervention price by 15% for both countries is shown in Figure 9.3. While the competitiveness of cucumber production in both countries improves relative to the base model, their estimated DRCs remain in the non-competitive range. As shown in Figure 9.4, similar results are obtained when the shadow wage rate for labour is varied. The results of the simulations are thus consistent with those obtained under the base model.

Export data compiled by Schwartz/Nurse report a small volume of cucumber exports from Antigua in 1989 and 1990. Data on US imports reported by APHIS indicate a small but consistent volume of exports from Dominica and St. Lucia to the US Virgin Islands over the 1983 to 1989 period. Some sporadic exports from St. Kitts/Nevis to the US Virgin Islands have also been observed over this time period.

FIGURE 9.1. DOMESTIC RESOURCE COST - CUCUMBER, 1992-93
Selected OECS Countries

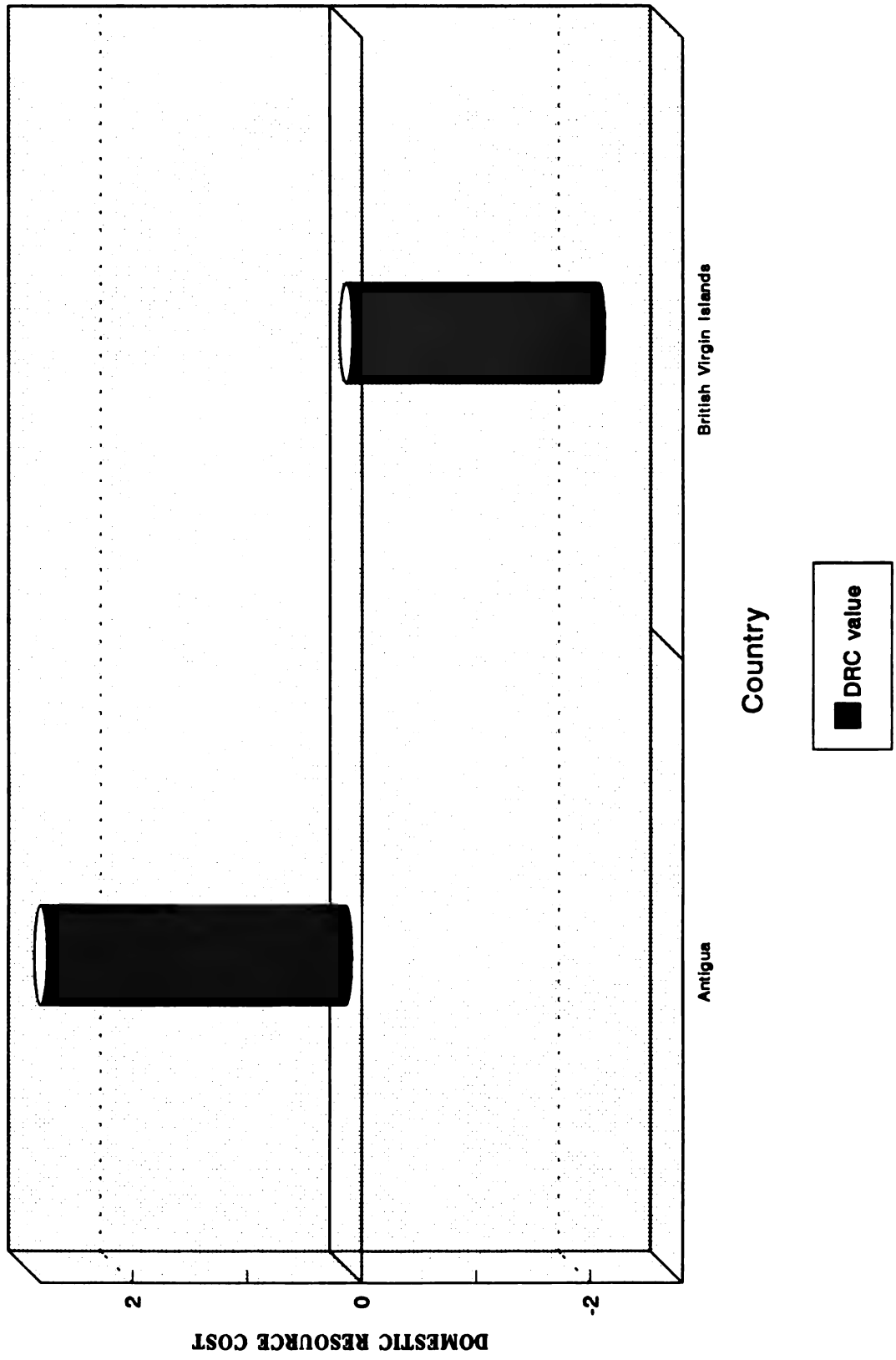


FIGURE 9.2 YIELD SENSITIVITY FOR CUCUMBER, 1992-93
Selected OECS Countries

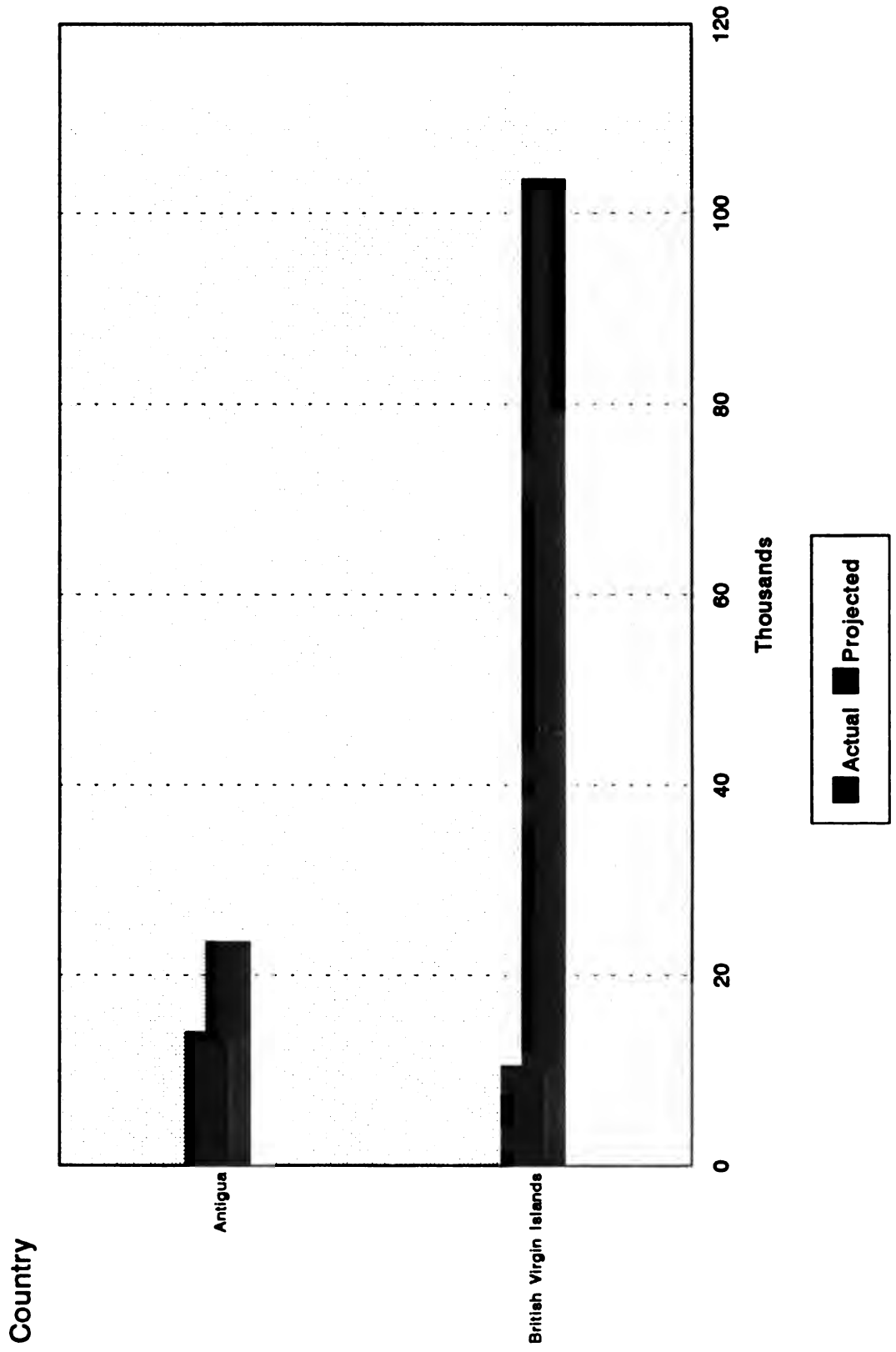


FIGURE 9.3. PRICE SENSITIVITY FOR CUCUMBER, 1992-93
Selected OECS Countries

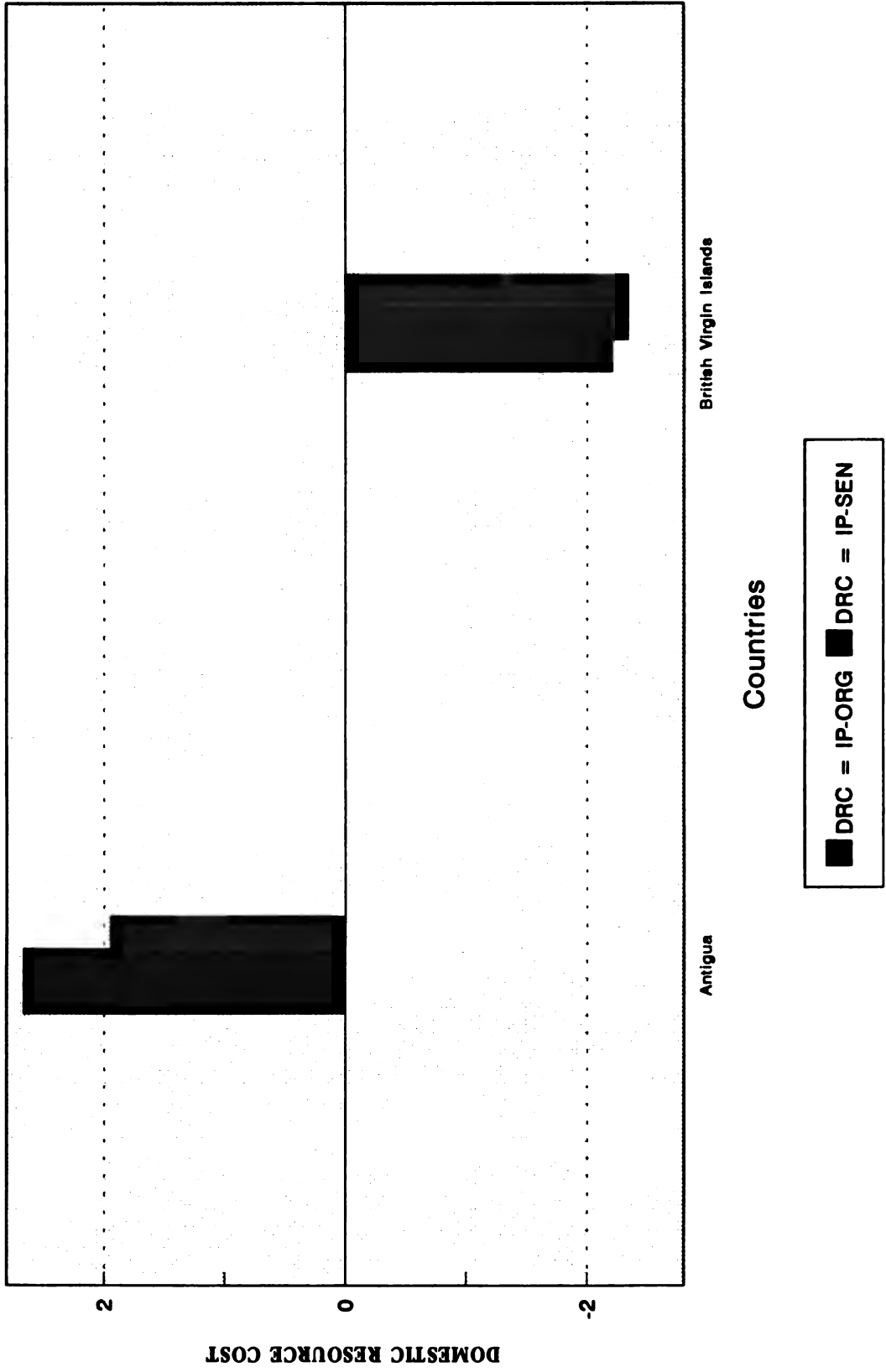
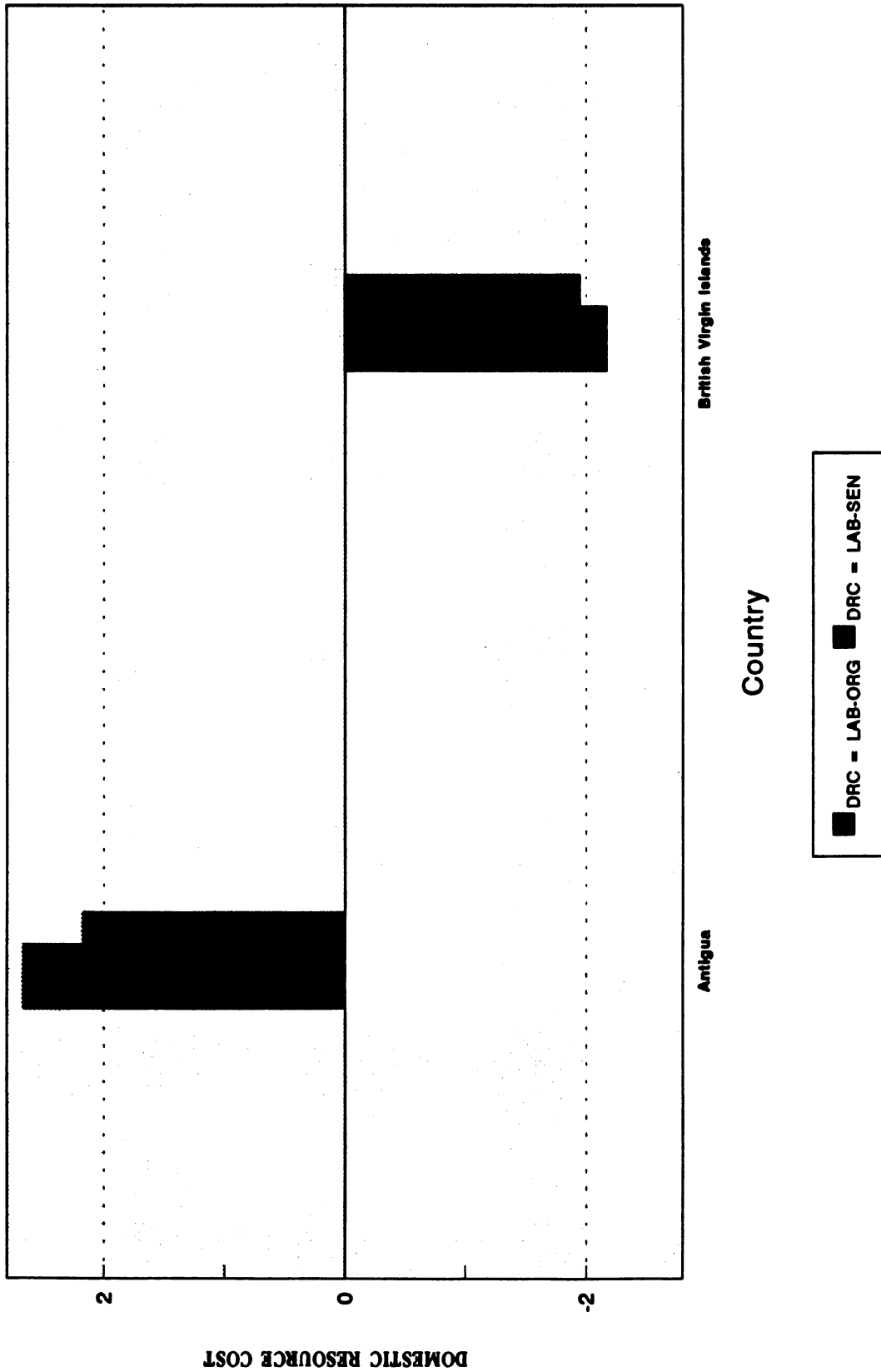


FIGURE 9.4. LABOUR SENSITIVITY FOR CUCUMBER - 1992-93
Selected OECS Countries



DASHEEN

Figure 10.1 shows the results of the DRC analysis for dasheen production among the four Windward Islands: St. Vincent, Grenada, Dominica and St. Lucia. Variations in the absolute value of the DRCs indicate the extent to which competitive advantage differs among countries. A country's relative efficiency in the production of a commodity can be evaluated by comparing its DRC ratio with that of its competitors. The decision criteria for cross-country analysis is that the smaller the ratio, the greater a country's relative efficiency and competitiveness in the production of the commodity.

The principal concern here is with relative country competitiveness. It can be seen from Figure 10.1 that St. Vincent ranks highest and St. Lucia lowest in terms of competitiveness. According to the analysis, the social costs of dasheen production in St. Vincent is lower than in the other three OECS territories. This implies that the economy is liable to derive net foreign exchange earnings from the production and trade of this commodity. Grenada and Dominica, while both being competitive, are relatively less efficient than St. Vincent.

St. Lucia, which has the highest DRC value (1.14), does not appear to be currently competitive in the production of dasheen. The higher value of the DRC suggests that the resources employed in dasheen production are not efficiently utilized. These results imply that producers may be engaging in production because of their ability to earn private rents from the captive domestic market. The results also indicate that the social costs of dasheen production exceed the foreign exchange earnings/savings which may be gained from domestic production.

The results of the yield sensitivity analysis, shown in Figure 10.2, indicate that improvements in yields of only 6% are required for St. Lucia to become competitive in dasheen production. Yield comparisons indicate that St. Vincent recorded the highest yield and that the levels obtained for St. Lucia were similar to those attained in both Dominica and Grenada. This leaves open the prospect for improved competitiveness in St. Lucia, Dominica and Grenada, via increases in production efficiencies.

Since the DRC measure of competitiveness depends inter alia on variations in the technical coefficients, sensitivity analysis was conducted to test the robustness of the cross-country rankings. A variation of 10% in the NIP of dasheen was simulated. The results of the simulation are given in Table 10.3. As expected, smaller absolute values for the DRCs resulted from the simulations indicating improved competitiveness across all four countries. A notable change in the results, was that dasheen production in St. Lucia shifted from being uncompetitive under the base model, to being competitive under the NIP simulation.

A test of the sensitivity of the DRC coefficients to variations in the conversion factor (CF) for labour was also undertaken. The results were similar to those obtained under the NIP simulation. According to Table 10.4, assuming a lower CF for labour also reduced the absolute value of the DRCs, thus indicating improved individual country competitiveness. The relative ranking between countries however, remained unaltered. The DRC ratio obtained under the

labour simulation, also indicates that St.Lucia switched from being uncompetitive to being a competitive producer of dasheen.

The results of the simulations suggest that the DRC coefficient for St.Lucia was more sensitive to changes in the NIP and labour variables than any of the other three countries. This implies that price policy, in addition to altering the current levels of technology may be instrumental in enhancing St.Lucia's competitiveness in dasheen production.

Ex-post trade data generally supported the DRC results. The data suggested that dasheen exports from St.Vincent outweighed similar exports from Grenada, Dominica and St.Lucia. The trade data also indicated that Dominica ranked second in the OECS in terms of dasheen exports. Grenada, which has a lower DRC than Dominica, and hence is relatively more competitive in dasheen production, is not a major exporter according to the available data. Further analysis of the export data for the 1980-1986 period did not support Grenada's competitive advantage over Dominica. The small level of exports from Grenada, particularly after 1986, appears to have been associated with the decline in the Trinidadian import demand for dasheen from the OECS. Despite its relatively lower competitive advantage in dasheen production, the trade data suggests that Dominica exports substantially more dasheen than does Grenada.

The improvements in cost and yields required to make dasheen production socially profitable in St.Lucia are generally quite small and increased resource investment in the areas previously outlined could result in their attainment of this objective to a reasonable degree. This fact, coupled with the sensitive nature of the DRC ratios to changes in key variables, suggests that dasheen cannot be dismissed as a commodity in which St.Lucia does not have a competitive advantage. While this does not suggest automatic attainment of the improvements outlined, the analysis suggests that there are no reasons to presume that social profitability could not be achieved within a reasonable timeframe.

FIGURE 10.1. DOMESTIC RESOURCE COST - DASHEEN, 1992-93
Selected OECS Countries

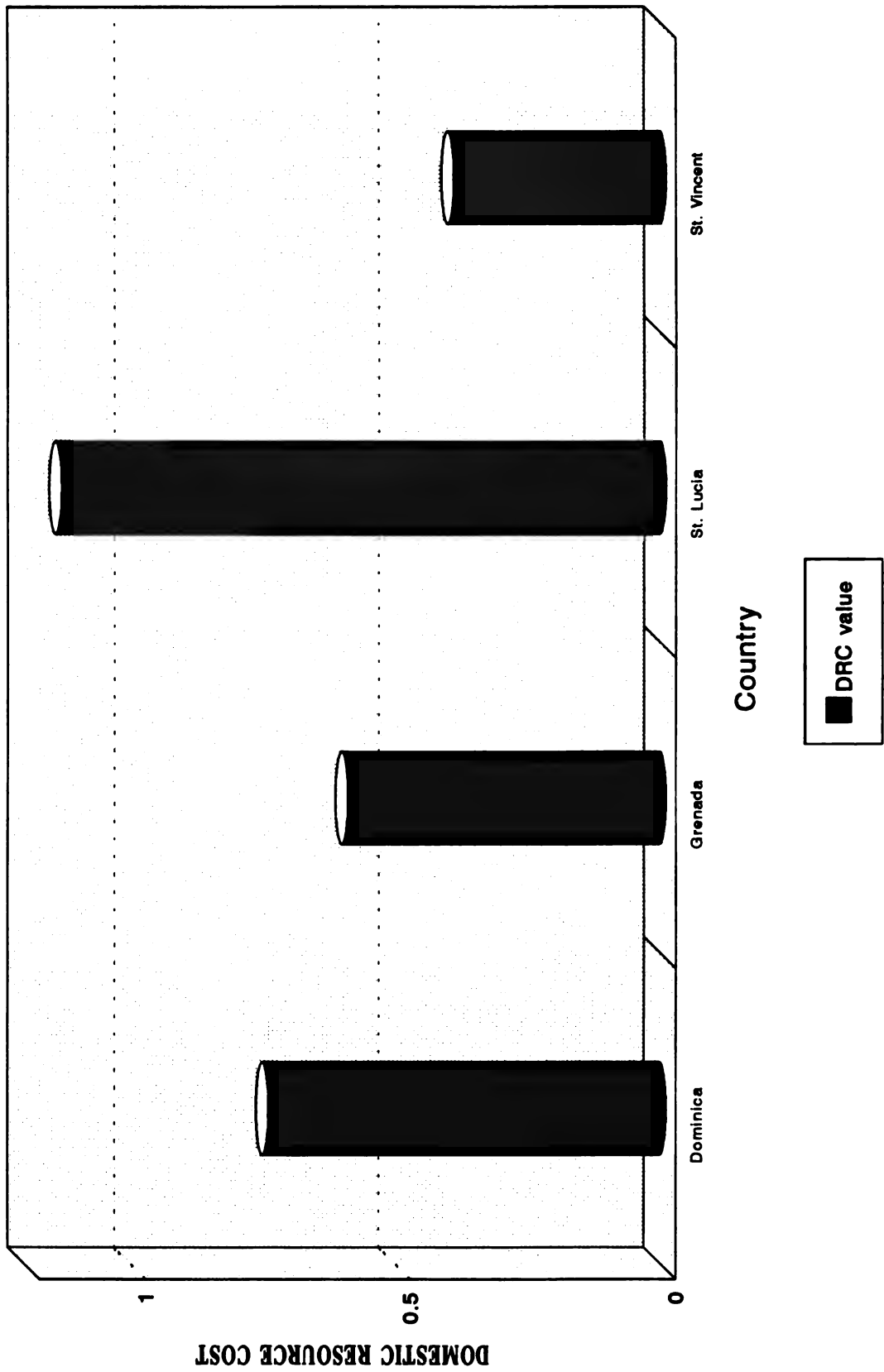


FIGURE 10.2. YIELD SENSITIVITY FOR DASHEEN, 1992-93
Selected OECS Countries

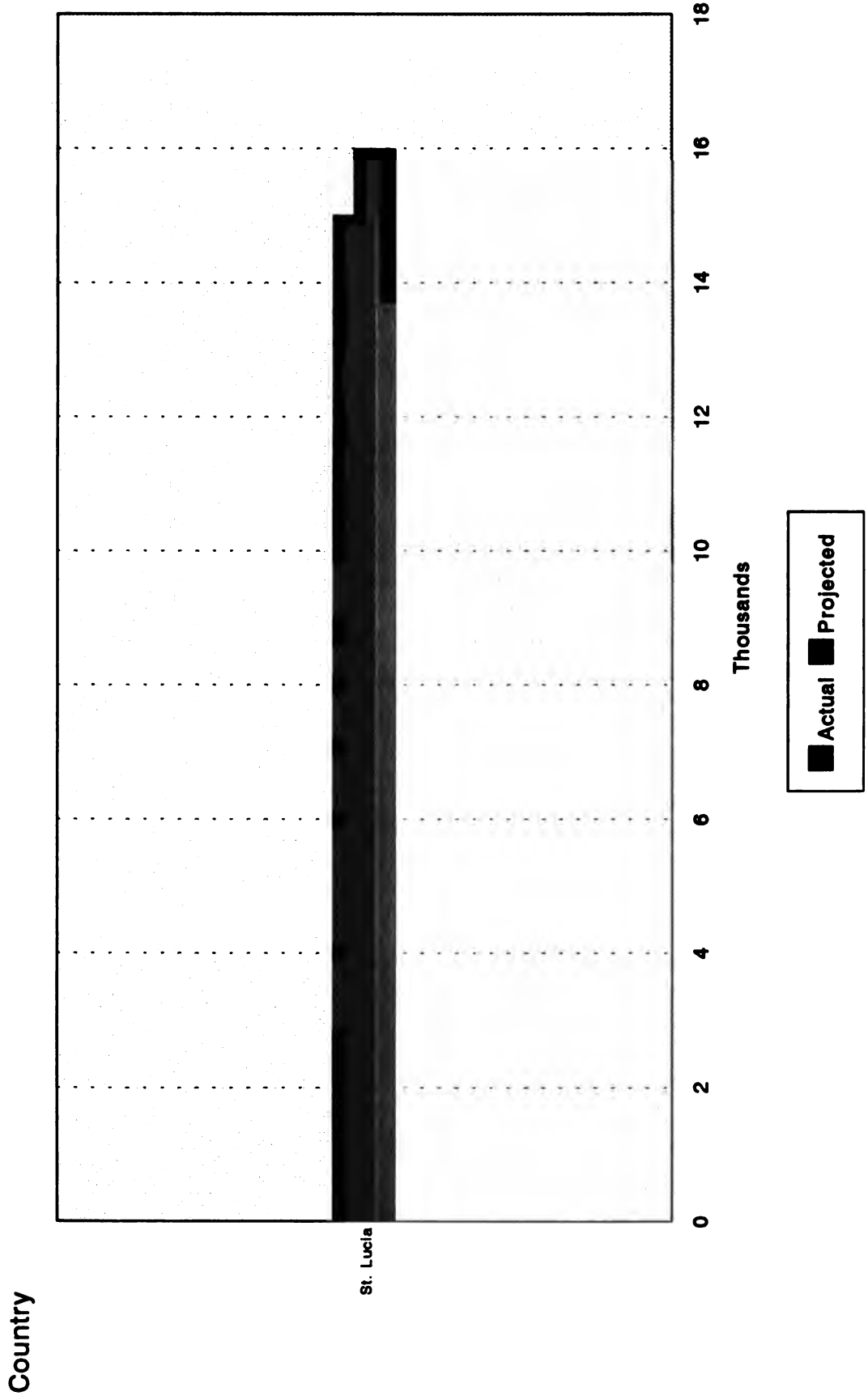


FIGURE 10.3 PRICE SENSITIVITY FOR DASHEEN, 1992-93
Selected OECS Countries

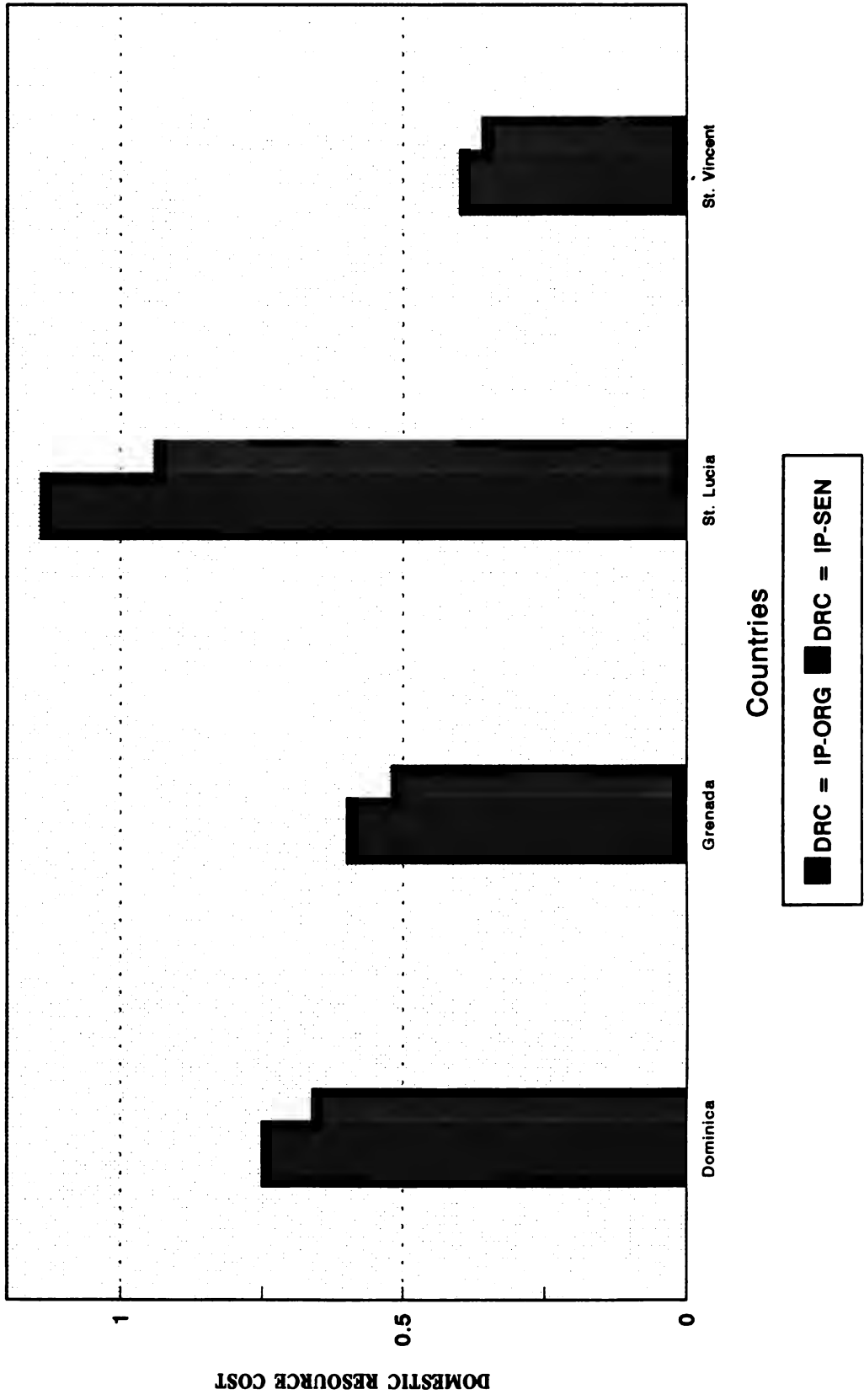
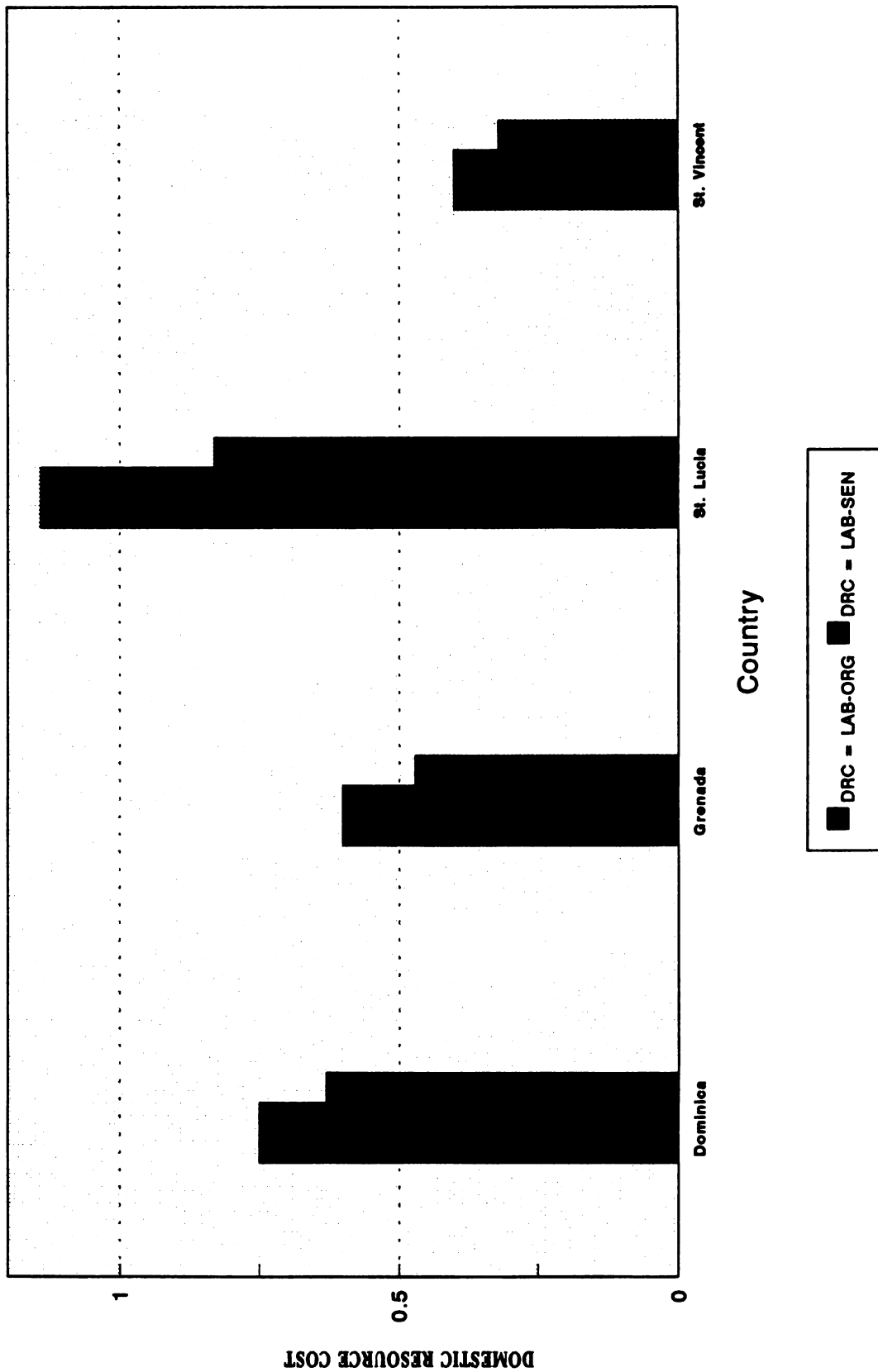


FIGURE 10.4. LABOUR SENSITIVITY FOR DASHEEN - 1992-93
Selected OECS Countries



EDDOE

Of the OECS member states, St. Vincent has traditionally been the main producer/exporter of eddoes. Eddoe production is geared toward satisfying the growing domestic demand and export, primarily to Trinidad and extra-regional markets. The available trade data was not sufficiently desegregated to facilitate separation of eddoes from the dasheen/eddoe export category for OECS countries. However, individual country export data indicated that the composition of eddoe in root crop exports is greater in St. Vincent than in other OECS producing states.

Figure 11.1 indicates that the DRC ratio is less than one. This suggests that eddoe production is an activity in which St. Vincent has a competitive advantage and that resources are profitably employed in its production. The favorable DRC also suggests that St. Vincent could gain from either intensification or expansion in current production. Eddoe production is both socially and privately profitable and hence net foreign exchange earnings could accrue to St. Vincent from the production and trade of this commodity.

While the DRC coefficient of 0.78 is quite favorable, a lower DRC value could be attained through, inter alia, more efficient utilization of domestic resources. While the yields attained in St. Vincent are unsurpassed in the OECS, substantial increases will be necessary if the country's competitive position is to be maintained. In this regard, better crop husbandry, improved management practices and productivity-enhancing technical change are factors which will prove critical to the maintenance of St. Vincent's competitiveness.

Since competitiveness is determined in part by the magnitude of the NIP, as well as various cost components, sensitivity analysis was carried out to assess the robustness of the DRC coefficients to changes in the key variables. Figure 11.2 indicates that an increase in the NIP of 10% reduced the absolute value of the DRC coefficient to 0.67, therefore competitiveness improved. The labour simulation undertaken on the assumption that the agricultural labour market was more inefficient than the estimated conversion factor (CF) indicated, generated a DRC of 0.62 (See Figure 11.3), which implies enhanced commodity competitiveness.

In general, the DRC analysis indicates that eddoe production in St. Vincent is viable and the enterprise has reasonably good survival prospects in a more competitive environment. This is particularly important since this country is a major banana producer, for which the prospects in a more liberalized environment are highly questionable. Identifying the export potential of the eddoe must however, await the results of the qualitative analysis of market demand in the following section.

FIGURE 11.1. DOMESTIC RESOURCE COST - EDDOES, 1992-93
Selected OECS Countries

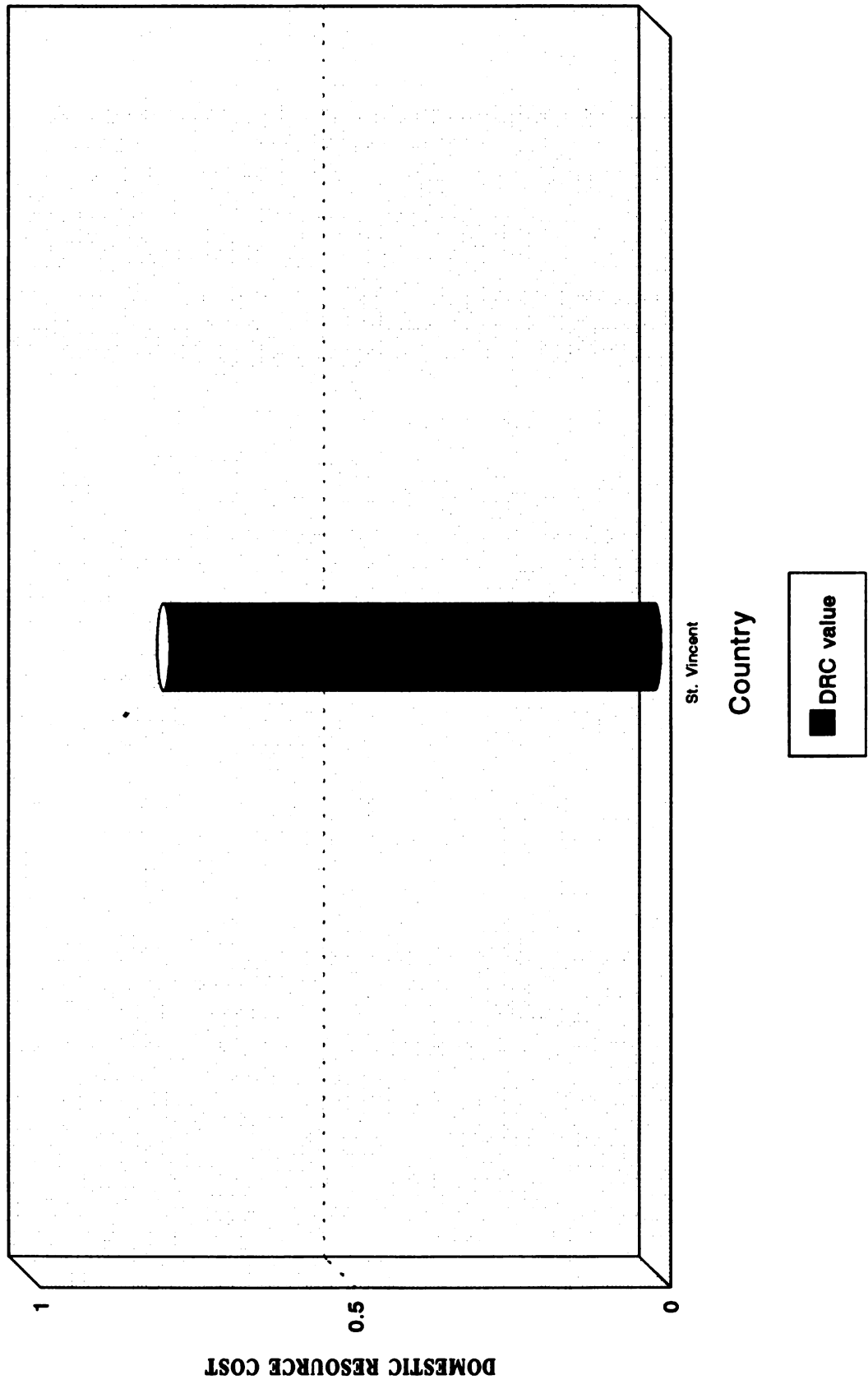


FIGURE 11.2. PRICE SENSITIVITY FOR EDDOES, 1992-93
Selected OECS Countries

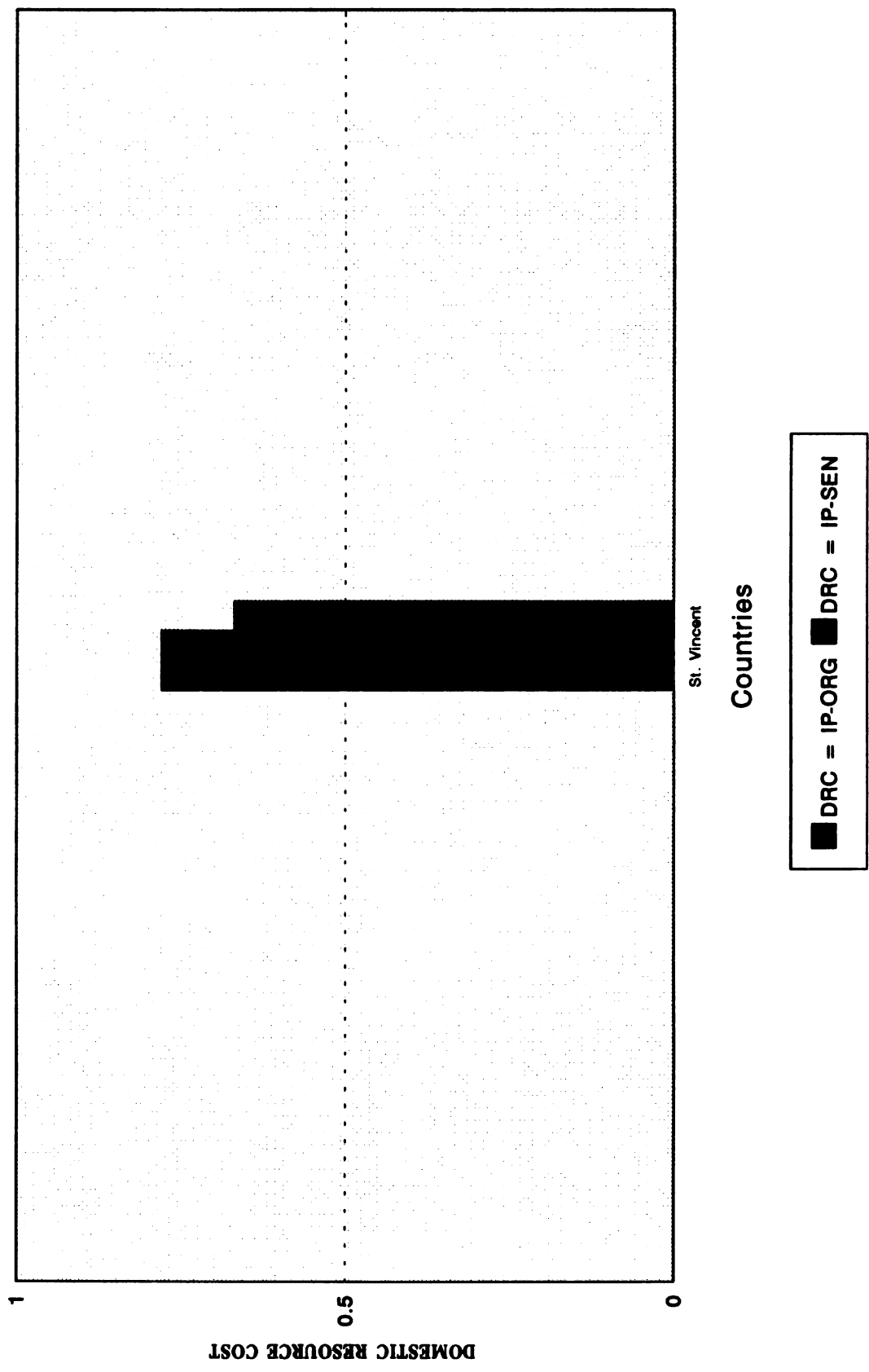
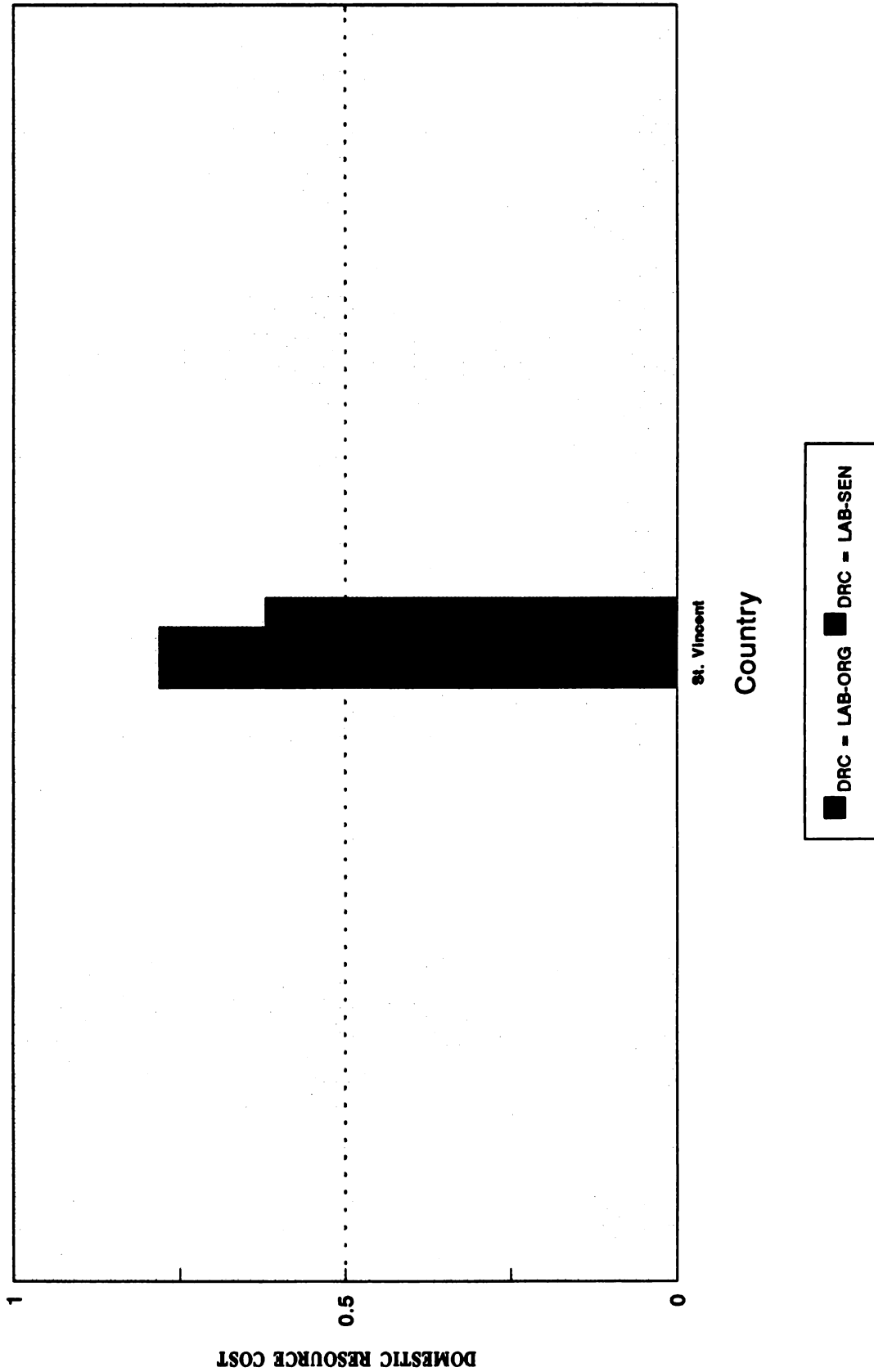


FIGURE 11.3. LABOUR SENSITIVITY FOR EDDOES - 1992-93
Selected OECS Countries



EGGPLANT

The analysis for eggplant was only presented for one country, the British Virgin Islands. The DRC coefficient, as illustrated in Figure 12.1, is negative. This suggests that not only is eggplant production non-competitive, but it is socially unprofitable as well. The negative value implies that eggplant production either as a means of displacing imports or earning foreign exchange via exports will result in net welfare losses to the economy as a whole.

The result is not surprising when one considers the relatively low marketable yield obtained. As indicated in Figure 12.2, holding the non-intervention price and the social cost of production constant at the base model levels, eggplant yield would have to increase by 167% (11,000 lbs) for production to be competitive for domestic resources in the country. This also provides an indication of the high levels of inefficiency in BVI agriculture. Private profits however, continue to be earned by producers due to the presence of government grants and subsidies.

As can be seen in Figure 12.3, increasing the NIP by 15% results in a worsening of the competitiveness of eggplant production from -3.57 under the base model to -6.27 under the NIP simulation. Increasing the export price of the product results in an increase in the production costs due to the high proportion of imported inputs utilized in eggplant production.

The results of the labour simulation differ from those obtained under the NIP simulation, suggesting that high agricultural wages are an important constraint to competitiveness in BVI eggplant production. Assuming that the divergence between the social and private cost of labour was greater than the estimated conversion factor indicated in the base model results in indication that the country's competitive disadvantage being less unfavorable. The labour simulation results presented in Figure 12.4 indicate that the degree of competitiveness improved, but the BVI still remained uncompetitive in eggplant production. Varying the NIP and shadow wage rate for labour does not alter the qualitative implication of the DRC analysis which is that eggplant production in the British Virgin Islands is non-competitive.

Given this adverse DRC estimate, it is not surprising that the BVI is a net importer of eggplant. The APHIS data reports a small volume of eggplant exports to the US Virgin Islands from Antigua, Dominica, Montserrat, St. Kitts and St. Lucia over the 1983 to 1989 period.

FIGURE 12.1. DOMESTIC RESOURCE COST - EGGPLANT, 1992-93
Selected OECS Countries

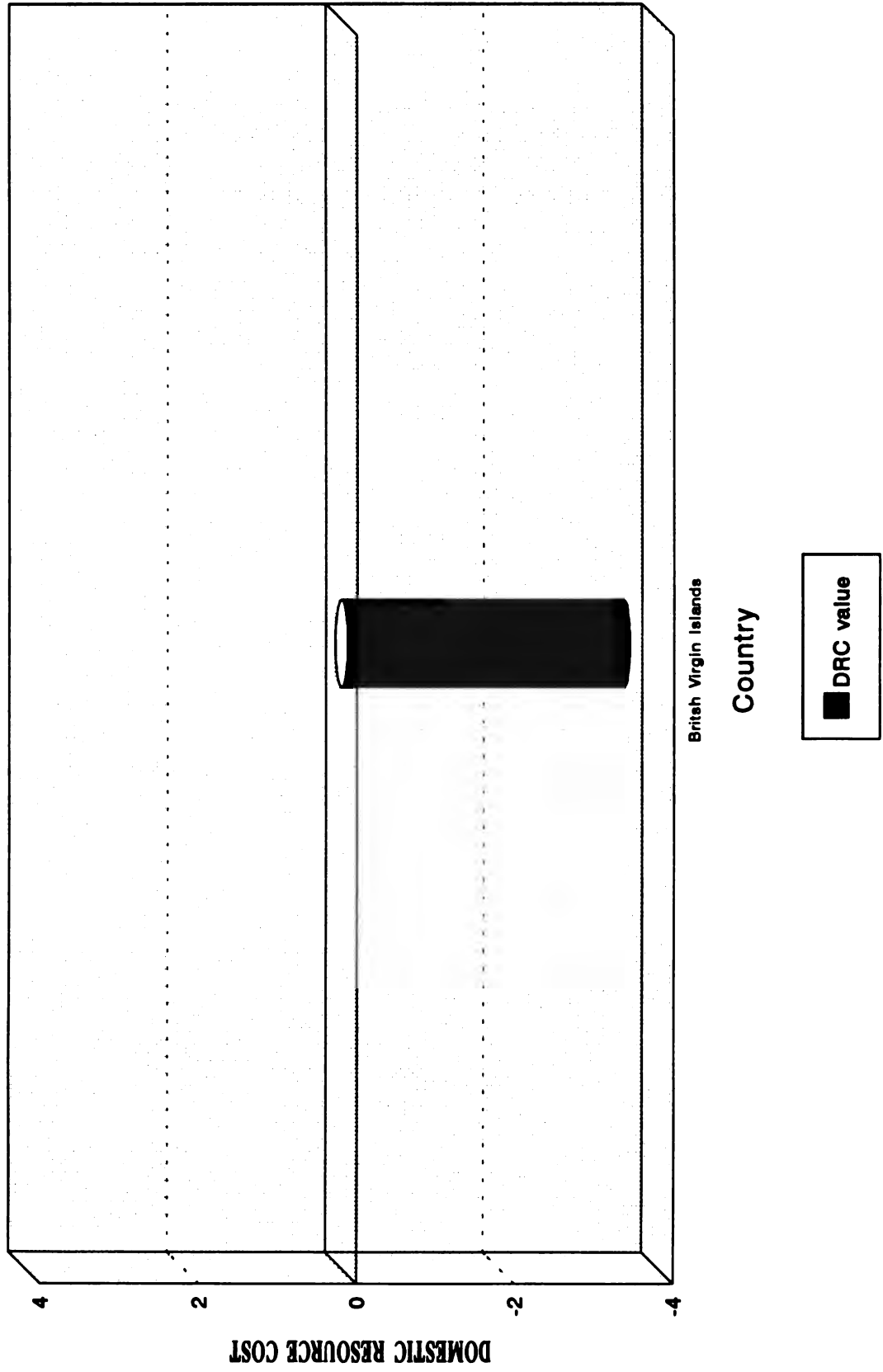


FIGURE 12.2. YIELD SENSITIVITY FOR EGGPLANT, 1992-93
Selected OECS Countries

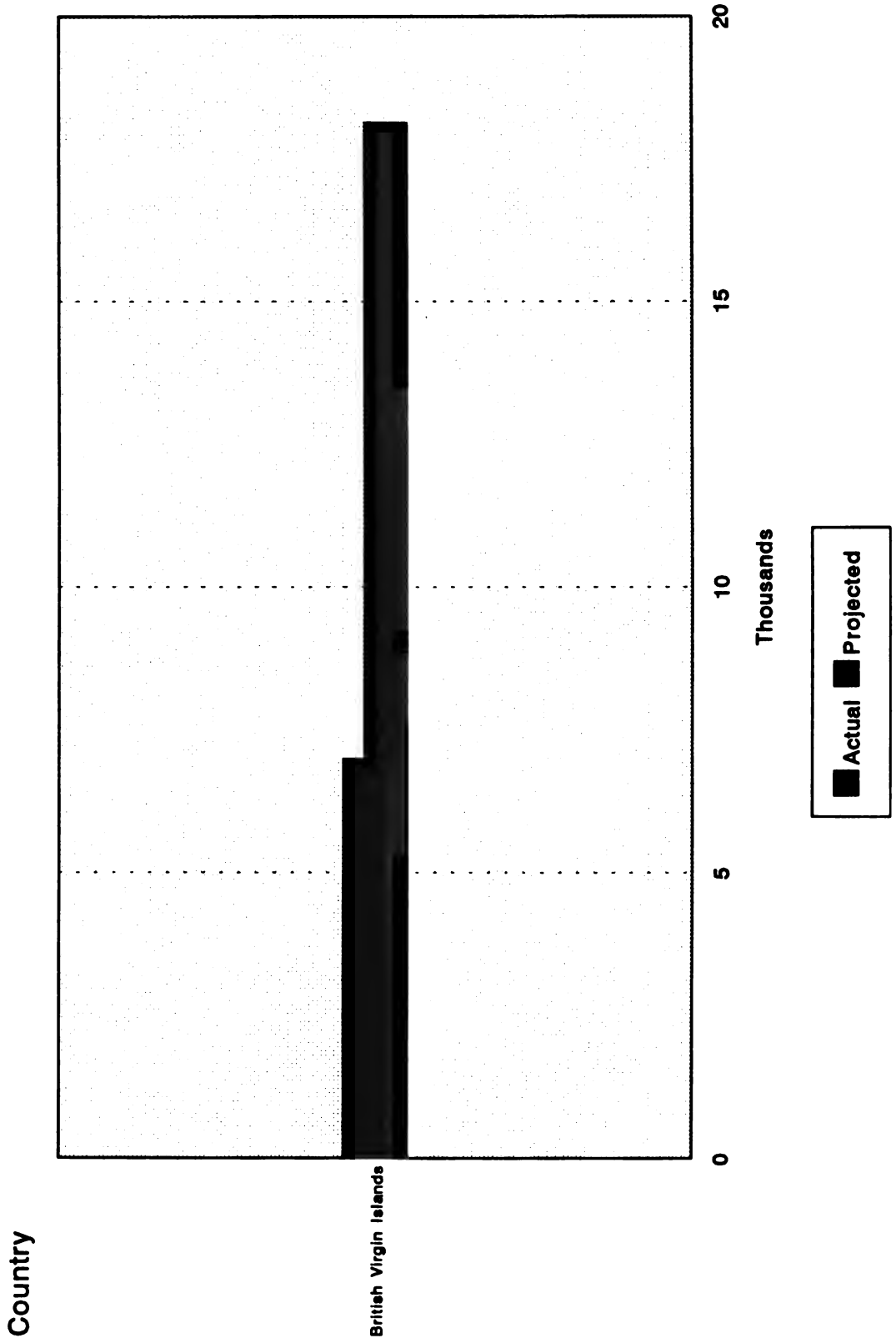


FIGURE 12.3. PRICE SENSITIVITY FOR EGGPLANT, 1992-93
Selected OECS Countries

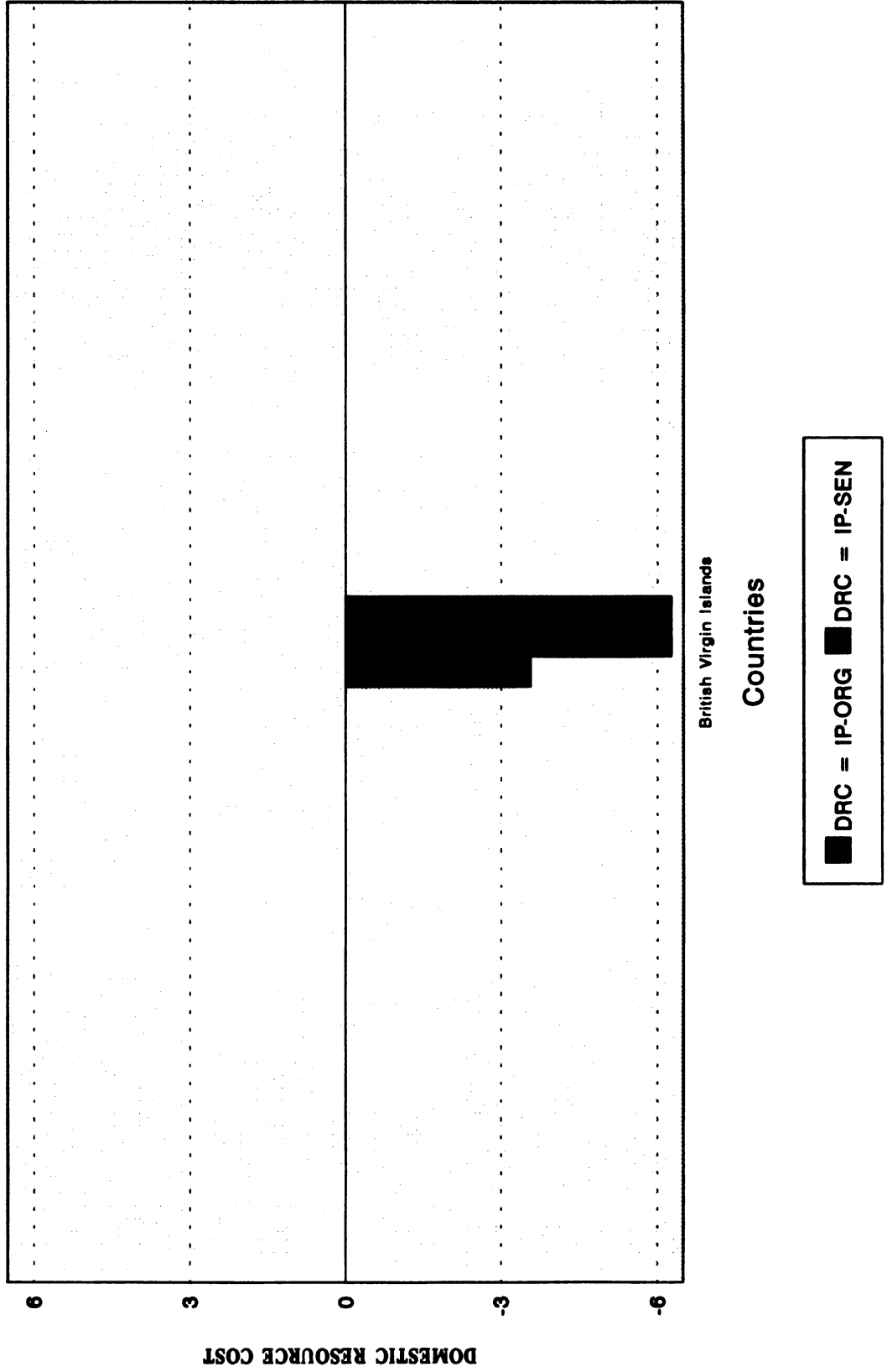
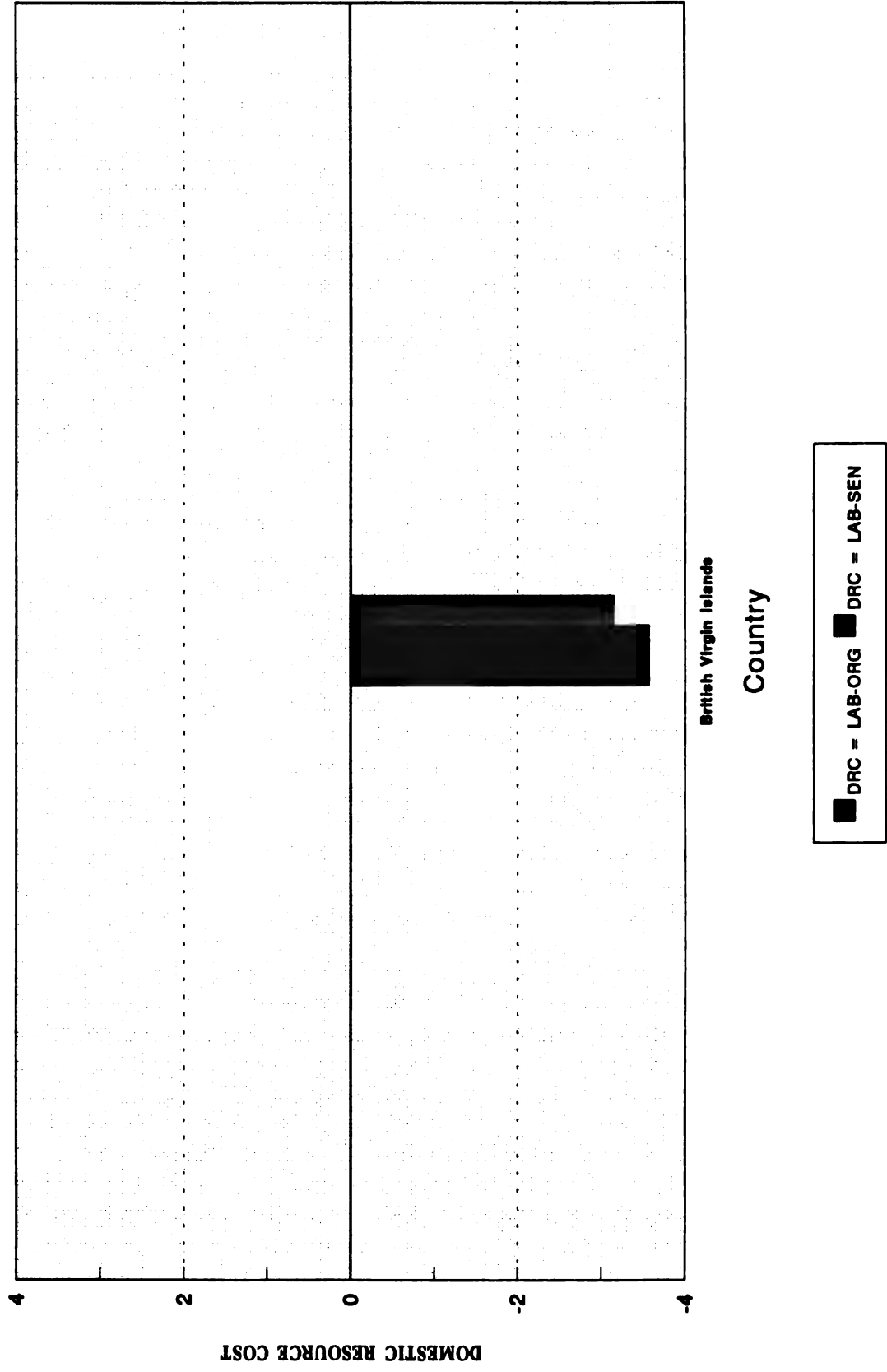


FIGURE 12.4. LABOUR SENSITIVITY FOR EGGPLANT - 1992-93
Selected OECS Countries



GINGER

A country's relative efficiency in the production of a commodity can be evaluated by comparing its DRC ratio with that of its competitors. The smaller the ratio, the greater a country's relative efficiency. The results of the analysis in Figure 13.1 indicate that St. Lucia, Dominica and St. Vincent are currently competitive in ginger production. The variations in the absolute value of the DRCs reflect the extent to which competitive advantage differs among them. In this regard, St. Lucia with a DRC coefficient of 0.34 ranks above both Dominica and St. Vincent. Under the current structure of production, prices and costs, ginger production in the OECS constitutes an efficient means of earning foreign exchange.

High yield levels do not appear to be a major contributing factor to St. Lucia's competitive edge, since the yields in Dominica and St. Vincent are higher than those of St. Lucia. That Dominica and St. Vincent are less competitive appears to be a function of higher production costs associated with a higher input-based level of technology. In both these countries use of non-domestic factors per unit of output is relatively higher than in St. Lucia. Despite such introduction, Dominica has not registered the improvements attained by St. Lucia. This may be the direct result of the production-enhancing ginger 'tech-pack' introduced in both Dominica and St. Lucia. This improved production technology places greater demands on the use of imported chemical inputs and farm labour.

Of particular interest, is the issue of whether or not the cross-country rankings are affected by variations in the technical variables. Sensitivity analysis was undertaken assuming changes in the NIP and in the conversion factor (CF) for agricultural labour. The labour sensitivity was based on the assumption that greater distortions exist in the agricultural labour market than were indicated by the base model estimate of the CF. Simulation was therefore based on a conversion factor (CF) of 0.57. The results of the labour simulations shown in Figure 13.2 indicate that relative competitiveness of all countries was enhanced under assumptions of greater inefficiency in the agricultural labour market.

The results of similar simulations on variations in the NIP are given in Figure 13.3. These results indicate that if NIP increased by 10% over its base model level, then each country's competitiveness, as indicated by the absolute value of the DRC, would be made more favorable. The results of both simulations suggest that, although the countries competitive advantage improves relative to the base model, their relative competitive advantage vis-a-vis each other remains unchanged. The magnitude of the reduction in the absolute value of the DRCs is greater under both simulations for Dominica and St. Vincent than for St. Lucia. As indicated earlier, this is most probably due to the greater share of imported inputs in overall production costs in St. Lucia and to the relatively small labour cost share which exists here.

The analysis of the trade data for 1988-1990 indicates that St. Lucia exported relatively small volumes of ginger, while St. Vincent's exports though declining in volume, have been consistently higher than both St. Lucia's and Dominica's. In terms of value however, the analysis also indicates that Dominican and St. Lucian exports received higher prices on average than

exports from St.Vincent. In conjunction with the DRC results, the analysis suggests that St.Vincent, with the highest DRC coefficient (least competitive) had greater net foreign exchange earnings due to greater production and trade. Over the 1988-1990 period, the data reflects declining export volumes for St.Vincent simultaneously with increasing export volumes for both St.Lucia and Dominica.

FIGURE 13.1. DOMESTIC RESOURCE COST - GINGER, 1992-93
Selected OECS Countries

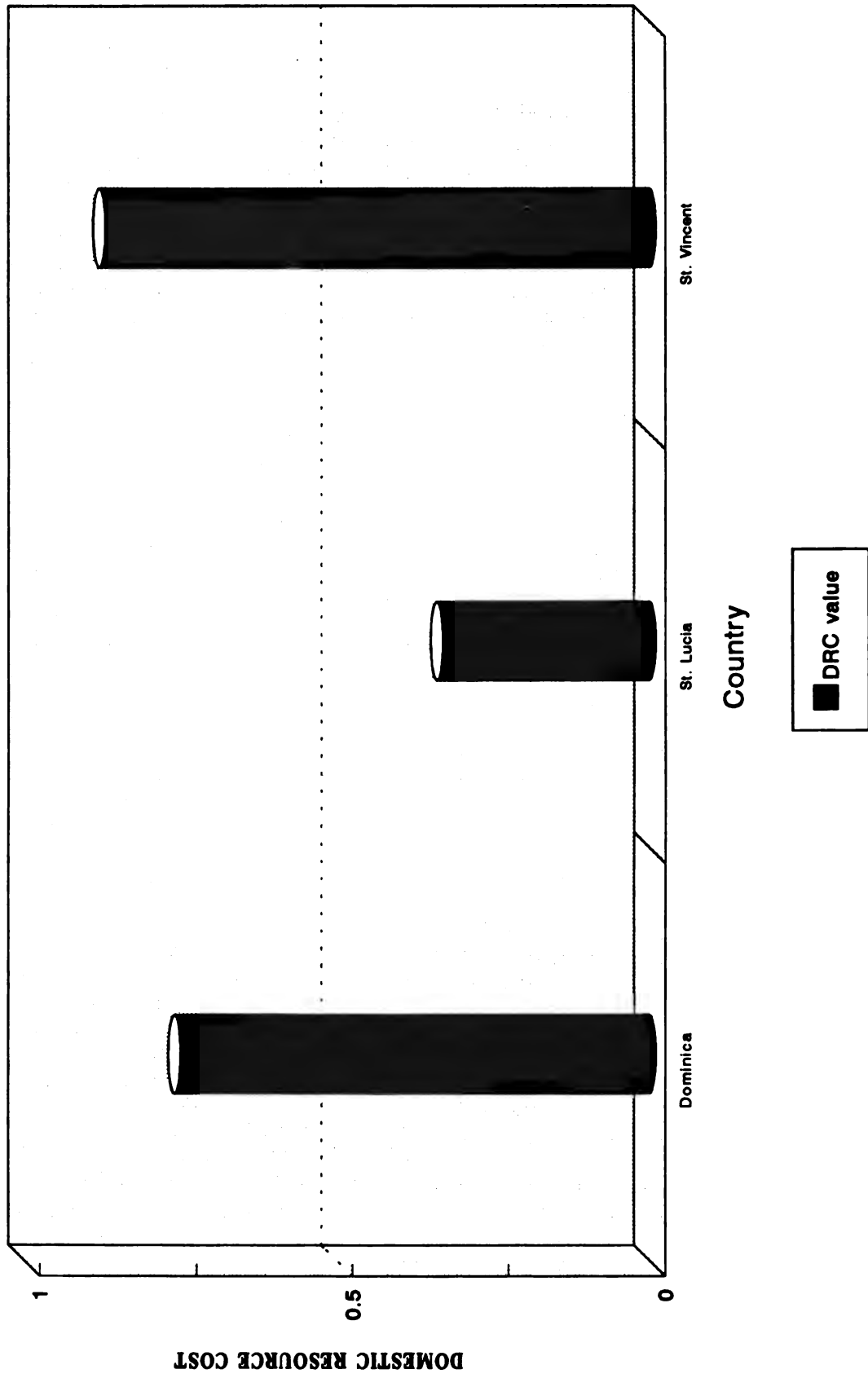


FIGURE 13.2. LABOUR SENSITIVITY FOR GINGER - 1992-93
Selected OECS Countries

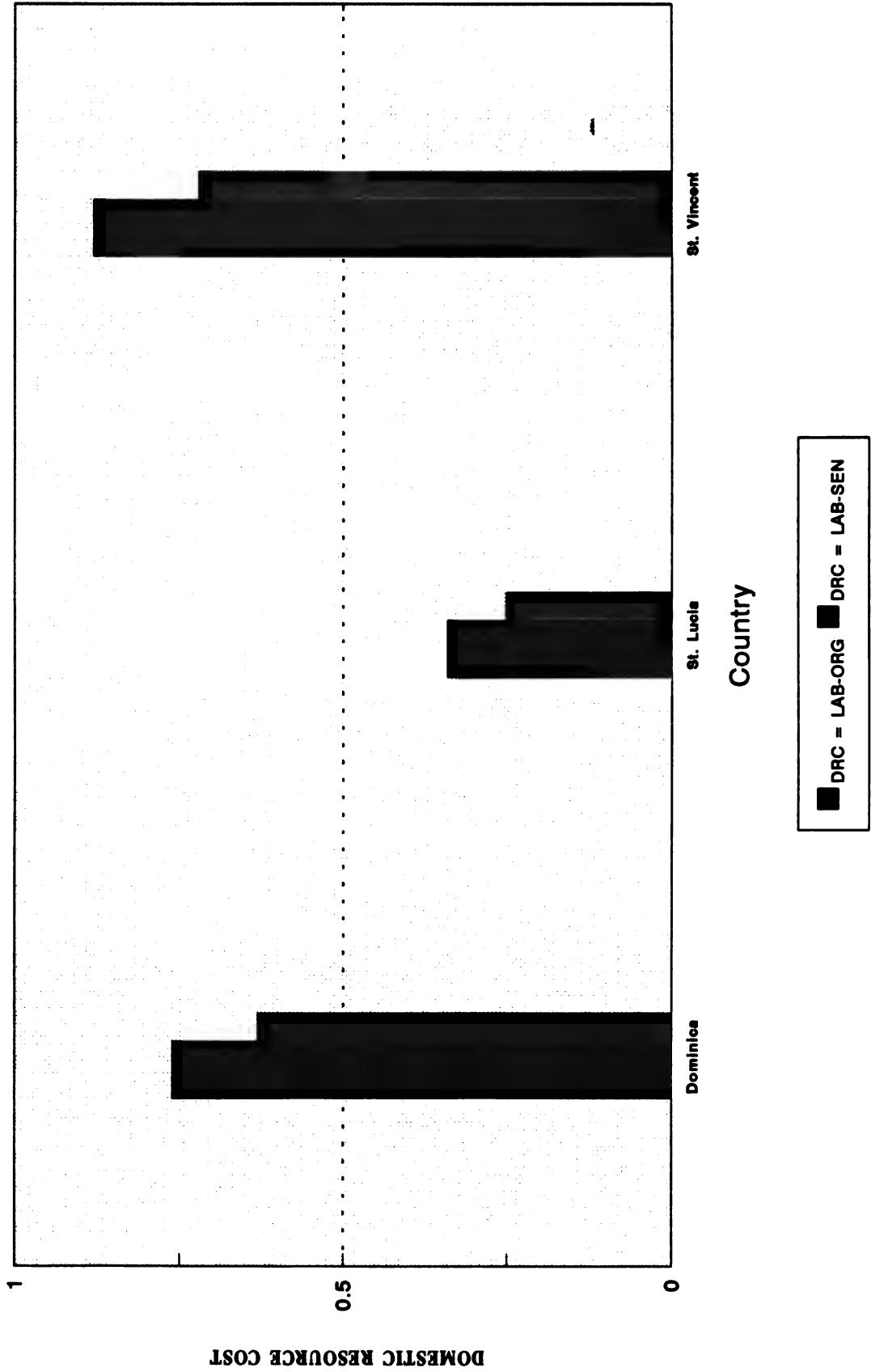


FIGURE 13.1. DOMESTIC RESOURCE COST - GINGER, 1992-93
Selected OECS Countries

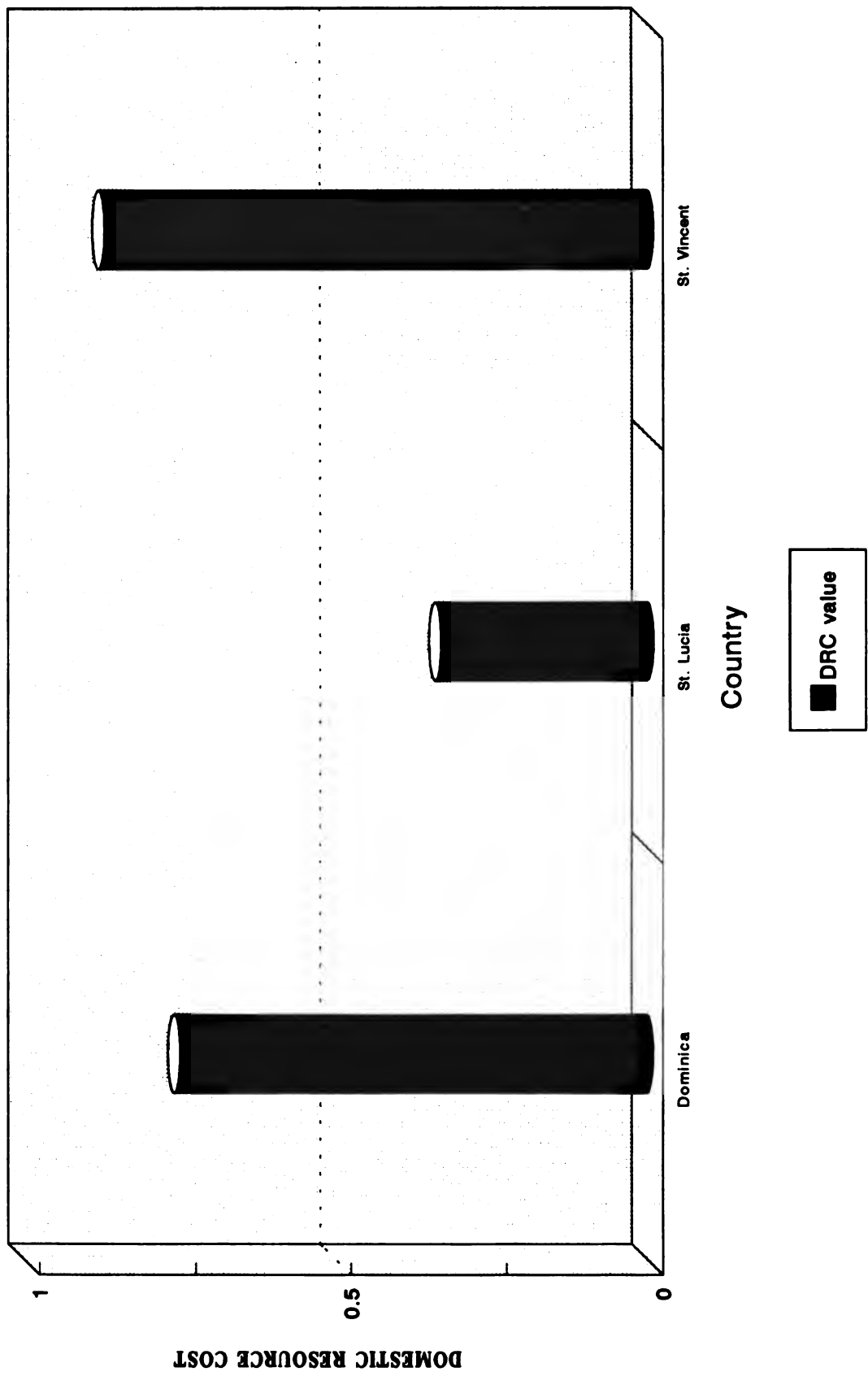


FIGURE 13.2. LABOUR SENSITIVITY FOR GINGER - 1992-93
Selected OECS Countries

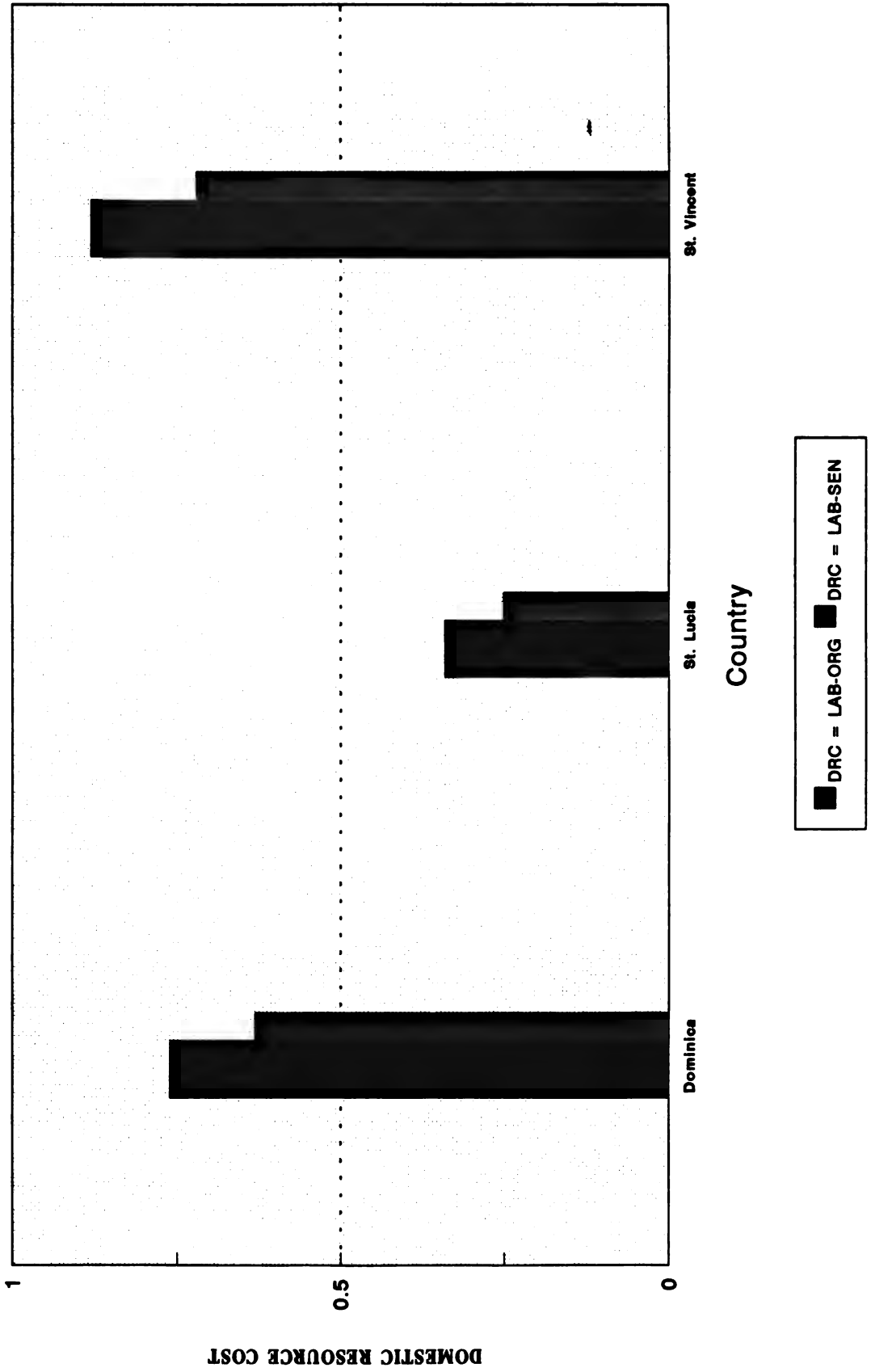
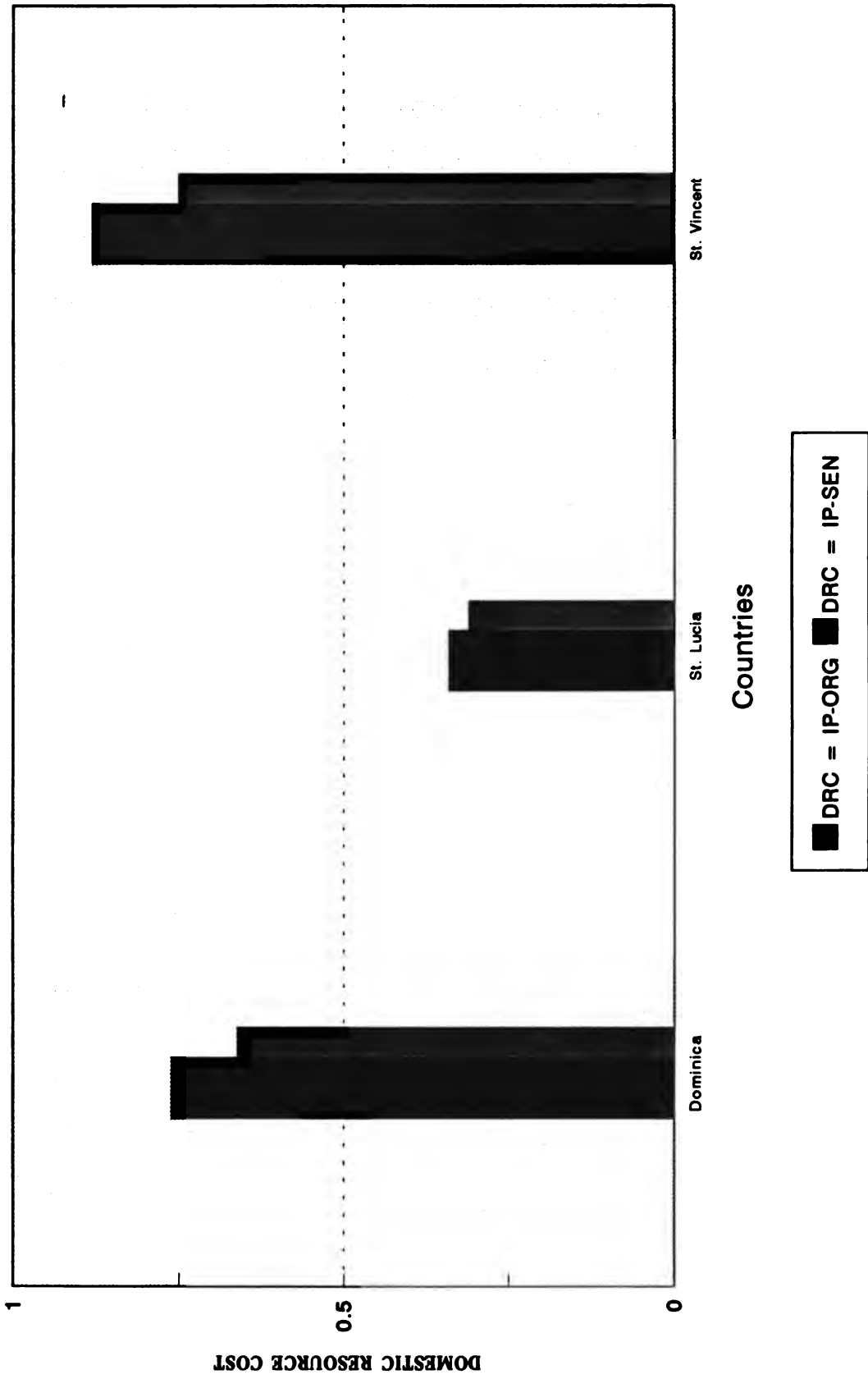


FIGURE 13.3. PRICE SENSITIVITY FOR GINGER, 1992-93
Selected OECS Countries



GINGER LILY

Figure 14.1 depicts the results of the DRC analysis for Grenada and Dominica. A striking feature of the results is that the DRC ratios are both greater than one⁷. This would seem to indicate that (red) ginger lily production is not an activity in which these two OECS member countries have a competitive advantage, since the resources devoted to production have more profitable alternatives.

The high ratios are not surprising since demand for the red ginger lily has declined somewhat resulting in lower prices, particularly for the 'small' and 'mini' blooms. In both Grenada and Dominica, producers continue to enjoy positive returns due to the lack of competition in local markets, where the standards for bloom acceptance are not as stringent as for the export market. Private profitability in the domestic market is also due to lower marketing costs, since in most instances, the high costs of cartons and packaging material do not have to be incurred.

The results in Figure 14.2 indicate that while the marketable yields will have to increase by 26% for ginger lily production to be competitive in Dominica, increases in excess of 70% will be required for the venture to be competitive in Grenada. There seems to be a strong association between the relative magnitudes of the DRC's and the composition of ginger lily and anthurium in total cut flower production in both Grenada and Dominica. For example, in Grenada, the ginger lily dominates cut flower production, while the converse is true of cut flower production in Dominica. The DRC ratios for both commodities indicate inefficiencies at the production level and hence a lack of competitiveness internationally. The relative DRC ratios of -2.61/8.99 for anthuriums/ginger lily in Grenada, and 1.44/1.63 for anthuriums/ginger lily in Dominica, may be indicative of operative scale economies or the effects of learning by doing.

The results of the simulations in Figure 14.3 and 14.4 indicate that the DRC rankings were more sensitive to variations in the NIP than to variations in the social cost of labour. Increasing the NIP by 15% resulted in DRC ratios of 1.32 and 4.34 for ginger lily production in Dominica and Grenada, respectively. The DRC coefficients for labour sensitivity also indicate that the relative rankings of the countries vis-a-vis each other remain unaffected.

Efficiency as measured by the DRC ratios can be enhanced by improving quality and through the establishment of marketing infrastructure. On the cost side, it appears that little can be done to reduce the foreign cost elements. In fact, if Grenada and Dominica intend to be internationally competitive, additional costs may have to be incurred to source hybrids and to develop the required infrastructure.

The competitiveness of these two OECS member states has also been affected by the fall off in demand for red ginger lily, which has led to reductions in the NIP for the product.

⁷ No analysis was conducted for gingerlily production in St. Vincent due to the paucity of data.

Indications are that the interest of consumers and importers in the red ginger lily which had become quite popular has now waned, as new product lines have become available. The low level of research and development has also affected competitiveness in Grenada and Dominica. Such support is critical to the development of disease-free planting material, identification of suitable production locations and the development of proper sorting, packing and storage facilities.

While producers in both Grenada and Dominica continue to enjoy positive profits in domestic and inter-regional markets, profits remain far below their potential levels. Given the present level of technology, costs and demand, serious reassessment of initiatives in both ginger lily and anthurium production is required since as the analysis indicates, at present they constitute a fairly expensive means of earning foreign exchange.

The DRC analysis for both ginger lily and anthurium, underscores the importance of adopting new varieties early in the product cycle. With strong demand for foliage plants, as well as variegated and brightly colored blooms, consumer demand for basic colors such as the 'reds' and 'pinks' are expected to remain low. This constitutes an additional factor which must be incorporated into the decision to increase resource investment in ginger lily and anthurium production in these two OECS countries.

FIGURE 14.1. DOMESTIC RESOURCE COST - GINGERLILY, 1992-93
Selected OECS Countries

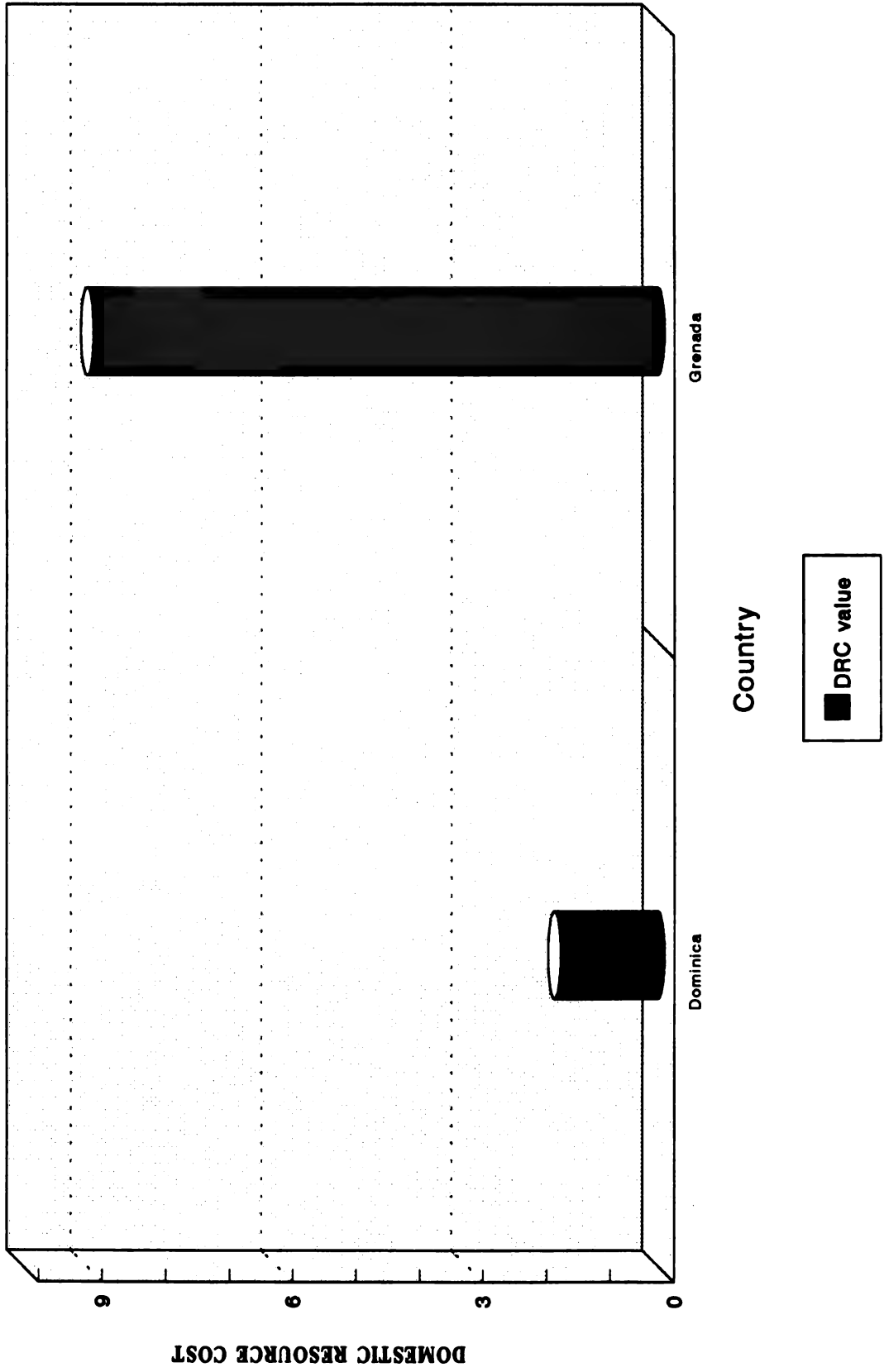


FIGURE 14.2. YIELD SENSITIVITY FOR GINGERLILY, 1992-93
Selected OECS Countries

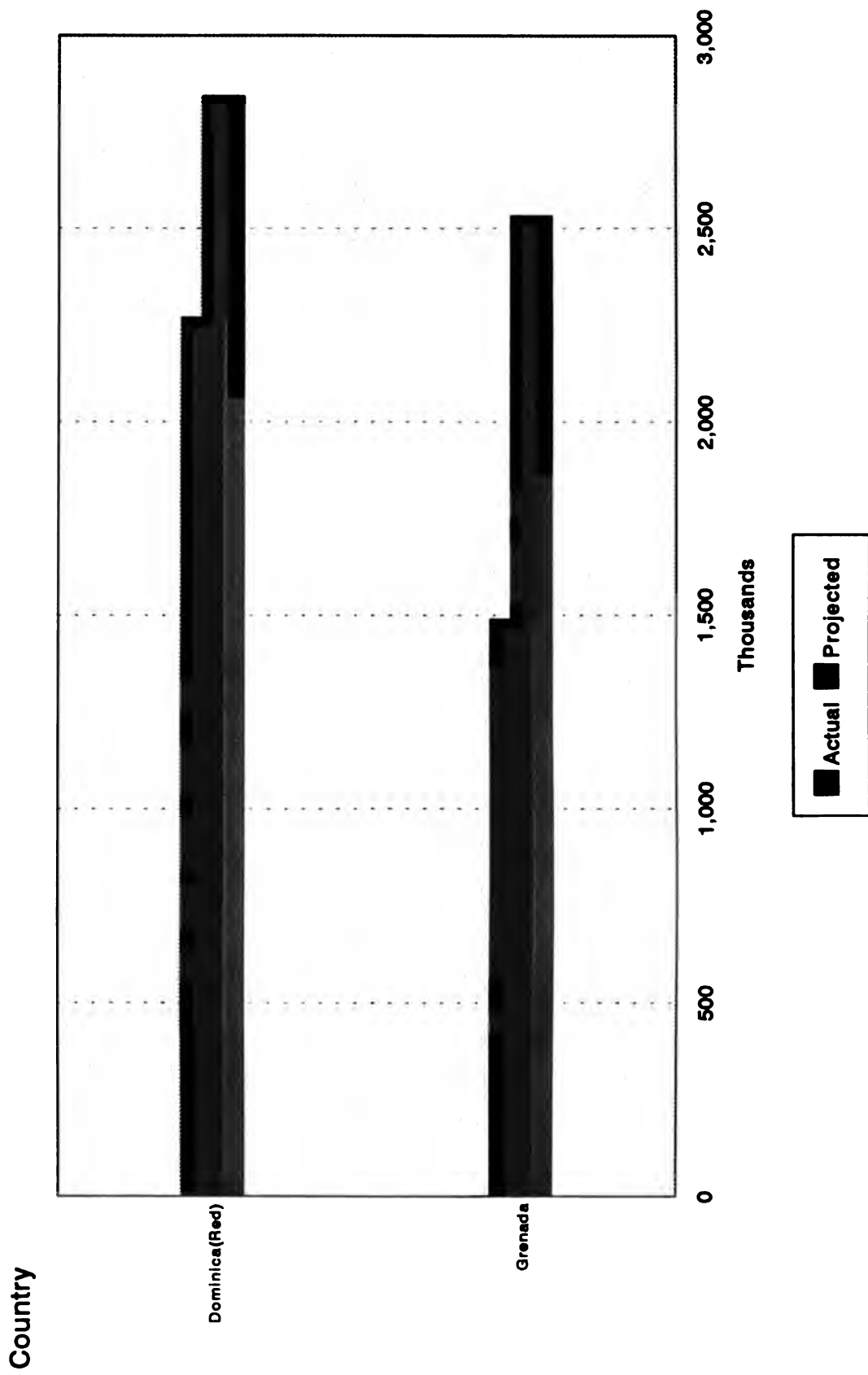


FIGURE 14.3. PRICE SENSITIVITY FOR GINGERLILY, 1992-93
Selected OECS Countries

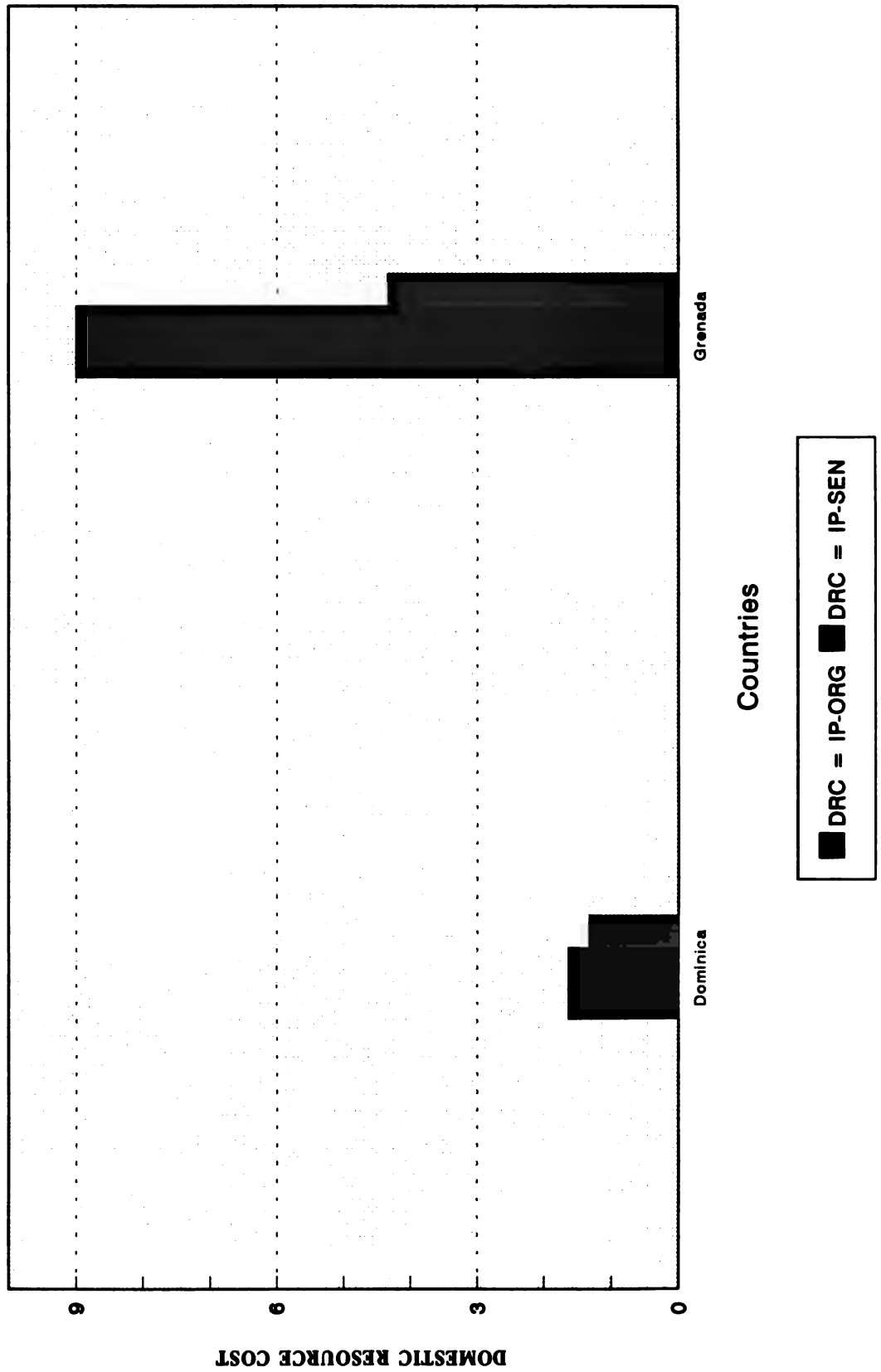
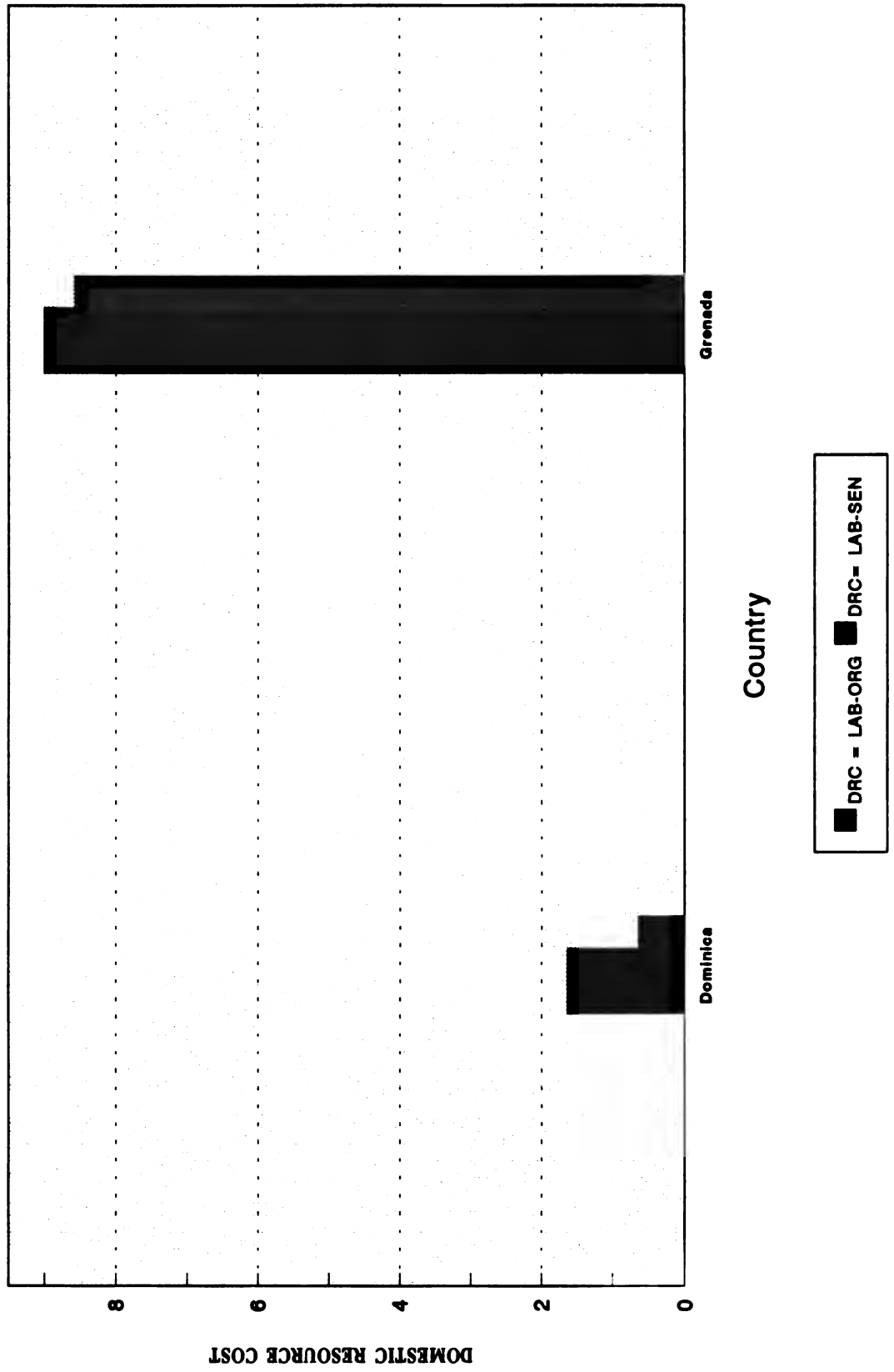


FIGURE 14.4. LABOUR SENSITIVITY FOR GINGERLILY - 1992-93
Selected OECS Countries



GOLDEN APPLE

The results of the DRC analysis in Figure 15.1 indicate that in general golden apple production is an activity in which member countries of the OECS have a competitive advantage. While St. Vincent ranks highest with a DRC coefficient of 0.30, Dominica and Grenada also have favorable DRC coefficients of 0.46 and 0.49, respectively⁸. The results of the analysis highlight that Grenada, given current yields, prices and the level of technology does not have an inherent advantage in the production and trade of golden apples over the other two OECS producers. This suggests that Grenada's dominance in terms of golden apple exports may be a consequence of the crop being more widely cultivated than in other OECS member states.

The data suggests that typical yields in Grenada are 10% above observed yield levels in St. Vincent, despite the fact that St. Vincent ranking ahead of Grenada in terms of relative competitiveness. This underscores the diverse nature of the factors (shadow prices, yields, technical production coefficients etc.) which determine the DRC measure of competitiveness. The results of the analysis are particularly encouraging when the high harvest and post-harvest losses incurred in production are considered (estimated to be about 30%). Attention to this constraint as well as to propagation of plants which are shorter and more manageable could further enhance competitiveness.

The results of the sensitivity analysis (Table 15.2) undertaken on the non-intervention price, indicate that increasing the NIP for golden apples by 10% results in improvements in the competitive advantage of both Grenada (0.41) and St. Vincent (0.24) relative to their previous positions. The results of the labour sensitivity analysis in Figure 15.3 were also fairly consistent with the NIP simulation, indicating that although the competitive advantage in both countries improved, their relative ranking remained unchanged.

The analysis suggests that domestic resources are employed efficiently in golden apple production and that both Grenada and St. Vincent stand to benefit from exports of this commodity. The results also indicate that for Grenada, earning U.S. \$1.00 of foreign exchange requires the expenditure of only E.C \$1.32, which is less than the exchange rate of 2.70. In the case of St. Vincent earning an extra dollar of foreign exchange requires the expenditure of E.C \$0.81, which is also less than the parity exchange rate.

The available trade data suggests that between 1988-1991 golden apple exports from Grenada exceeded exports from St. Vincent. Prior to 1980 however the data indicates that St. Vincent was the only country in the OECS with significant exports of this product. The data is therefore consistent with the conclusions of the analysis which indicate that both countries are highly competitive in the production and trade of this commodity.

⁸ Dominica was included for comparison purposes only, since golden apple is in general not a major crop in that country. The lower limit of yield levels based on the fifth year of production along with the technical coefficients from Grenada have been used in the analysis for Dominica.

FIGURE 15.1. DOMESTIC RESOURCE COST - GOLDENAPPLE, 1992-93
Selected OECS Countries

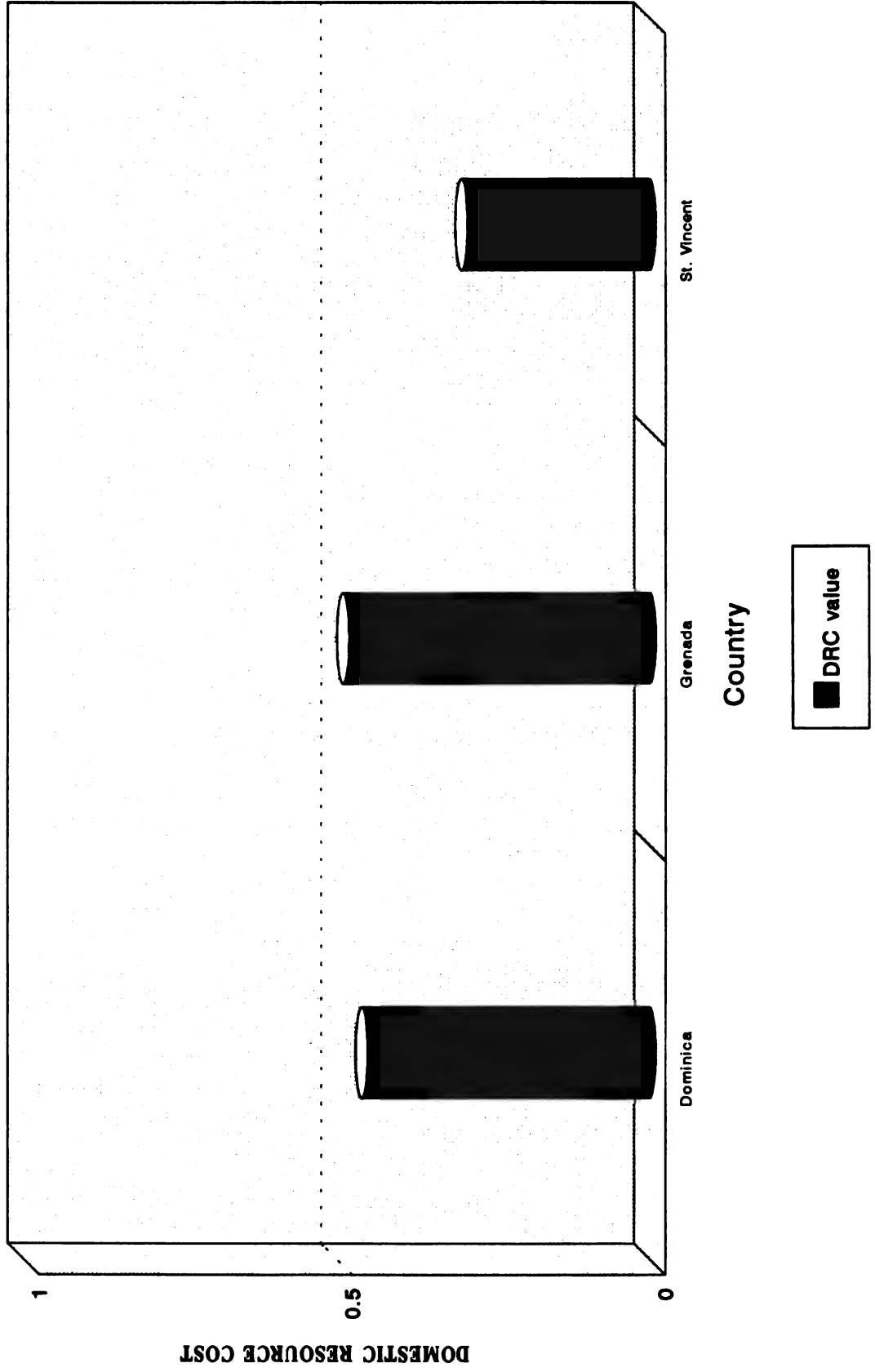


FIGURE 15.2. PRICE SENSITIVITY FOR GOLDENAPPLE, 1992-93
Selected OECS Countries

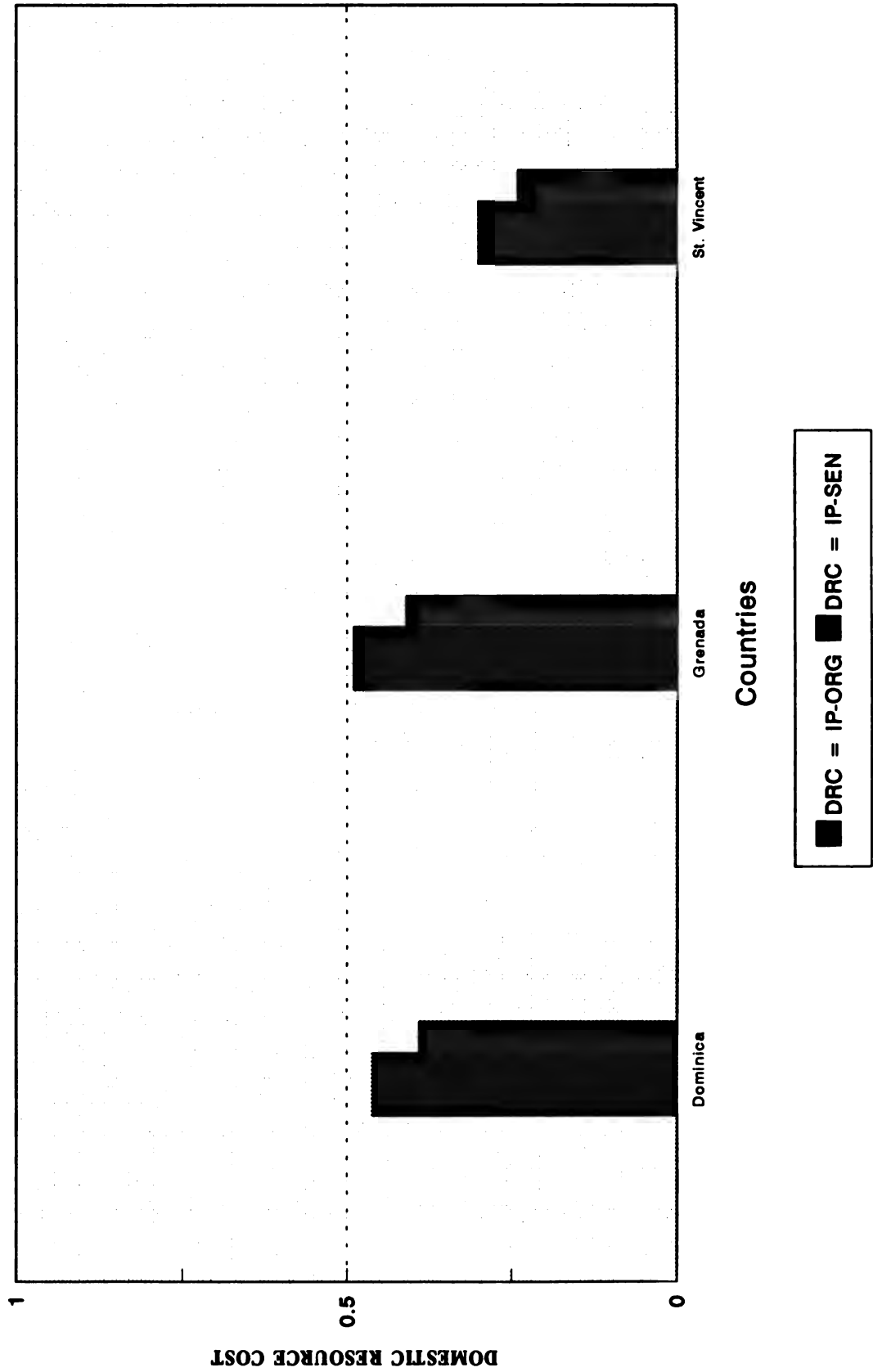
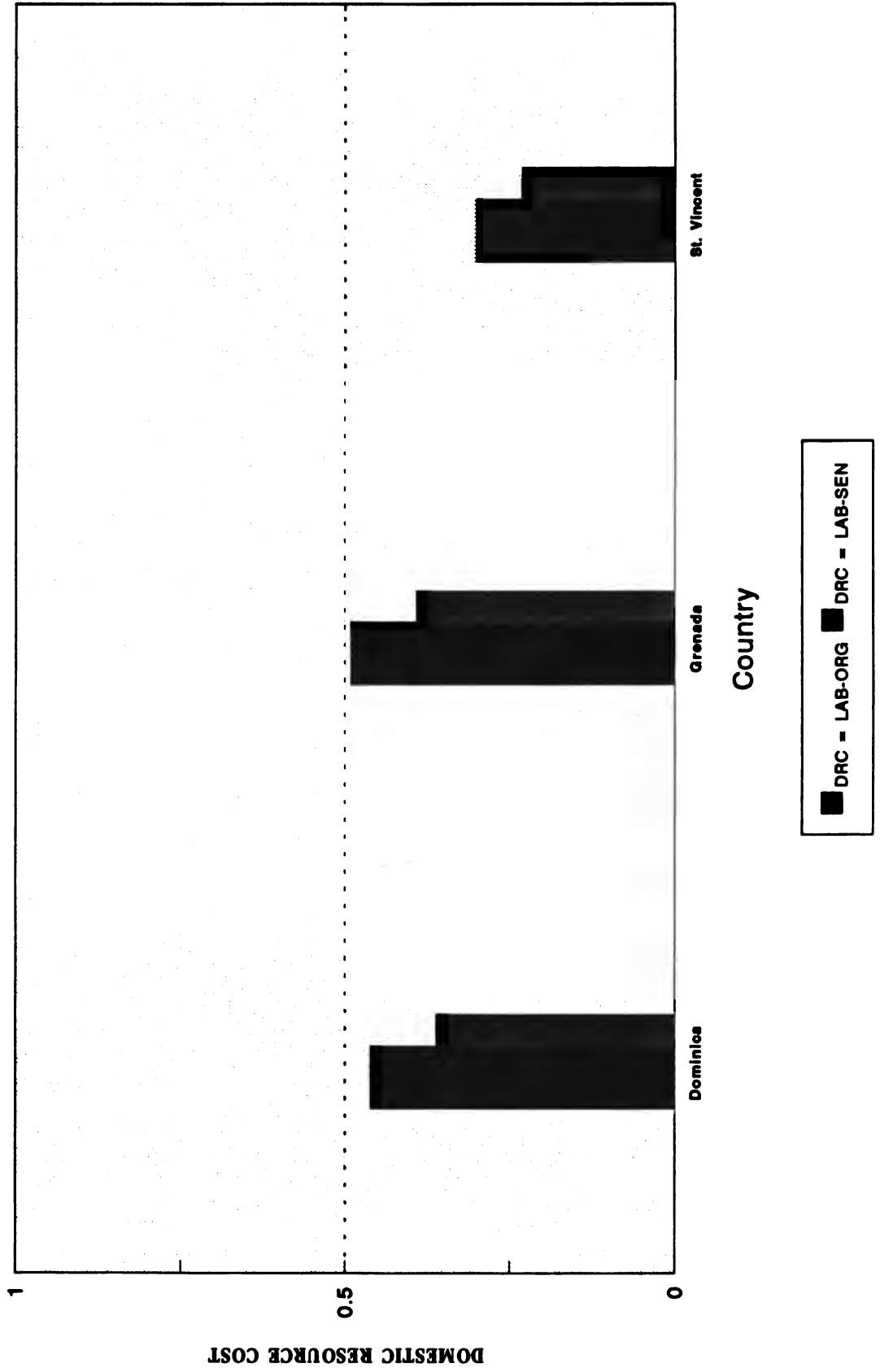


FIGURE 15.3. LABOUR SENSITIVITY FOR GOLDENAPPLE - 1992-93
Selected OECS Countries



HOT PEPPER

Although broad in scope the data used for hot pepper production in St. Lucia suffers from its inability to measure production cost for disease-free farms. The data used by the authors therefore includes the higher costs incurred for pests and disease control as well as chemical utilization. While the magnitude of these costs was modest, it is suggested that the absence of significant government subsidies, the impact of the disease on yields and its disproportionate effect across countries introduces a potentially serious bias to the analysis. The ramifications for international competitiveness are equally serious, as the absolute level of the DRC coefficients may increase substantially, with consequent increases in the severity of these biases. In order to partially adjust for the problem in St. Lucia, sensitivity analysis was undertaken using upper and lower limits of yields and costs and their associated DRC coefficients presented.

The results of the DRC analysis in Figure 16.1 indicate that based on the observed level of technology, costs and prices both Antigua and St. Lucia have DRC coefficients above unity and hence are uncompetitive in the production of hot peppers. The fact that producers continue to earn private profits is indicative of the subsistence nature of much of OECS agriculture which causes producers to be resistant to leaving the area of agricultural production even though more profitable alternatives exist outside the sector. Another possibility is that farmers engaging in the production of this commodity may have reservation wages below the levels indicated by the estimates used in this analysis. This could be the case if for example, retirees and/or family labour with little or no opportunity for engaging in off-farm employment were producing hot pepper. The results could also be explained by the data limitations which may have caused an upward bias in the DRC coefficients.

Sensitivity analysis was undertaken to assess the improvements in yields and reductions in costs necessary to generate reductions in the DRC coefficients, sufficient to make hot pepper production competitive in both Antigua and St. Lucia. According to the yield sensitivity results in Figure 16.2, an increase in typical marketable yields of at least 3,500 lbs (37%) and 1,800 lbs (18%) in Antigua and St. Lucia respectively, would be necessary to make hot pepper production competitive. Similarly, reductions in unit costs of 23% (St. Lucia) and 41% (Antigua) would be required to obtain a DRC of unity, given current yields, technology and prices. While the improvements required for St. Lucia do not appear to be substantial, the improvements in Antigua will be a bit more difficult to achieve. However, conditioned on the caveat regarding the data previously outlined, with increased attention to research and extension efforts aimed at eradicating present pest and disease problems, there is no reason to suppose that increases in social profitability could not be achieved in due course.

The labour sensitivity reported in Figure 16.3 suggests that if the social costs of labour were less than indicated by the estimated value of the conversion factor (CF) for agricultural labour in both countries, then each country's competitiveness as indicated by the DRC coefficient would be more favorable than previously indicated under the base model. Apart from production in St. Lucia switching from being uncompetitive to competitive, the relative ranking between countries is unchanged. According to Figure 16.4, if the non-intervention price (the price at

which hot peppers from competitor countries could be sold domestically) increased by 10%, the competitive advantage of both countries as measured by the DRC would become more favorable. While St. Lucia would be marginally competitive (DRC value of 1.04), Antigua with a DRC coefficient of 1.30 would still be uncompetitive.

The share of labour in the total cost of production in St. Lucia was relatively larger than in Antigua. This along with the estimated DRC coefficients suggested that if labour costs could be lowered or labour productivity enhanced, then production could become competitive, data limitations notwithstanding. To assess this assumption, simulation was carried out on the St. Lucian model assuming that producers faced wage rates equal to that of Grenada and St. Vincent. The results of the simulation suggested that the DRC coefficient for hot peppers in St. Lucia would have been 1.03 instead of 1.32 which was obtained under the base model. The analysis suggests that hot pepper production in St. Lucia cannot be overlooked as an initiative in which the country may have a competitive advantage.

While any conclusions in regard to which commodities appear to have the best potential for production and trade, must await the results of the analysis in the following section of this study, it appears opportune to point out that production of hot peppers for processing within both Antigua and St. Lucia appears to be an area in which greatest value added can be earned. This could compensate to some extent for the high DRC values in production. In this regard, research efforts aimed at growing the perfectly shaped pepper may require reassessment to ascertain whether the social returns to resources expended in this area justify the social costs.

FIGURE 16.1. DOMESTIC RESOURCE COST - HOTPEPPER, 1992-93
Selected OECS Countries

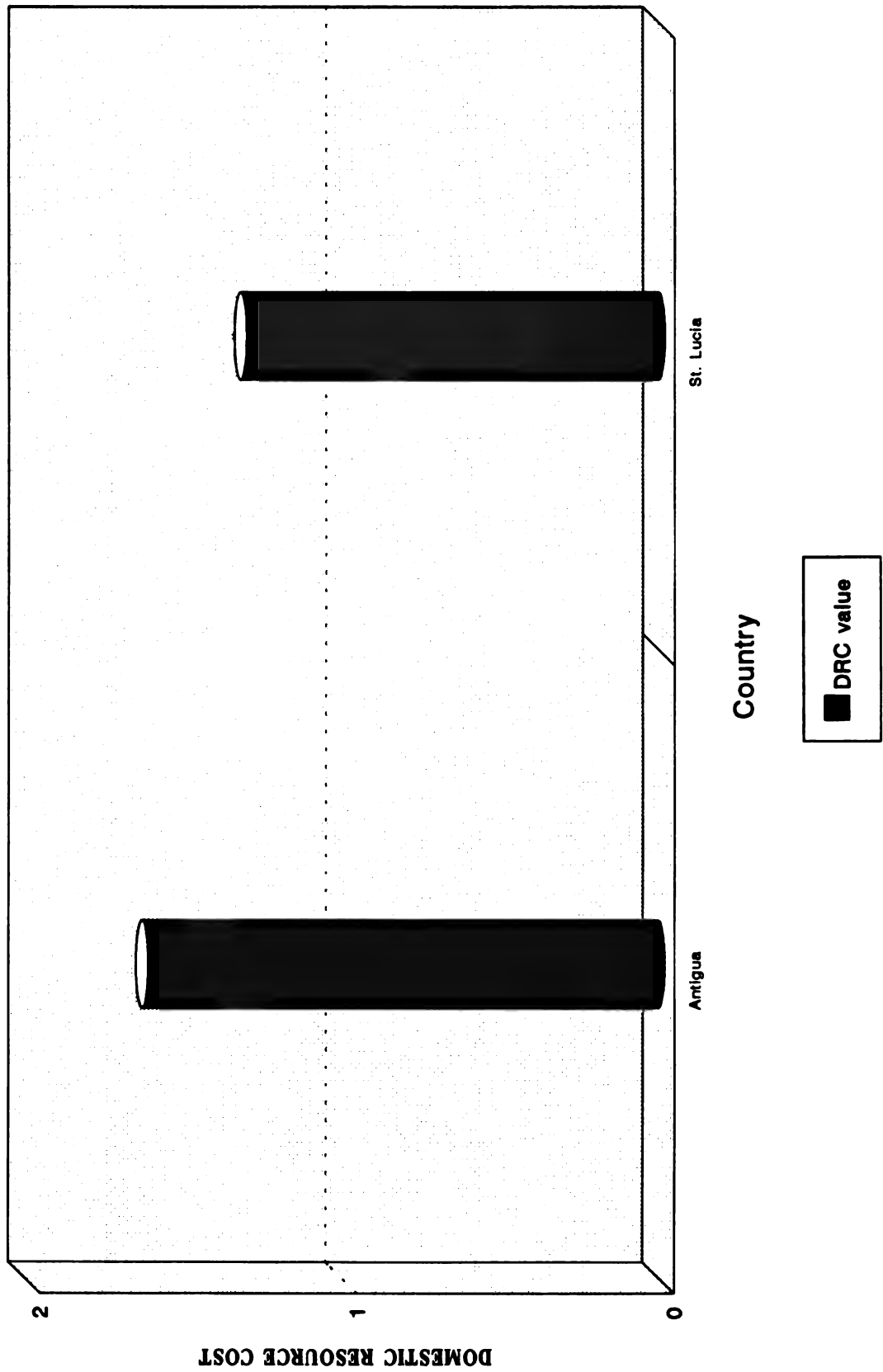


FIGURE 16.2. YIELD SENSITIVITY FOR HOTPEPPER, 1992-93
Selected OECS Countries

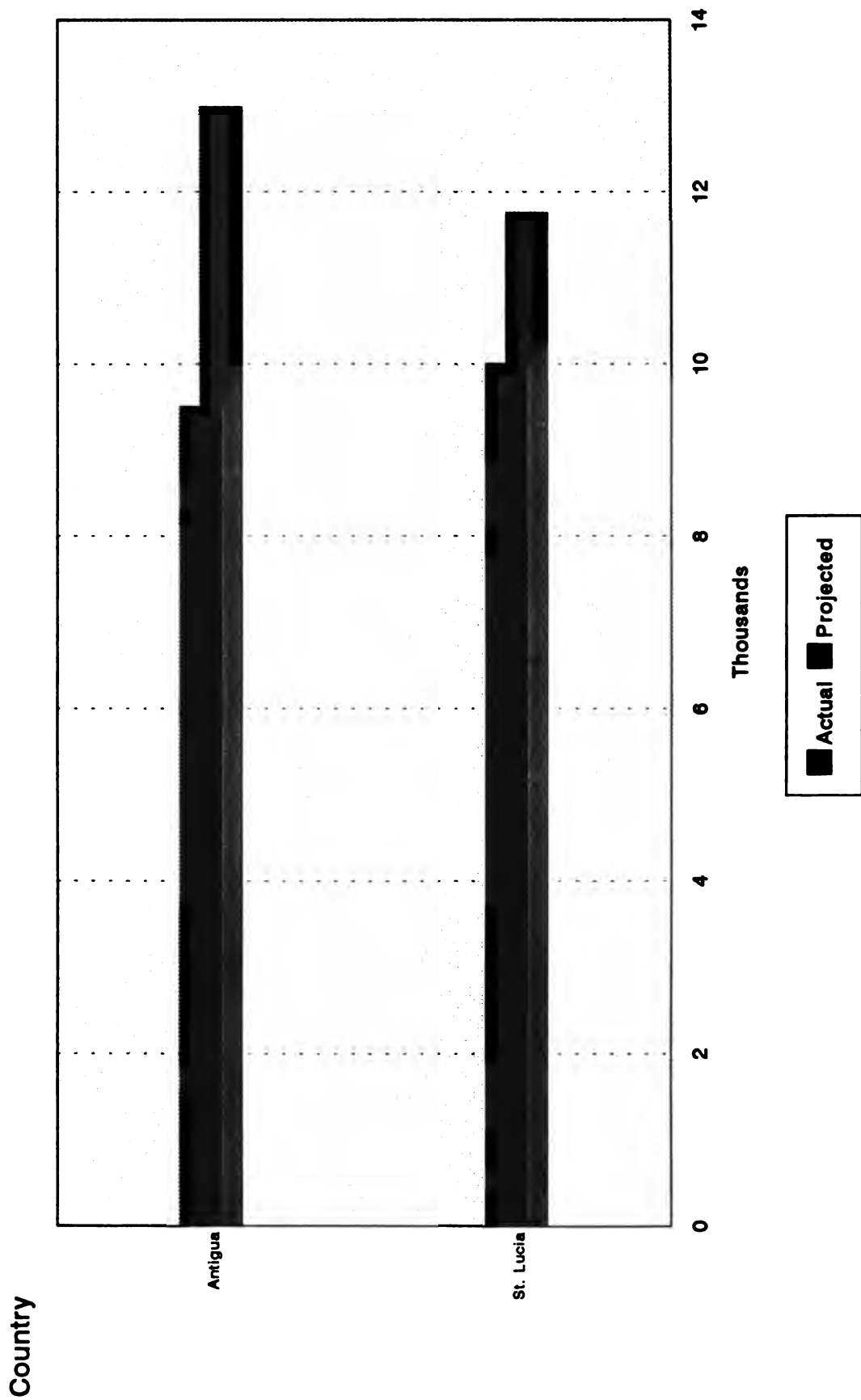


FIGURE 16.3. LABOUR SENSITIVITY FOR HOTPEPPER - 1992-93
Selected OECS Countries

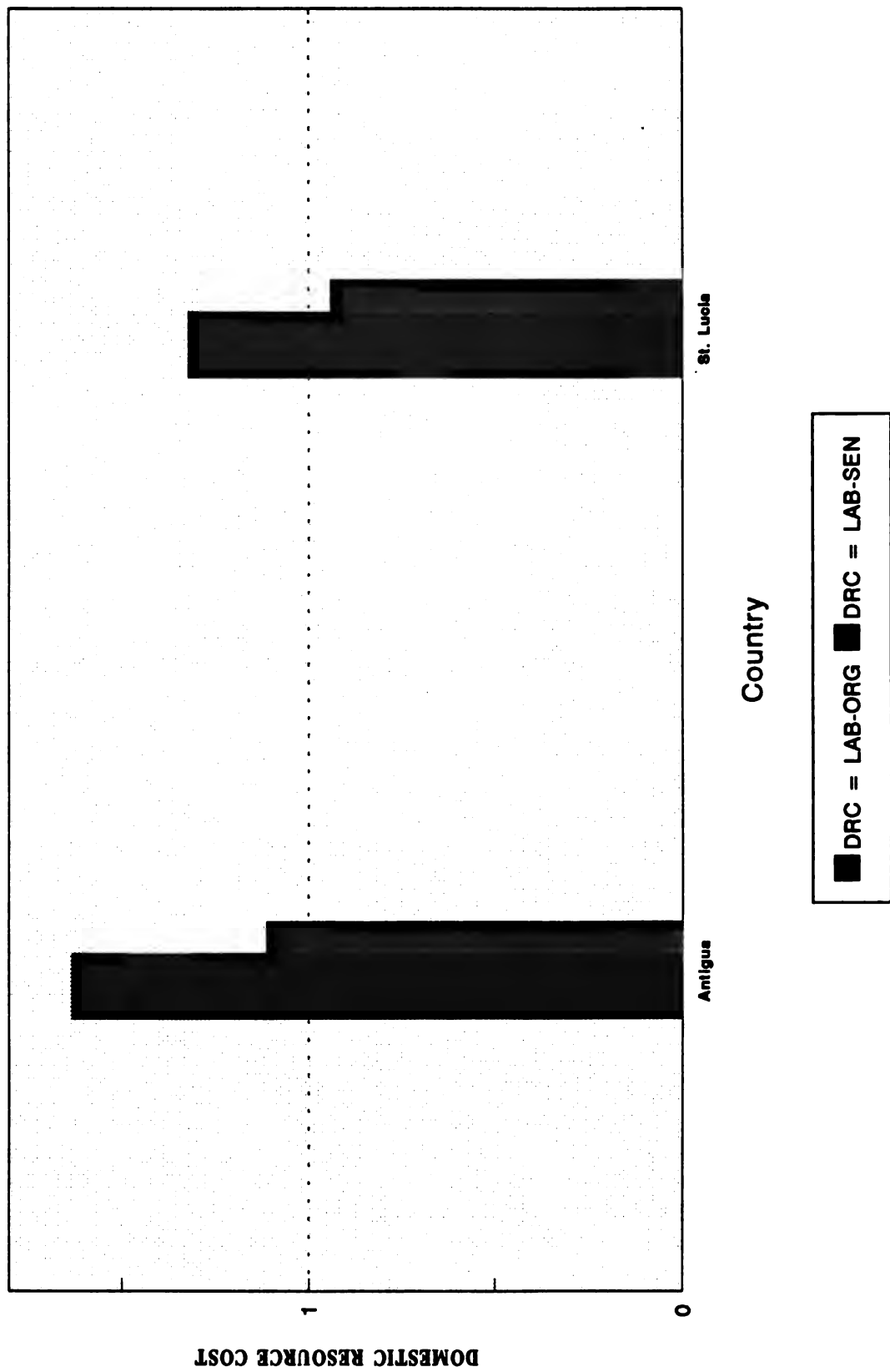
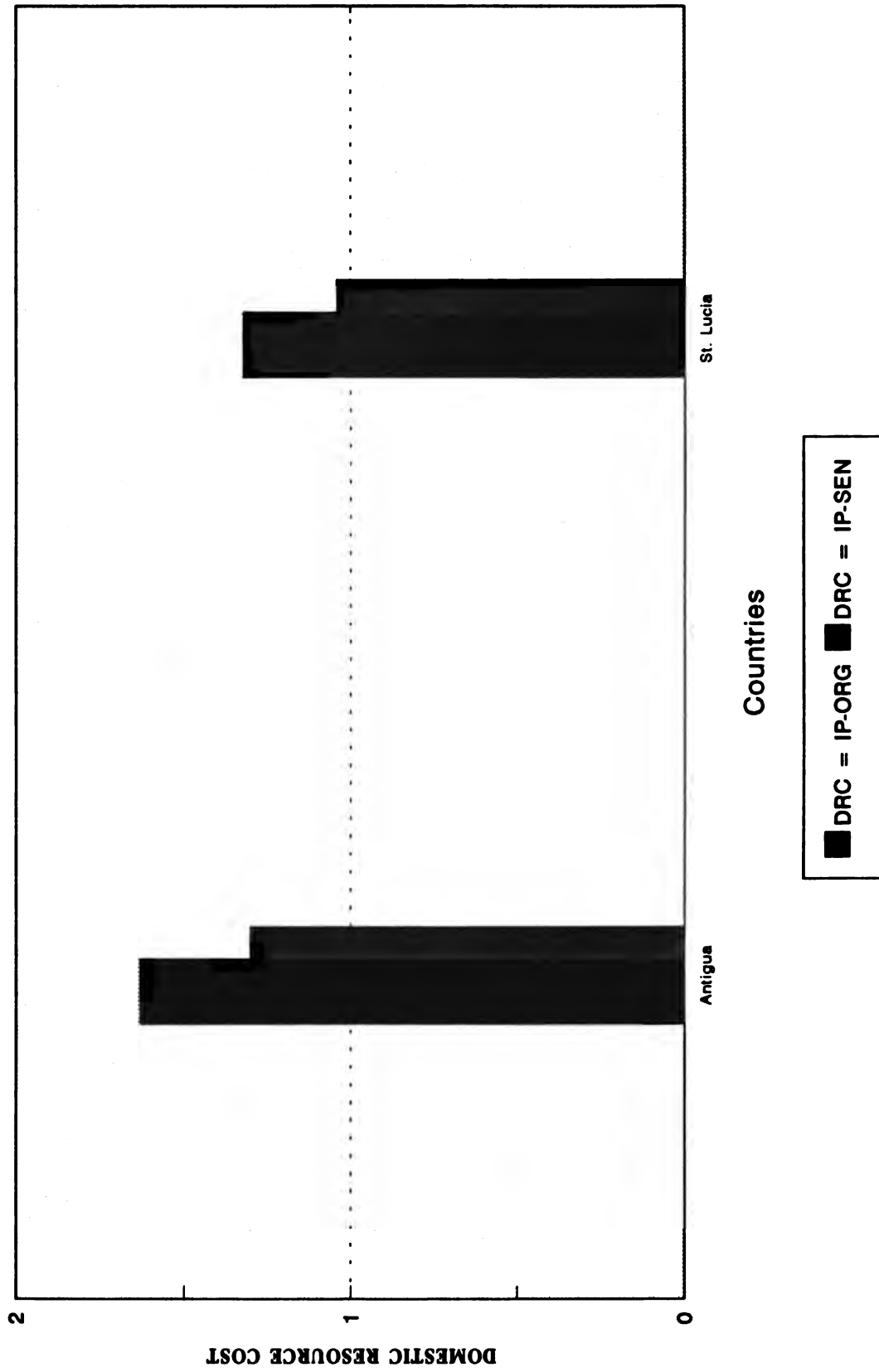


FIGURE 16.4 PRICE SENSITIVITY FOR HOTPEPPER, 1992-93
Selected OECS Countries



MANGO

The results of the cross-country analysis presented in Figure 17.1, indicate that of the six OECS countries included in the analysis, only three are presently competitive in the production of julie mangoes. As can be seen, the estimated DRC values varied widely, ranging from 0.19 in Dominica and St. Vincent to -1.11 in the British Virgin Islands. It is evident that mango production, in Dominica, St. Vincent and Grenada, is competitive with other domestic activities and that these three countries possess a clear competitive advantage over St. Lucia, Antigua and the British Virgin Islands.

While Dominica and St. Vincent share a DRC value of 0.19, higher yield levels were recorded for St. Vincent. It is also interesting to note that mango yield in St. Lucia is 27% higher than in Dominica, even though Dominica has a much lower DRC. Low yield levels in Dominica may be attributable to fruit infestation due to the presence of the '*fruit fly*' and the '*mango seed weevil*'. St. Vincent's higher yields may be due to the fact that the country enjoys a fruit-fly free production status.

While Dominica appears to be competitive based on the low DRC, the estimated value was calculated on the basis of information for disease-free production. Disease infested acreage however, will result in lower yields and higher per unit costs of production. For acreages affected by *fruit-fly* and *anthracnose*, the DRC estimates for Dominica may be somewhat misleading. Whether or not Dominica's current competitive ranking vis-a-vis St. Vincent and St. Lucia can be maintained will depend on the magnitude of the additional cost and the associated impact on productivity and output levels of disease control measures.

Figure 17.2 indicates that St. Lucia requires improvements in yields of only 13% for mango production to become competitive. Respective yield increases of 43% and 392% for Antigua and the BVI, are required to make mango production in these two countries competitive. Given the structure of costs and the levels of technology existing in the agricultural sector in these two countries, such improvement appears to be relatively more attainable for St. Lucia and Antigua than for the BVI. This would indicate that mango production is not an appropriate enterprise for the BVI, implying a need for resource reallocation from the mango enterprise to some other economic activity offering a higher return to resources.

Sensitivity analysis was employed to assess the robustness of the competitive advantage rankings to changes in two key technical variables. Figure 17.3 illustrates the effect of a 10% increase in the non-intervention price on the estimated DRC. Except for the BVI where the competitive disadvantage worsened, increasing the product price resulted in a decline in the absolute value of the DRCs for the other five countries, indicating improved competitiveness. A simulation varying the shadow wage rate for labour produces similar results. As shown in Figure 17.4, assuming greater efficiencies in the agricultural labour market resulted in improved country competitiveness. Under both simulations, however the relative ranking remained unchanged.

Of special interest in the simulations, is the DRC coefficient for St. Lucia, which moved from 1.50 under the base model to 1.08 under the NIP simulation and 1.10 under the labour simulation. This suggests that mango production in that country is very close to being competitive for domestic resources. It appears that though not currently competitive, St. Lucia, with initiatives aimed at increasing productivity and reducing production costs and marketing inefficiencies, could become competitive in julie mango production and trade.

The DRC estimates for Dominica, St. Vincent and Grenada, suggest that mango production is a substantial net earner of foreign exchange. The cost of US\$1.00 obtained through mango exports in these three countries is, EC\$0.51, EC\$0.65 and EC\$0.51, respectively. These costs compare to the official exchange rate which places the cost of US\$1.00 at EC\$2.70.

Schwartz/Nurse reports significant exports of mangoes from Dominica, Grenada, St. Lucia and St. Vincent over the 1988-1991 period. St. Vincent and St. Lucia appear to be the predominant exporters. The export position of St. Lucia relative to that of Dominica and Grenada may seem to be inconsistent with the estimated DRCs (less than 1 for Dominica and Grenada, greater than 1 for St. Lucia). However, it should be recalled that mango exports from Dominica are limited due to the presence of the fruit-fly. It must be kept in mind that the sensitivity analysis resulted in St. Lucia essentially attaining a competitive position in mango production. The APHIS data indicate that modest exports of mangoes to the U.S. have occurred over the 1983 to 1989 period. As is the case with the nontraditional crops previously discussed, the primary U.S. destination is St. Thomas and St. Croix in the Virgin Islands.

FIGURE 17.1. DOMESTIC RESOURCE COST - MANGO, 1992-93
Selected OECS Countries

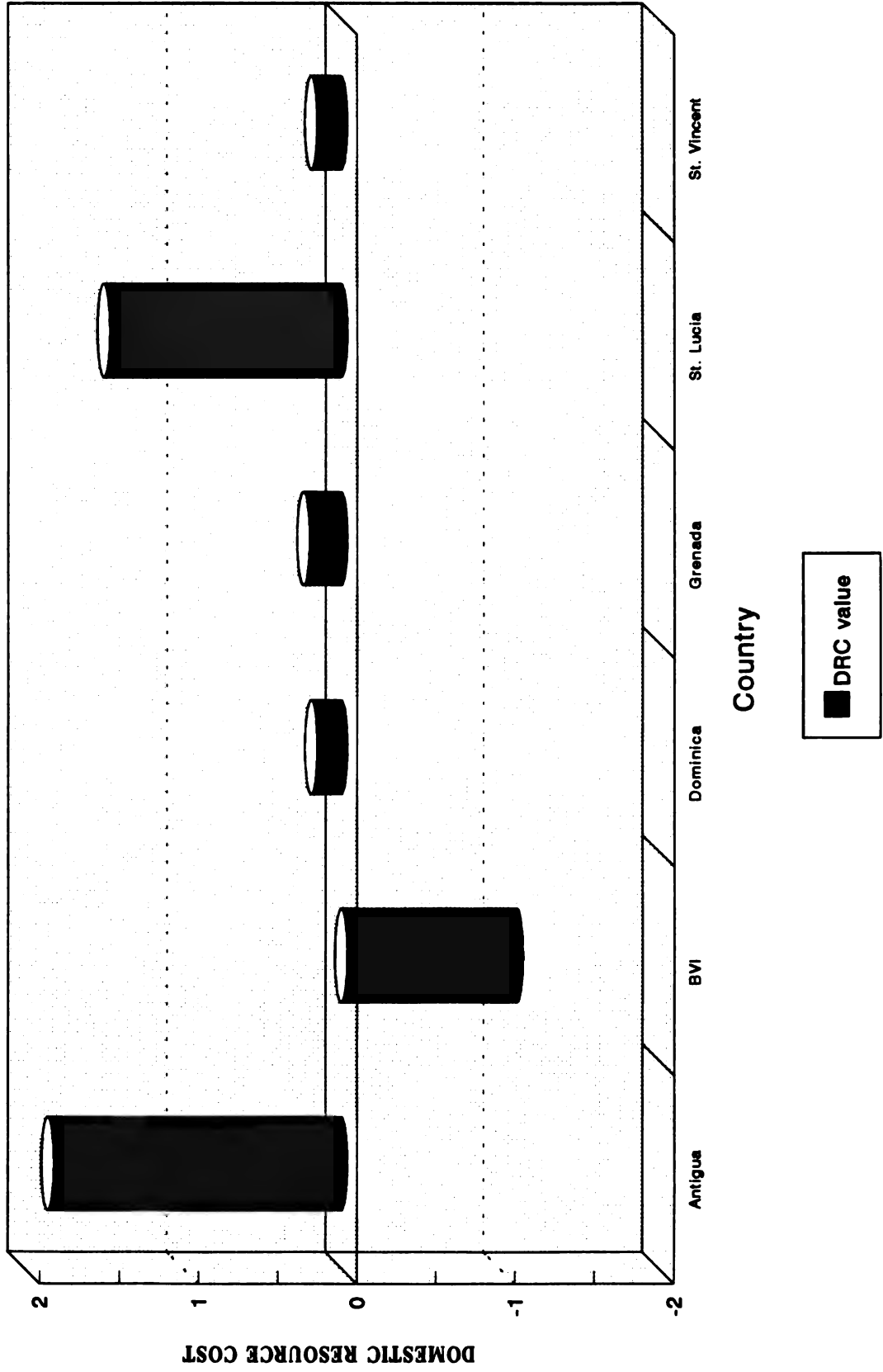


FIGURE 17.2. YIELD SENSITIVITY FOR MANGO, 1992-93
Selected OECS Countries

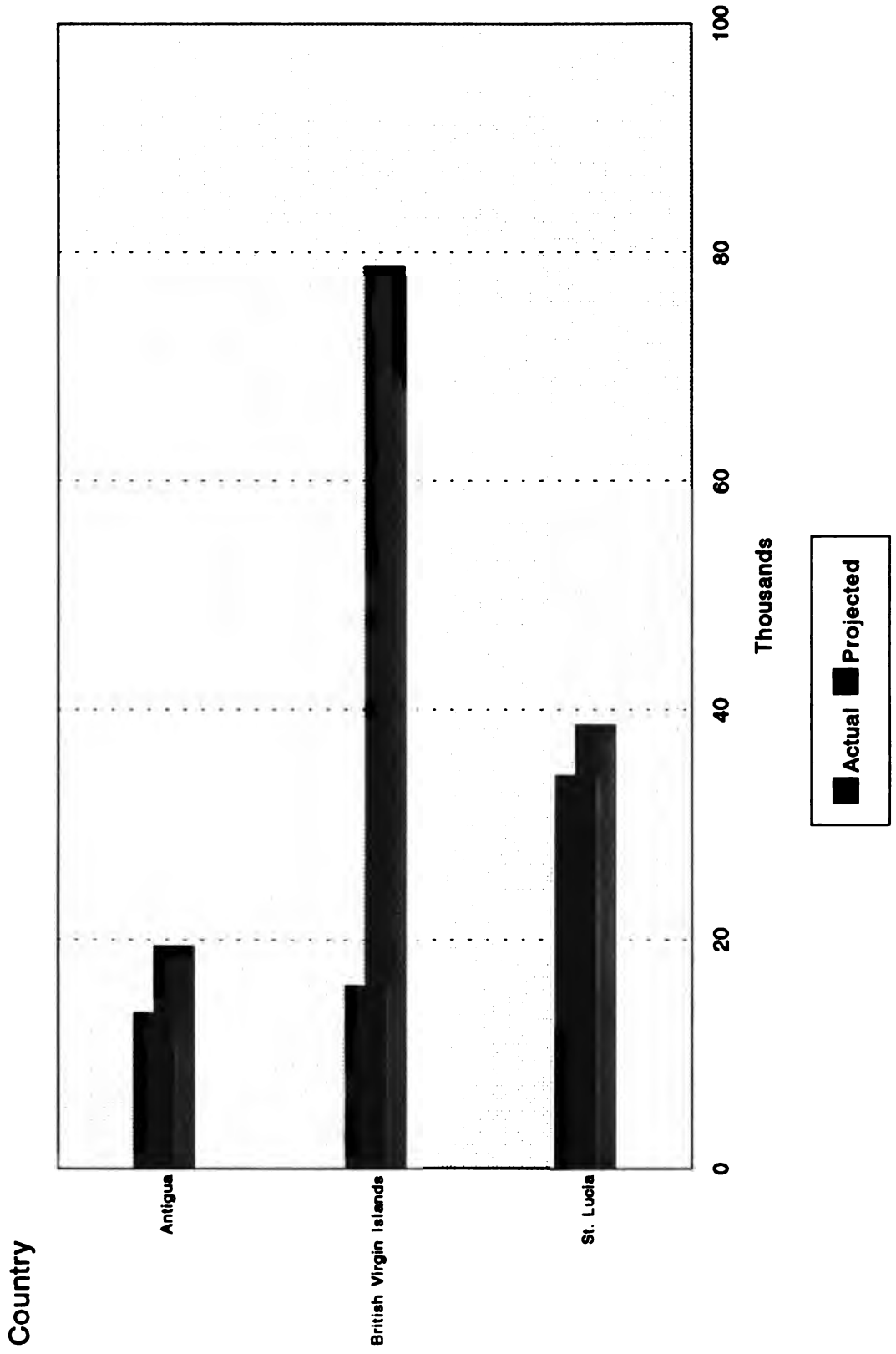


FIGURE 17.3. PRICE SENSITIVITY FOR MANGO, 1992-93
Selected OECS Countries

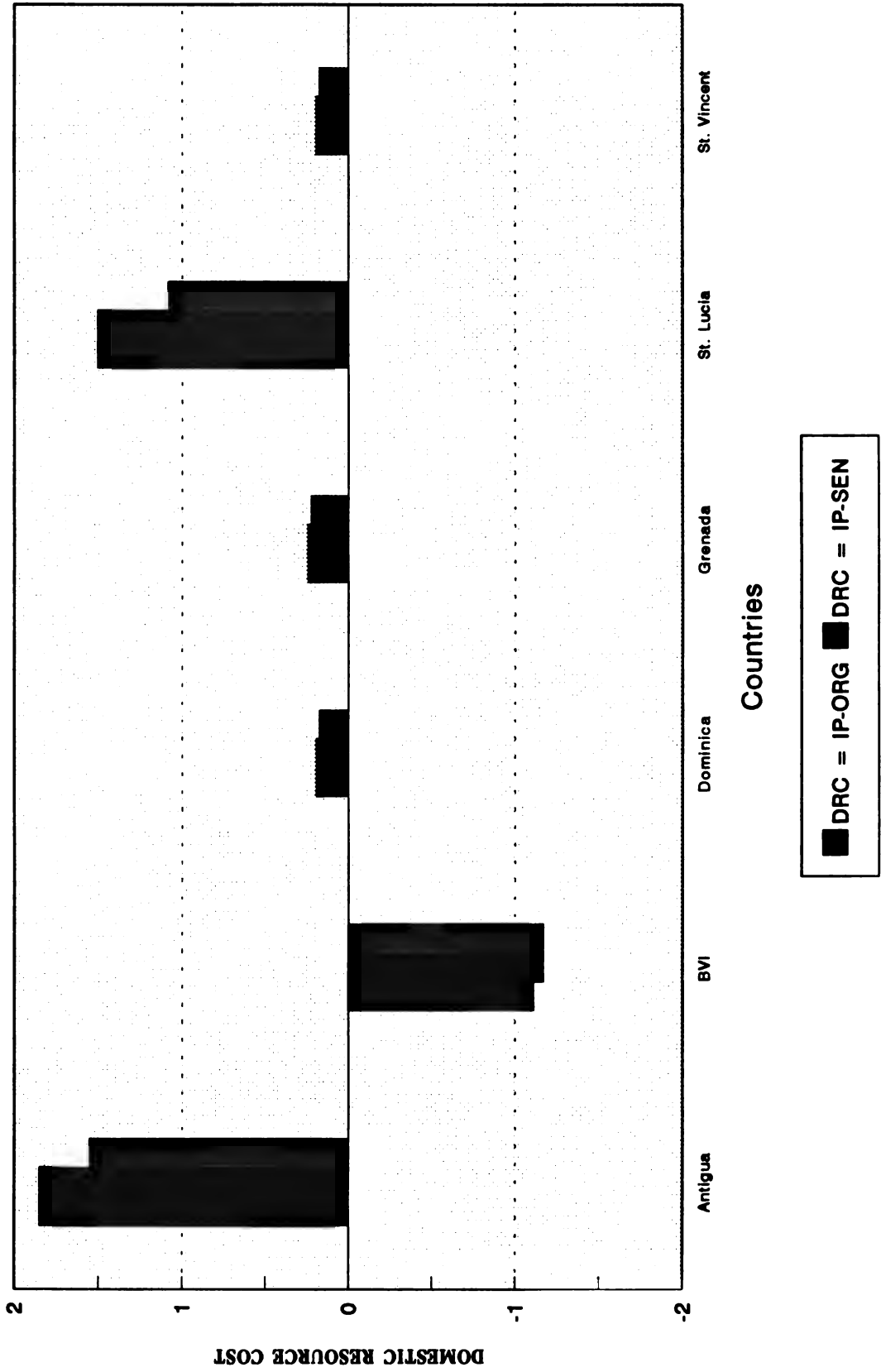


FIGURE 17.2. YIELD SENSITIVITY FOR MANGO, 1992-93
Selected OECS Countries

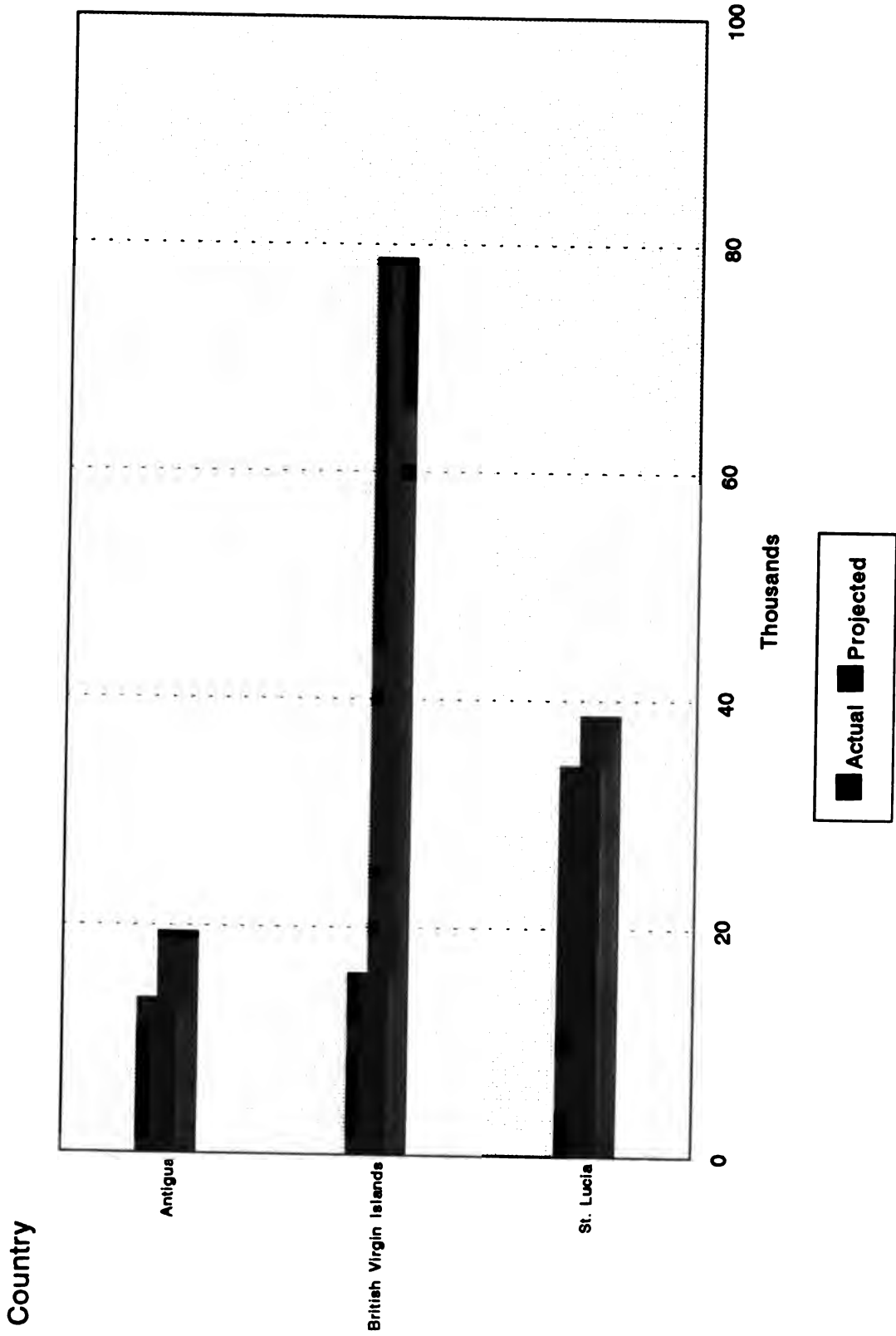


FIGURE 17.3. PRICE SENSITIVITY FOR MANGO, 1992-93
Selected OECS Countries

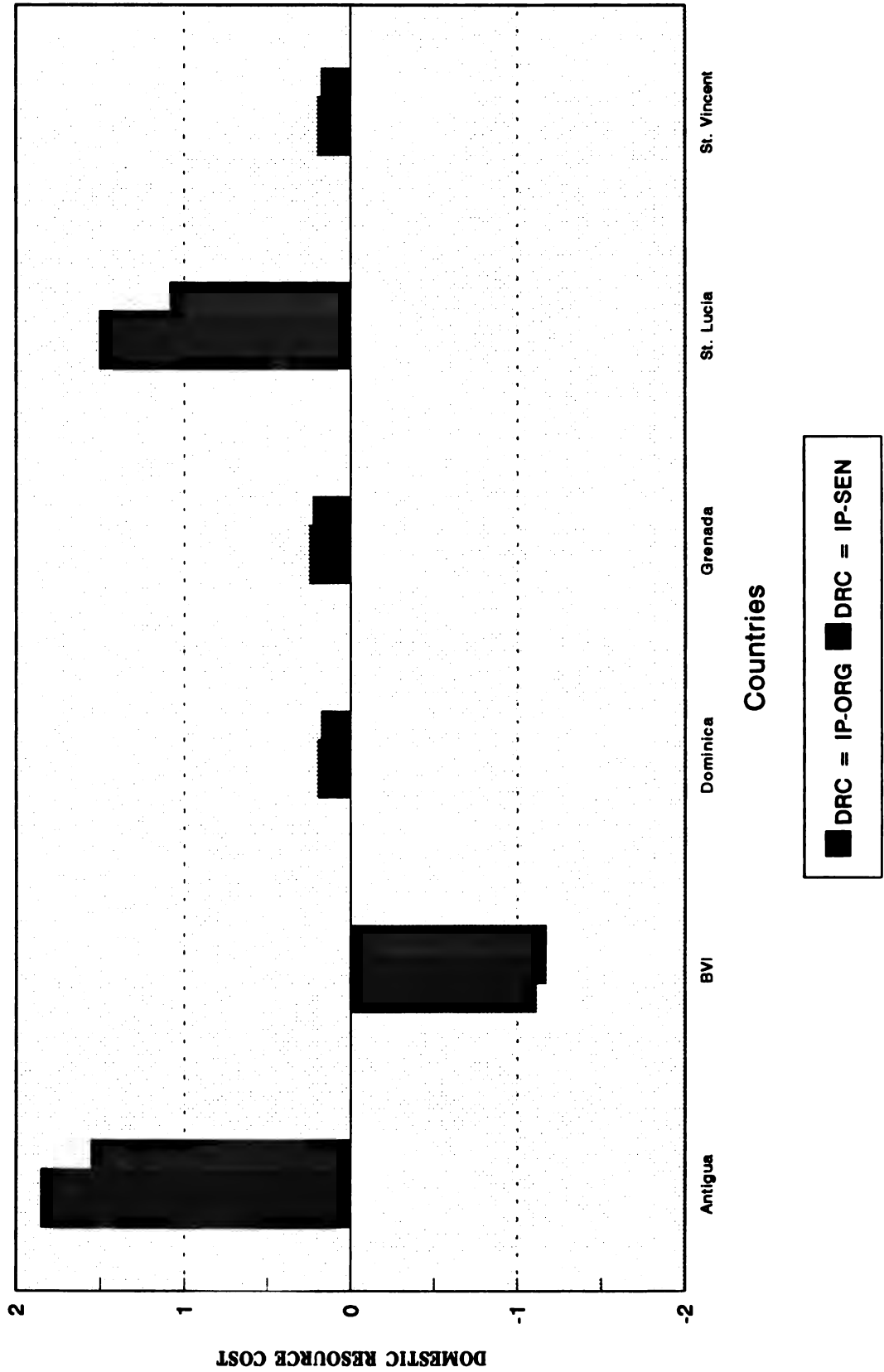
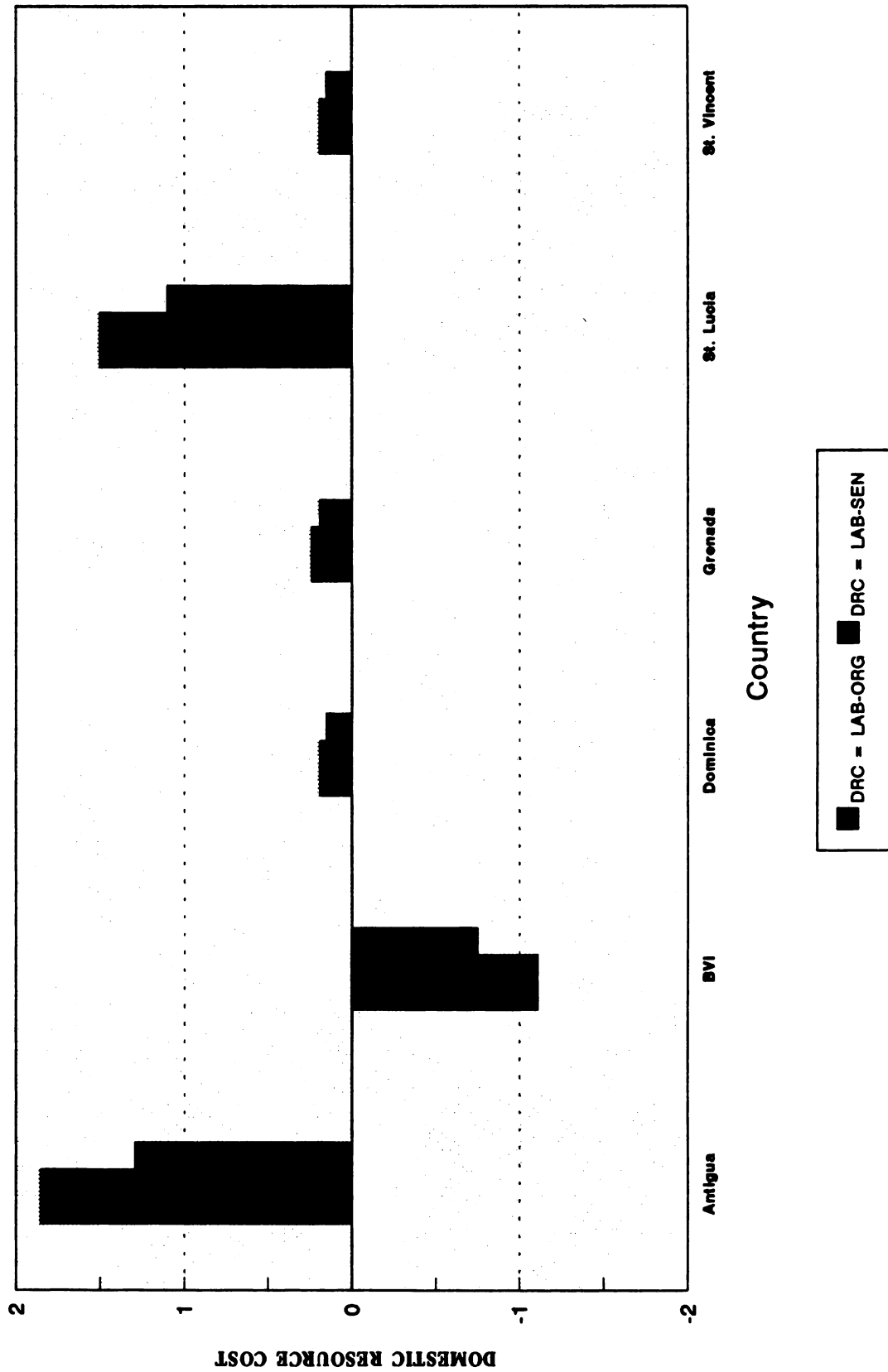


FIGURE 17.4. LABOUR SENSITIVITY FOR MANGO - 1992-93
Selected OECS Countries



ONION

The DRC coefficients for onion production in Antigua, Montserrat and St.Kitts/Nevis are presented in Figure 18.1. Both St.Kitts/Nevis and Montserrat have DRCs of less than unity suggesting that onion production in both countries is efficient and that resources employed can compete favorably for domestic resources. In contrast, the DRC coefficient for Antigua suggests that onion production is not competitive and returns to resources employed are less than could be earned in an alternative economic activity. The results also indicate that St.Kitts/Nevis, with a lower DRC than Montserrat has a relative competitive advantage in onion production, partly due to the higher onion yields obtained in that country. While both social and private profitability of onion production are higher in St.Kitts/Nevis than in Montserrat, they are lower in Antigua, which earns negative foreign value added from onion production. However onion production in Antigua still results in private profits to producers due to the implicit transfers transmitted via government policies.

Figure 18.2 presents the results of sensitivity analysis undertaken to determine the improvement in yields necessary to make onion production competitive in Antigua. Improvement in yield by 47% (approximately 6,000 lbs) is required to obtain a DRC of unity. However a DRC of unity implies that the country neither earns nor loses foreign exchange from the production of onion. If Antigua intends to become competitive in onion production and trade, yields of over 47% would have to be sustained.

As expected, increasing the NIP by 10% improves competitiveness for all countries. The results in Figure 18.3 indicate that while the absolute value of the DRC coefficient for each country diminishes relative to its base model value, onion production in Antigua still remains uncompetitive. The labour sensitivity results in Figure 18.4, indicate that assuming the social cost of labour was less than suggested under the base model still results in onion production being uncompetitive in Antigua. The relative competitive positions of St.Kitts/Nevis and Montserrat under both simulations remained unchanged.

The DRC coefficients for St.Kitts/Nevis and Montserrat suggest that onion production in both countries results in foreign exchange earnings. The cost of US\$1.00 obtained through onion production and trade in St.Kitts/Nevis is approximately EC\$1.40, while in Montserrat it is EC\$2.65. From this analysis, net foreign exchange earnings from onion production and trade in St.Kitts/Nevis appears to be relatively higher than in Montserrat. The Schwartz/Nurse trade data reports limited onion exports over the 1988 to 1991 period, with Antigua exporting about 8000 kg in 1991 and St.Kitts exporting a mere 65 kg in 1990.

FIGURE 18.1. DOMESTIC RESOURCE COST - ONION, 1992-93
Selected OECS Countries

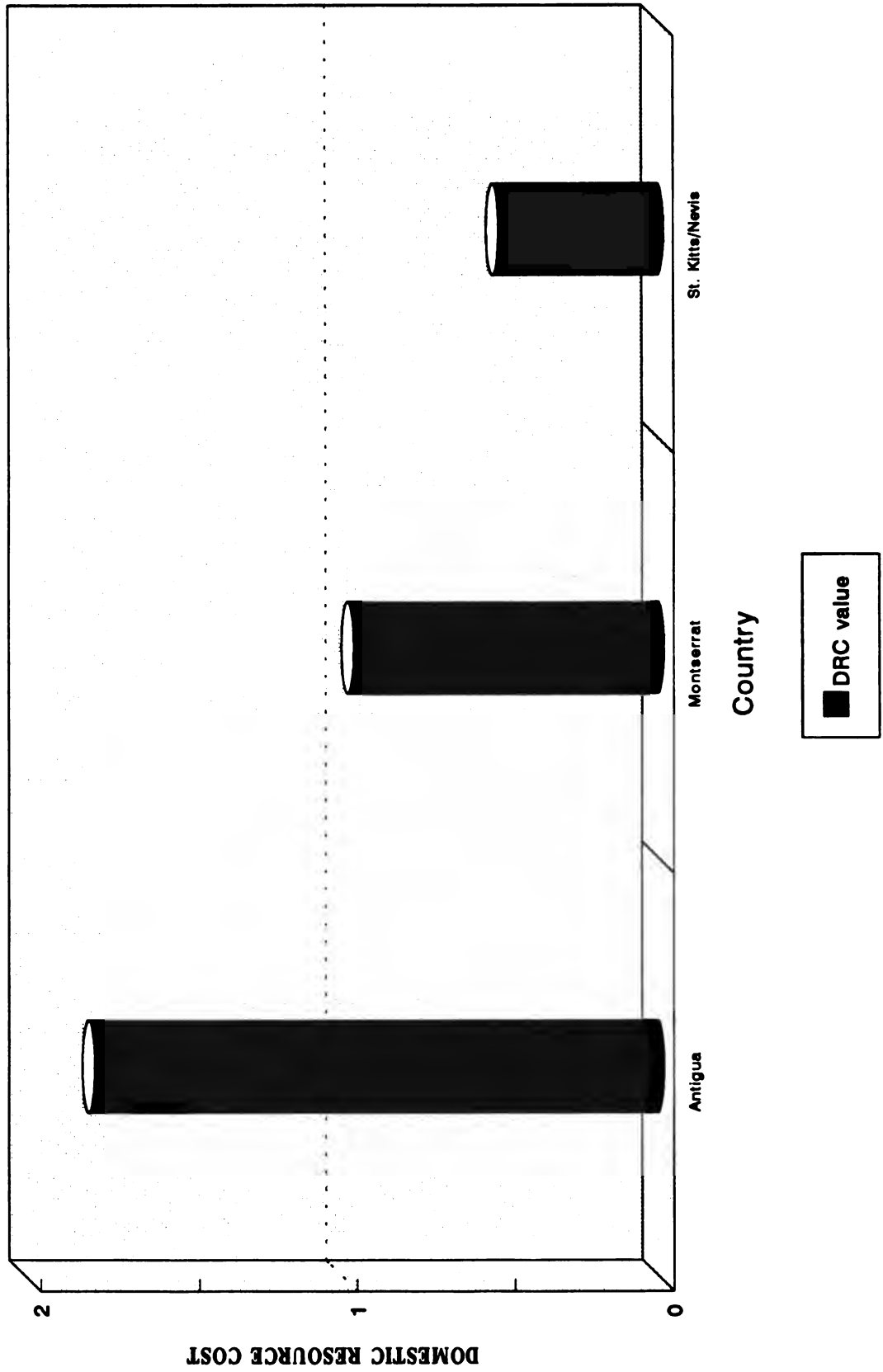


FIGURE 18.2. YIELD SENSITIVITY FOR ONION, 1992-93
Selected OECS Countries

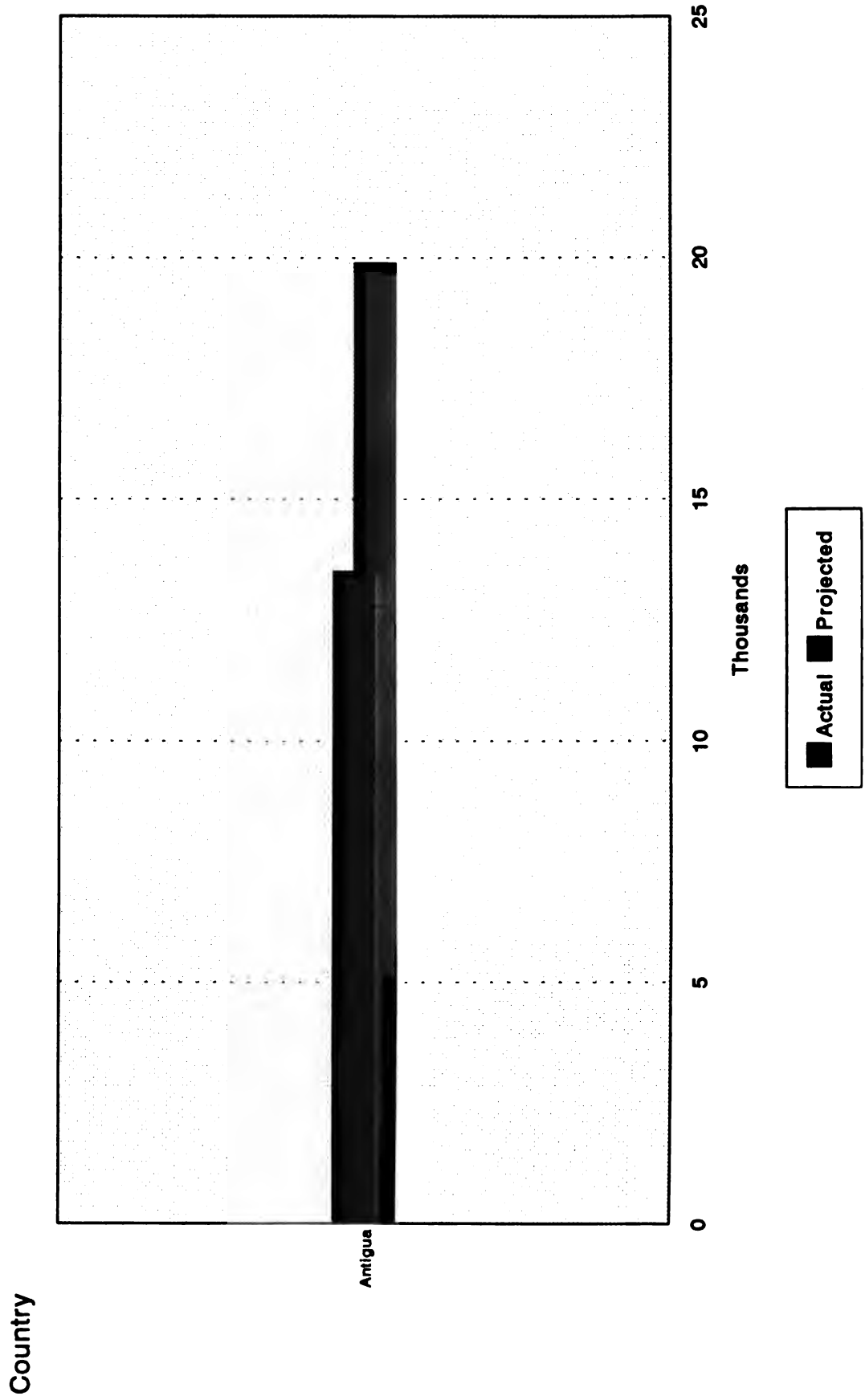


FIGURE 18.3. PRICE SENSITIVITY FOR ONION, 1992-93
Selected OECS Countries

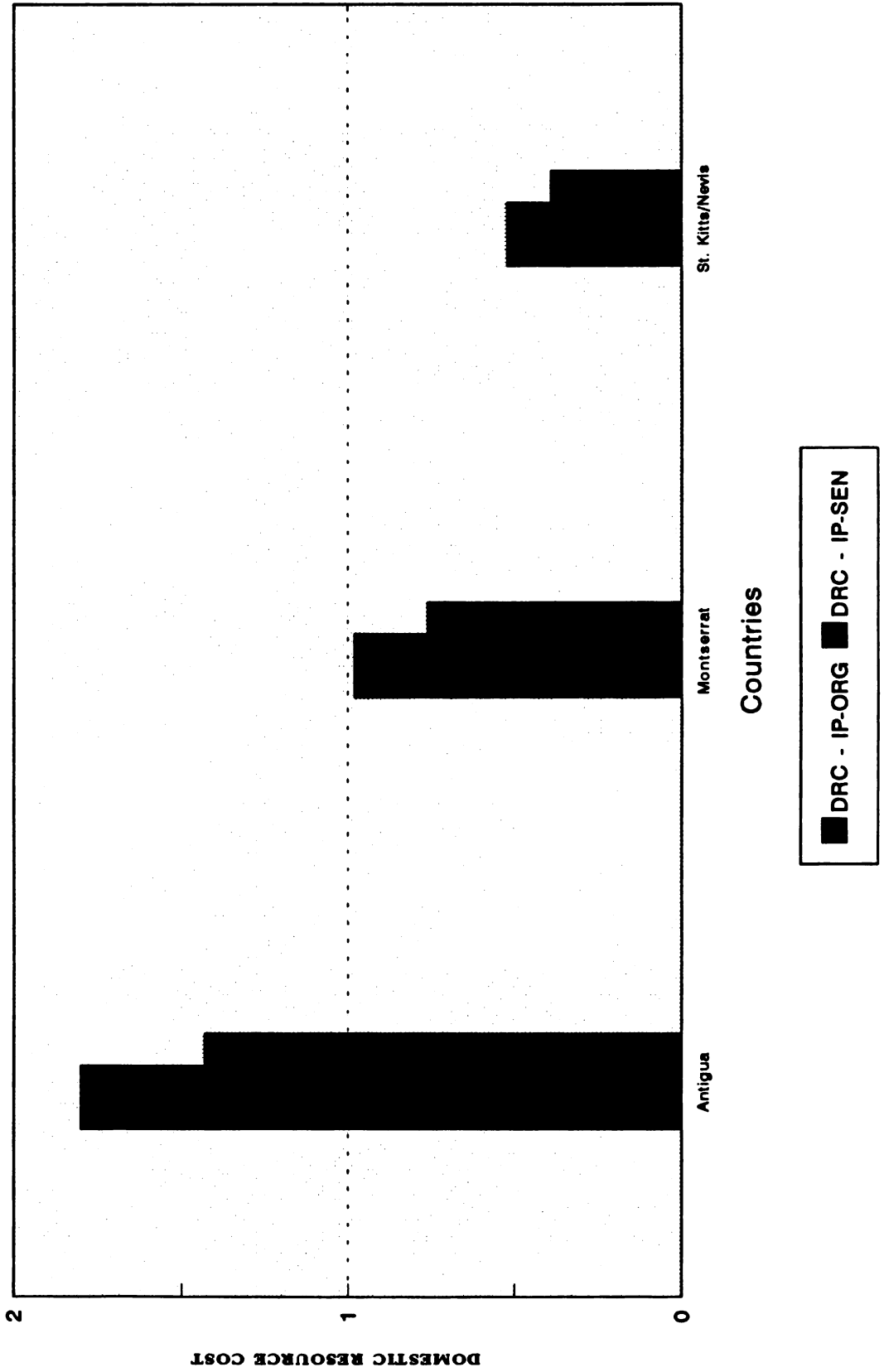
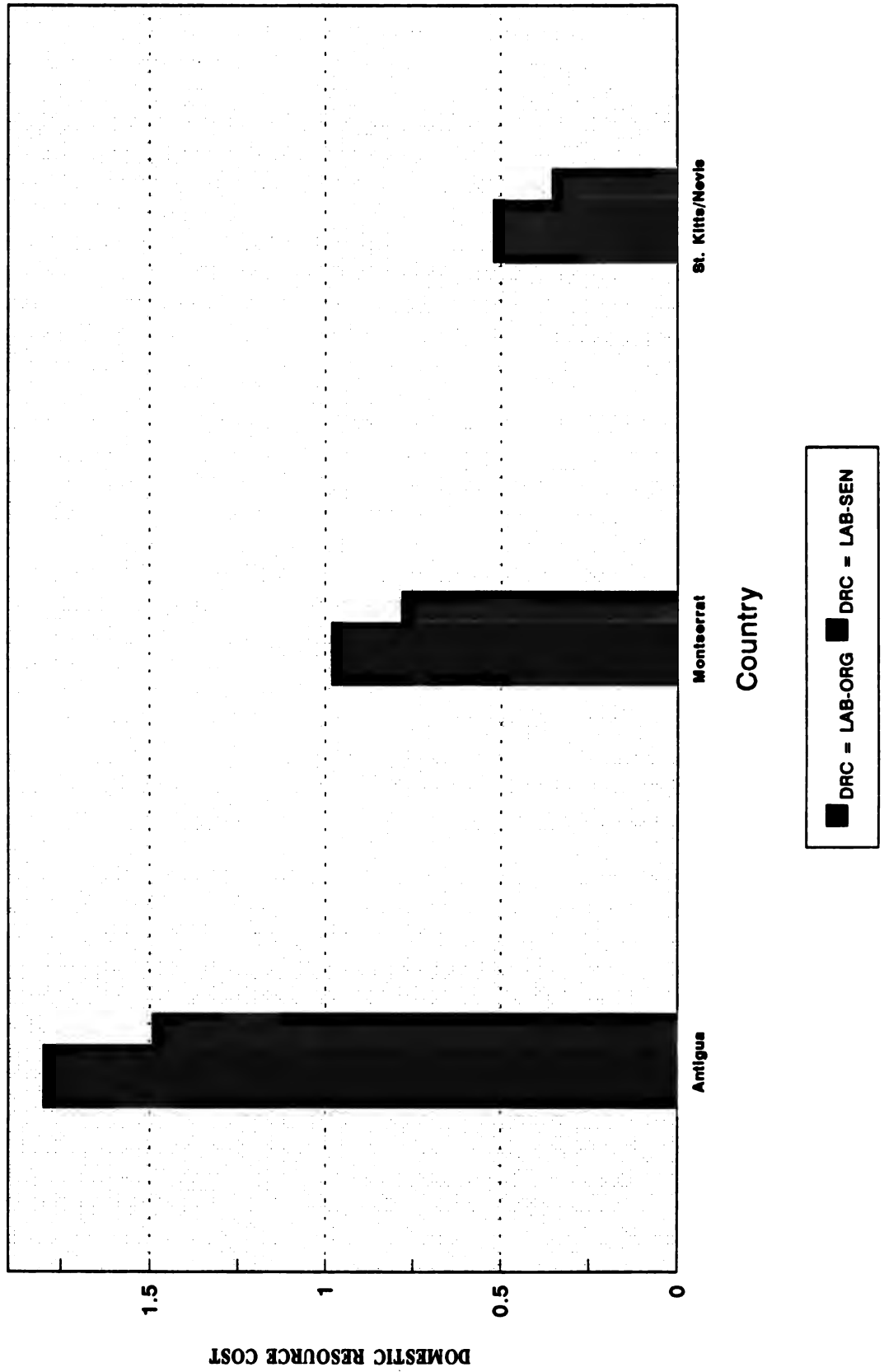


FIGURE 18.4. LABOUR SENSITIVITY FOR ONION - 1992-93
Selected OECS Countries



PASSION FRUIT

Figure 19.1 indicates, that of the four OECS member states examined, Dominica and Grenada, with DRC ratios of less than unity are competitive, while St. Vincent and St. Lucia with DRC ratios greater than unity are uncompetitive producers of passion fruit. For producers in St. Vincent and St. Lucia, resources employed in passion fruit production appear to have more profitable alternatives elsewhere in their respective economies.

Dominica with a DRC ratio of 0.83, ranks highest (the most competitive), of all four OECS countries and hence is the most efficient producer of passion fruit. In spite of passion fruit being both socially and privately profitable, production in Dominica continues to be affected by inadequate marketing arrangements which may have had an adverse impact on the commodity's competitiveness.

Passion fruit in Dominica is sold in two inter-related markets. Agro-industrial demand exists for the product which is processed into a concentrate by a local firm. A fairly strong though stable consumer demand also exists for the fresh product. Some fresh fruit is also exported to neighboring islands, particularly Antigua and the French Antilles, where prices are more attractive than in the domestic market. Periodic saturation of the domestic market, induced by sluggish agro-industrial demand for the product, has affected producer efficiency and vine productivity, since it has been observed that field husbandry generally declines in periods of depressed producer prices. Competitiveness of the commodity, particularly in Dominica and to a lesser extent in Grenada, St. Vincent and St. Lucia appears to be demand determined.

While the DRC ratios in Dominica and Grenada imply that foreign exchange can be earned from increasing resource investment in passion fruit production, the decision to do so will be influenced by several other factors which will be discussed later in this study's section on market demand characteristics.

St. Vincent and St. Lucia are not presently competitive in the production of passion fruit with DRC ratios of 1.34 and 1.66, respectively. These relatively higher DRC ratios are indicative of lower productivity. Given the current structure of production costs and technology, opportunities do exist for improving yields if these two countries intend to become competitive. The results of the yield sensitivity analysis reported in Figure 19.2, indicate that passion fruit initiatives in St. Vincent and St. Lucia will be competitive with increases in marketable yields of only 17% and 16%, respectively.

To assess the robustness of the competitiveness rankings to changes in two key parameters, product price and labour, the sensitivity analysis was employed. Sensitivity of the DRC ratios to variations in the non-intervention price of 10% are shown in Figure 19.3. According to the results, increasing the NIP to E.C. \$0.35 led to a decline in the absolute value of the DRC coefficients in all four countries. The relative country rankings however, remain unchanged. The countries which were competitive/uncompetitive in the production of passion fruit under the base model continued to be competitive/uncompetitive under the NIP simulation.

The results of the labour sensitivity in Figure 19.4, also indicate that passion fruit competitiveness in all four countries improved as a result of reduction in the social cost of labour. This notwithstanding, passion fruit production remained uncompetitive in both St. Vincent and St. Lucia.

In general, the DRC results suggest that at current levels of technology, yields, costs and prices, St. Vincent and St. Lucia cannot compete either internationally or with Grenada and Dominica in the production of passion fruit. The available export data appears to support this conclusion. The data indicates that Dominica accounted for the bulk of OECS exports of passion fruit to Antigua, the French and Dutch Antilles, Montserrat as well as to other OECS member states. The relative rankings indicated by the DRC analysis are thus fairly consistent with those suggested by the available ex-post trade data.

FIGURE 19.1. DOMESTIC RESOURCE COST - PASSIONFRUIT, 1992-93
Selected OECS Countries

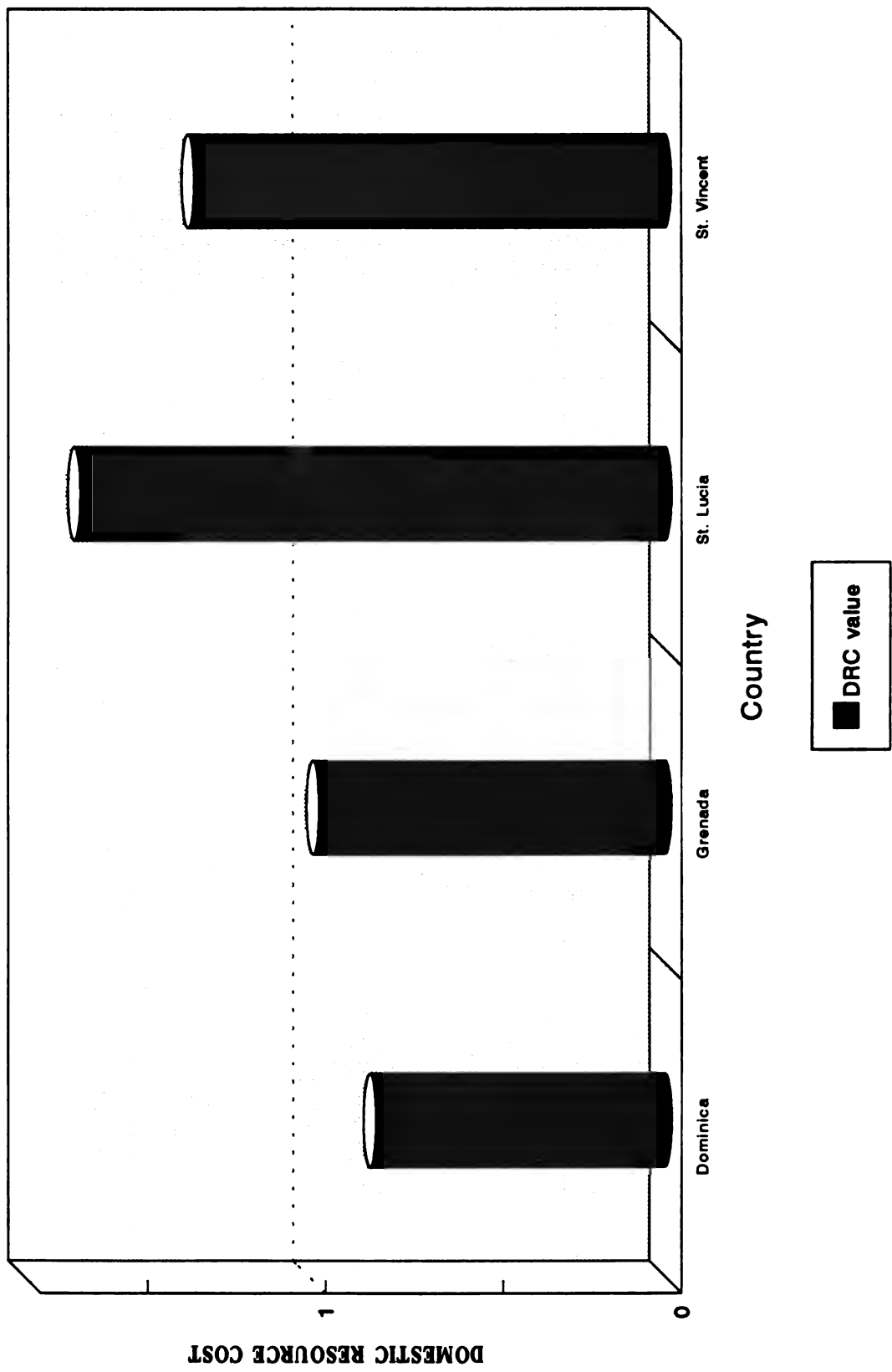


FIGURE 19.2. YIELD SENSITIVITY FOR PASSIONFRUIT, 1992-93
Selected OECS Countries

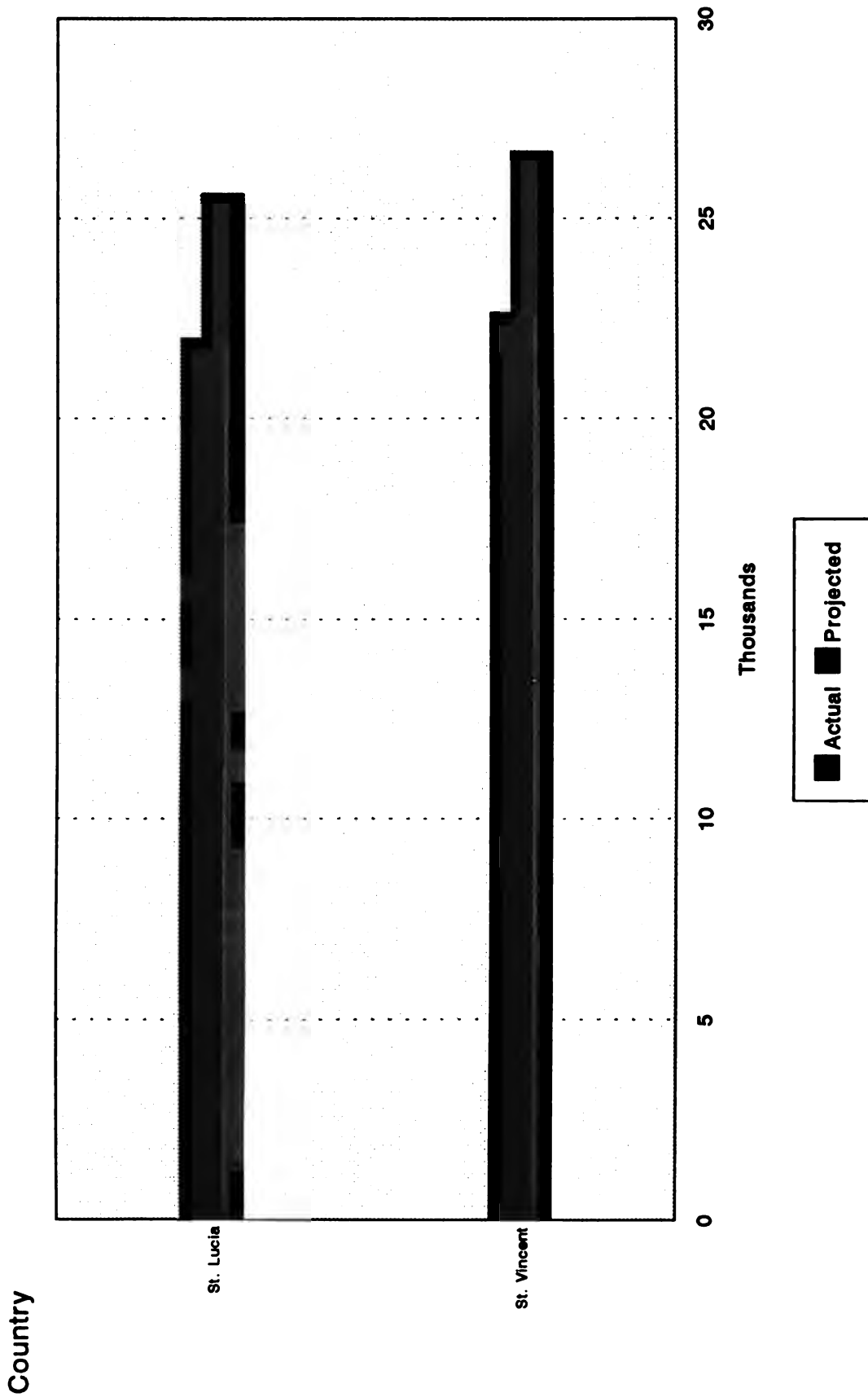


FIGURE 19.3. PRICE SENSITIVITY FOR PASSIONFRUIT, 1992-93
Selected OECS Countries

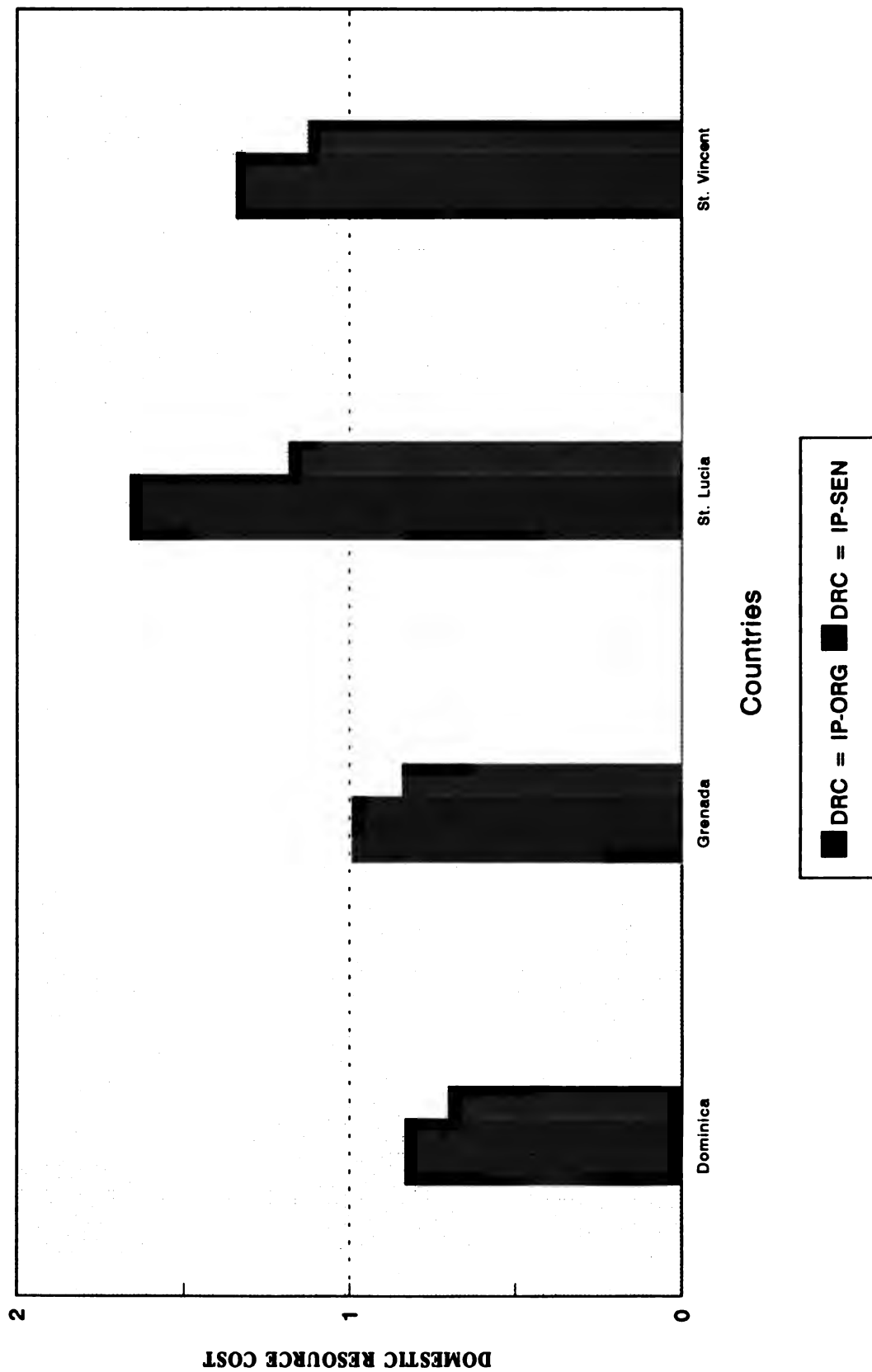
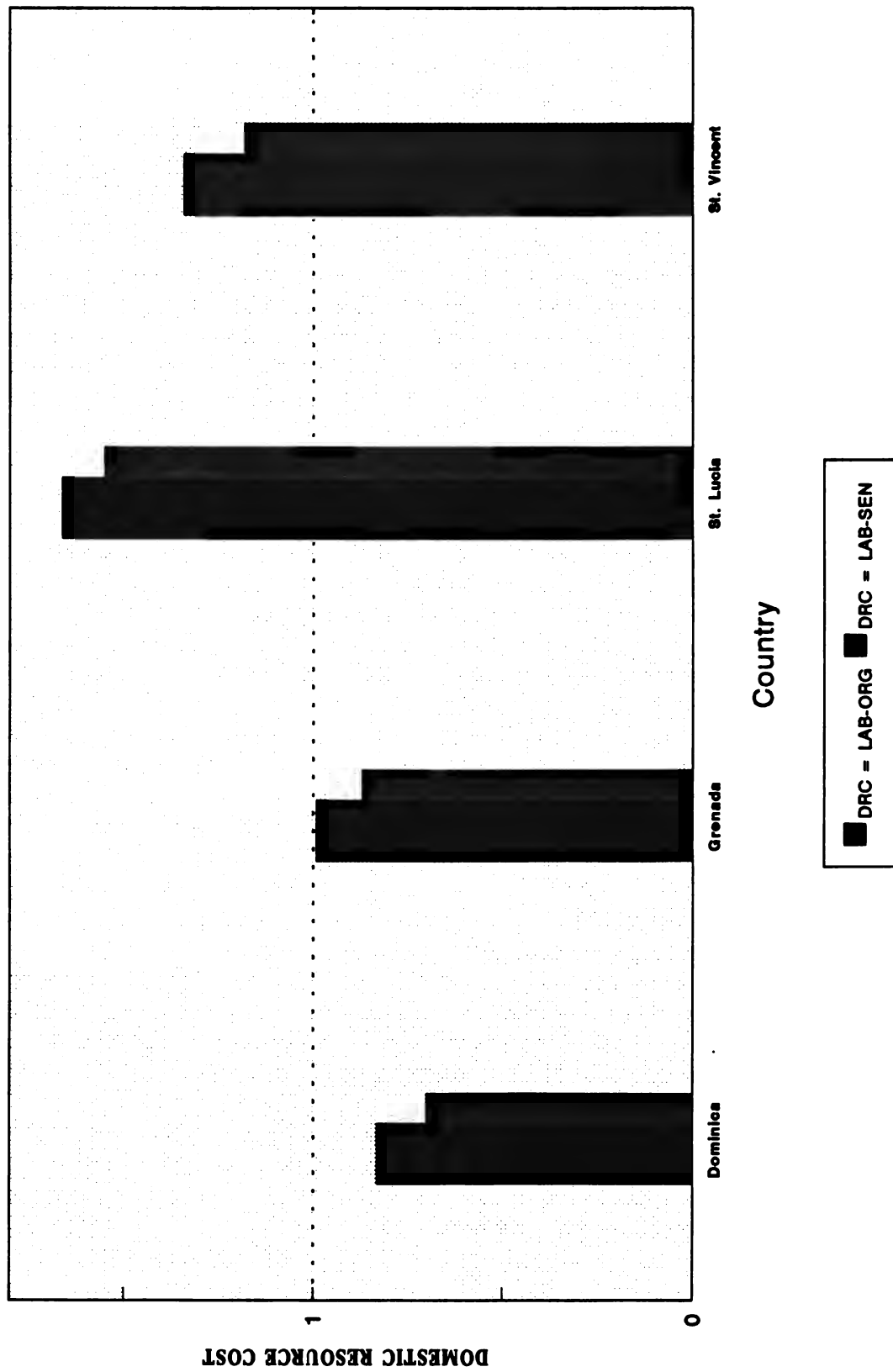


FIGURE 19.4. LABOUR SENSITIVITY FOR PASSION FRUIT - 1992-93
Selected OECS Countries



PAPAYA

Papaya is a popular fruit in the Caribbean region but in spite of that popularity, commercial development of this crop has been relatively slow. Figure 20.1 presents the DRC estimates of papaya production for five OECS member states: St. Vincent, Grenada, St. Lucia, Antigua and Dominica. A striking feature of the cross-country analysis is not only that the DRCs fall within the zero-to-unity competitive range, but that they are all much closer to zero than unity.

This may be explained by the fact that these DRCs were calculated on the basis of information for disease-free production. It has been seen that generally, the DRC values are quite sensitive to variations in yields and pest and disease control. Disease infested acreage however will result in lower yields and higher per unit production costs. The widespread occurrence of 'bunchy-top' (*erwinia*) in the OECS region has constrained commercial development of papaya. Should the OECS countries decide to invest in commercial papaya production, research initiatives aimed at controlling the disease or the introduction of a resistant varieties will have to be undertaken.

That the DRCs are all less than 0.30 suggests that in the absence of pest and disease infestations and based on the current structure of costs and technology, papaya production and trade in these five OECS member states can potentially result in net foreign exchange earnings/savings. The extremely low DRCs are also indicative of the relatively low current demand on imported resources utilized in papaya production.

Based on the results, St. Vincent ranks highest in relative competitiveness, followed by Dominica, Grenada, St. Lucia and Antigua (in descending order of competitiveness). The competitive advantage possessed by St. Vincent may be attributable to its significantly higher yields. While Dominica ranks second in terms of competitiveness, its yields are the lowest recorded of all five OECS territories

In assessing whether the relative rankings across countries are affected by variations in the key technical parameters, sensitivity analysis was undertaken on both the non-intervention price and on the conversion factor for labour. The results of the sensitivity of the DRC ratios to a 10% variation in the non-intervention price are shown in Figure 20.2. According to the results, increasing the NIP reduces the DRC coefficients for all five countries. However, the relative competitiveness of each country remains unchanged.

The labour sensitivity results reported in Figure 20.3 suggest that if the social cost of labour was less than indicated by the estimated value of the conversion factor for agricultural labour in these countries, then each country's competitiveness, as measured by the DRC coefficient, would be more favorable.

Due to the low values of the DRC coefficients in each country the magnitude of the responses to changes in the technical variables was relatively small. This suggests that current production (disease free) is operating efficiently.

The cost of US\$1.00 which could be obtained through papaya production and trade in all the countries is estimated to be EC\$0.73 in Antigua, EC\$0.30 in Dominica, EC\$0.46 in Grenada, EC\$0.54 in St.Lucia and EC\$0.19 in St.Vincent. In spite of the considerable competitive potential of papaya in the region, the available trade data reports exports from only Dominica over the 1988-1990 period. Low export volumes may be due to the highly perishable nature of the commodity and also to the fact that the marketing infrastructure is not sufficiently developed in the region to make the export of papaya viable.

FIGURE 20.1. DOMESTIC RESOURCE COST - PAPAYA, 1992-93
Selected OECS Countries

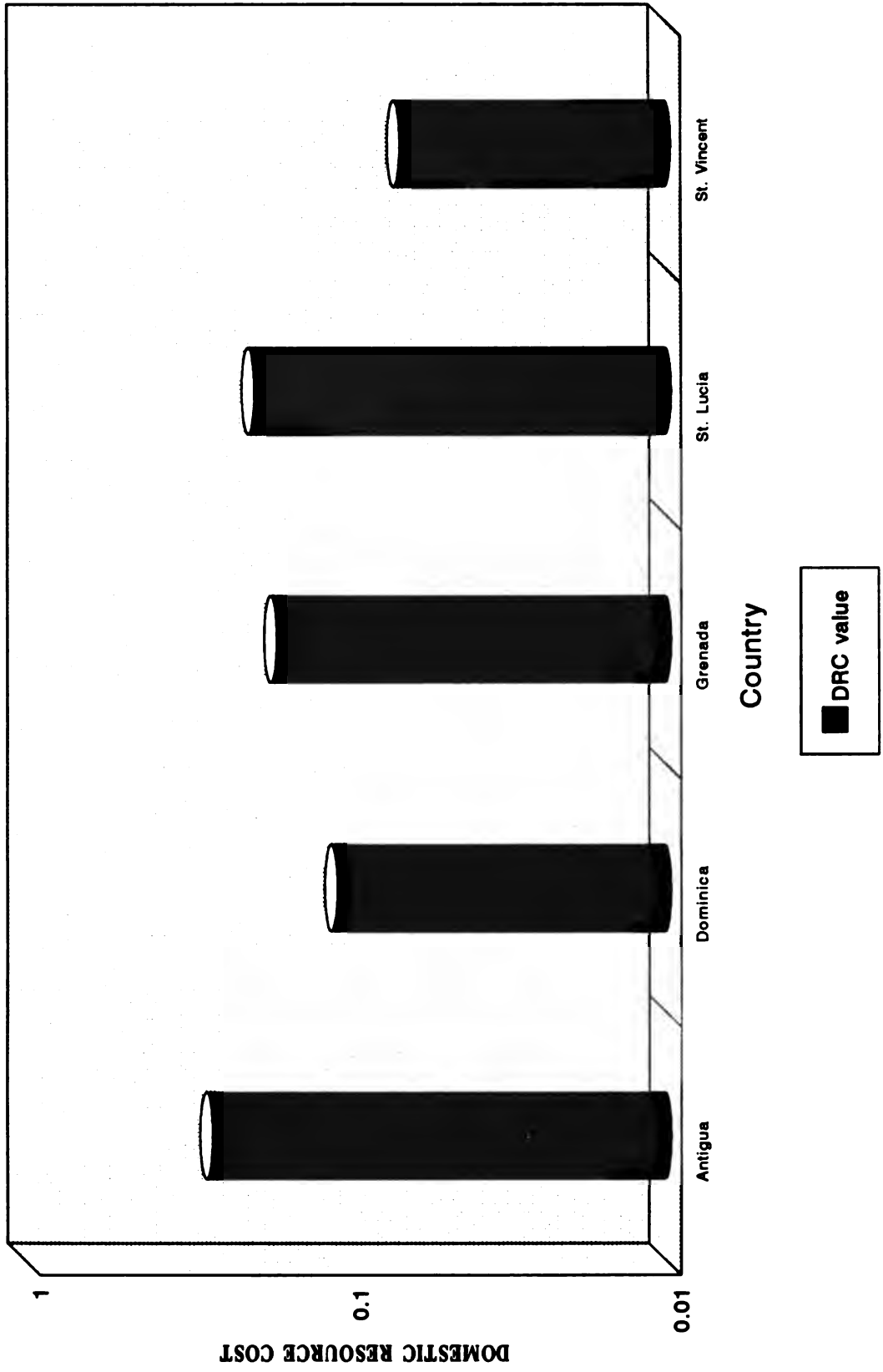


FIGURE 20.2. PRICE SENSITIVITY FOR PAPAYA, 1992-93
Selected OECS Countries

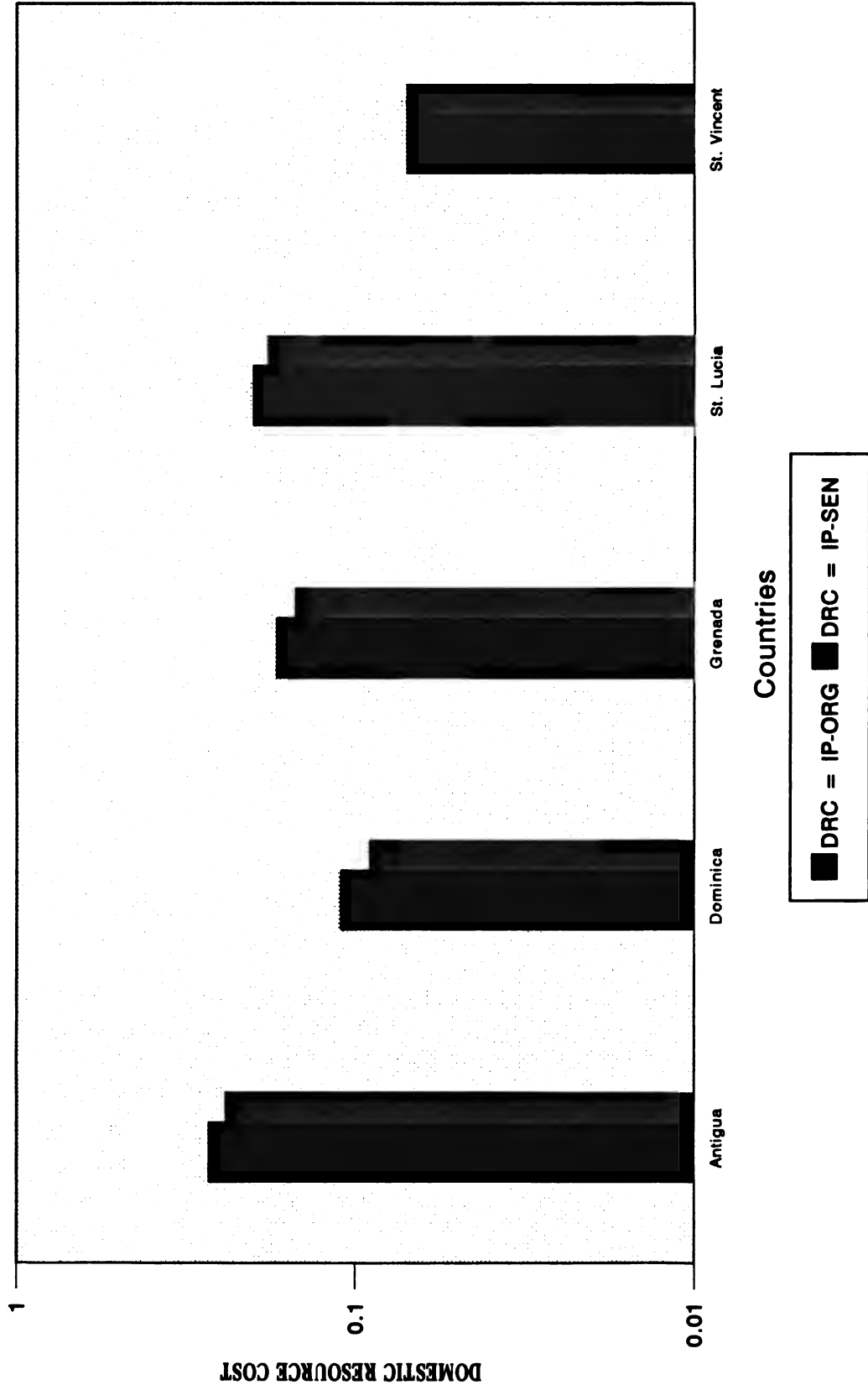
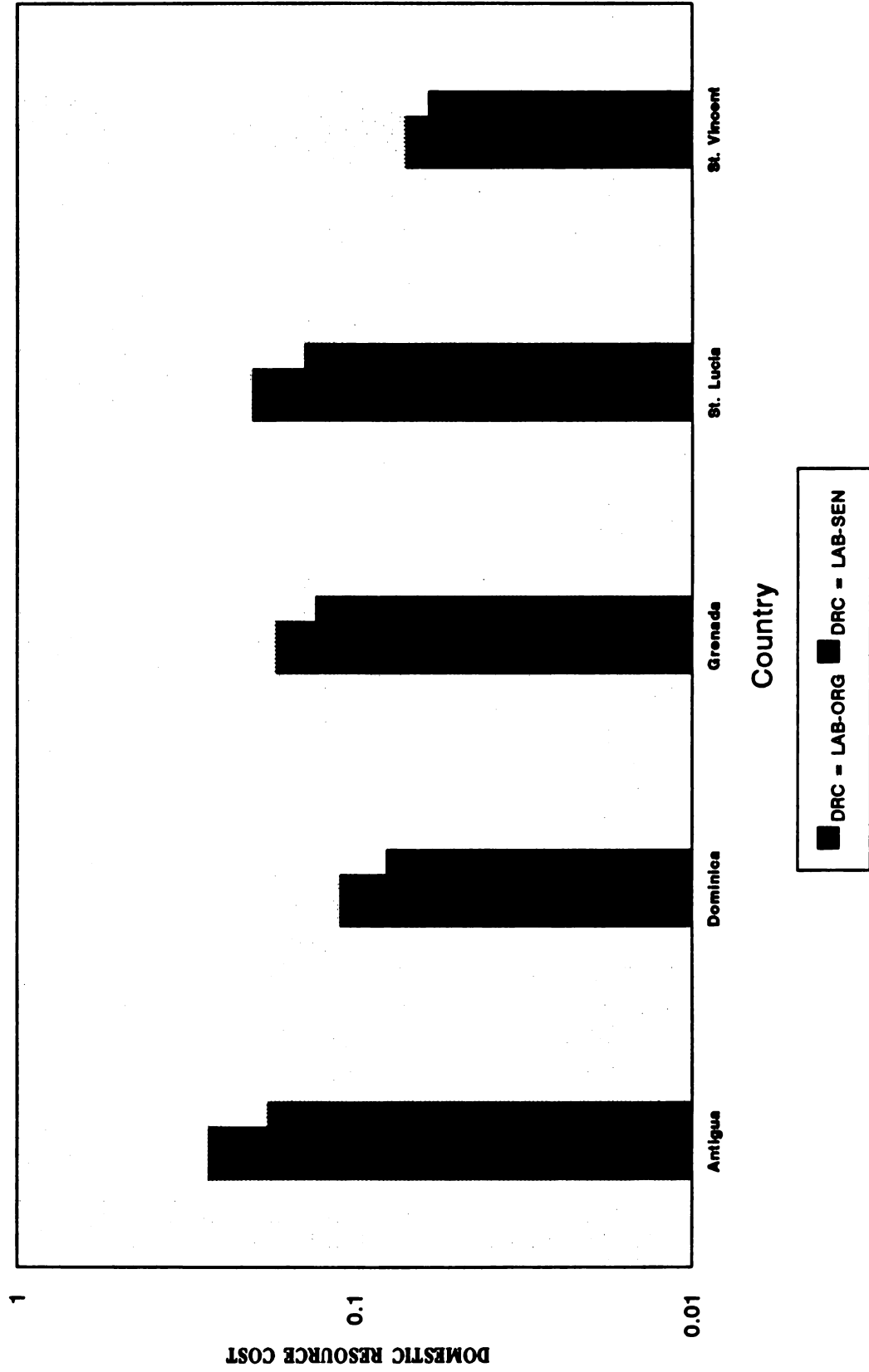


FIGURE 20.3. LABOUR SENSITIVITY FOR PAPAYA - 1992-93
Selected OECS Countries



PINEAPPLE

Figure 21.1 shows the results of the DRC analysis for pineapple production among four OECS member states. It is apparent from the results that pineapple production in Antigua, Montserrat and St. Vincent is competitive with other domestic activities, while similar production in St. Lucia is not. The results suggest that not much variation exists in the DRC coefficients among Antigua, Montserrat and St. Vincent indicating that none of the three countries appear to possess a significant relative competitive advantage over the others. However a large degree of variation exists between this group of three and St. Lucia.

In terms of relative ranking, Montserrat, with the lowest DRC ratio, ranks the highest, followed by Antigua. St. Vincent, with a DRC ratio of 1.00, is just competitive, implying that incremental pineapple production will neither earn the country foreign exchange nor cause it to incur losses. Montserrat's competitive position appears not to be closely related to higher yields since the yield levels of both St. Vincent and Antigua are higher. It is interesting to note that St. Lucia, while having an extremely high DRC ratio (7.93), need only increase pineapple yield by 36% (approximately 6,000 lbs as indicated in Figure 21.2), in order to bring the DRC ratio down to unity.

To assess the robustness of the relative competitive advantage rankings to variations of the key technical variables, sensitivity analysis to changes in the product price and wages was employed. Increasing the export price by 10% succeeded in improving the competitive advantage for all countries. As indicated in Figure 21.3, there are two notable changes from the non-intervention price simulation. The first is that the relative ranking among countries altered causing production in St. Vincent to rank highest in terms of relative competitiveness. St. Lucia however remains uncompetitive as indicated by the changes in DRC from 7.98 to 2.82. The relative ranking of Montserrat and Antigua in relation to each other remained unaltered.

Similar results are obtained under the labour simulations presented in Figure 21.4. Assuming a greater divergence between the social and private costs of agricultural labour than under the base model, improved the competitiveness of each country. The results are also consistent with those obtained under the NIP simulation where St. Vincent shifted from third to first in relative competitive ranking. St. Lucia's competitive advantage became more favorable, however the country continued to remain uncompetitive in pineapple production.

The available 1988-1991 trade data reports that St. Lucia despite its adverse DRC estimate, was the largest exporter of pineapples over that period.

FIGURE 21.1. DOMESTIC RESOURCE COST - PINEAPPLE, 1992-93
Selected OECS Countries

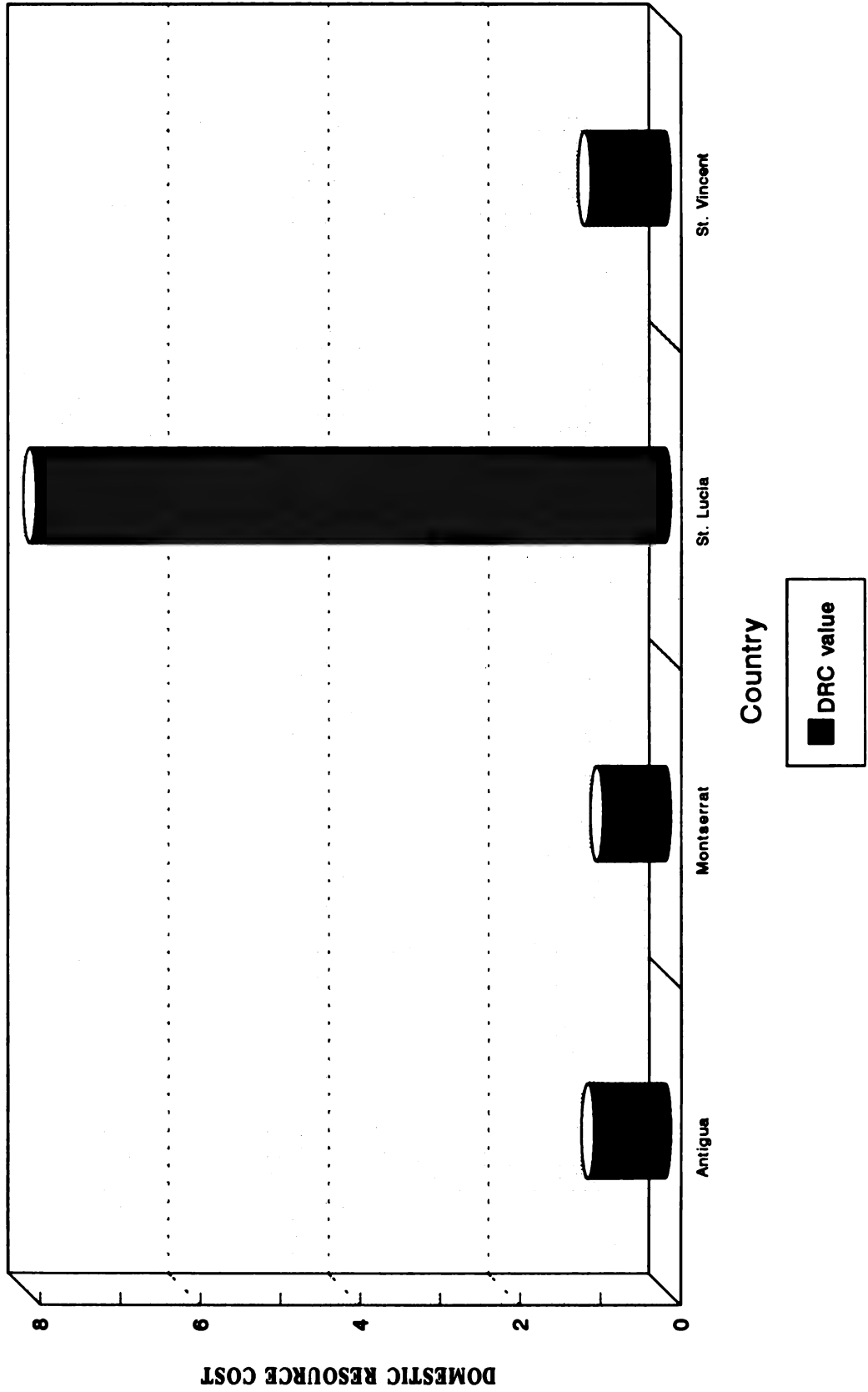


FIGURE 21.2. YIELD SENSITIVITY FOR PINEAPPLE, 1992-93
Selected OECS Countries

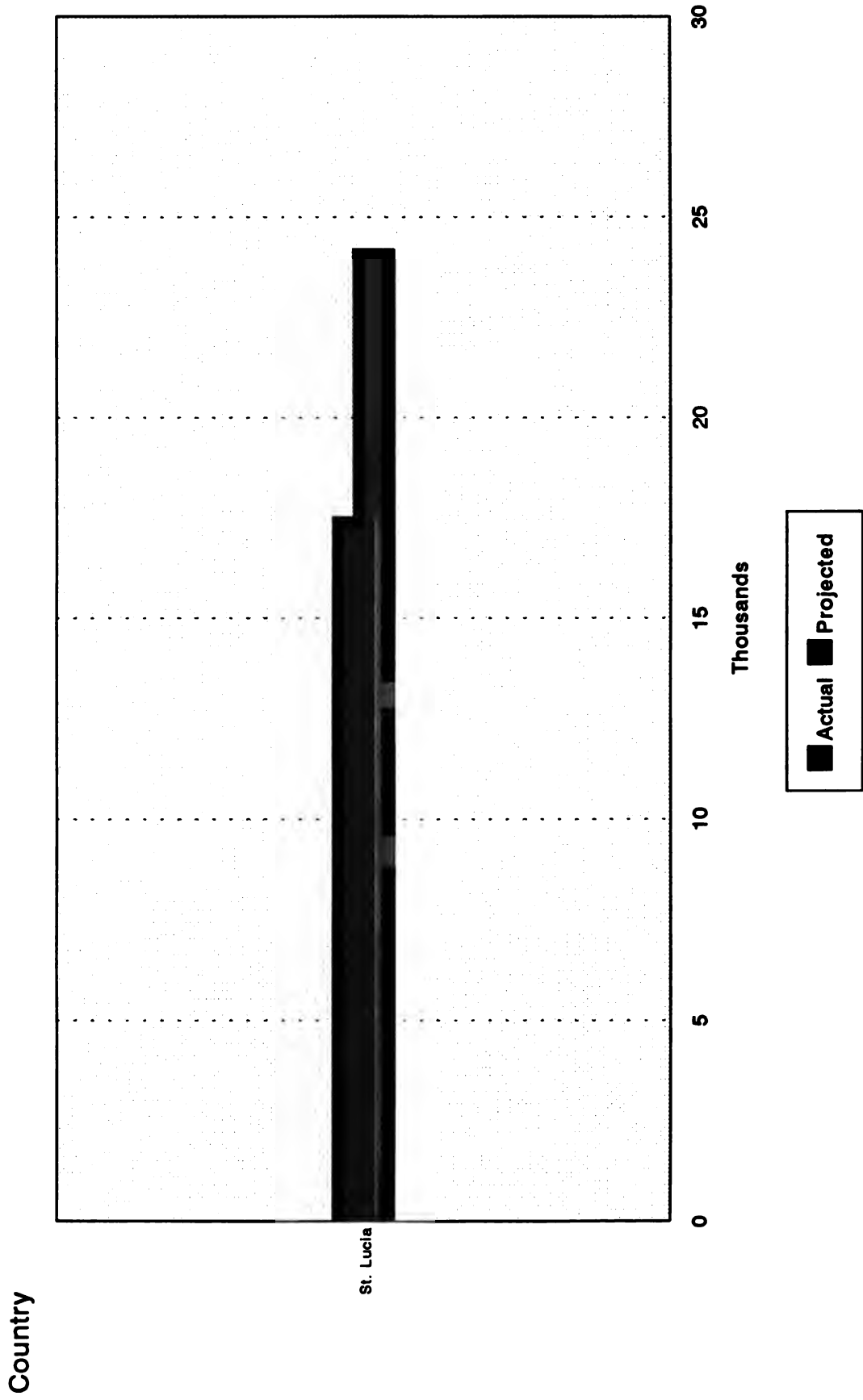


FIGURE 21.3. PRICE SENSITIVITY FOR PINEAPPLE, 1992-93
Selected OECS Countries

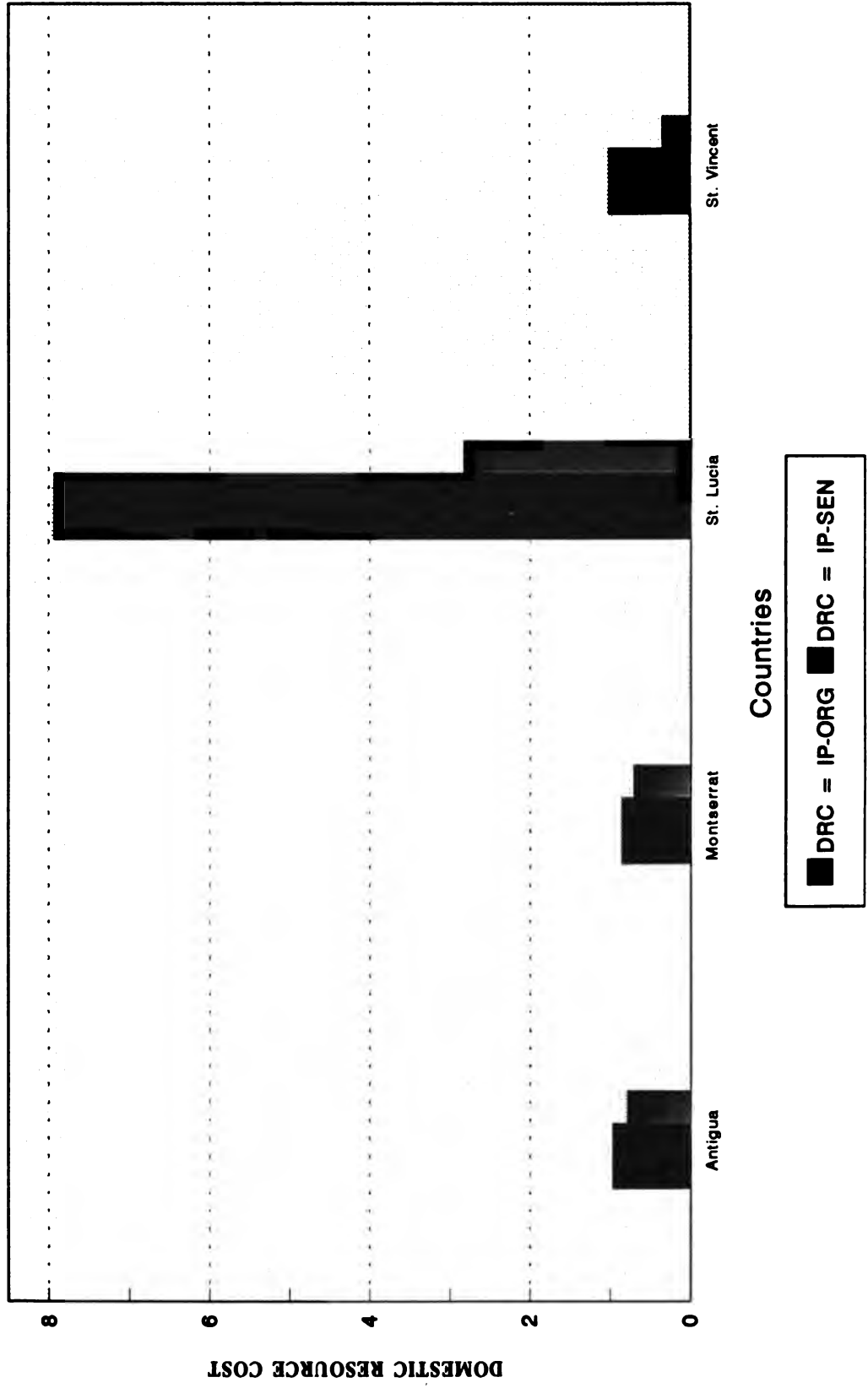
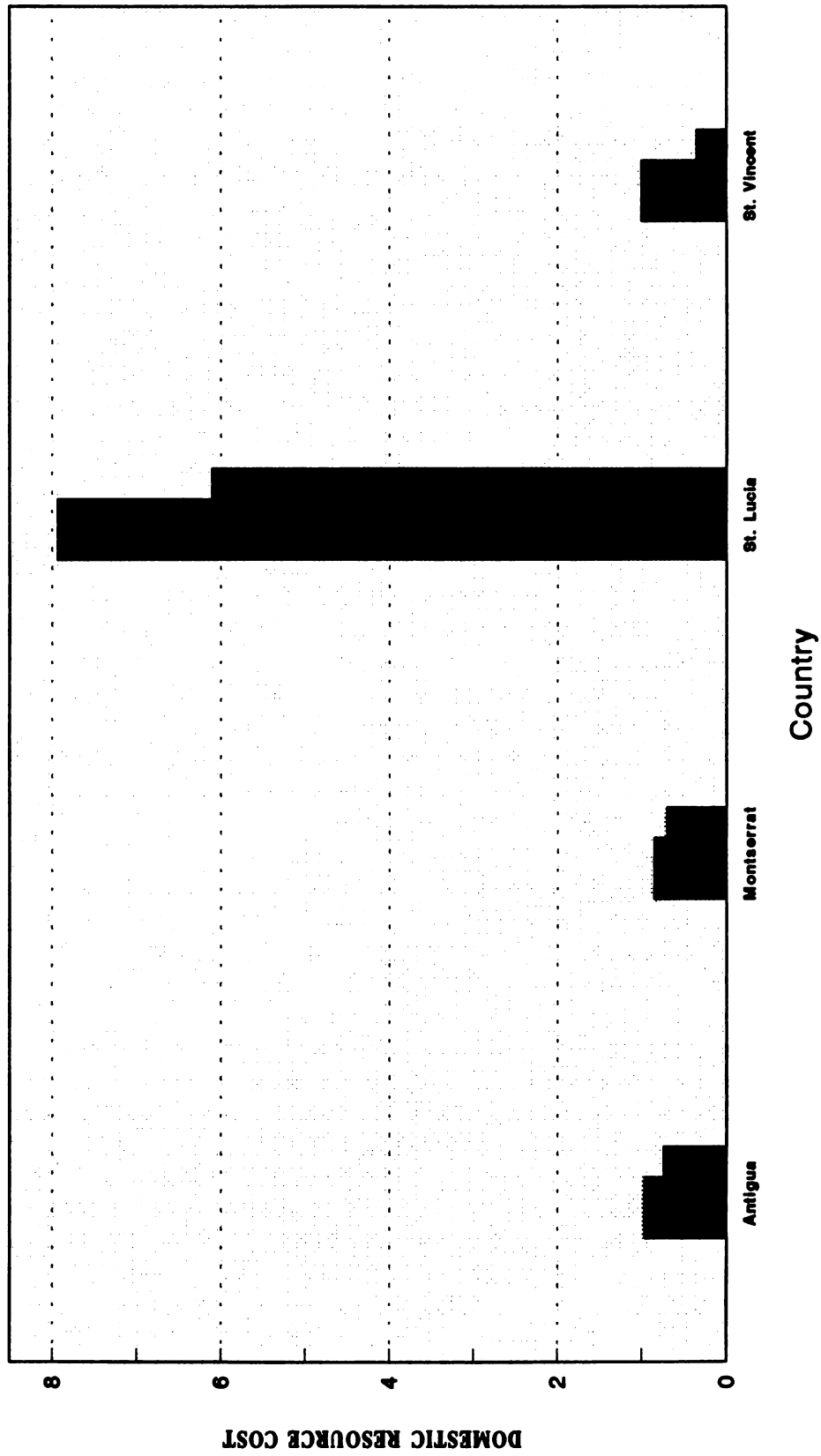


FIGURE 21.4. LABOUR SENSITIVITY FOR PINEAPPLE - 1992-93
Selected OECS Countries



PUMPKIN

The results of the analysis reported in Figure 22.1, indicate that the DRC coefficients for pumpkins in Antigua and St. Kitts are both negative. This result is not surprising when the relatively low marketable yields obtained in both countries are considered. The yield levels are however, typical of those obtained in other CARICOM countries such as Jamaica, where marketable yields among small farmers range from 7,000 to 11,000 per acre. The inefficiency of these two OECS producing countries vis-a-vis Jamaica arises because their cost structure is higher than Jamaica's, which for instance, currently faces an exchange rate of JA. \$22.26 to U.S. \$1.00.

The high agricultural wage rates in Antigua (the second highest in the OECS), also contribute to the high DRC coefficient recorded in that country. In St. Kitts/Nevis, low marketable yields appear to be a major factor explaining the inability of pumpkin producers to efficiently compete for domestic resources. In both countries the negative DRC values imply that pumpkin production either as a means of displacing imports or earning foreign exchange via exports will result in net welfare losses to the economy as a whole, since resources presently employed in its production have more profitable alternatives elsewhere in the economy.

The results of the yield sensitivity analysis in Figure 22.2 indicate that given the structure of costs, prices and the level of technology in both St. Kitts/Nevis and Antigua, observed yields will have to improve by better than 100% for pumpkin production to be competitive in international trade. This also shows how far removed efficiency levels in the OECS are from those of its major competitors. Private profits however continue to be earned by producers in domestic markets in both countries due to their ability in the absence of imports (for various reasons), to extract rents from consumers. This analysis suggests however, that without radical changes in the level of technology and/or the structure of costs, such rent seeking behavior will not lead to sustained improvements in competitiveness.

Sensitivity analysis was undertaken to assess the robustness of the results to variations in the more critical assumptions underlying the base model. Assuming that the divergence between the social and private costs of agricultural labour was greater than the estimated CF for each country indicated, the results in Figure 22.3 suggest that both countries' competitive disadvantage would be more favorable than under the base model. The results in Figure 22.4 also suggest that both countries' competitive disadvantage diminishes somewhat, relative to their base model levels due to a 10% increase in the non-intervention price of pumpkins. The results of the sensitivity analysis confirm the lack of competitiveness of both St. Kitts/Nevis and Antigua in the production and trade of pumpkin.

The export data from 1988 to 1991 indicates that both countries simultaneously imported and exported pumpkins. The data for Antigua exhibited cyclical variations indicating positive net-exports every other year. In general however, net exports from Antigua when positive, average 27,500 kgs per annum. This exceeds average net-exports from St. Kitts/Nevis, which range between 600 and 3000 kg per annum. While it is difficult to conclude support for the DRC analysis based on the available trade data for St. Kitts/Nevis and Antigua, the trade data along with the results, appear consistent in that they indicate that neither countries may be strong competitors in the pumpkin production and trade.

FIGURE 22.1. DOMESTIC RESOURCE COST - PUMPKIN, 1992-93
Selected OECS Countries

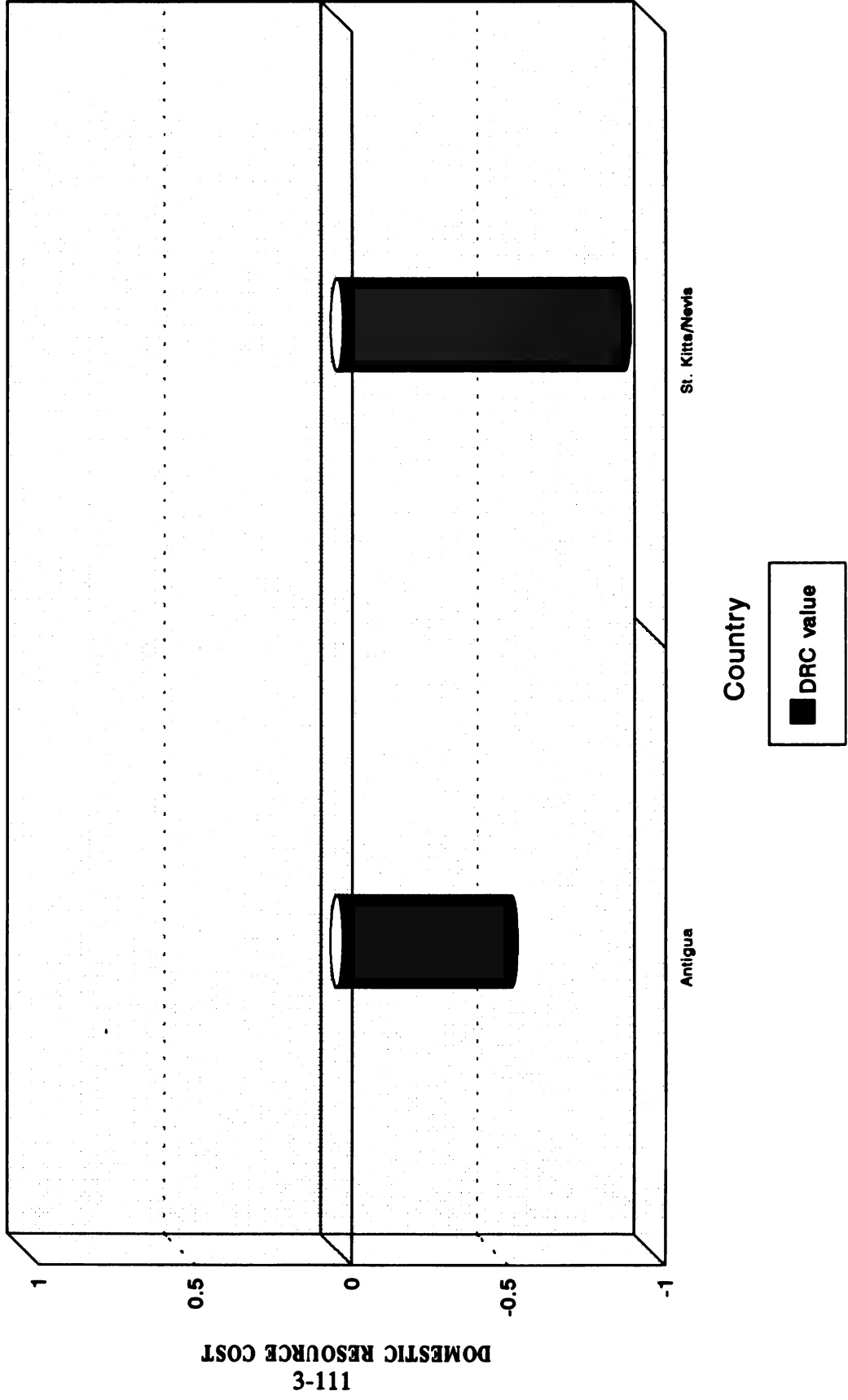


FIGURE 22.2. YIELD SENSITIVITY FOR PUMPKIN, 1992-93
Selected OECS Countries

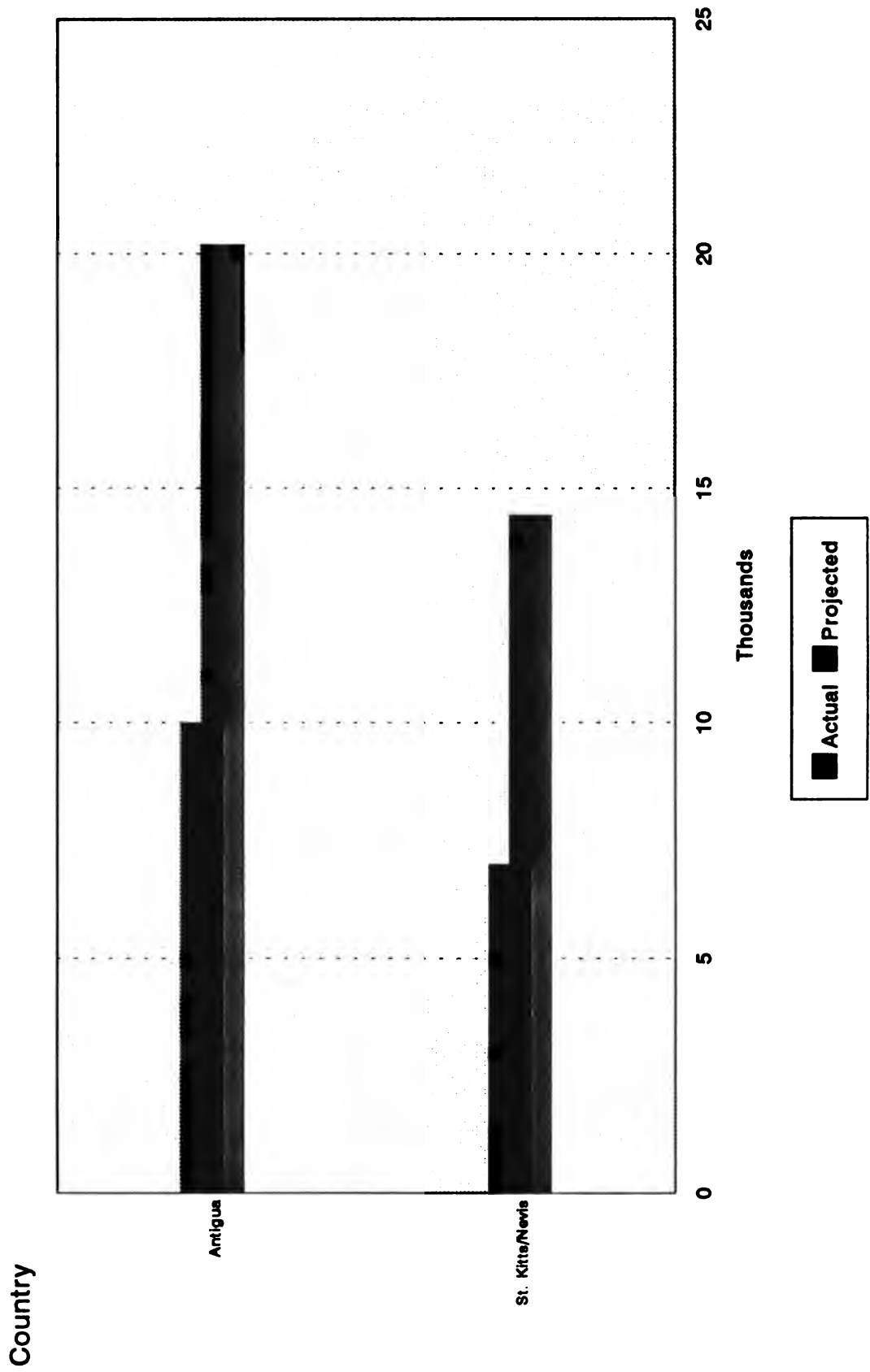


FIGURE 22.3. LABOUR SENSITIVITY FOR PUMPKIN - 1992-93
Selected OECs Countries

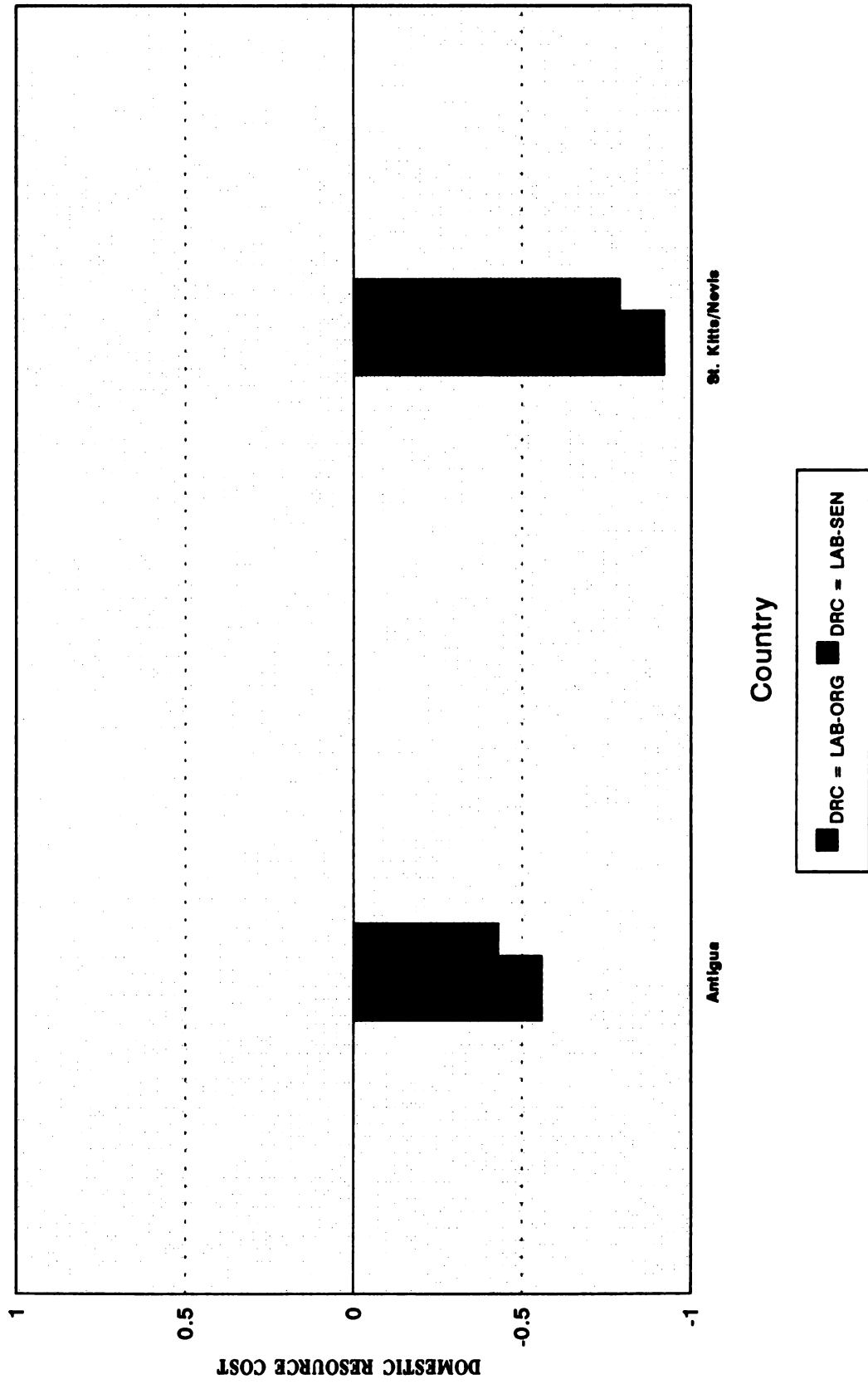
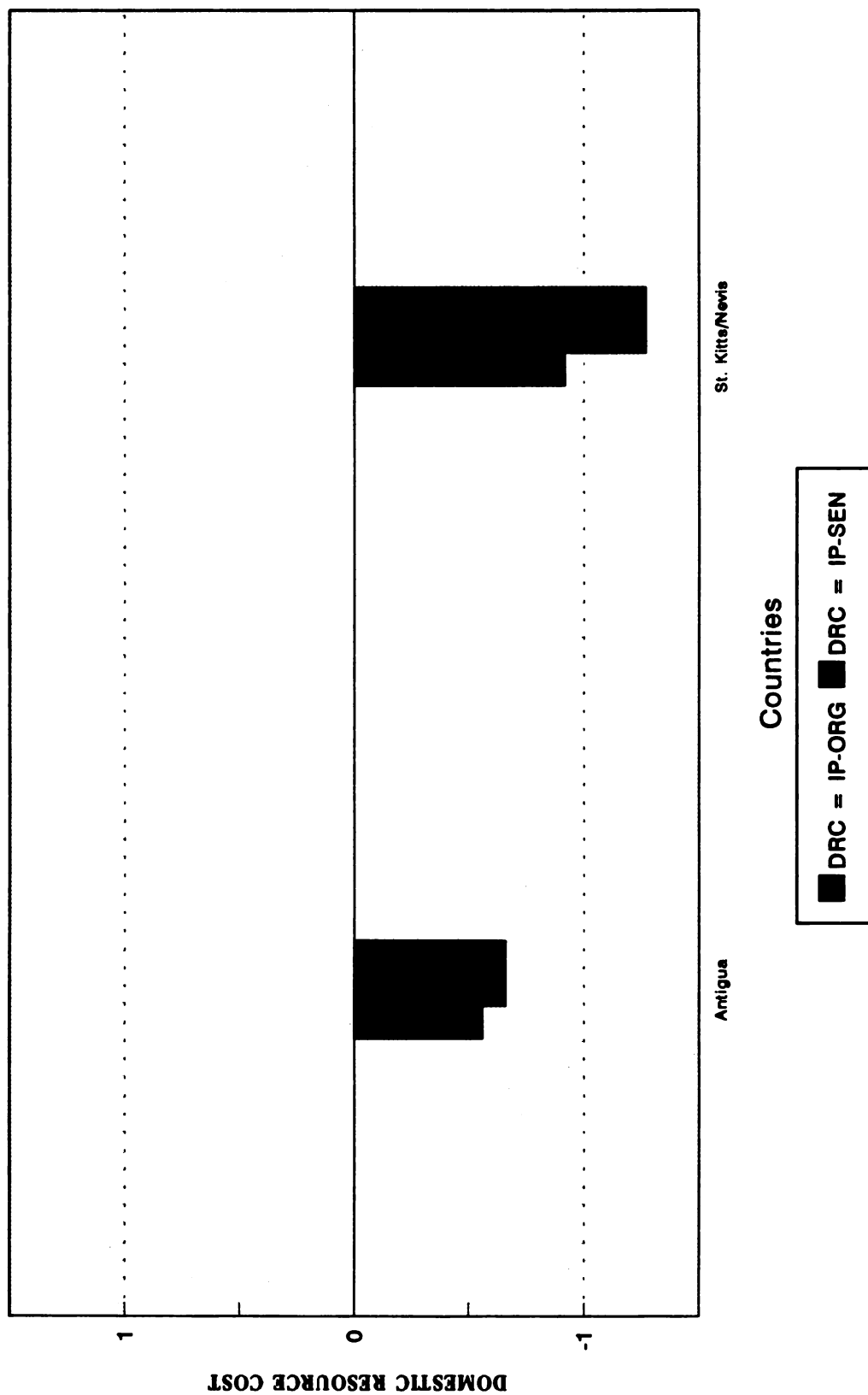


FIGURE 22.4. PRICE SENSITIVITY FOR PUMPKIN, 1992-93
Selected OECS Countries



SOURSOP

According to the DRC criterion, products with ratios of less than unity are socially profitable (competitive) while those with DRC ratios greater than unity are not (uncompetitive). If a commodity is socially profitable foreign exchange can be saved from production of the commodity domestically. Similarly, ceteris paribus if the commodity is exported foreign exchange can be earned and real gains will accrue to the country.

The results in Figure 23.1 indicate that Grenada and St. Vincent have DRC ratios which are less than one. These two countries are thus competitive in the production of soursop in that resources are utilized efficiently and foreign exchange can be earned/saved from production of the commodity domestically. The analysis also suggests that producers of soursop in St. Lucia are not efficient and that given the present level of technology, structure of costs and prevailing prices the resources employed in the production of this commodity have more profitable alternatives elsewhere in the economy. The data in Figure 23.1 reflects the varying efficiency (competitiveness) of production across OECS territories, with producers in St. Vincent tending to be slightly more efficient than their counterparts in Grenada.

Figure 23.2 indicates that while St. Lucia is not presently an efficient producer of soursop, the improvements in yields required for this initiative to be competitive are generally not very great. For instance, soursop production with a DRC ratio of 1.56 would have had a ratio below one, if marketable yields increased by 10%. That the required improvements are not significant is also supported by the results of the sensitivity analysis undertaken. If there was a greater divergence between the private and social costs of agricultural labour in St. Lucia, than is suggested by the estimated conversion factor (CF) of 0.57, the results of the labour sensitivity analysis, reported in Figure 23.3, indicate then the DRC coefficient would have had a value of 1.03 instead of 1.56. In terms of relative rankings however, assuming a similar value for the CF in both St. Vincent and Grenada (i.e. $CF=0.57$) would result in DRC coefficients of 0.20 and 0.36 respectively, which would still place them ahead of St. Lucia in terms of relative ranking.

As expected the DRC coefficients for soursop as well as for other commodities will change with variations in the non-intervention price. While theory indicates that the direction of response is unambiguous, the magnitude of the change in the DRC coefficient remains an empirical question. As shown in Figure 23.4, increasing the non-intervention price by 10% across all three countries resulted in a greater change in the DRC coefficient for St. Lucia than for Grenada or St. Vincent. While for all the countries DRC coefficients declined, indicating improving competitiveness relative to the base model, the relative ranking remained consistent with St. Vincent maintaining the highest rank and St. Lucia bringing up the rear. The greater sensitivity of the results in St. Lucia raises the possibility that a well conceived price policy may be used as an instrument to improve the competitiveness of this commodity.

The results, particularly for St. Lucia, should be interpreted with caution, particularly since there is a tendency toward rising wages and costs. The options open to producers are, to some extent limited in the absence of wage restraint policies and/or increases in productivity.

Soursop production suffers from certain locational disadvantages and efforts to improve yields and product quality should be undertaken as a matter of priority. Such efforts would seem to be more prudent than those which emphasize reducing labour costs per se.

Sensitivity analysis was undertaken on the base model for St. Lucia assuming that producers were faced with prevailing wage rates in Grenada and St. Vincent. The results of this simulation in Figure 23.5, indicated that the DRC coefficient would have been 1.20 as compared to the value of 1.56 obtained under the base model. This indicated that lower wage rates by themselves would be insufficient to generate the conditions required to engender competitiveness among St. Lucian producers of soursop.

Ex-post trade data is consistent with the results of the DRC analysis. The data suggests that for the 1980-1986 period, Grenada and St. Vincent were comparatively larger exporters of soursop than St. Lucia. According to the export data for the 1988-1991 period however, St. Lucia was the only country with soursop exports of any significance in the OECS. This result is explained in part by the loss of the Trinidad market to Grenada and St. Vincent after 1986. The results also suggest that Grenada and St. Vincent can earn foreign exchange from increased resource investment in soursop for exports. Ironically, St. Lucia leads all OECS countries in new investments in soursop production. In the context of the present analysis this augers well for further improvements in this country's industry competitiveness.

FIGURE 23.1. DOMESTIC RESOURCE COST - SOURSOR, 1992-93
Selected OECS Countries

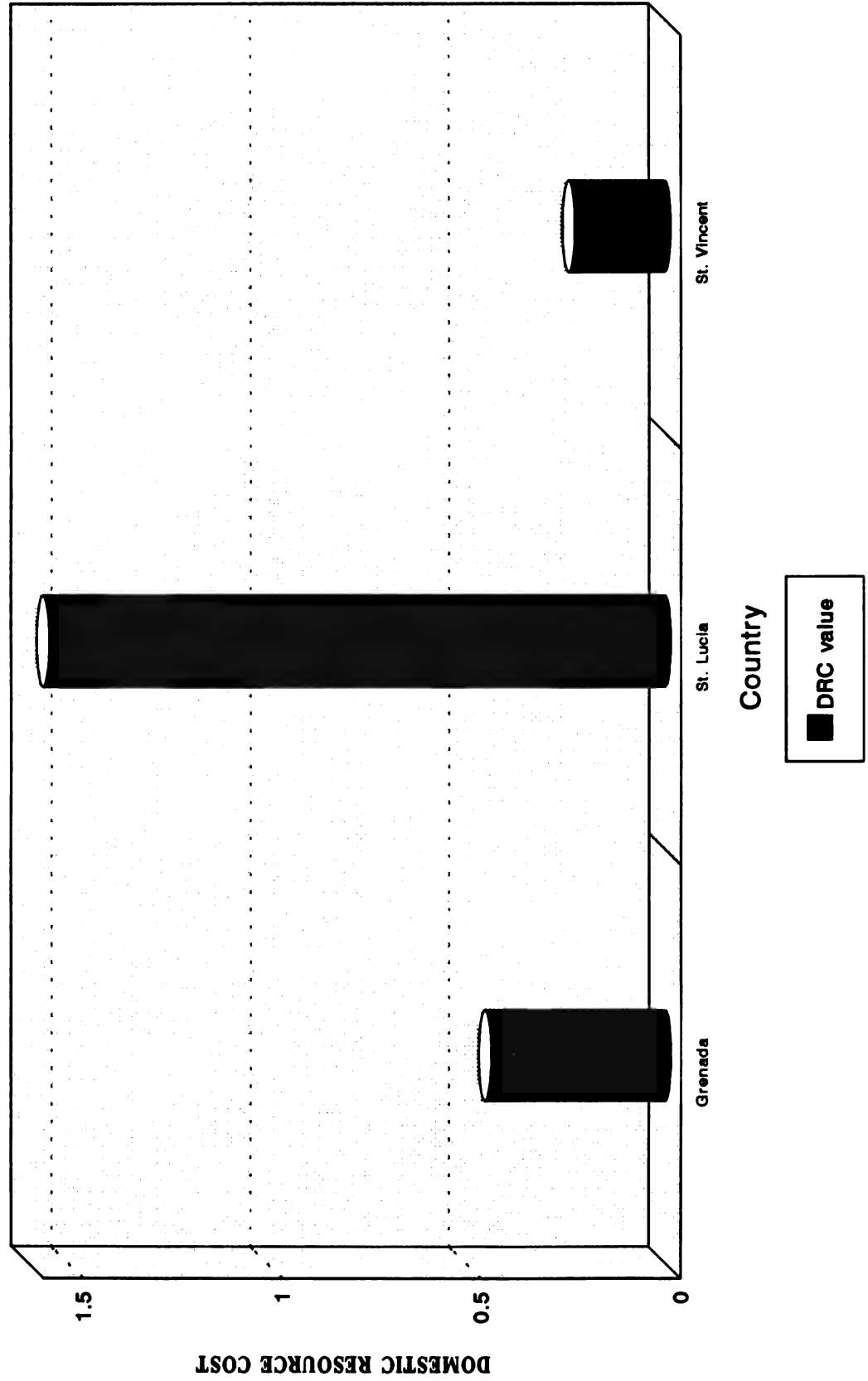


FIGURE 23.2. YIELD SENSITIVITY FOR SOURSOP, 1992-93
Selected OECS Countries

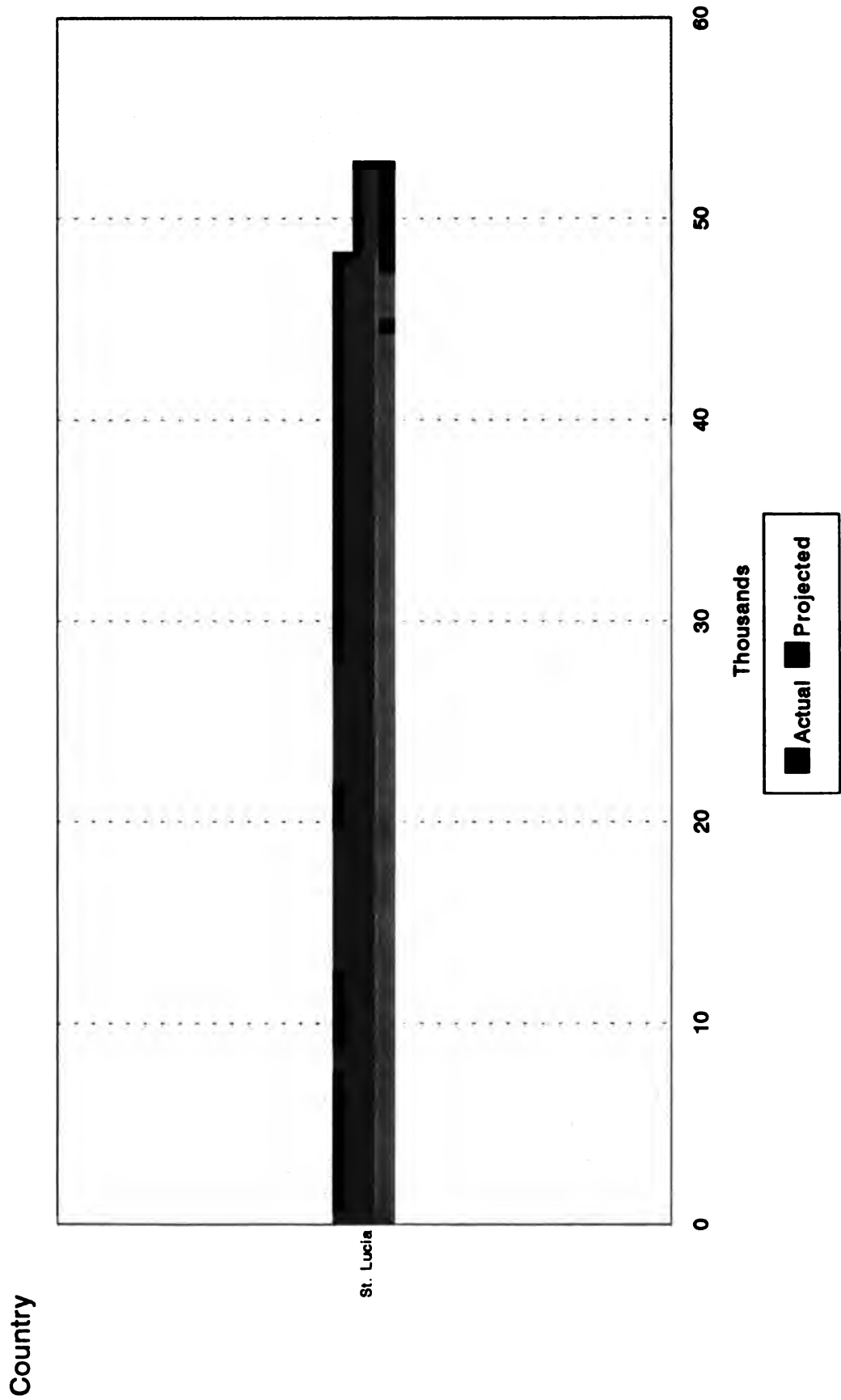


FIGURE 23.3. LABOUR SENSITIVITY FOR SOURSOP - 1992-93
Selected OECS Countries

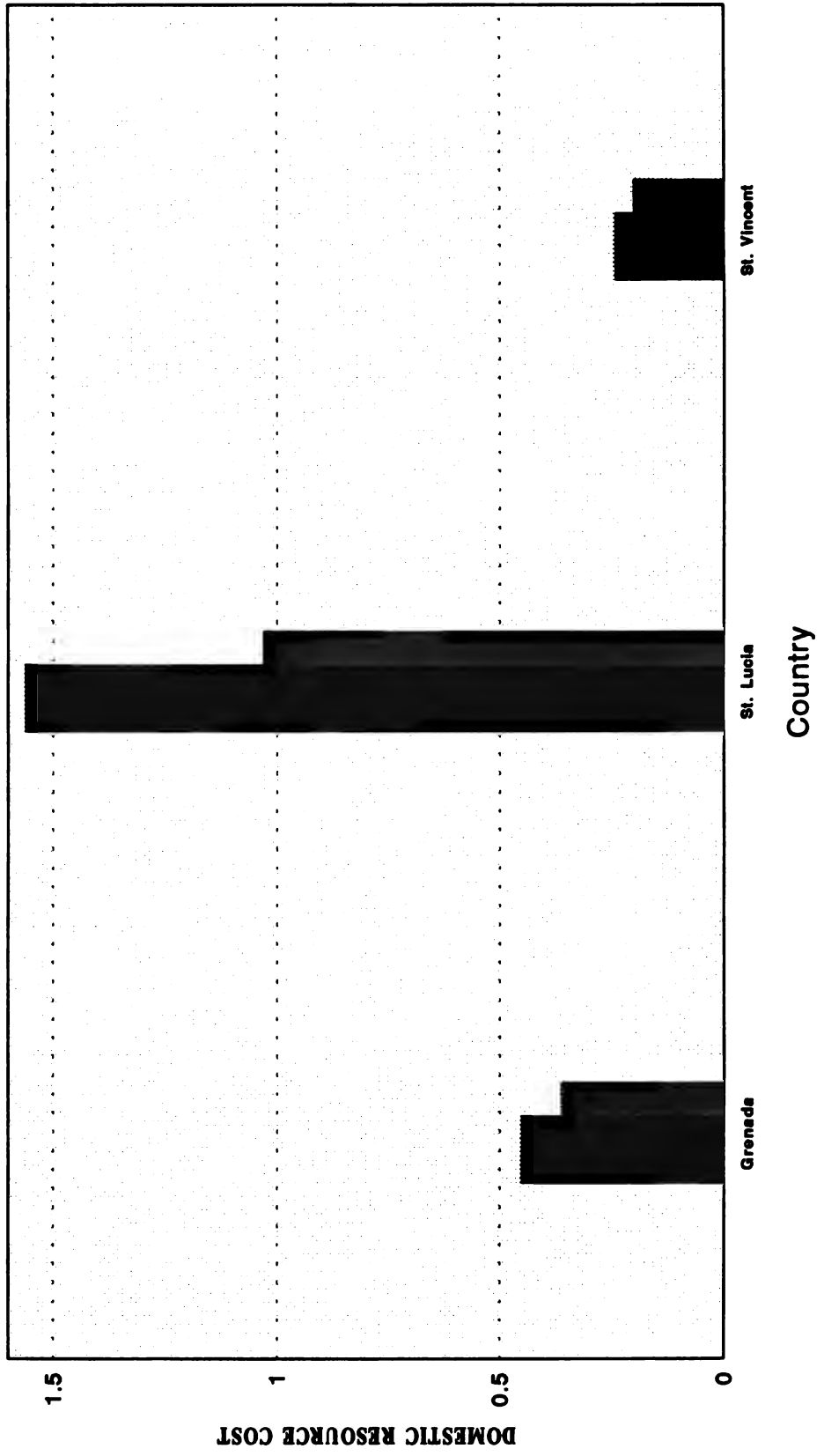
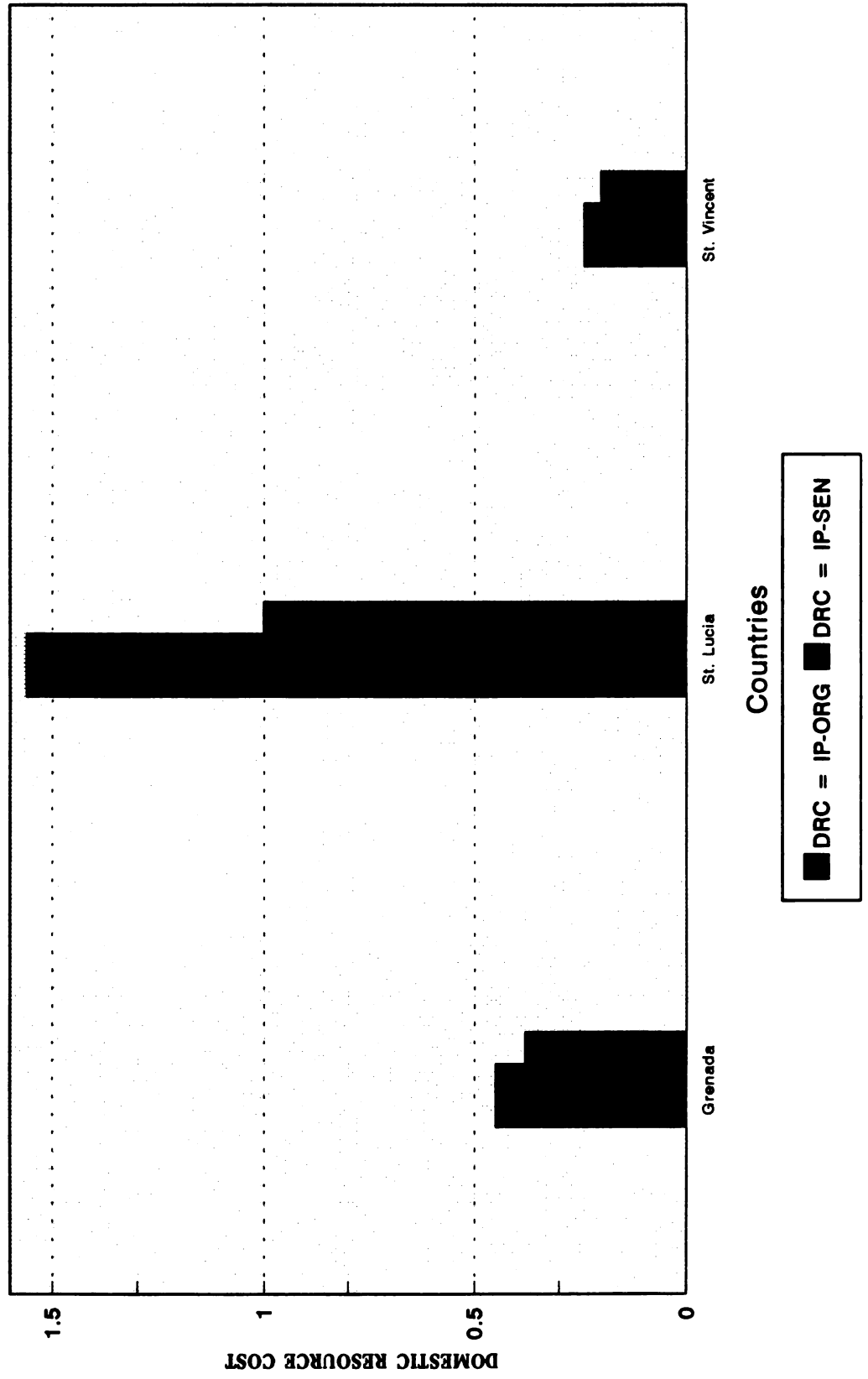


FIGURE 23.4. PRICE SENSITIVITY FOR SOURSOP, 1992-93
Selected OECS Countries



SQUASH

Figure 24.1 presents the estimated DRC for squash in the British Virgin Islands. That the value of the DRC is negative indicates that squash production will result in net foreign exchange losses. This negative DRC value further indicates that squash production is highly inefficient in the BVI and that the enterprise is highly dependent on implicit government-induced support measures. While this protection allows private producers to realize profits, squash production remains socially unprofitable and constitutes an inefficient use of domestic resources since more profitable alternatives exist elsewhere in the economy.

Figure 24.2 indicates that yield levels are significantly lower than typical minimum yield levels in other countries. Sensitivity analysis was undertaken to assess the improvement in yields necessary to make squash production competitive. The sensitivity results suggested that holding the non-intervention price and production costs constant required yield improvements of as much as 135% (14,000 lbs/acre) if a DRC of unity is to be attained. However a DRC of unity implies that the enterprise neither earns nor saves foreign exchange. Given the prevailing prices, current structure of costs and the low level of technology in the BVI, it would appear that the required yield increases will not be easily attained. Importation of the country's requirements for squash therefore appears to constitute a more efficient use of domestic resources.

Sensitivity analysis was also undertaken to assess the robustness of the DRC coefficient to variations in product price and assumptions about the nature of the agricultural labour markets. The results of a 10% increase in the non-intervention prices, reported in Figure 24.3, further indicate an increase in the DRC ratio relative to the base model (decrease in competitiveness). The results of labour simulations, reported in Figure 24.4, under assumptions of greater inefficiency in the agricultural labour market in the BVI, revealed a reduction in the absolute value of the DRC relative to the base model (declining competitive disadvantage). Overall, both simulations indicate that the BVI remained uncompetitive in squash production.

The results of the analysis suggest that squash production does not appear to be an appropriate enterprise for the BVI. This is based on the magnitude of yield improvements required, the current structure of costs and the present level of technology employed in squash production. Even with significant structural change in the levels of productivity, costs and technology, and in the absence of government protection, and in a more liberalized environment, the survival prospects of squash production appear dim.

FIGURE 24.1. DOMESTIC RESOURCE COST - SQUASH, 1992-93
Selected OECS Countries

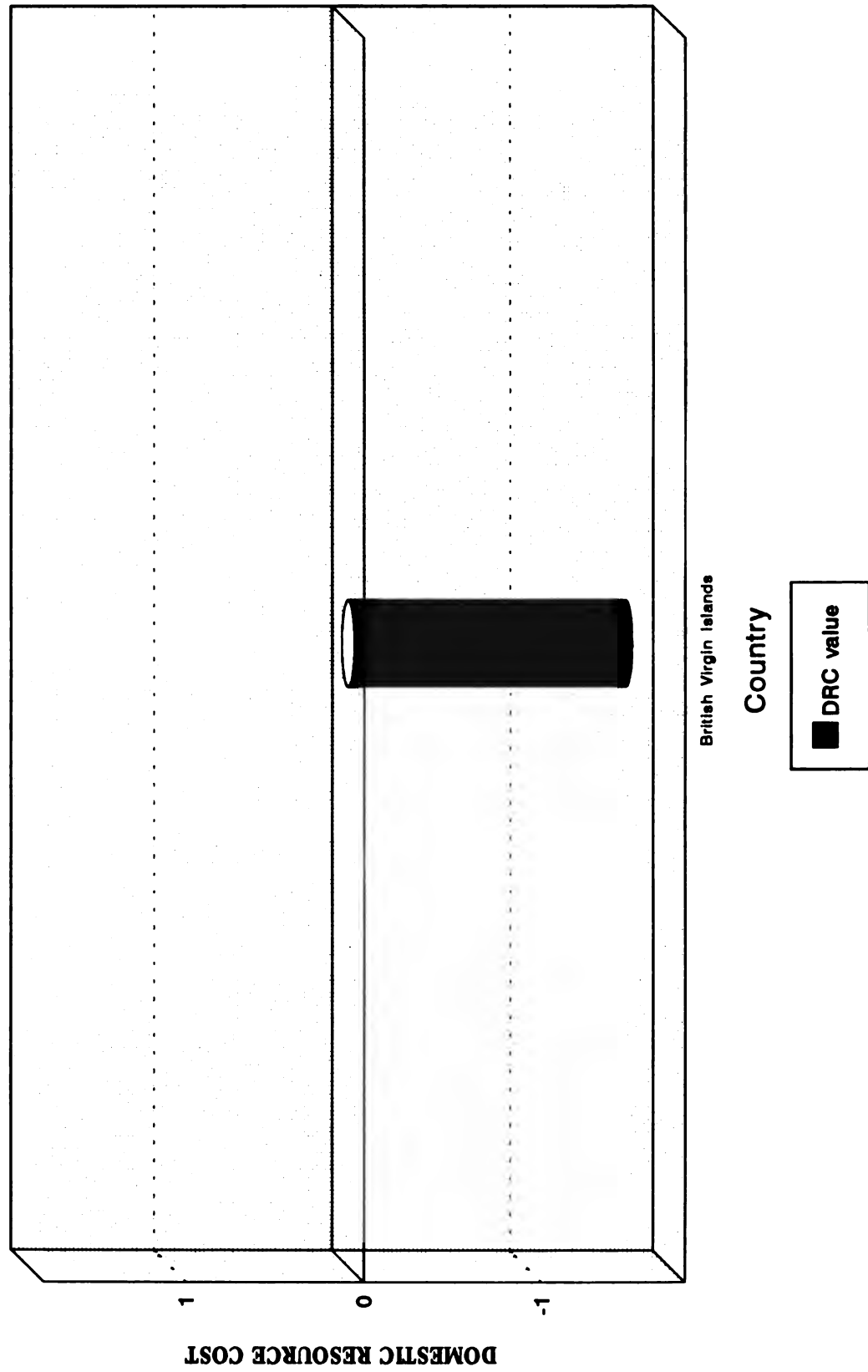


FIGURE 24.2. YIELD SENSITIVITY FOR SQUASH, 1992-93
Selected OECS Countries

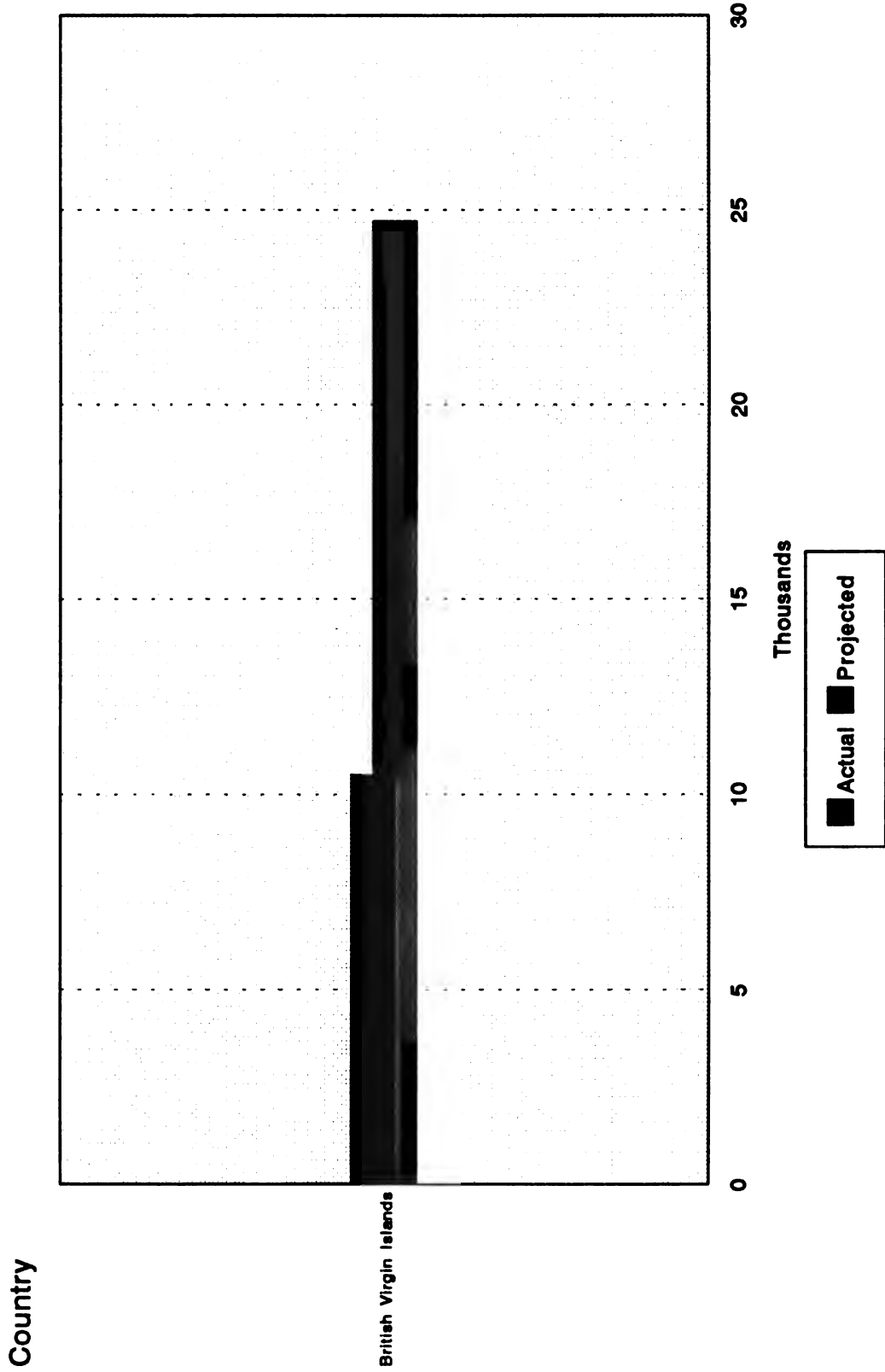


FIGURE 24.3. PRICE SENSITIVITY FOR SQUASH, 1992-93
Selected OECS Countries

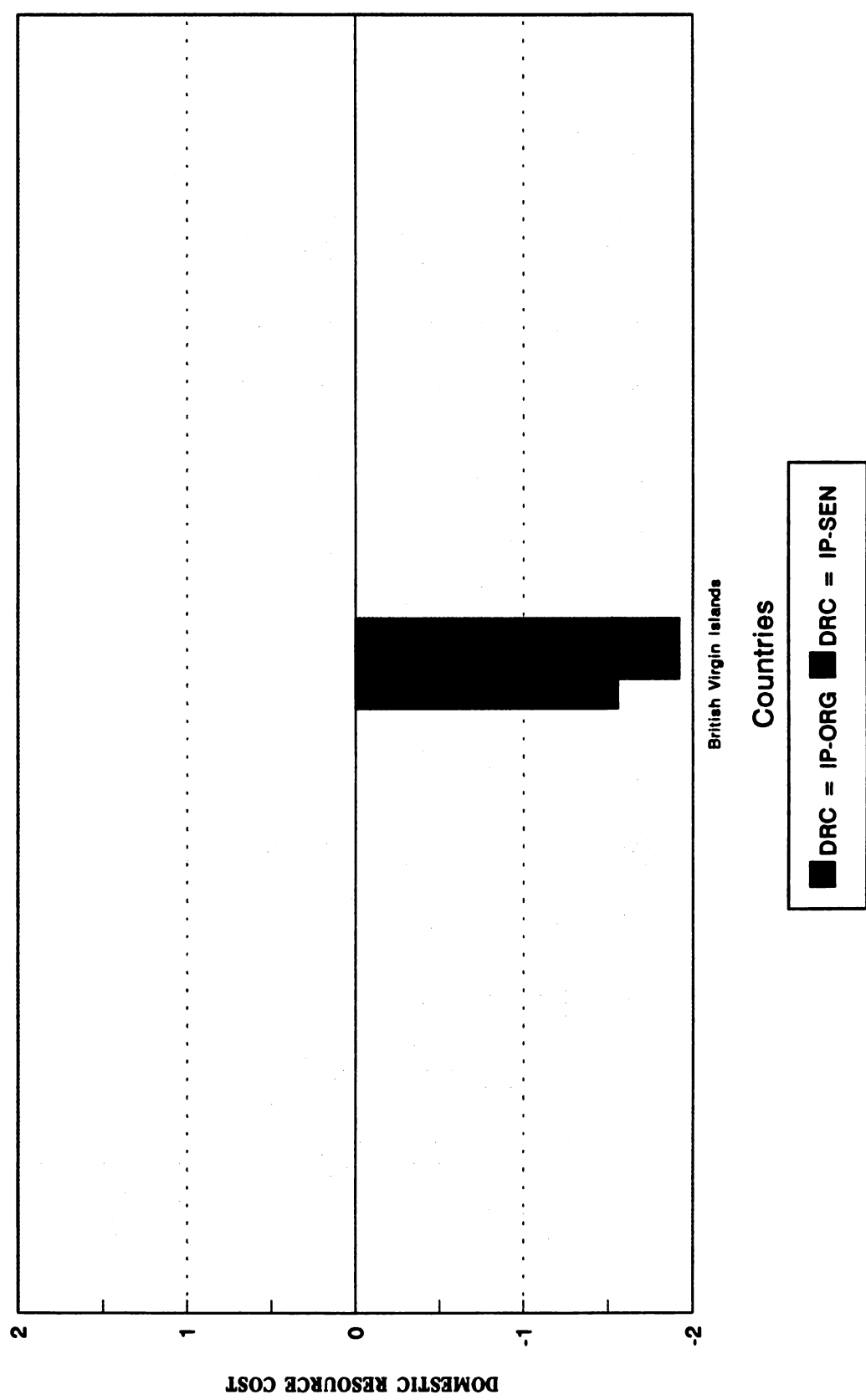
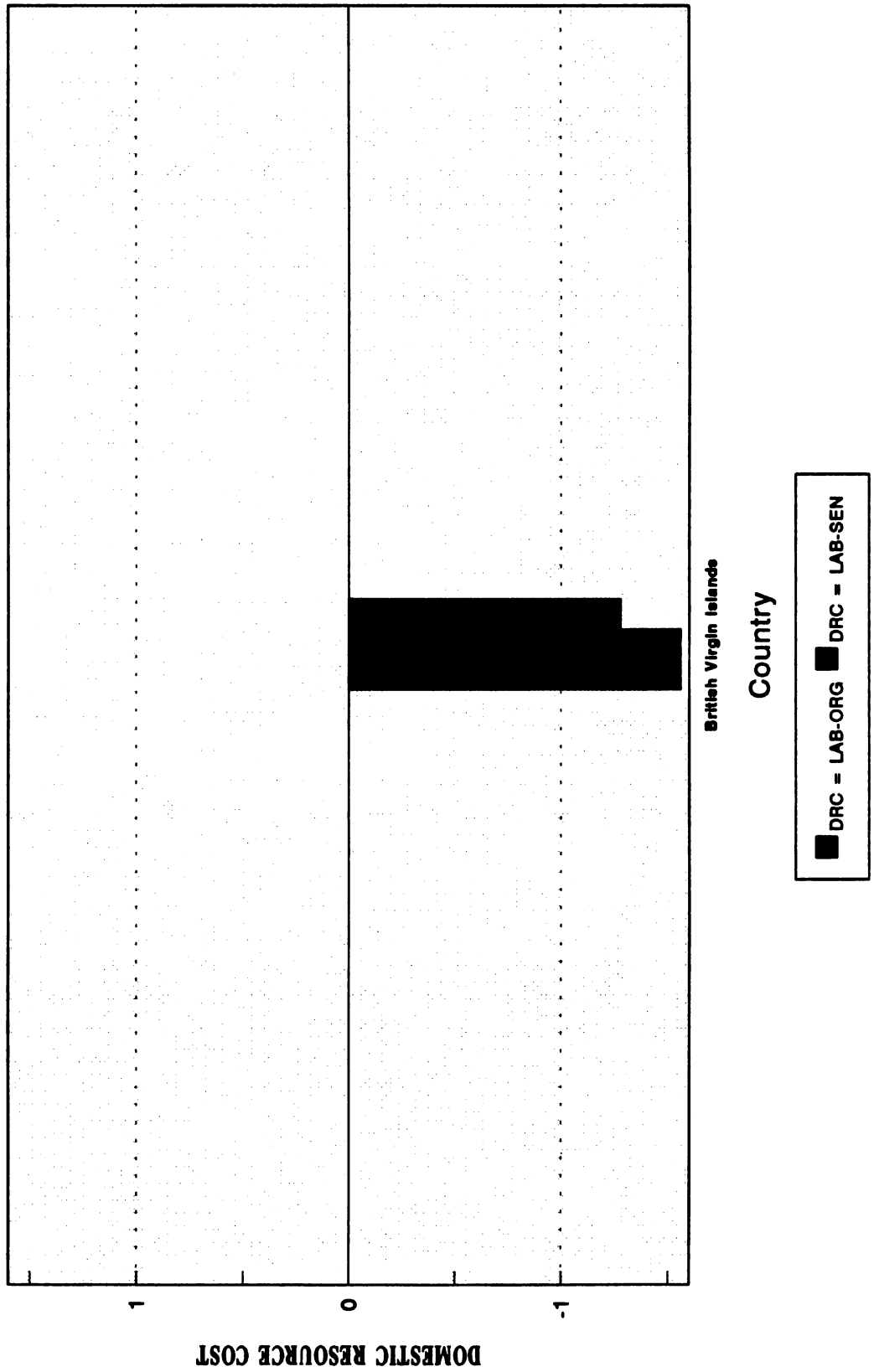


FIGURE 24.4. LABOUR SENSITIVITY FOR SQUASH - 1992-93
Selected OECs Countries



SWEET PEPPER

The DRC analysis for sweet pepper is presented for Antigua only. The results in Figure 25.1 clearly indicate that Antigua is not an efficient producer of sweet pepper and given current yields, costs and the level of technology, incremental production will result in substantial foreign exchange leakage. The extremely high DRC of 10.72 indicates that production of sweet pepper is socially unprofitable. Private producers engaged in sweet pepper production may be making economic losses and could potentially earn more by engaging in some alternative economic activity. That they remain in production at all, may be due to their ability to earn positive private profits through implicit government support. Another possibility is that producers are engaged in sweet pepper production for reasons other than profit maximization (both economic and private).

The DRC measure of competitiveness depends on a variety of technical variables, among them, yields per acre, various cost components and the price for which the product can be sold on the international market. Analysis was carried out to test the sensitivity of the DRC coefficient to changes in these variables. The results of the yield sensitivity analysis presented in Figure 25.2, indicate that based on the prevailing structure of cost and technology, yields for sweet pepper would have to improve by better than 265% (or over 23,000 lbs), in order to bring the DRC down to the threshold value of one. This yield improvement does not appear possible, particularly in light of the structure of Antiguan agriculture. This would seem to indicate that sweet pepper is not an appropriate enterprise for Antigua and that resources allocated to its production have more profitable alternatives elsewhere in the economy.

As indicated in Figure 25.3, variations in the non-intervention price by 15% reduce the competitive disadvantage, however the reduction in the DRC was not sufficient to make the enterprise competitive. Similar results were obtained under the labour simulation, as presented in Figure 25.4. Assuming that greater efficiency of agricultural labour did succeed in reducing the magnitude of the disadvantage, the enterprise remained uncompetitive for domestic resources.

The available trade data indicated that Antigua exported small quantities of sweet pepper in 1990 and 1991. However based on the above analysis, the country would have earned negative foreign value added from production and trade in that commodity. The results also imply that the non-competitiveness of sweet pepper production in Antigua is related to factors other than labour costs or product price and that such production will be hard-pressed to be profit-maximizing relative to existing economic alternatives.

FIGURE 25.1. DOMESTIC RESOURCE COST - SWEETPEPPER, 1992-93
Selected OECS Countries

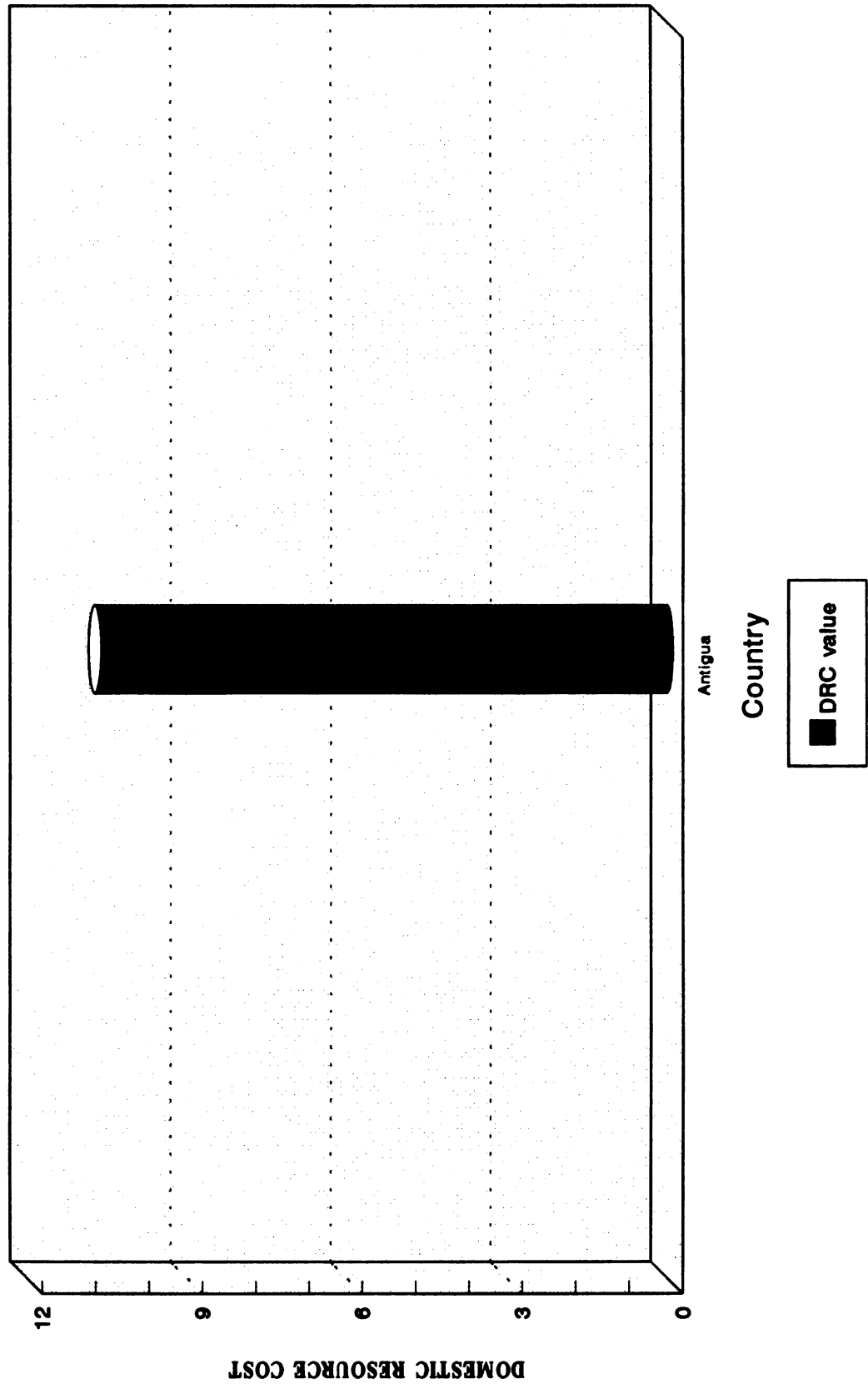


FIGURE 25.2. YIELD SENSITIVITY FOR SWEETPEPPER, 1992-93
Selected OECS Countries

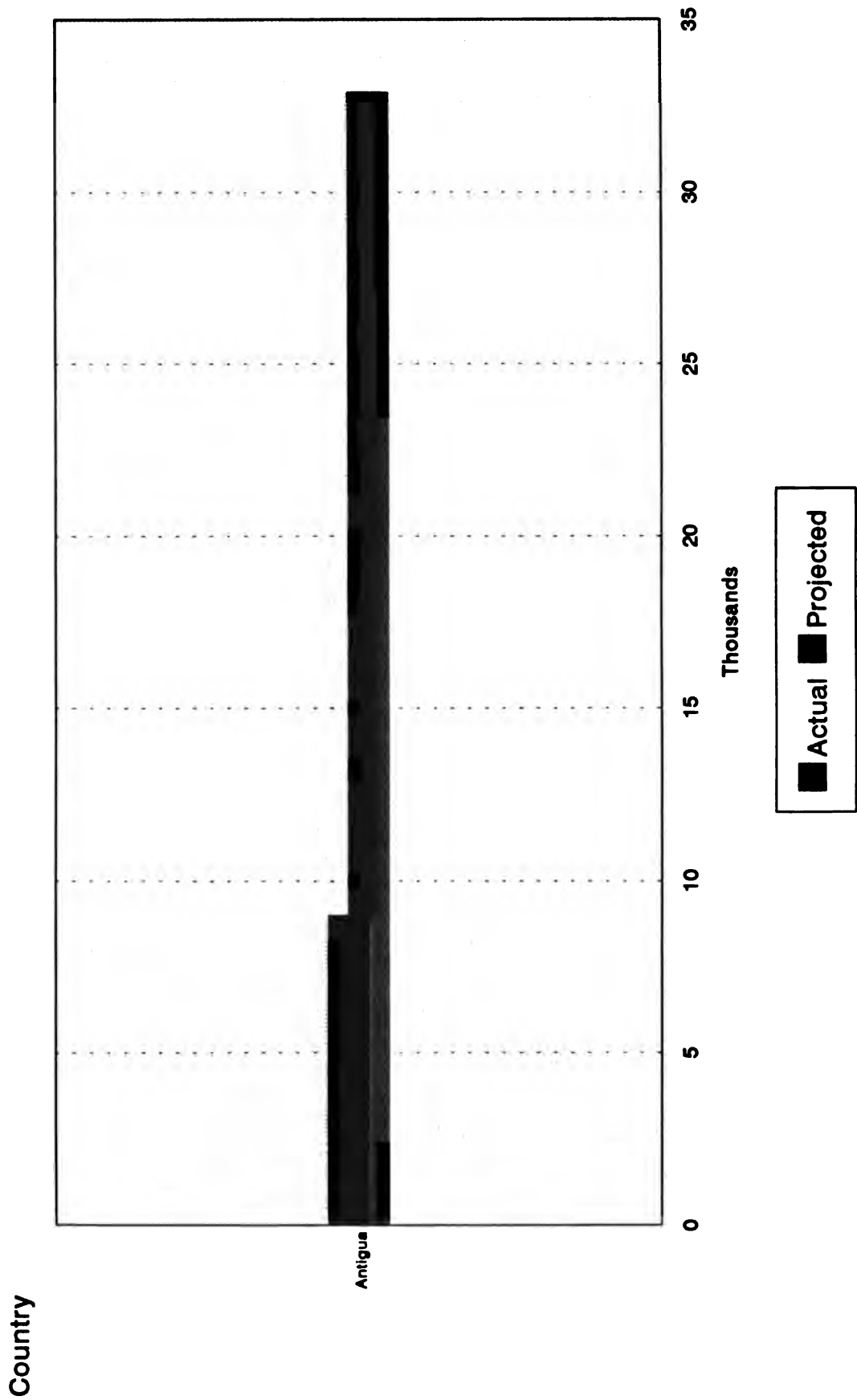


FIGURE 25.3. PRICE SENSITIVITY FOR SWEETPEPPER, 1992-93
Selected OECS Countries

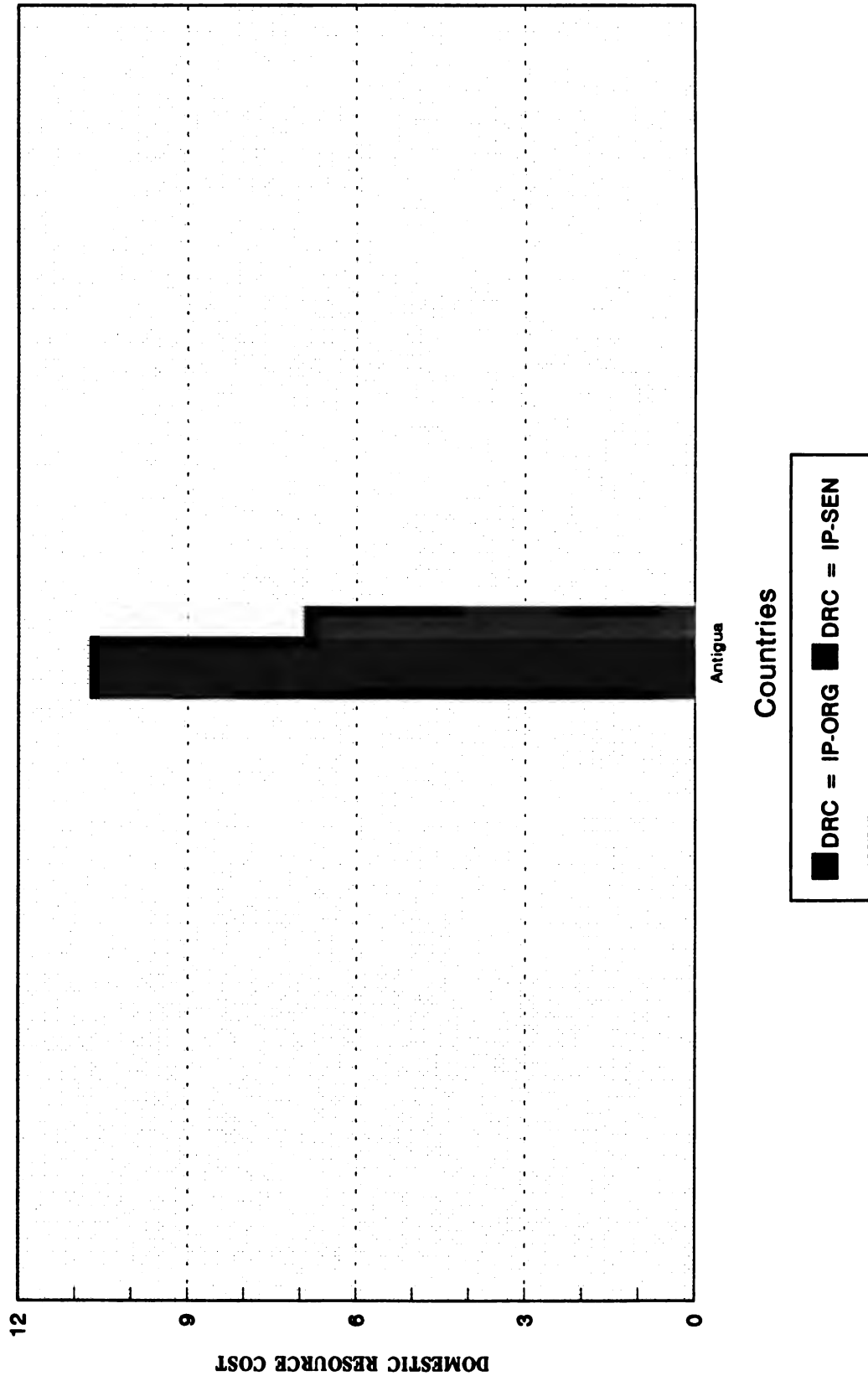
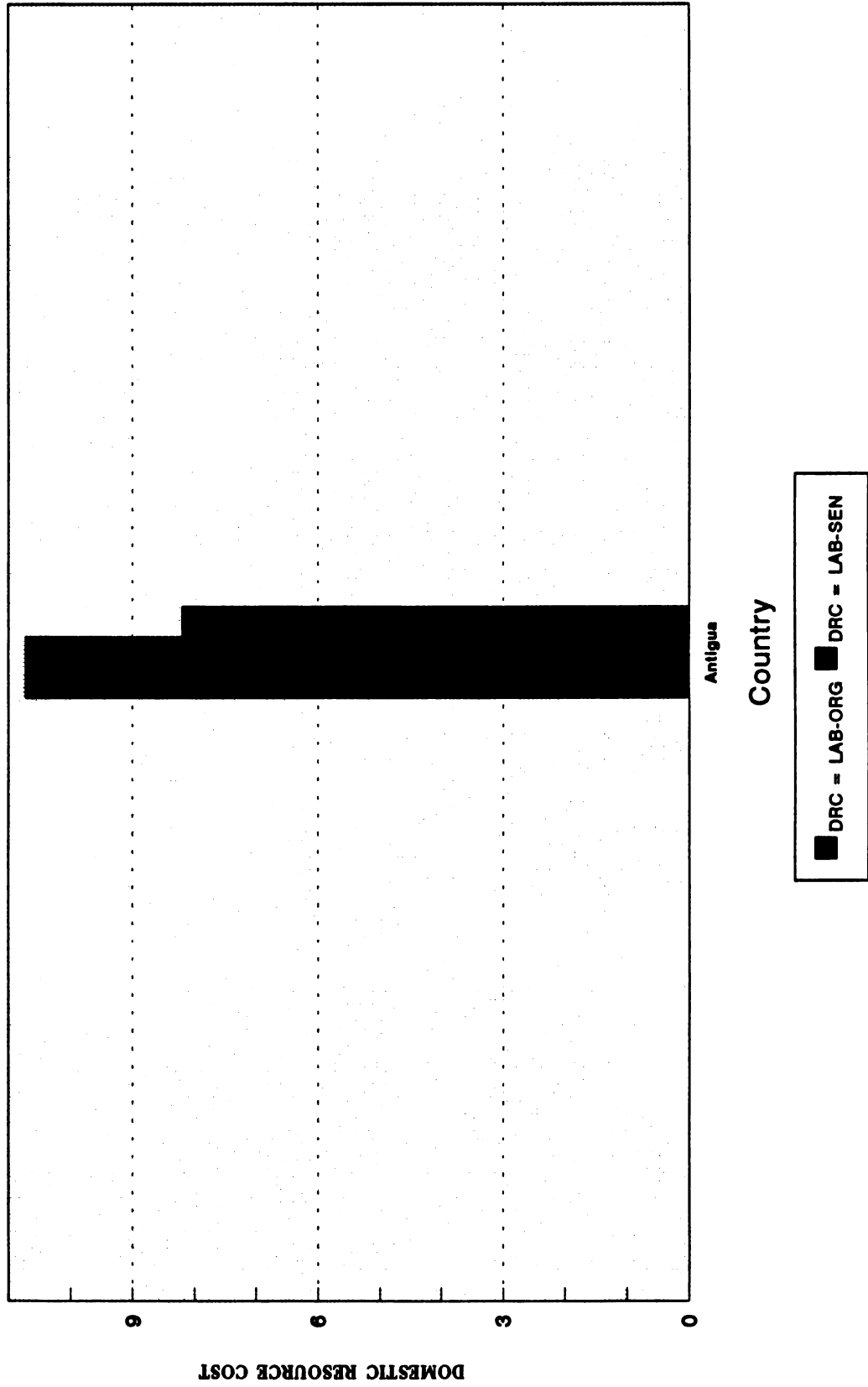


FIGURE 25.4. LABOUR SENSITIVITY FOR SWEETPEPPER - 1992-93
Selected OECS Countries



SWEET POTATO

Figure 26.1 presents the results of the DRC analysis for Antigua, Dominica, Montserrat and St. Kitts/Nevis. A striking feature of the analysis is that for all countries, with the exception of Antigua, the ratios are less than one. This suggests that sweet potato production is an activity in which these OECS countries have competitive advantage, since resources are profitably employed. That these countries are efficient producers is not surprising, particularly when one considers that sweet potato has for centuries been a major staple in all these countries.

The analysis suggests that even though producers in Antigua are not currently efficient in production of this commodity the improvements required to make the enterprise competitive are generally not great (See Figure 26.2). Increasing production in Antigua by just under 5% given current yields, costs and the level of technology will be sufficient to generate a DRC value of one. The analysis clearly indicates that per acre yields are but one of the many factors which determine the value of the DRC. In Antigua for instance, which ranks lowest of all four countries in sweet potato competitiveness, yield levels of 13,000 lbs per acre lie above the observed levels in both St. Kitts and Dominica.

Results of the labour sensitivity analysis assuming that the level of inefficiency inherent in agricultural labour markets among OECS member states was greater than that indicated by the estimated value of the labour conversion factor (CF), are reported in Figure 26.3. The results reflect marked improvements in the competitive advantage for all four countries relative to the base model. These results are fairly consistent with a priori expectations about the sensitivity of the DRC results for labour-intensive initiatives such as sweet potato production, to variations in the assumptions regarding the efficiency of labour markets. In terms of relative rankings, the results indicate that Dominica and St. Kitts rank highest with a DRC value of 0.52, followed by Montserrat (0.63) and Antigua (0.72), in descending order of competitiveness.

Simulation was also undertaken assuming a 10% improvement in the non-intervention price for sweet potatoes in all four countries. While the results in Figure 26.4 indicate that the competitive ranking of each country is more favorable than under the base model, the relative cross-country rankings are unchanged. In general, the DRC coefficients showed relatively smaller reductions in magnitude under the NIP simulation than under the labour sensitivity analysis.

For Antigua sensitivity of the results to the simulations undertaken and the closeness of the base model DRC coefficients to unity, make it difficult to conclude that this country is incapable of earning foreign exchange from the production and export of sweet potato. It is however clear, that all four OECS territories can improve their efficiency, through inter alia, productivity enhancement and reductions in production costs. While there has been a resurgence of interest in sweet potato as a diversification crop, there has not been the same emphasis on increasing efficiency in such areas as biological research aimed at increasing yields, product quality and improving the quality of planting material.

Data on OECS exports by country indicate that sweet potato exports from Dominica and St. Kitts/Nevis were far less than exports from Montserrat and Antigua. Sweet potato exports from Antigua and Montserrat amounted to less than 20,000 kgs between 1988 and 1991. This represented approximately 10% of combined export volumes from St. Kitts/Nevis and Dominica. The export data for 1988-1991, also supports St. Kitts/Nevis's competitive edge relative to Dominica. Between 1988 and 1990, exports from St. Kitts/Nevis of approximately 115,000 kg was more than three and a half times similar exports from Dominica (31,000 kg)⁹.

⁹ The data for sweet potato exports from Montserrat is of questionable reliability.

FIGURE 26.1. DOMESTIC RESOURCE COST - SWEETPOTATO, 1992-93
Selected OECS Countries

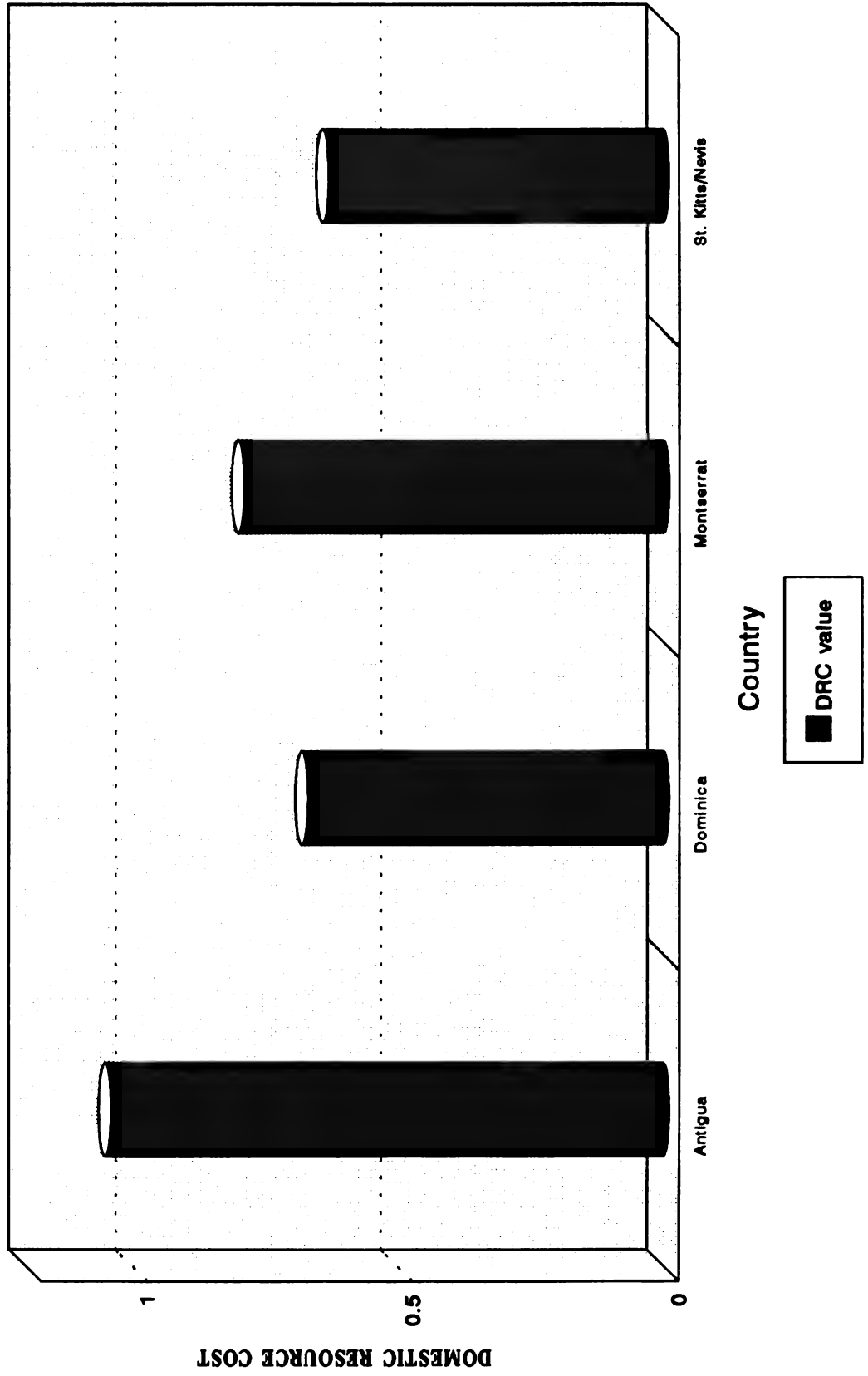


FIGURE 26.2. YIELD SENSITIVITY FOR SWEETPOTATO, 1992-93
Selected OECS Countries

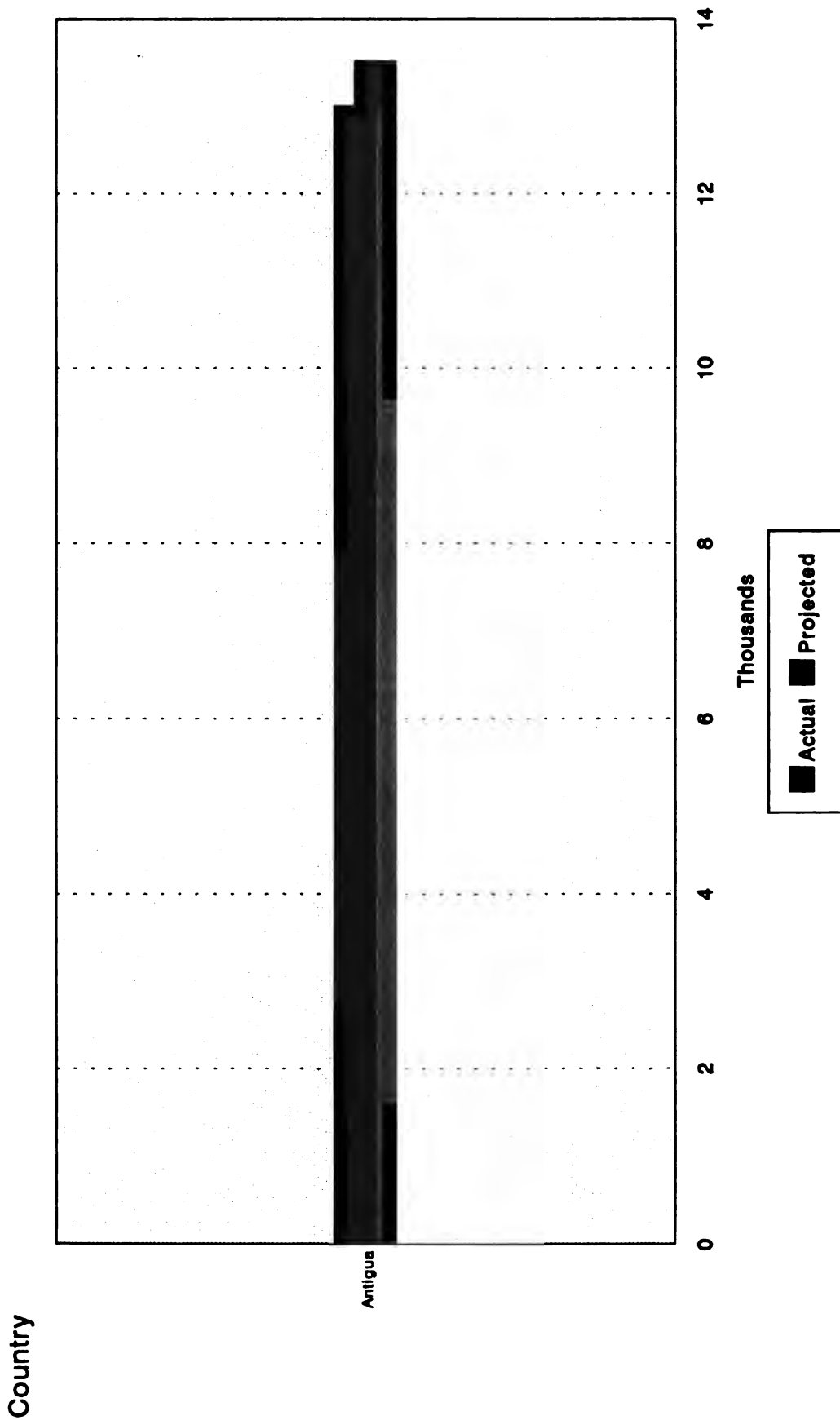


FIGURE 26.3. LABOUR SENSITIVITY FOR SWEETPOTATO - 1992-93
Selected OECS Countries

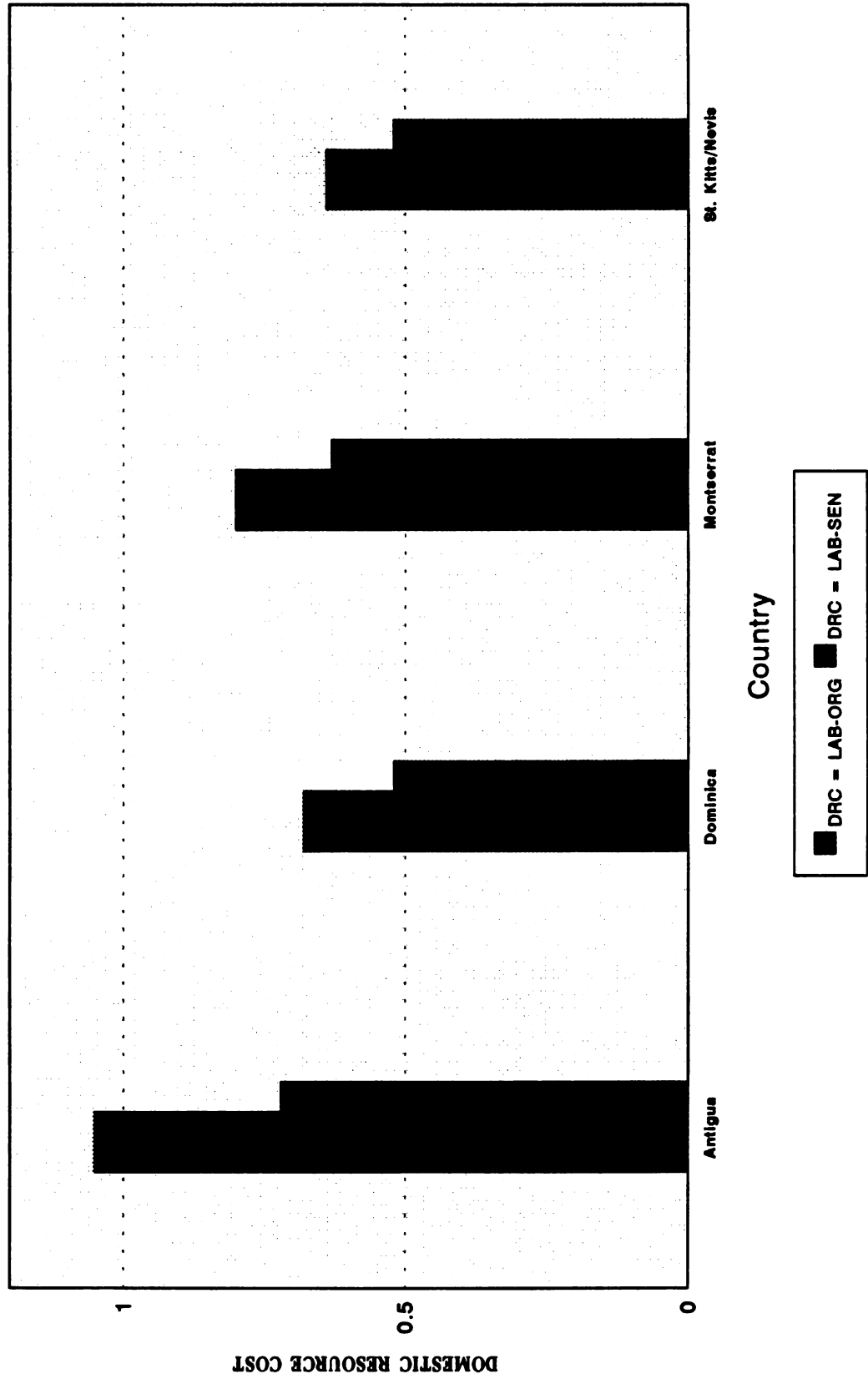
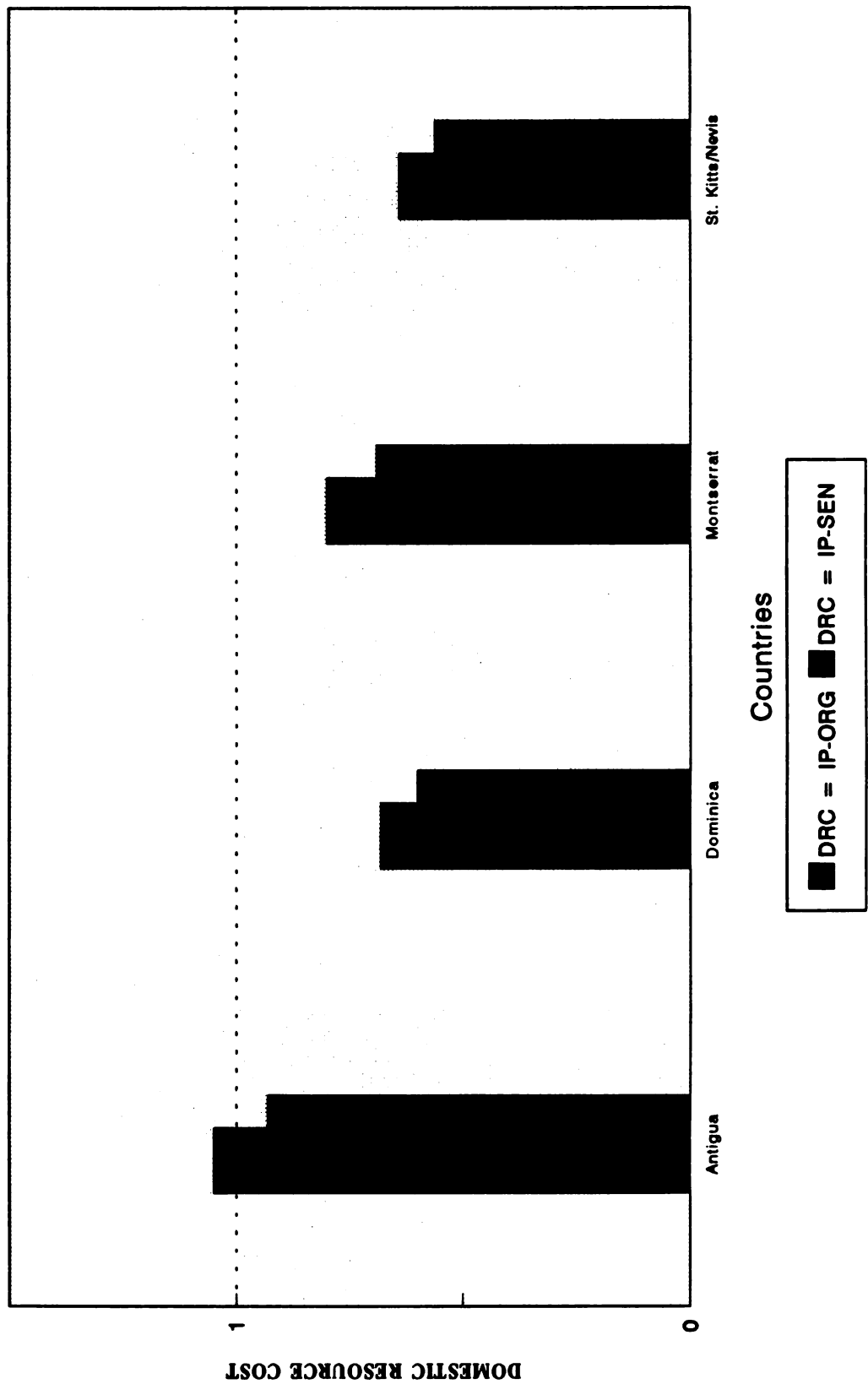


FIGURE 26.4. PRICE SENSITIVITY FOR SWEETPOTATO, 1992-93
Selected OECS Countries



TANNIA

According to the results in Figure 27.1, the four Windward Islands possess absolute competitive advantage in the production and trade of tannia. The results also indicate that St. Vincent, with a DRC ratio of 0.24, ranks highest, followed by Grenada (0.25) and Dominica and St. Lucia each with a DRC value 0.53. St. Vincent's competitive edge may be attributed to its relatively higher yields and production efficiencies.

Relatively higher production costs combined with lower yields per acre in part accounts for the higher DRC coefficients in St. Lucia and Dominica. In the case of Dominica, the higher cost of planting material was caused by the outbreak of the tannia burning disease which has resulted in a shortage of disease-free planting material. The tannia burning disease has also had an adverse impact on yields in certain producing areas in Dominica. To combat this problem, planting material propagated via 'mini-setting' has been introduced. Mini-setting technology requires greater use of labour and imported chemical inputs which are used in the treatment of planting material. This has led to modest increases in production costs.

In light of the constraints identified above, increased attention will need to be given to improving the adaptation of the current tannia technological package (altering the technology). This could potentially result in improved yields and reduced unit cost. Improvement in competitiveness also hinges on the availability of the resource investment directed toward improving overall production efficiency. Even if these measures are instituted, whether or not Dominica and St. Lucia will be able to compete with St. Vincent and Grenada in tannia production, remains in question.

To assess the impact of changes in the non-intervention price (NIP) on the competitive advantage rankings across country, a 10% increase in the NIP for root crops was simulated. The results in Figure 27.2 suggest that the competitive advantage of all four tannia producing countries improved relative to the base model. The relative ranking of countries vis-a-vis each other however, remained unaltered. The simulation results also indicated that the DRCs for tannia production in Dominica and St. Lucia were more sensitive to variations in the NIP than were the DRCs for Grenada and St. Vincent.

In addition to the NIP, the relative ranking is also influenced by factors such as wage rates, technical coefficients and variable input prices. Analysis of the sensitivity of DRC results to variations in the value of the conversion factor (CF) for labour was carried out to determine the robustness of the country rankings to assumptions regarding labour market distortions in the OECS. The results in Figure 27.3 indicate that, assuming greater distortions in the agricultural labour market, resulted in a reduction in the absolute value of the DRCs across all four countries. In absolute terms, the DRC coefficients declined from 0.53 under the base model for St. Lucia and Dominica to 0.38 and 0.46 respectively. Relative cross-country rankings again remained unchanged as compared to their base model positions.

The available trade data for 1988-1990, supports the competitive advantage of St. Vincent relative to other producers in the OECS. The data indicates that exports from St. Vincent totalled 5.7, 1.2 and 0.1 million kg in 1988, 1989 and 1990, respectively. While suggesting negative export growth, traded volumes from St. Vincent remained consistently higher than exports from either, Grenada, Dominica or St. Lucia.

According to the 1988-1990 data, Dominica and not Grenada as indicated by the DRC coefficients, recorded the second highest volumes of tannia exports. This suggests that while Grenada may be more competitive than Dominica in tannia production, it was not a major exporter over the 1989-1990 period. The small level of exports from Grenada may have been associated with the decline in Trinidadian import demand for agricultural commodities after 1986. If this rationale is correct, then export data for the 1980-1986 period should partially support Grenada's ranking in relation to Dominica.

FIGURE 27.1. DOMESTIC RESOURCE COST - TANNIA, 1992-93
Selected OECS Countries

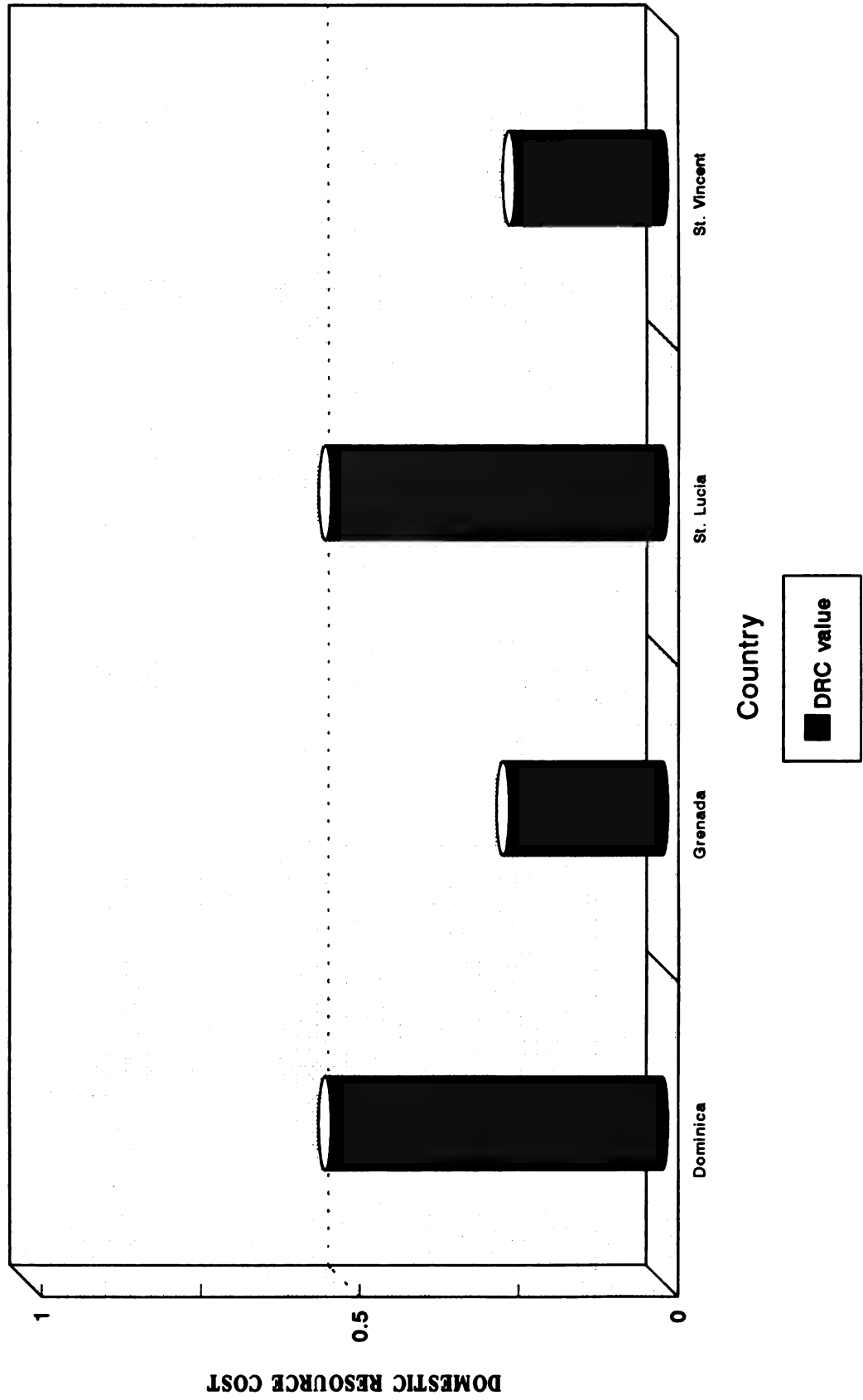


FIGURE 27.2. PRICE SENSITIVITY FOR TANNIA, 1992-93
Selected OECS Countries

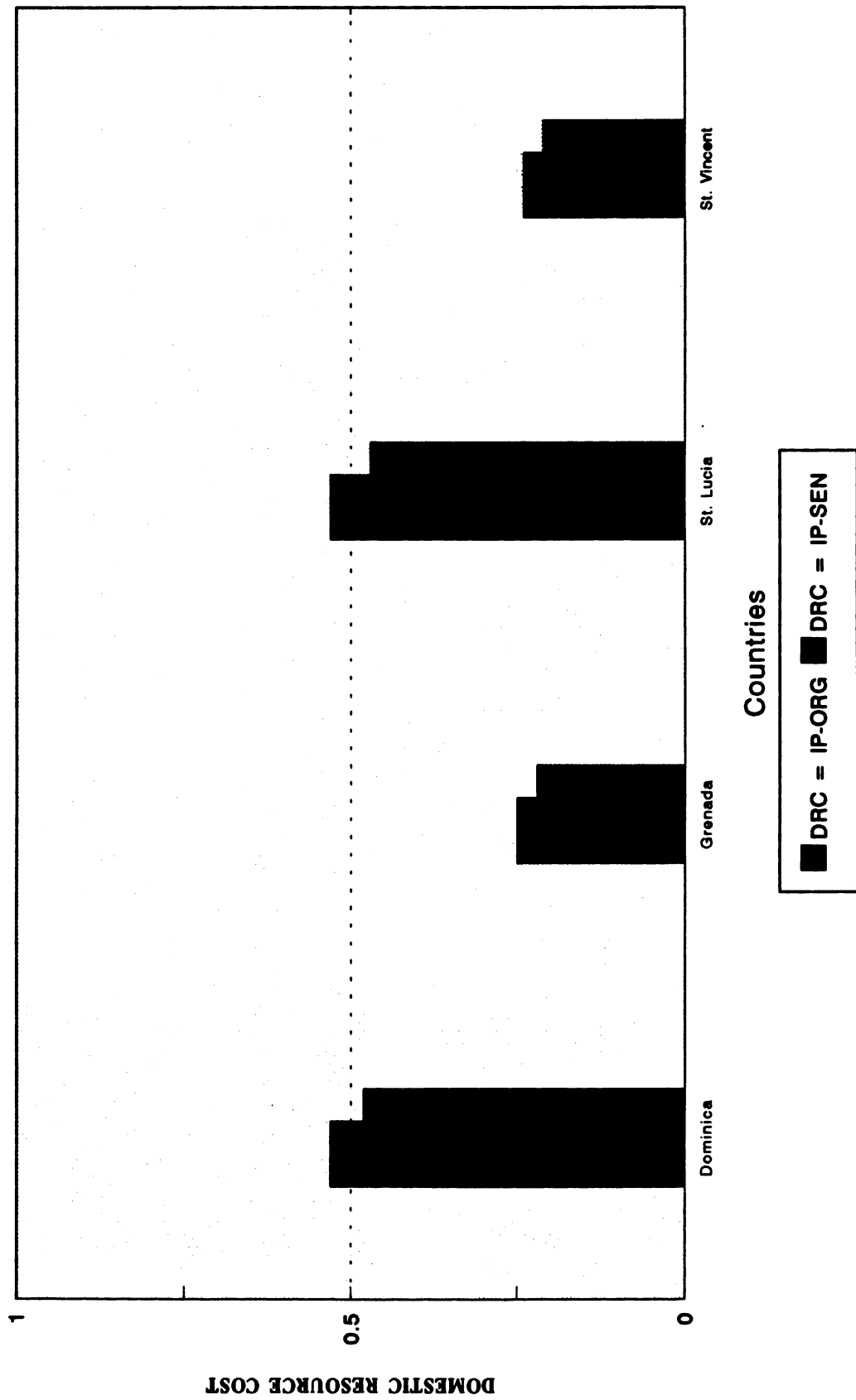
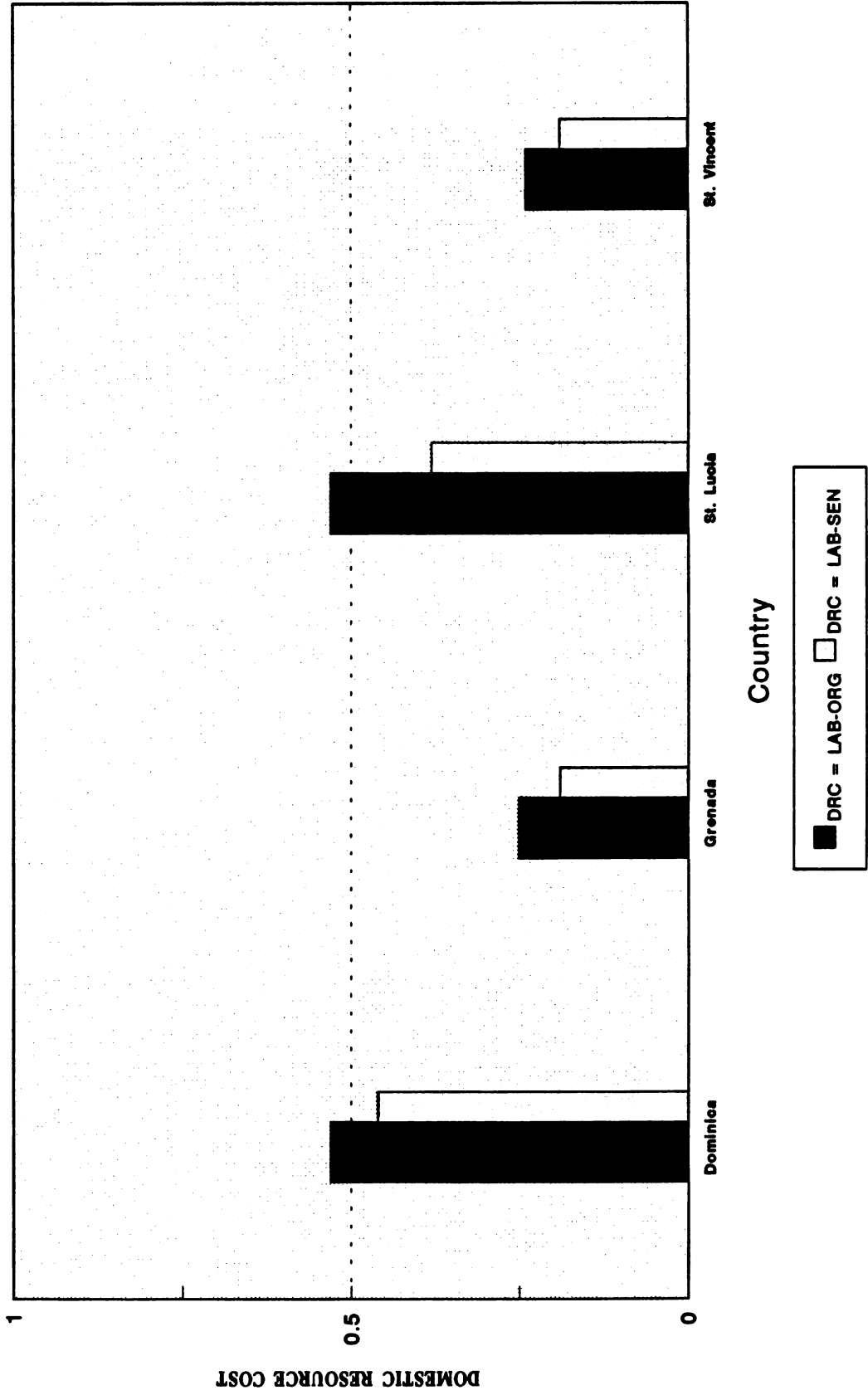


FIGURE 27.3. LABOUR SENSITIVITY FOR TANNIA - 1992-93
Selected OECS Countries



TOMATO

The estimated DRCs for tomatoes produced in the British Virgin Islands, Montserrat and St.Kitts/Nevis are presented in Figure 28.1. As can be seen, tomato production is non-competitive in its use of domestic resources in all three countries. Based on the high DRC values, none of the three countries is currently efficient in such production, implying that it is highly dependant on implicit government-induced support measures. While this protection allows private producers to realize profits, tomato production is socially unprofitable. This suggests foreign exchange losses for the BVI and further indicates that tomato production in Montserrat and St. Kitts constitutes a fairly expensive means of earning foreign exchange.

Sensitivity analysis was undertaken to assess the improvements in yields necessary to make tomato production competitive. Figure 28.2 indicates that holding the non-intervention price and production costs constant, yield improvements in the order of 10%, 12% and 23%, would be required for the BVI, Montserrat and St.Kitts/Nevis, respectively, to be competitive. Given the prevailing wages, prices and the level of technology it does not appear that the required yield increases are unattainable. However a DRC ratio of one implies that the enterprise neither earns nor saves foreign exchange. Enterprises which are not currently competitive should not be favored over those whose DRC is already adequate.

Sensitivity analysis was also applied to assess the robustness of relative competitive rankings to variations in the non-intervention price (NIP) and wages. The results of an increase in the NIP by 15% are presented in Figure 28.3. In the case of Montserrat, this price increase results in a DRC of 0.96 suggesting that tomato production would become competitive. While the competitive disadvantage of St.Kitts/Nevis diminished somewhat compared to the base model, the enterprise still remained uncompetitive. The competitive disadvantage of the BVI also worsened relative to the base model. The results of the labour simulation, presented in Figure 28.4, were fairly consistent with the base model results, in that the countries remained uncompetitive in tomato production even when greater inefficiencies in the labour markets of the three countries were assumed.

The Schwartz/Nurse data reports only limited exports of tomatoes from the OECS over the 1988-1991 period. Antigua exported about 6800 kg in 1991, while St.Kitts/Nevis and St. Vincent exported small volumes in 1989-90 and 1988-89, respectively. APHIS data indicated that small volumes of tomatoes were exported from Dominica, Montserrat and St.Lucia to the US Virgin Islands in the mid-80's.

FIGURE 28.1. DOMESTIC RESOURCE COST - TOMATO, 1992-93
Selected OECS Countries

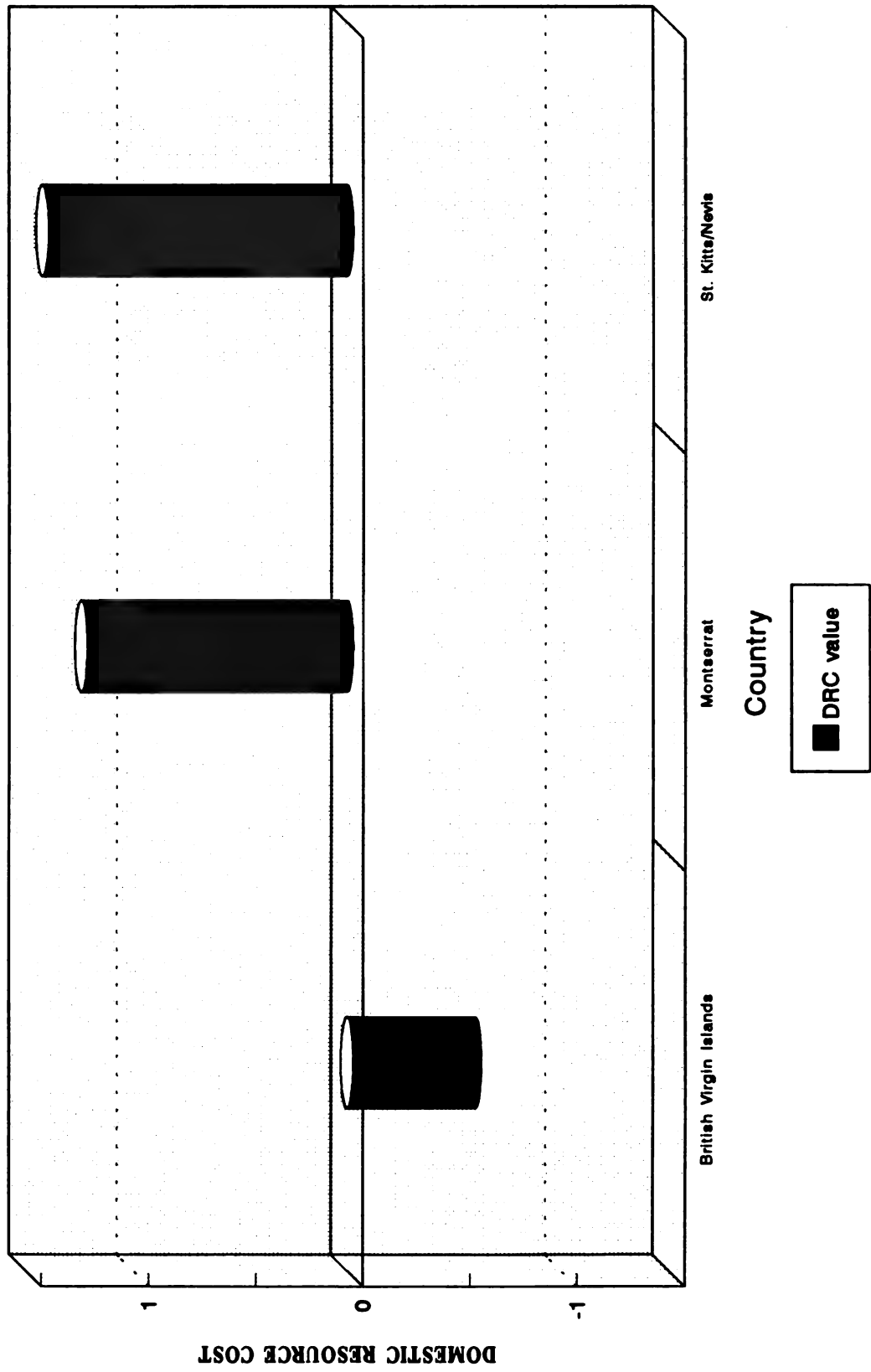


FIGURE 28.2. YIELD SENSITIVITY FOR TOMATO, 1992-93
Selected OECS Countries

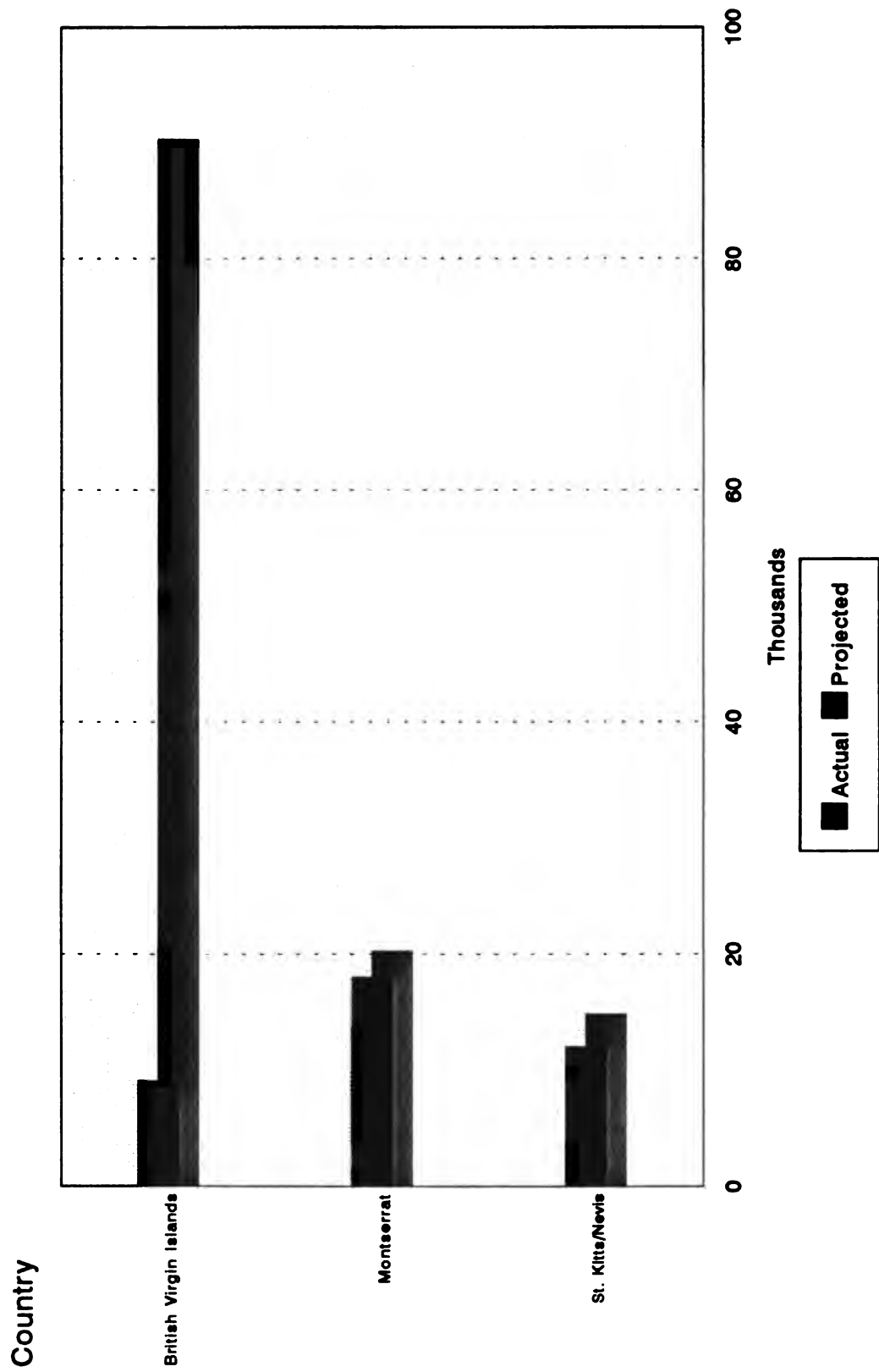


FIGURE 28.3. PRICE SENSITIVITY FOR TOMATO, 1992-93
Selected OECS Countries

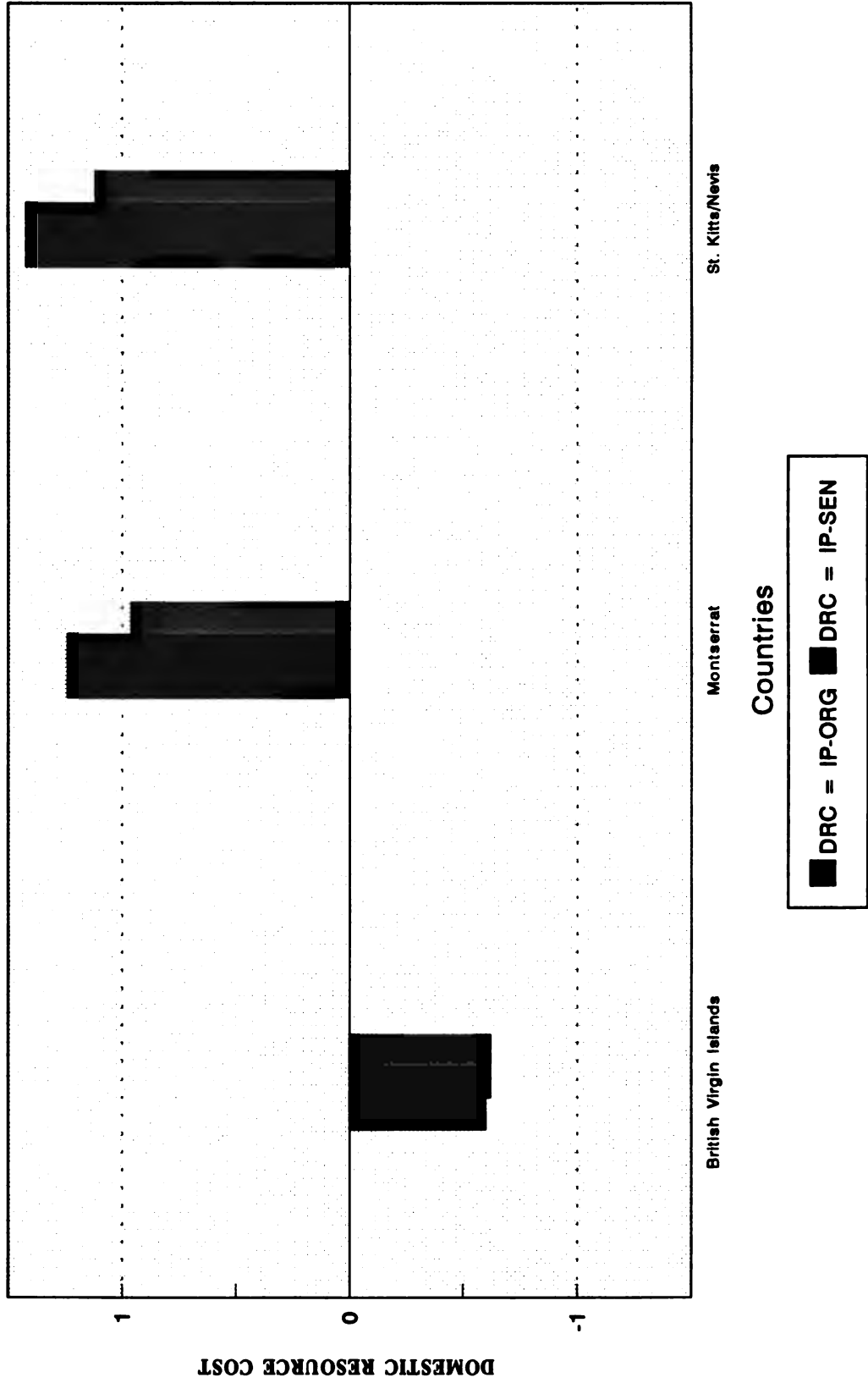
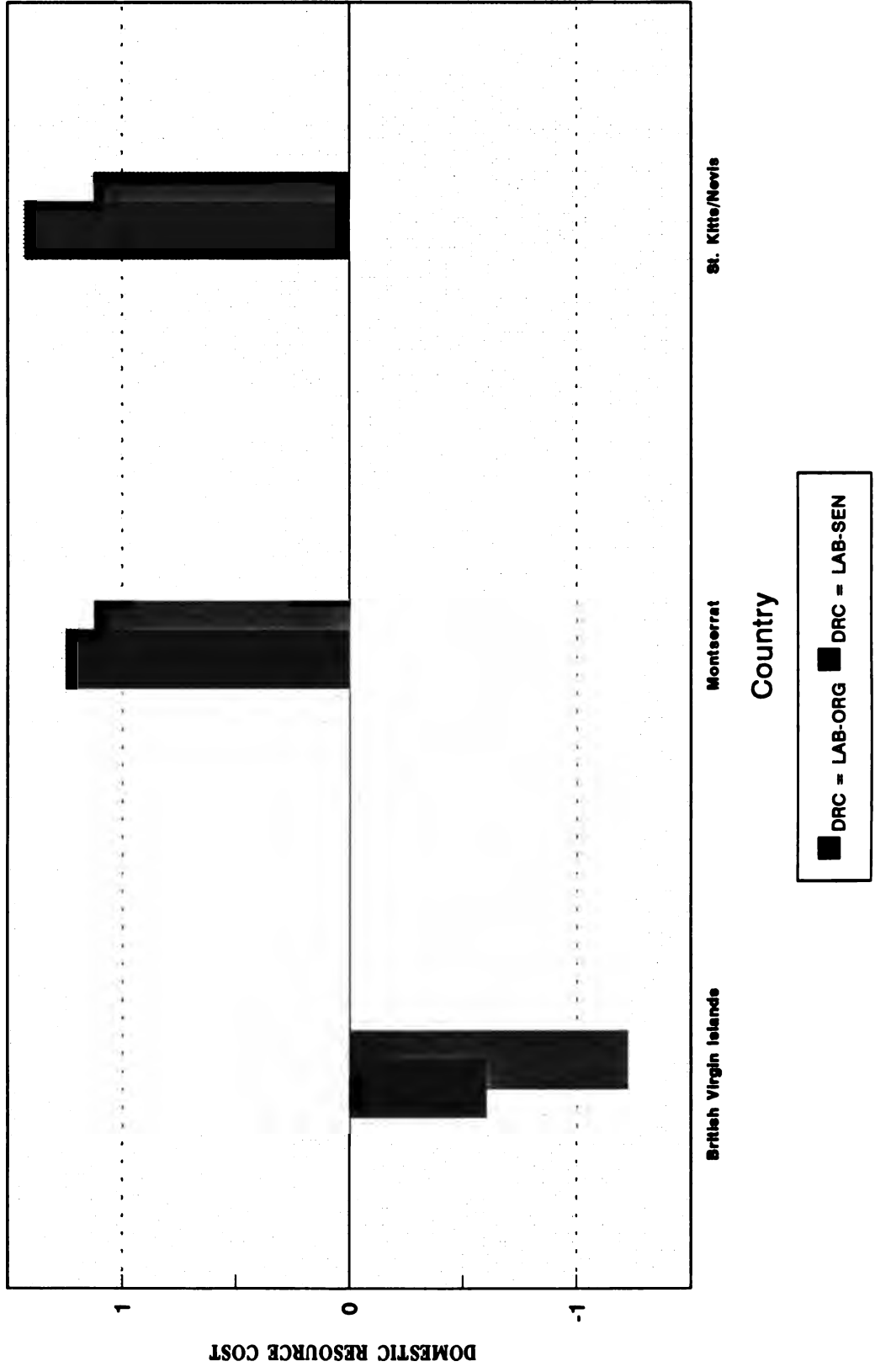


FIGURE 28.4. LABOUR SENSITIVITY FOR TOMATO - 1992-93
Selected OECS Countries



WATER MELONS

The results of the cross-country analysis in Figure 29.1 indicate that water melon production is non-competitive for domestic resources in BVI and Antigua. The high values of the respective DRCs are indicative of inefficiencies in production, suggesting that water melon is not an enterprise in which either country has a competitive advantage. The negative value of the DRC for the BVI suggests that incremental production of water melon will result in foreign exchange losses. This is because the cost of imported resources in production exceeds the price at which the commodity could be sold internationally in the absence of policy interventions.

Based on yields the sensitivity results for watermelon presented in Figure 29.2 for water melon production are especially precarious in the British Virgin Islands where more than a five-fold increase (496%) in yields (*ceteris paribus*) would be required to bring the estimated DRC value to unity. In contrast, holding the non-intervention price and shadow cost of production constant in Antigua suggests that water melon yields would have to increase by approximately one third (31%) in order to bring the estimated DRC to unity.

Sensitivity analysis was undertaken to assess the responsiveness of the DRC to changes in product price and labour. Figure 29.3 indicates that an increase in the non-intervention price of 10% results in an improvement in the competitiveness of water melon production in Antigua and leads to an increased competitive disadvantage for the BVI. The effects on the estimated DRCs of varying the shadow wage rate for labour are presented in Figure 29.4. As indicated, assuming greater divergence between the private and social costs in agricultural labour, leads to a reduction in the absolute value of the DRC, indicating improved competitiveness.

Under the NIP simulation, the results generally indicate that the estimated value of the DRC approaches unity in Antigua but not in the BVI. However, for both countries water melon production remains non-competitive for domestic resources.

In spite of the fact the estimated DRC for water melon production exceeds one, the data compiled by Schwartz/Nurse indicated water melon exports from Antigua of about 86,200 Kg in 1990 and 131,100 kg in 1991. Dominica and St. Lucia also exported water melons during the 1988-1991 period.

FIGURE 29.1. DOMESTIC RESOURCE COST - WATERMELON, 1992-93
Selected OECS Countries

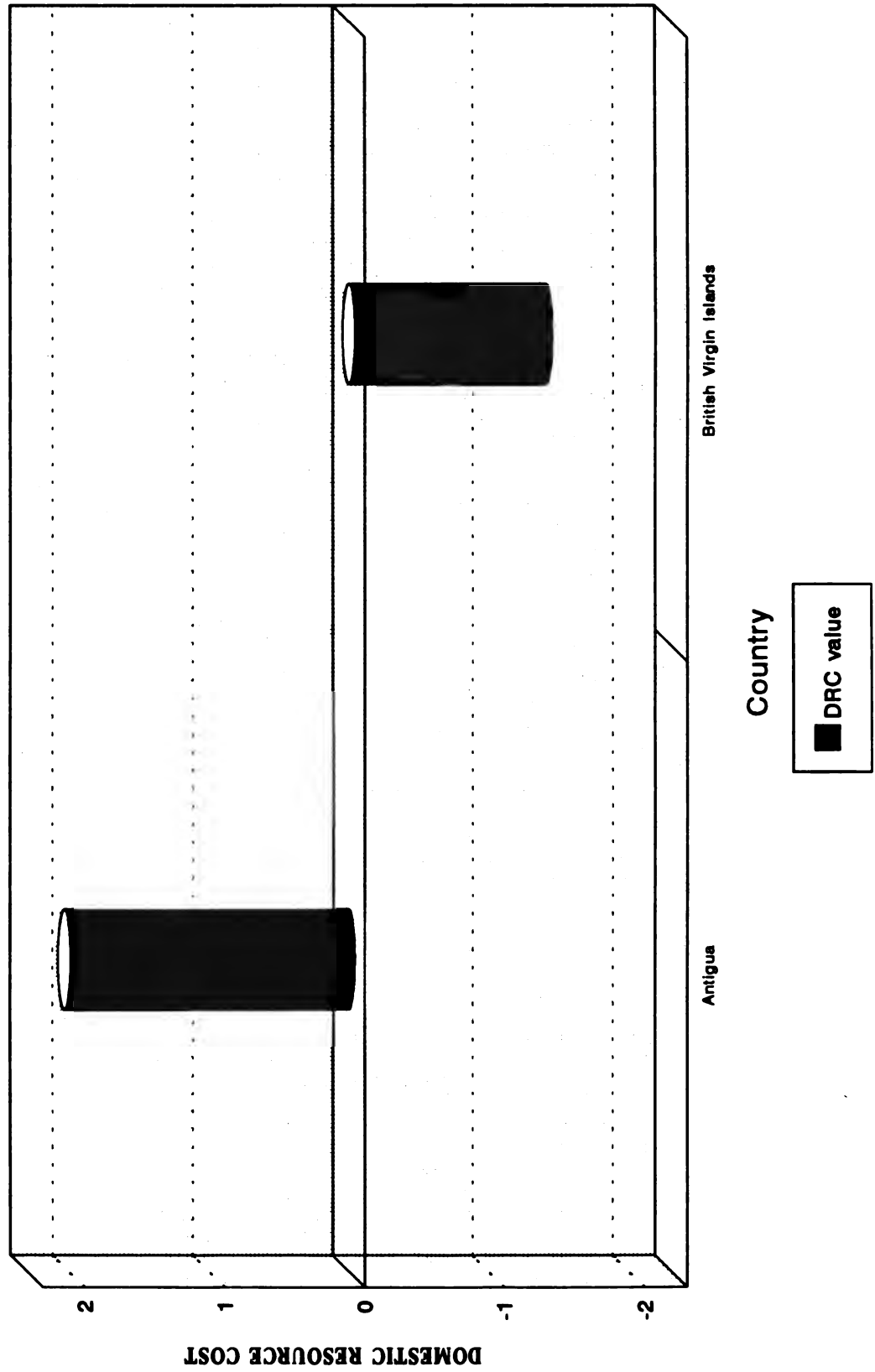


FIGURE 29.2. YIELD SENSITIVITY FOR WATERMELON, 1992-93
Selected OECS Countries

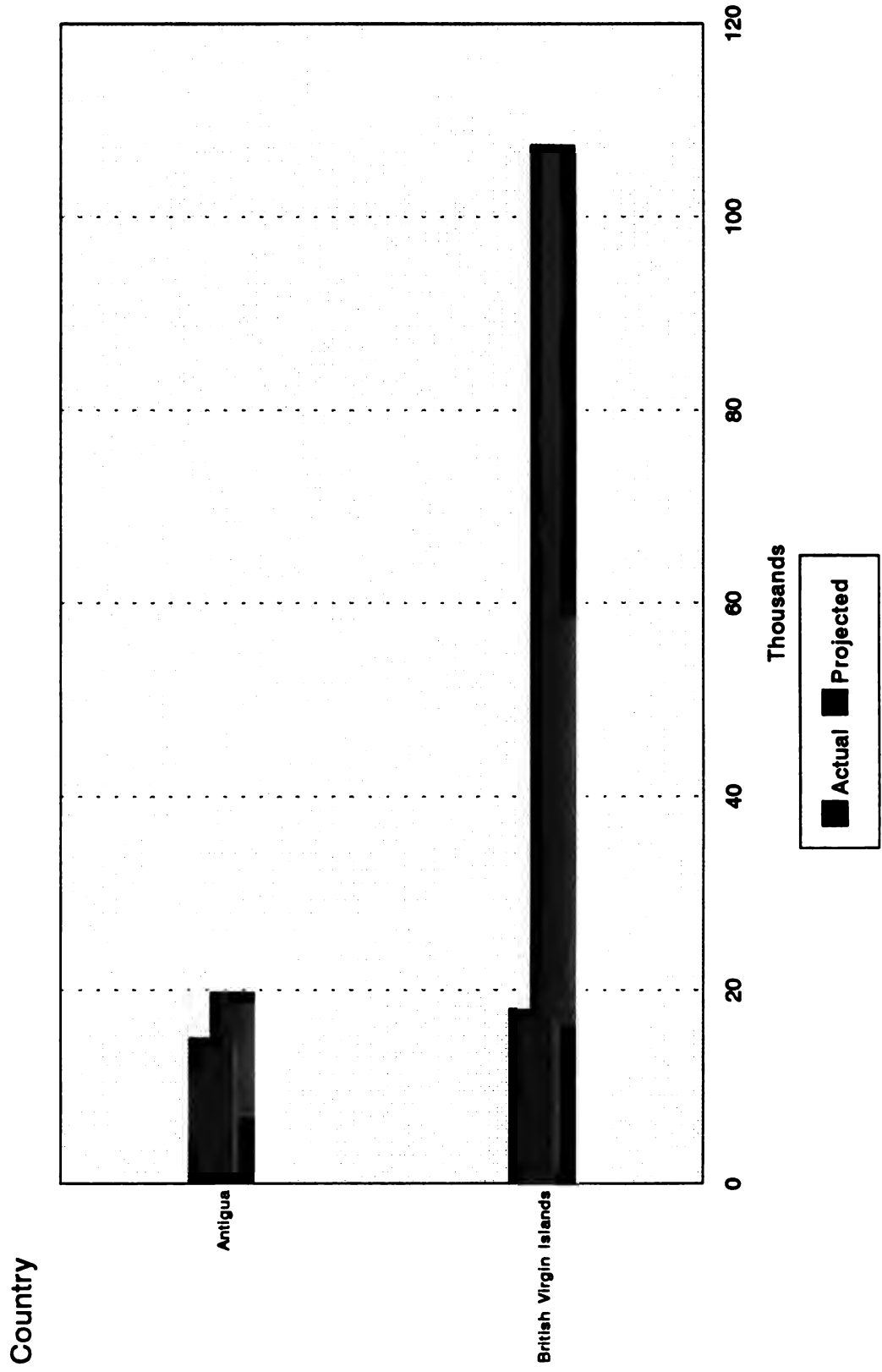


FIGURE 29.1. DOMESTIC RESOURCE COST - WATERMELON, 1992-93
Selected OECS Countries

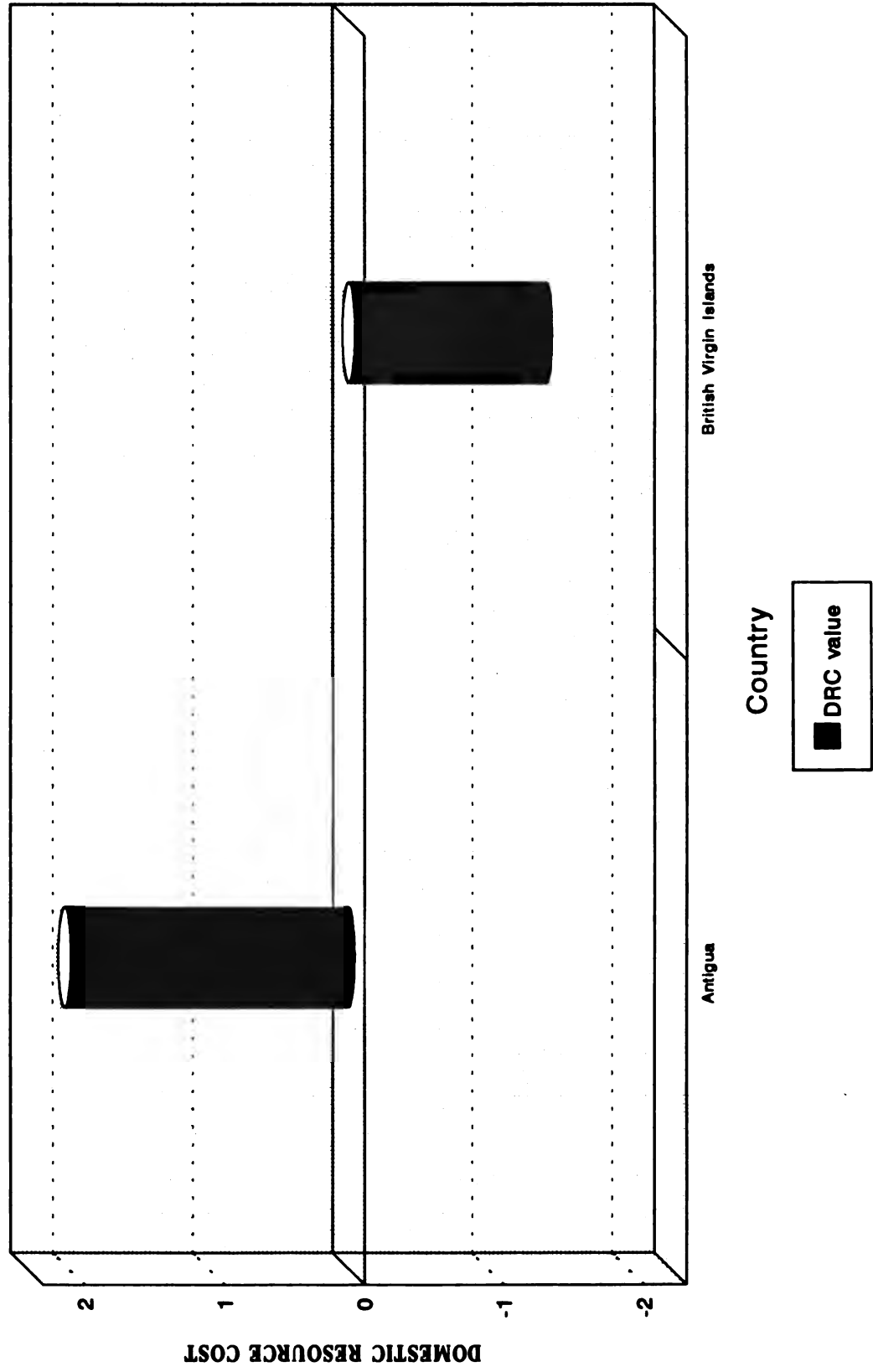


FIGURE 29.2. YIELD SENSITIVITY FOR WATERMELON, 1992-93
Selected OECS Countries

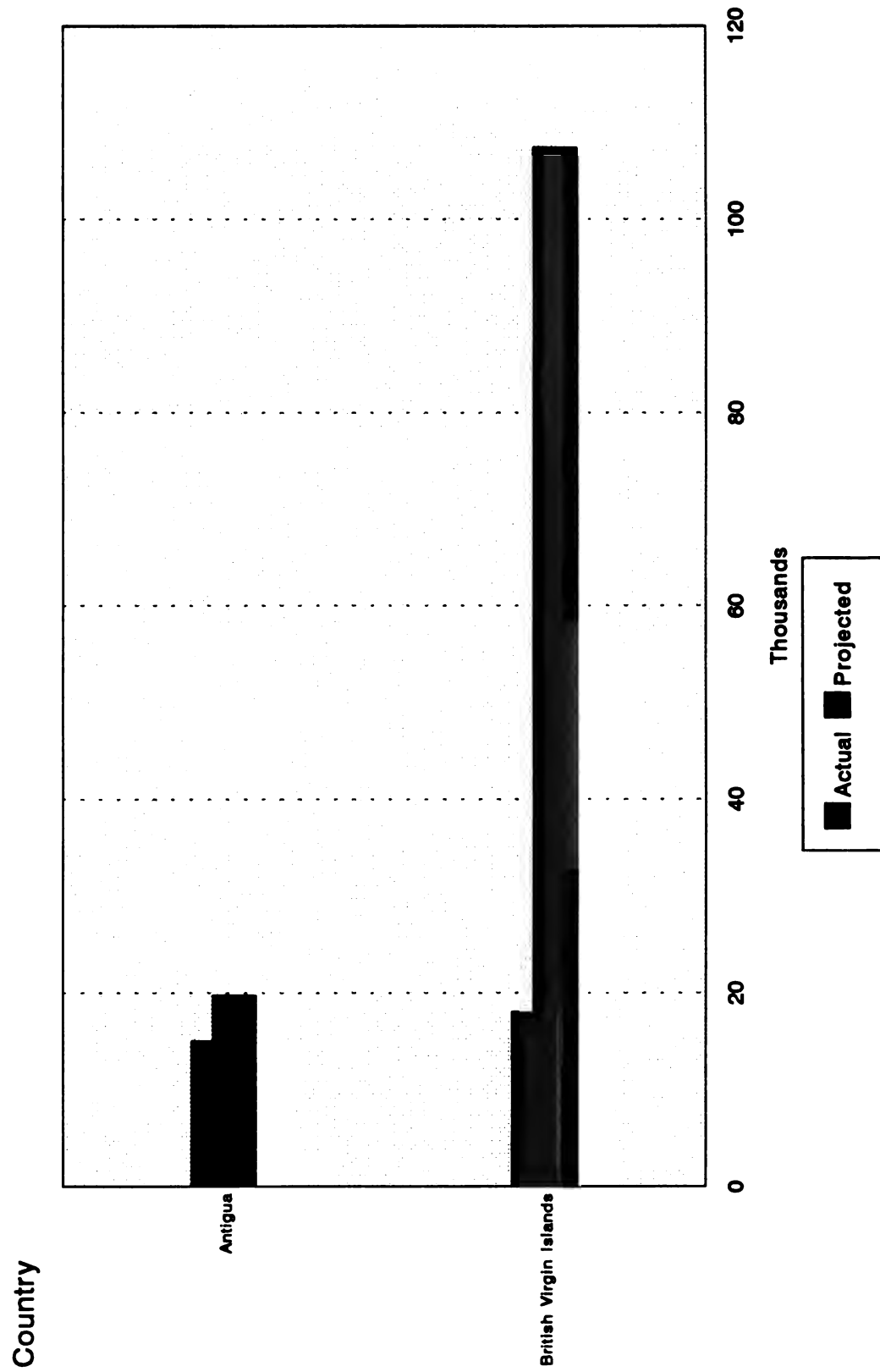


FIGURE 29.3. PRICE SENSITIVITY FOR WATERMELON, 1992-93
Selected OECS Countries

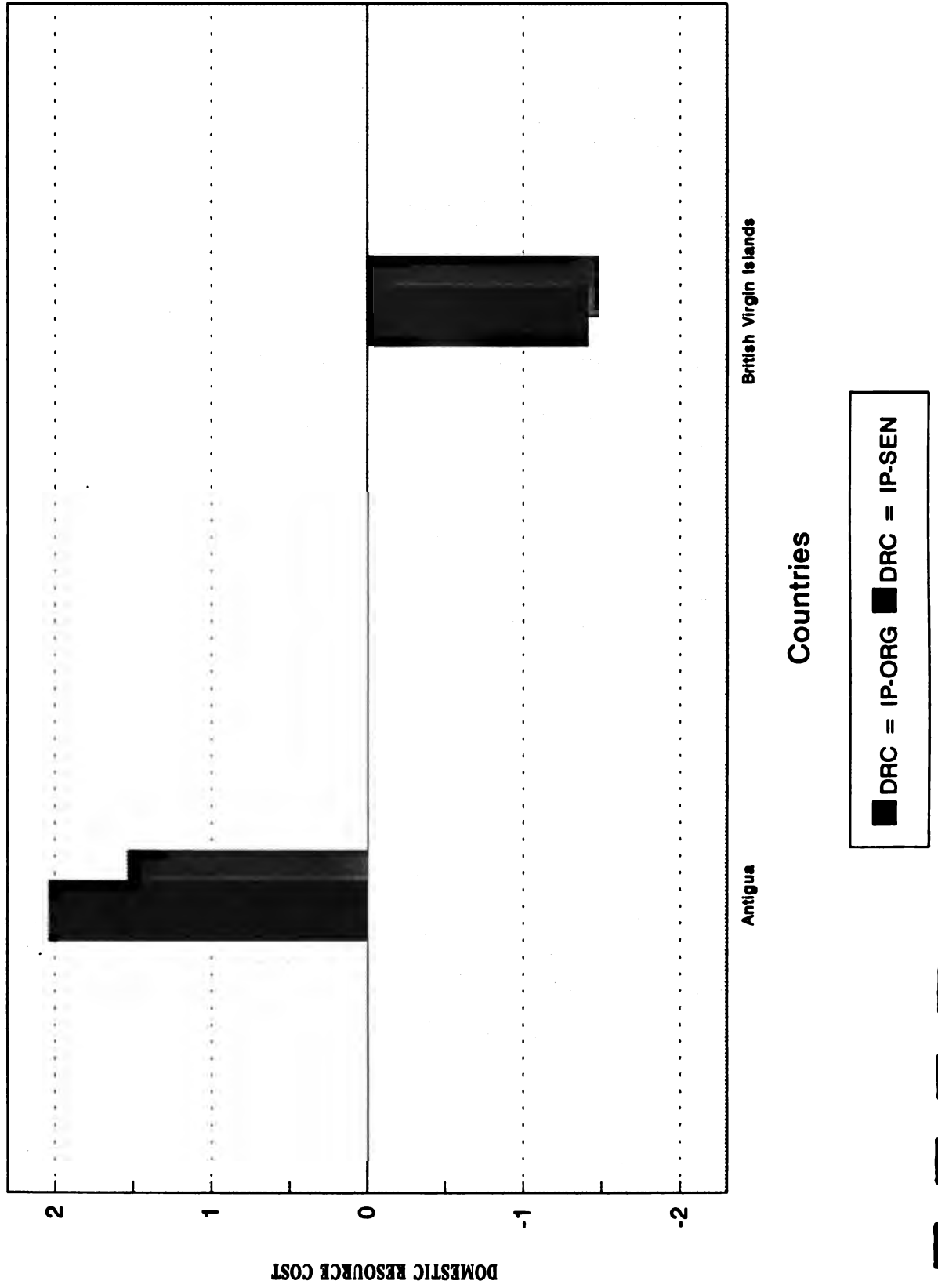
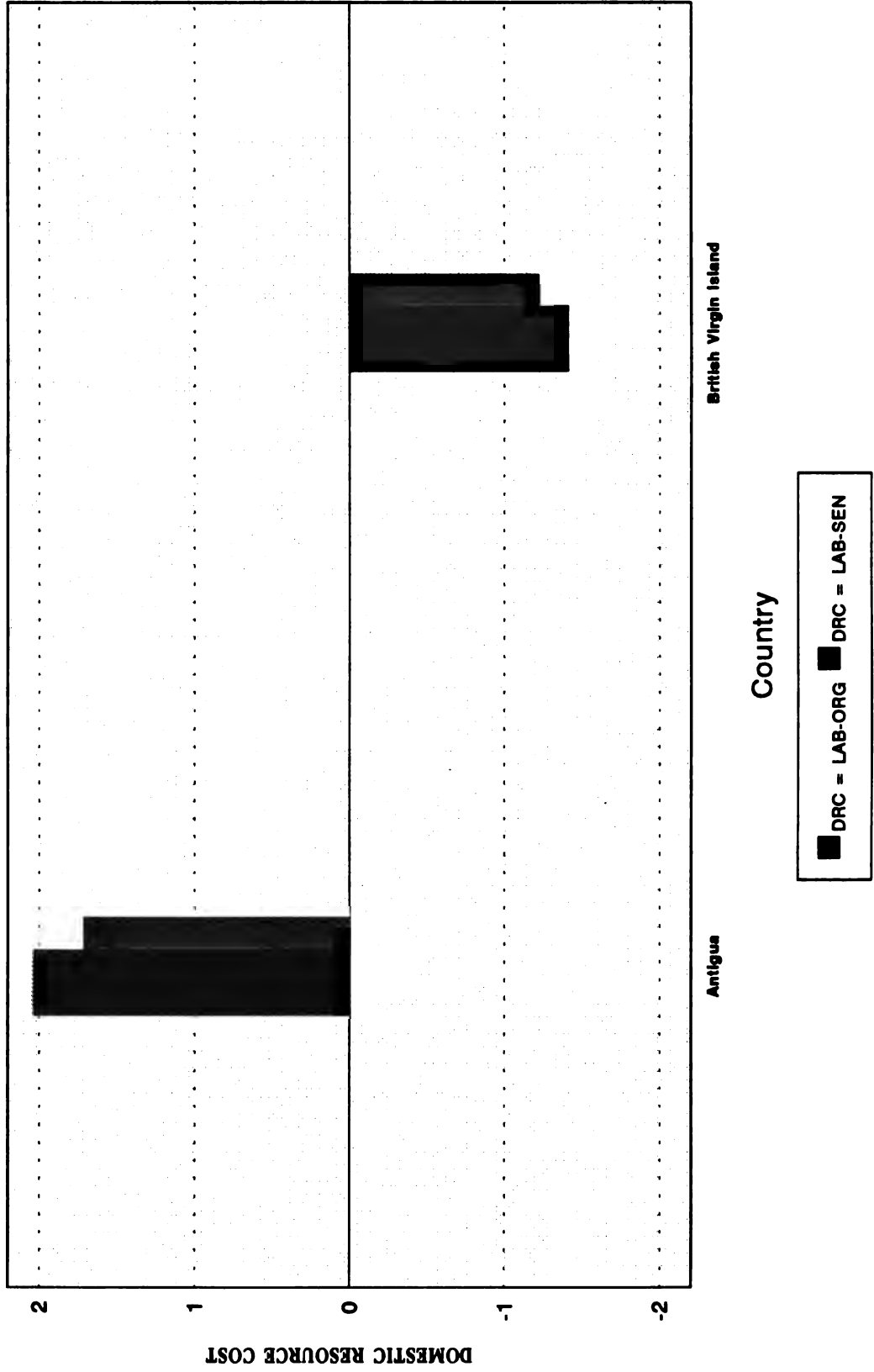


FIGURE 29.4. LABOUR SENSITIVITY FOR WATERMELON - 1992-93
Selected OECS Countries



WHITE POTATO

Figure 30.1 presents the estimated DRCs for white potato production in Montserrat and St.Kitts/Nevis. The DRC coefficients indicate that of these two OECS countries, St.Kitts/Nevis is clearly more competitive in white potato production. The fact that white potato is uncompetitive in Montserrat suggests that the resources devoted to its production have more profitable alternatives. This implies that if foreign exchange earnings constitute a major objective of the agricultural sector in Montserrat then the enterprise constitutes an expensive means of achieving this objective. Judged on its ability to efficiently utilize domestic resources and to generate foreign exchange earnings/savings, white potato is a more appropriate enterprise for St.Kitts/Nevis than for Montserrat.

Part of the advantage St.Kitts/Nevis enjoys over Montserrat is related to its superior yield levels. White potato yields in St.Kitts/Nevis exceed those in Montserrat by more than 25%. Figure 30.2 indicates that yields in Montserrat would have to increase by 34% (*ceteris paribus*) in order to attain an estimated DRC coefficient of one. A DRC of one indicates that the enterprise neither earns nor saves foreign exchange and given the current structure of costs and levels of technology, the importation of white potato would appear to represent a more efficient use of domestic resources in Montserrat.

Simulation analysis was carried out to assess the sensitivity of the countries' DRCs to changes in the product price and labour. Increasing the non-intervention price by 10%, as shown in Figure 30.3, reduces the estimated DRC in both countries. As shown in Figure 30.4, similar results are obtained for variations in the shadow wage rate. While the qualitative inferences regarding the competitiveness of white potato production remain unchanged, the DRC for Montserrat proved to be more robust under simulations based on improved efficiency in the agricultural labour market, than those based on increases in the NIP. However, in spite of improved competitiveness, Montserrat, with incremental production, will still incur high social costs and experience negative foreign value added from the production of white potatoes.

Because the estimated DRC for white potato production in St.Kitts/Nevis is less than one, exportation of this crop has the potential to generate net foreign exchange earnings. The estimated cost of US\$1.00 obtained through the export of white potatoes is approximately EC\$1.78, considerably below the official exchange rate of EC\$2.70. The Schwartz/Nurse trade report indicates no exports of white potatoes from the OECS over the 1988-90 period. Country data indicates that St.Kitts/Nevis is a net importer of the commodity, however, imports declined from 1,087,284 lbs in 1987 to 836,770 lbs in 1990.

FIGURE 30.1. DOMESTIC RESOURCE COST - WHITEPOTATO, 1992-93
Selected OECS Countries

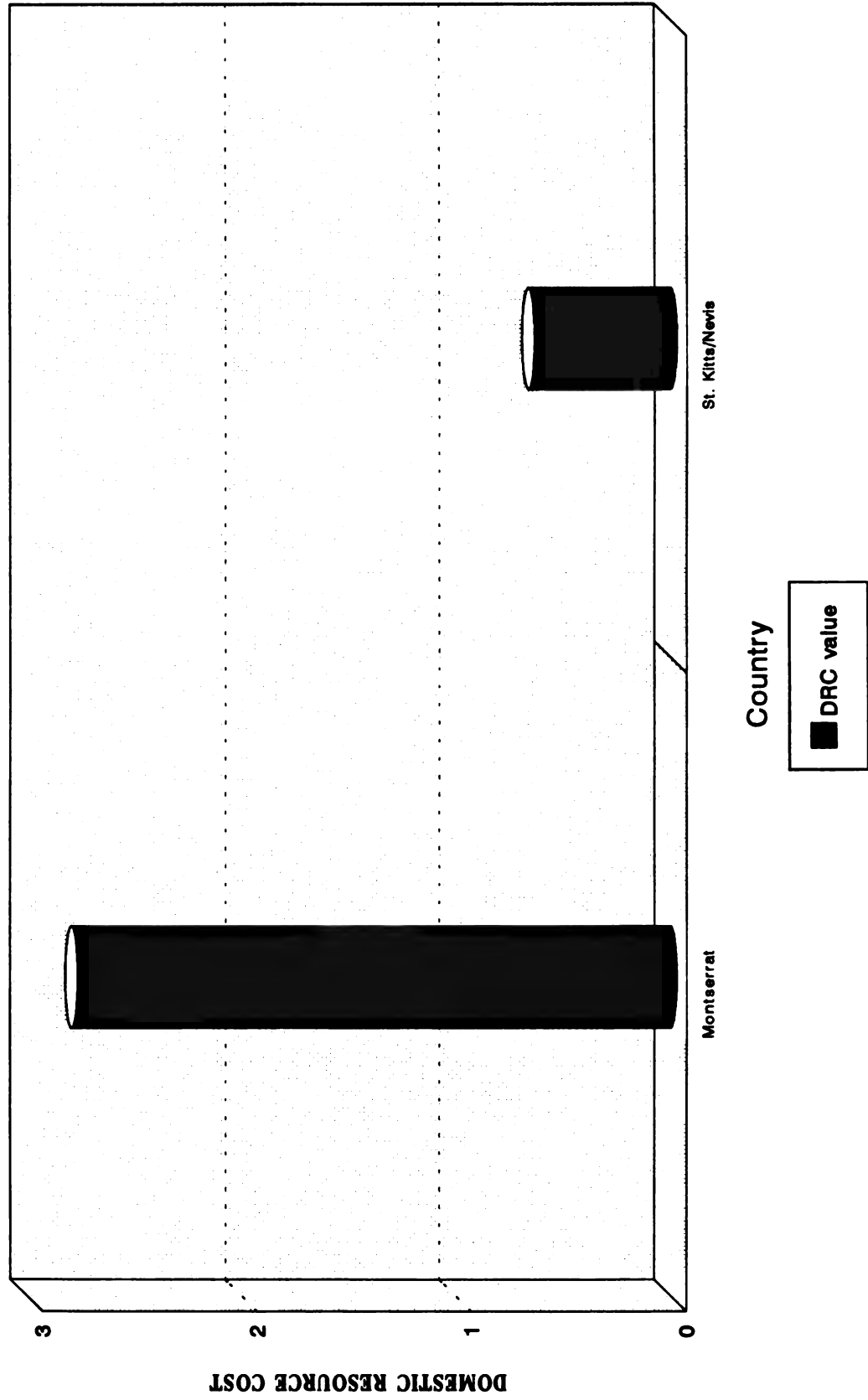


FIGURE 30.2. YIELD SENSITIVITY FOR WHITEPOTATO, 1992-93
Selected OECS Countries

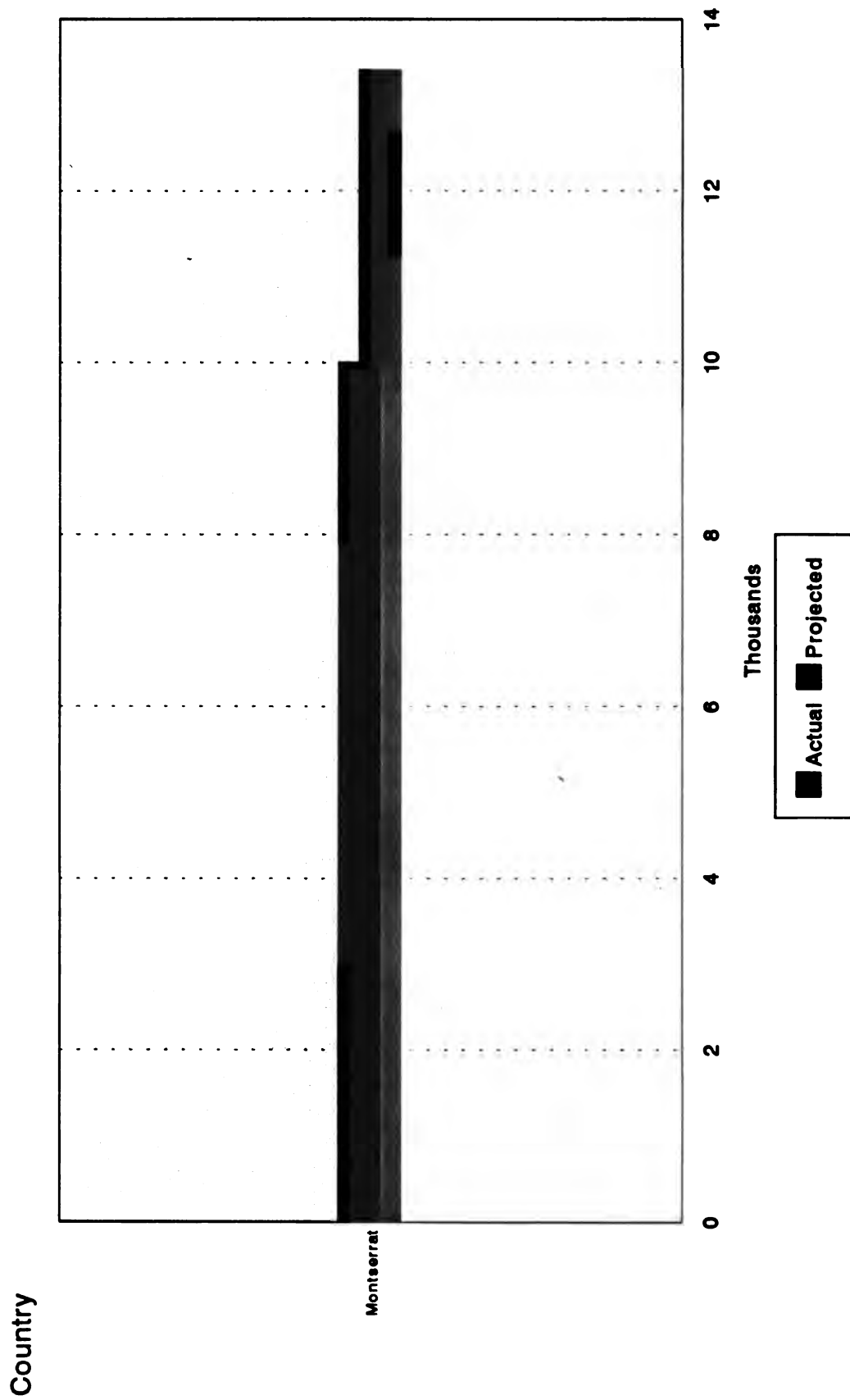


FIGURE 30.3. PRICE SENSITIVITY FOR WHITEPOTATO, 1992-93
Selected OECS Countries

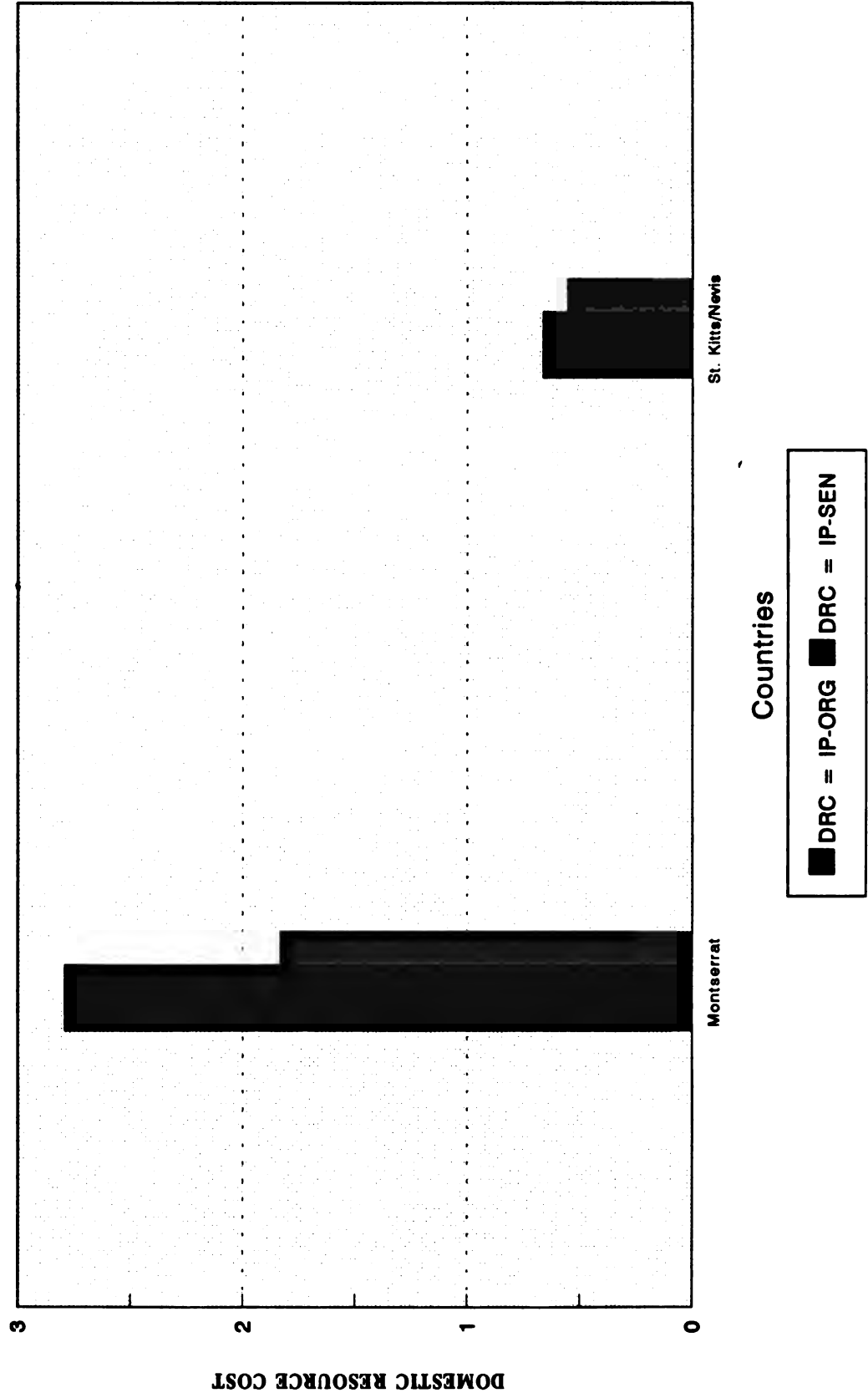
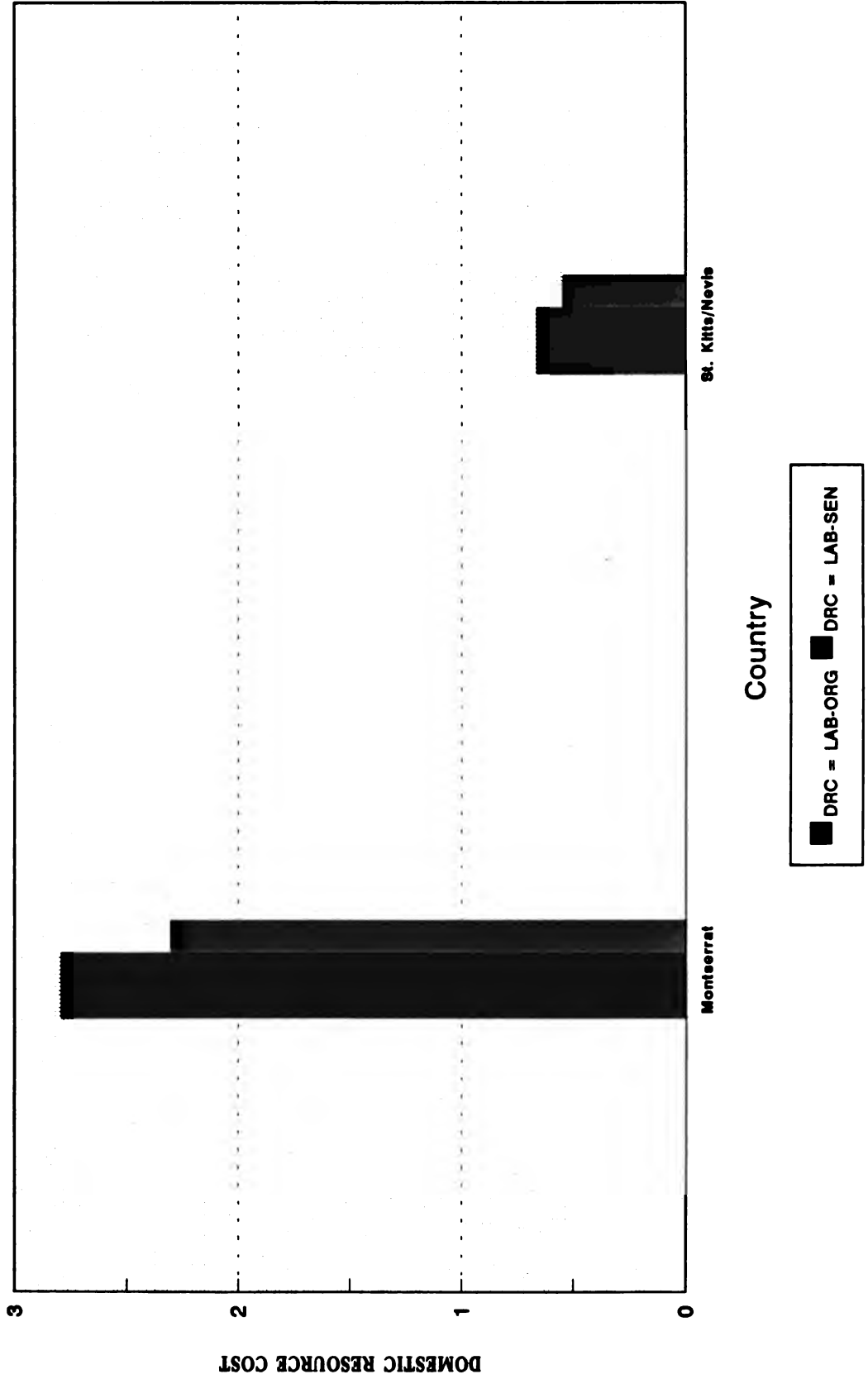


FIGURE 30.4. LABOUR SENSITIVITY FOR WHITEPOTATO - 1992-93
Selected OECS Countries



YAM

Figure 31.1 shows the results of the DRC analysis for yam production in Montserrat and St.Kitts/Nevis. A DRC ratio of less than unity indicates greater overall production efficiency and hence competitiveness. According to the results, only Montserrat is presently competitive in yam production. While producers in St.Kitts/Nevis could earn private profits from yam production, the DRC analysis suggests that in general the economy will not benefit from its production.

The DRC value for Montserrat of 0.46 indicates that the returns to domestic resources utilized in production are higher than would obtain in alternative enterprises. The available trade data indicates however, that Montserrat is not presently a large exporter of yam. Based on the results, Montserrat can save foreign exchange from domestic production of yam rather than relying on its importation. The competitive advantage of Montserrat may be associated with the relatively lower use of foreign inputs per unit of output and generally lower production costs. This suggests that given current prices, costs and the level of technology, Montserrat is likely to benefit substantially from production expansion and trade of yams.

The DRC of 1.65 for St.Kitts/Nevis is indicative of inefficiencies in production. Given the current production and price structure, the economy would save resources by importing rather than producing yam domestically. This implies that the activity is socially unprofitable but private producers may earn profits due to implicit transfers from consumers. Implicit government protection may also account for producers being privately profitable. The high DRC value for St.Kitts/Nevis suggests inefficiencies in domestic resource allocation and suggests that further investment would result in high social costs.

Since competitiveness depends on the non-intervention price for competing products, yields per acre and various cost components, an examination of the sensitivity of the results to changes in these key variables was undertaken. While the results indicate that St.Kitts/Nevis is not currently competitive in yam production, the low levels of technology and relatively high costs suggest that opportunities exist for improving competitiveness. Yield sensitivity tests were aimed at determining the improvement in yield levels necessary for St.Kitts/Nevis to achieve competitiveness. The results presented in Figure 31.2 indicate that increases of at least 17% would be required to generate a DRC coefficient of at least one. Under the current structure of production and price, this improvement appears attainable.

To assess the robustness of the competitive ranking to changes in these variables, tests of the sensitivity to variations in the non-intervention price and labour were conducted. The simulation result based on a 10% increase in NIP is reported in Figure 31.3. As expected, NIP increases resulted in both countries competitive advantage becoming more favorable although the relative impact varied between the countries. The DRC coefficient of 1.65 under the base model declined in absolute value to 1.18 under the NIP simulation, indicating improved competitiveness. In spite of the improvement in competitive advantage, the reduction in the coefficient was not sufficient to cause St.Kitts/Nevis to switch from being uncompetitive to being competitive.

The results of the labour sensitivity tests for yam shown in Figure 31.4 were similar to those obtained under the NIP simulation. Assuming increased efficiency in agricultural labour, led to a reduction in the absolute value of the DRC, i.e improved competitiveness in both countries. The primary objective of the analysis however, is to rank countries. In this regard the results of both simulations (NIP and labour) suggest that, although the countries' competitive advantage/disadvantage is more favorable than under the base model, their relative competitive ranking vis-a-vis each other remains unchanged. The results under both simulations therefore reinforce those derived via the base model.

Generally, the results in Figure 31.1 suggest that presently, St.Kitts/Nevis could save foreign exchange from sourcing its requirements of yam via imports. Based on the analysis, it does not appear that St.Kitts/Nevis could enhance its competitiveness without structural changes in the level of technology, productivity and costs. The results also indicate that Montserrat has competitive advantage in yam production relative to St.Kitts/Nevis. These results imply that it is feasible for Montserrat to expand production, and that the production and trade of this commodity is likely to remain competitive in a more liberalized trading environment.

FIGURE 31.1. DOMESTIC RESOURCE COST - YAM, 1992-93
Selected OECS Countries

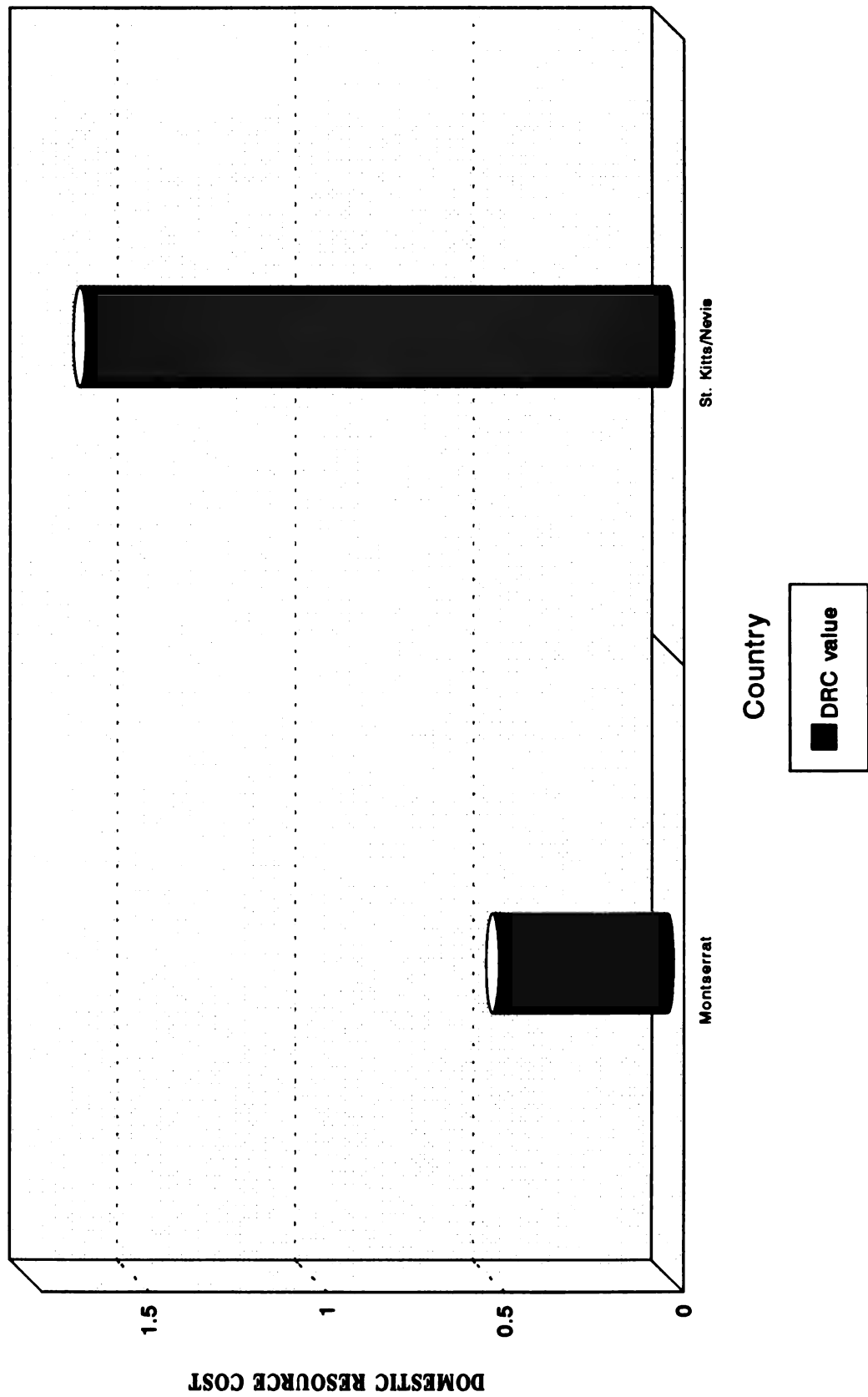


FIGURE 31.2. YIELD SENSITIVITY FOR YAM, 1992-93
Selected OECS Countries

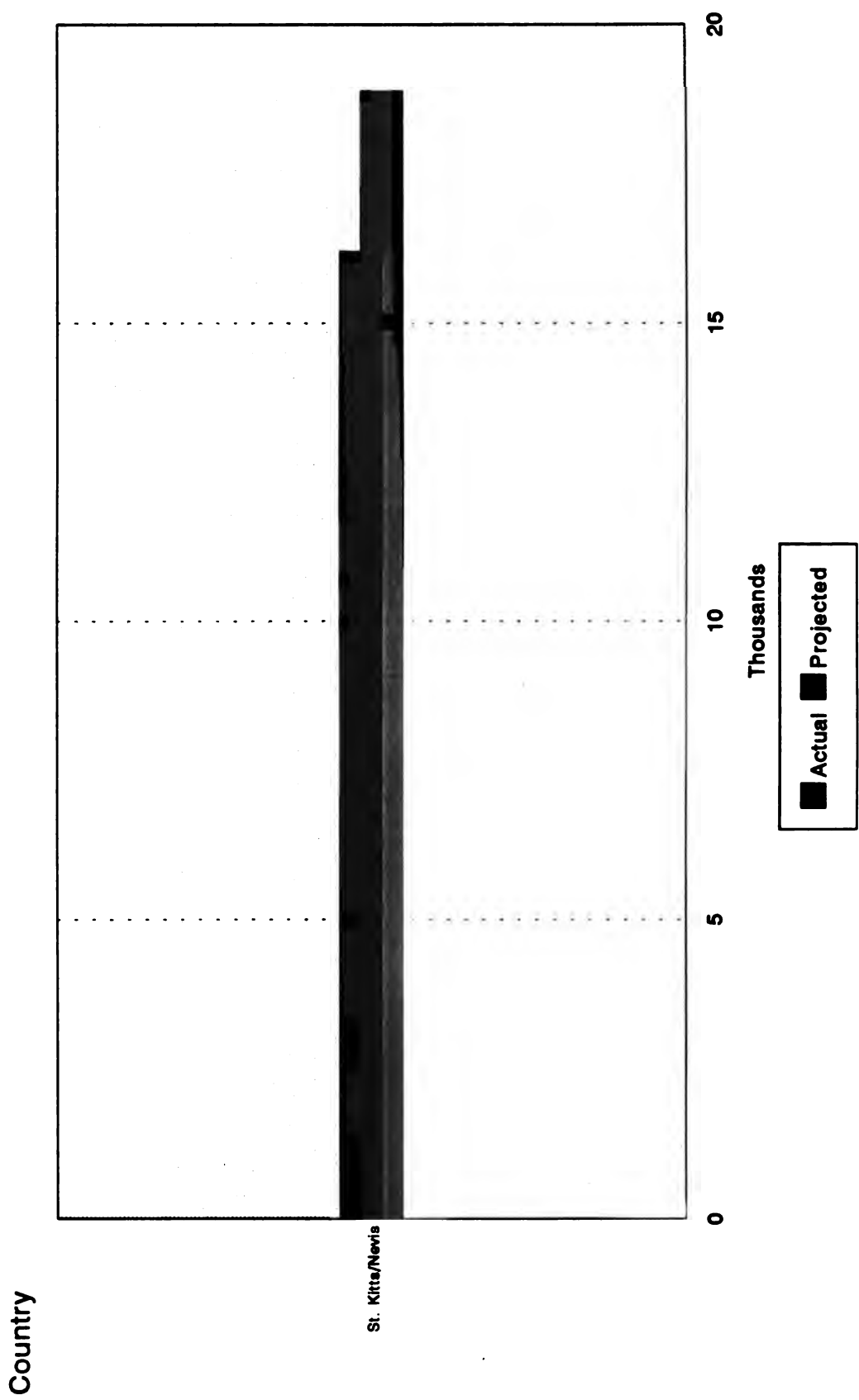


FIGURE 31.3. PRICE SENSITIVITY FOR YAM, 1992-93
Selected OECS Countries

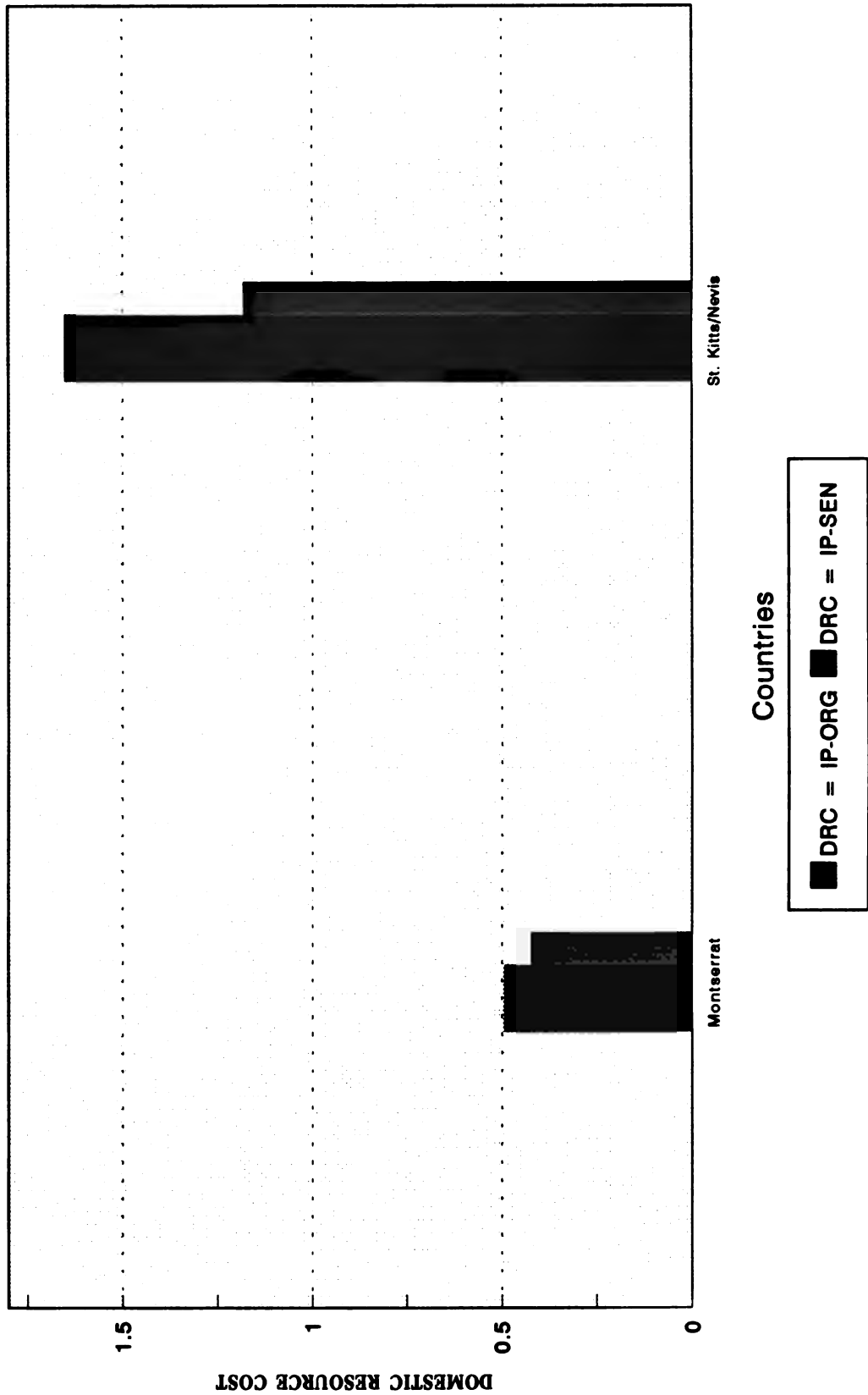
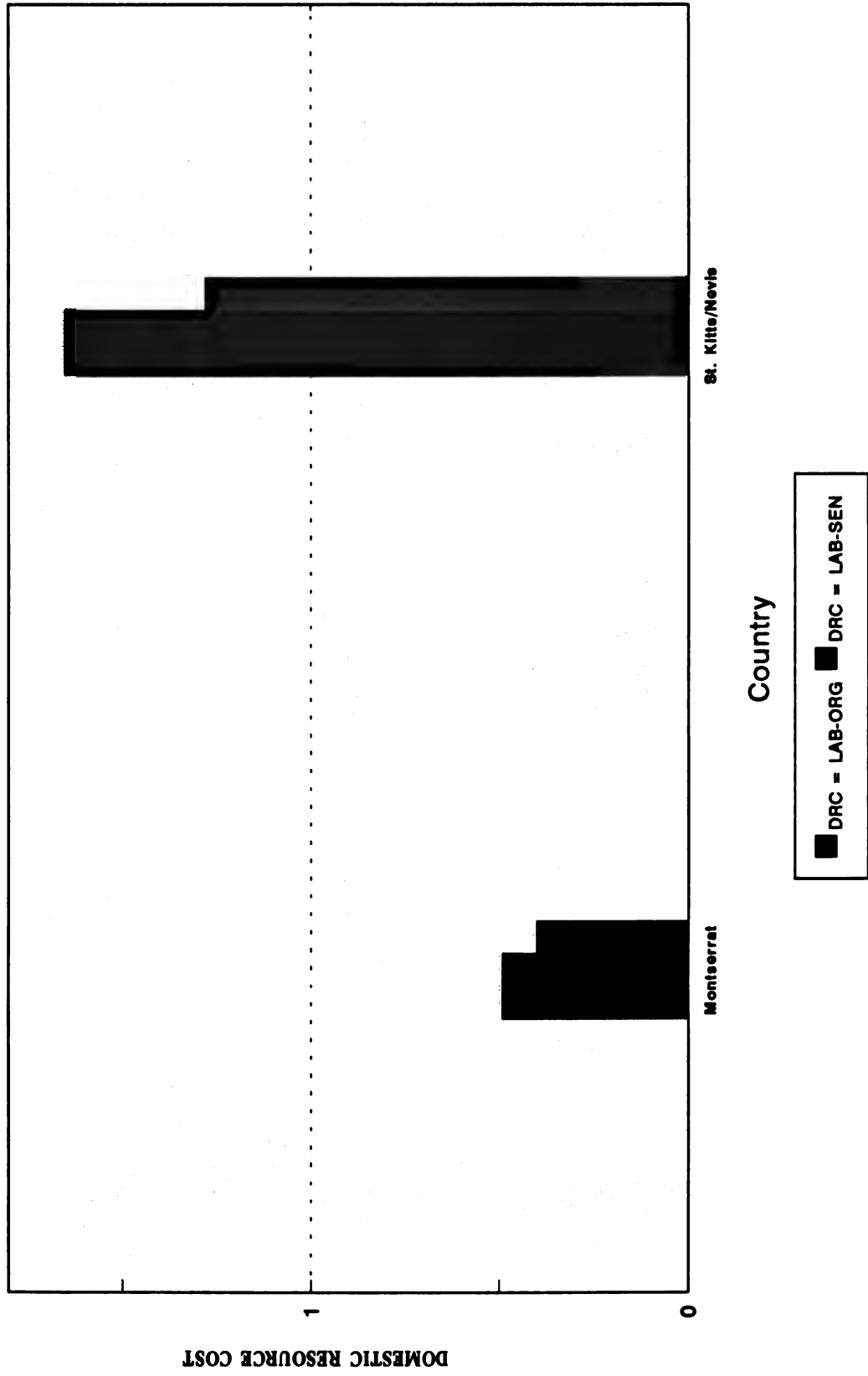


FIGURE 31.4. LABOUR SENSITIVITY FOR YAM - 1992-93
Selected OECS Countries



Cross-Country Analysis of Competitiveness



ANTIGUA

Figure A.1 shows the DRC results for eleven commodities included in the analysis for Antigua. Of the eleven commodities, Antigua has an absolute competitive advantage in the production of three of these commodities: papayas, pineapples and avocados. This implies that these are the most appropriate agricultural enterprises in that they generate net foreign exchange earnings and compete favorably for resources within Antigua.

The DRC of 1.05 for sweet potato indicates that production will result neither in foreign exchange earnings nor losses for Antigua. The low level of technology employed in Antiguan agriculture suggests that opportunities exist for improving the competitiveness of sweet potato based on increased attention to improving yields and reducing production costs. The simulation results further suggest that the percentage improvement in yield required to reduce the DRC of sweet potato to unity is only 4%. Thus, even though initiatives aimed at increasing productivity and reducing cost may be instituted, there is still no guarantee that the enterprise will become competitive.

The DRC results in Figure A.1 also indicate that Antigua is not an efficient producer and therefore does not currently have a competitive advantage in production of the remaining seven commodities. The DRCs for these commodities indicate that the returns to domestic resources (measured in foreign exchange) in production are lower than would obtain in alternative enterprises. While producers are able to earn profits from the production of these commodities, sourcing the country's incremental requirements through importation would result in net foreign exchange savings from an economy-wide standpoint. This implies that while the production of these commodities is socially unprofitable, private rents accrue to producers as a result of the implicit transfers induced by policy interventions. While the results imply that the production of hot peppers, mangoes, watermelons and onions is not presently competitive, the low levels of technology and associated low yields suggest that substantial opportunities may exist for improving competitiveness.

Since competitiveness depends on the non-intervention price for competing products, yields per acre and various cost components, analysis was carried out to determine the sensitivity of the DRC coefficients to changes in these variables. Yield sensitivity was undertaken to identify the improvement in yields necessary to make production competitive (i.e. necessary to generate a DRC coefficient of at least one). The results of the yield sensitivity indicate that based on the prevailing structure of cost and technology, yields in the order of 36% would be required for hot pepper, 43% for mangoes, 31% for watermelons and 47% for onions, if Antigua is to be competitive in the production of these commodities.

The DRC for pumpkins (-0.56) suggests that incremental production of pumpkins will result in negative foreign value added or foreign exchange losses, given the present level of yields and technology. Additional resource investment, particularly in pumpkin production constitutes an extremely costly method of saving foreign exchange since the resource costs exceed the price at which the product could be sold in international markets in the absence of policy intervention and implicit government support.

Simulation analysis was also carried out to assess the sensitivity of the commodity DRCs to changes in various technical coefficients. To assess the impact of changes in the non-intervention price (NIP) on the competitive advantage rankings, NIP simulations based on variations of 10% for root crops and fruits and 15% for vegetables were conducted. The results in Figure A.2 indicate that the absolute values of the DRC were reduced for all commodities, indicating improvements in their potential foreign exchange earning capabilities. This notwithstanding, the rankings remain unaltered. Sweetpotato, which was previously uncompetitive in the base model, becomes competitive under the NIP simulation.

The sensitivity of competitiveness rankings to distortions in the labour market was also undertaken. The results of the labour simulation are presented in Figure A.3. These results were similar to that of the NIP, which indicated general improvements in individual crop performance. Again, the ranking of commodities remained unaltered relative to the base model scenario. Sweet pepper which utilizes proportionately more labour than any of the other enterprises remained uncompetitive as did cucumber, hot pepper, mango, melon, onion, and pumpkin.

The results of the sensitivity analysis are consistent with those obtained under the base model, which suggest generally that Antigua is not presently competitive in the production of cucumber, hot pepper, mangoes, watermelon, onion and pumpkins. The results in the base model (Figure A.1), suggest that re-allocation of the resources presently employed in the production of these commodities could potentially result in foreign exchange earnings and enhanced producer welfare.

FIGURE A.1. DOMESTIC RESOURCE COSTS - ANTIGUA, 1992-93
Selected Commodities

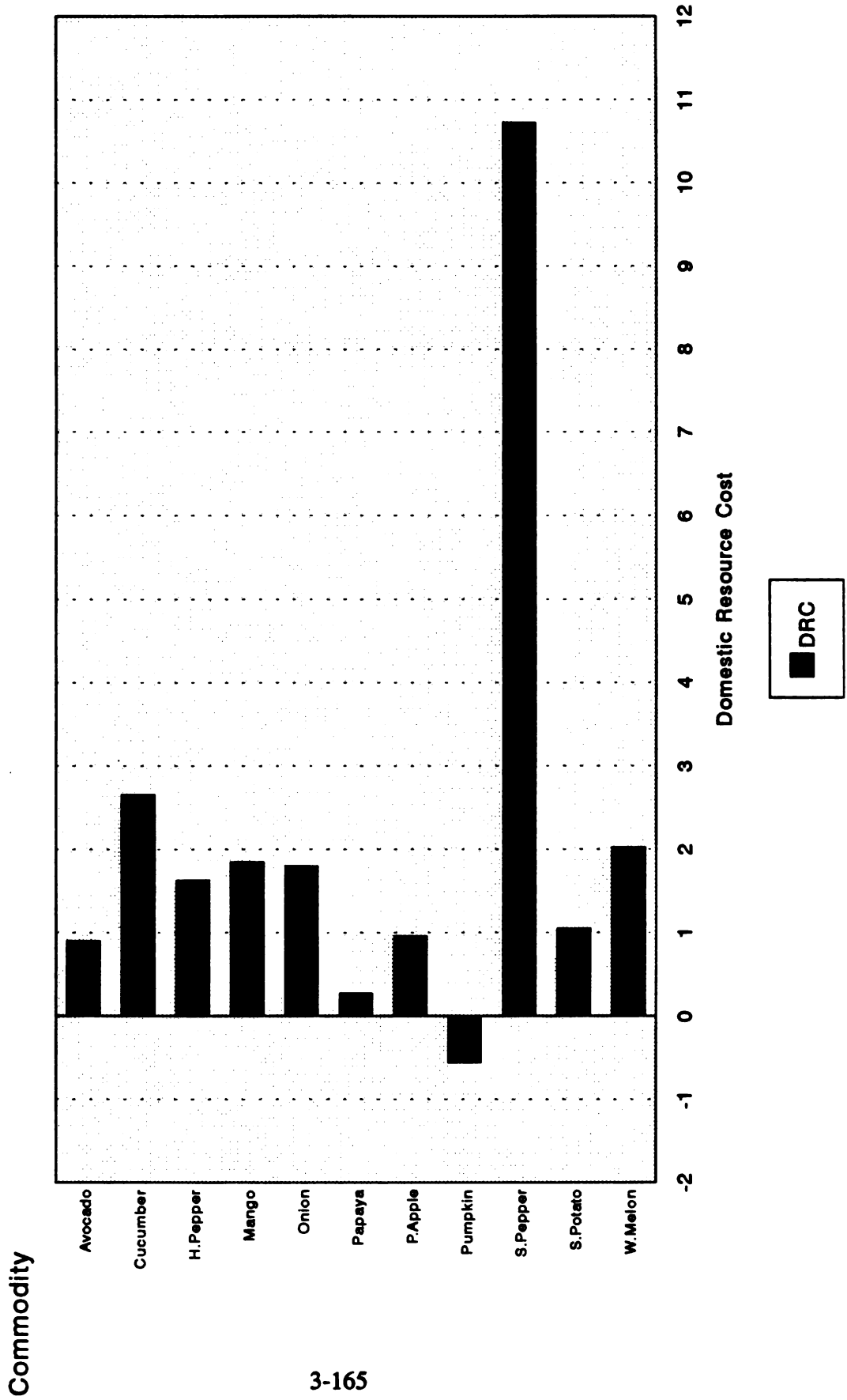


FIGURE A.2. PRICE SENSITIVITY - ANTIGUA, 1992-93
Selected Commodities

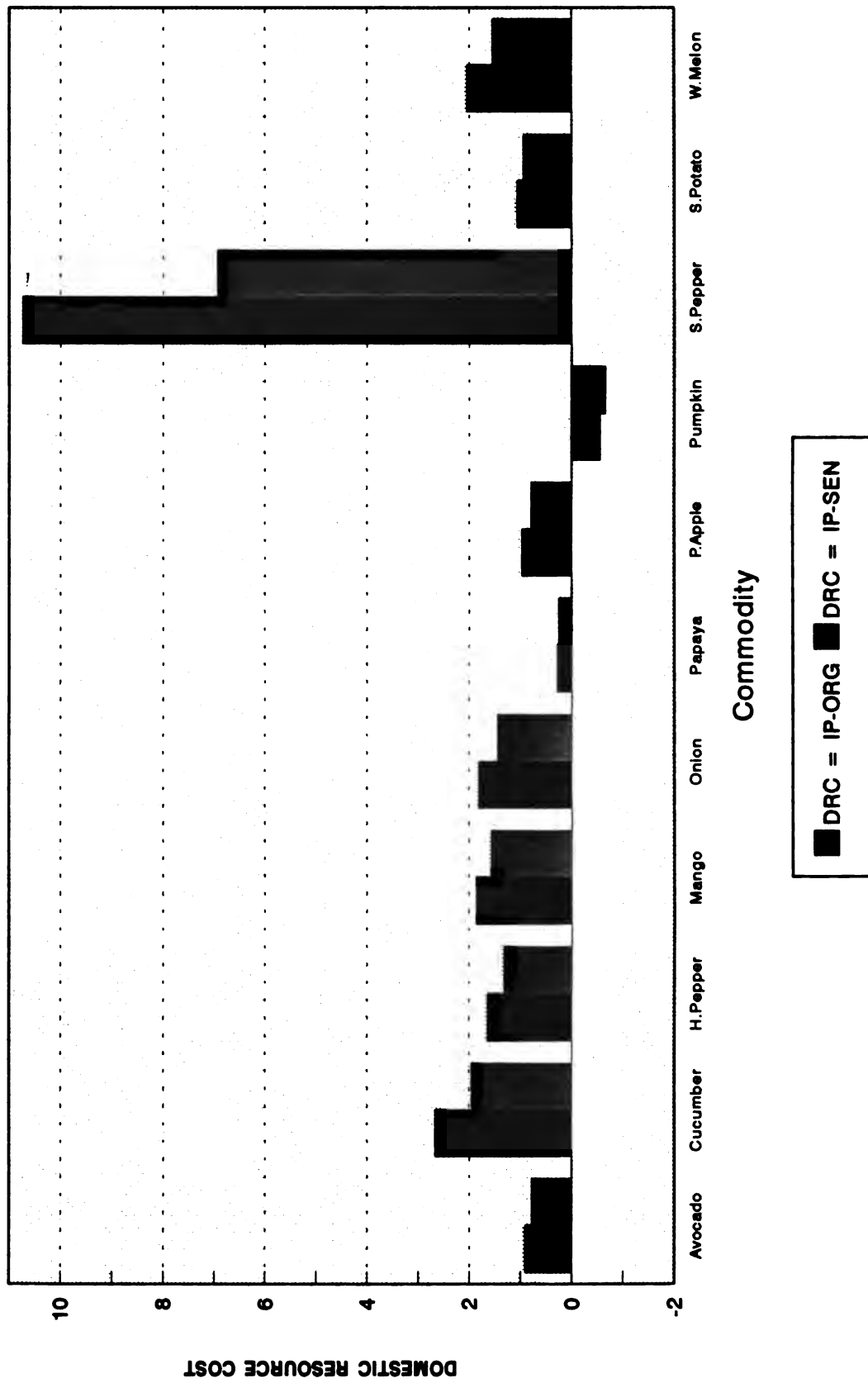
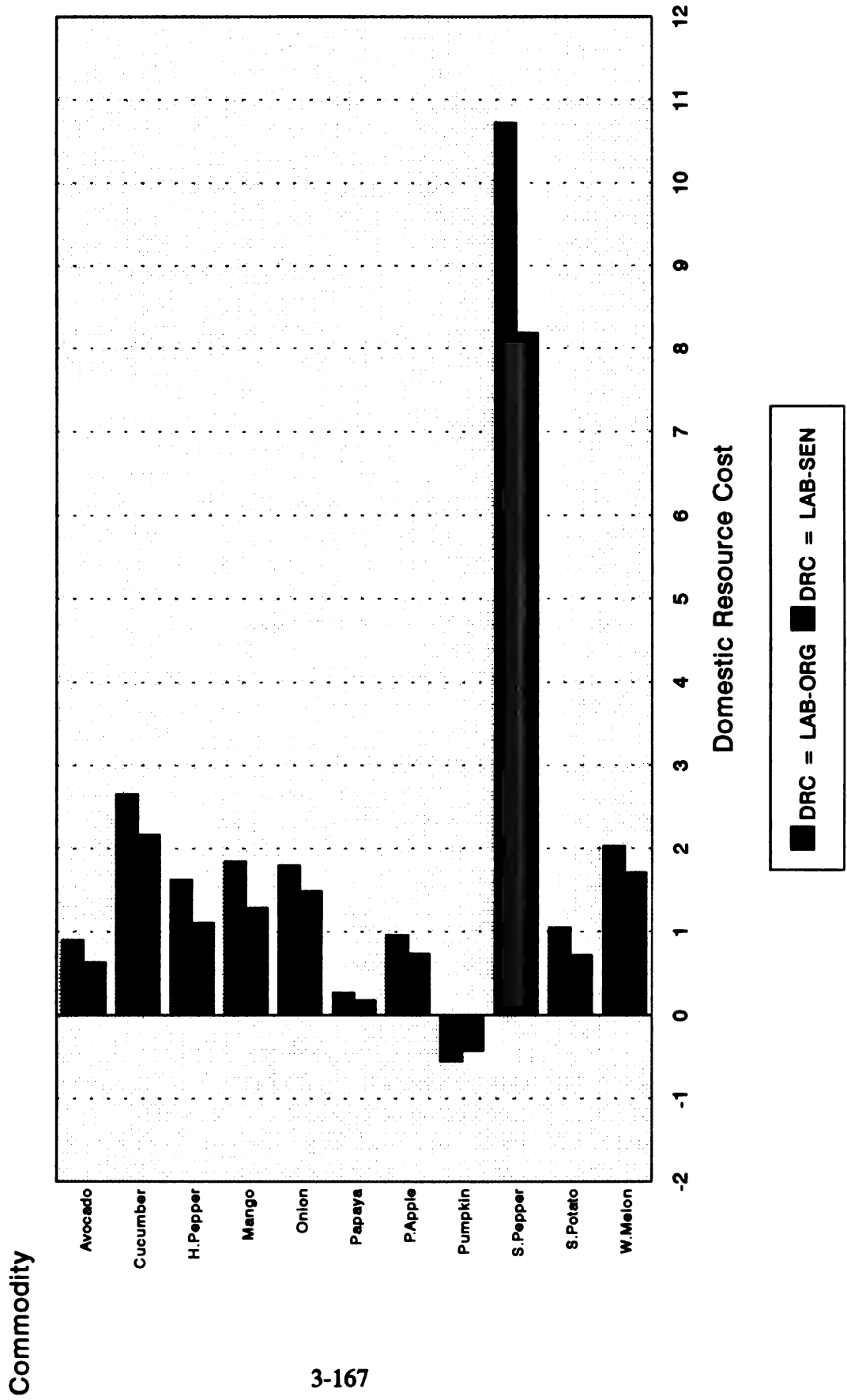


FIGURE A.3. LABOUR SENSITIVITY - ANTIGUA, 1992-93
Selected Commodities



BRITISH VIRGIN ISLANDS

DRC ratios for the non-traditional commodities included in the study for the British Virgin Islands (Tortola) are shown in Figure B.1. A distinctive feature of the DRC ratios for this country is that they are all negative, indicating that the resources presently devoted to production have more profitable alternatives. Initially this result may seem to be at variance with a priori expectations, since agriculture is highly subsidized in the BVI, however, both the lower level of productivity and the relatively higher wage structure in BVI agriculture vis-a-vis other OECS countries, induced by a booming tourism sector, have contributed to the non-competitiveness status for the non-traditional crops included in this study.

Based on the results in Figure B.1, incremental production of all seven commodities will result in foreign exchange losses. Production of eggplant, given current yields and the level of technology will be the greatest foreign exchange loser, followed by cucumber, squash, watermelon, mango and avocado. Of all these commodities, it is the incremental production of tomatoes that results in the smallest foreign exchange leakage. The results indicate that while production of these non-traditional crops are socially unprofitable they remain privately profitable due to the distortions created by government grants and subsidies.

The results also suggest that producers may be making economic losses by engaging in the production of these commodities, since the potential exists for greater earnings in some alternative economic activity. It would also seem that producers are engaging in production of these commodities for reasons other than the pursuit of profits (both economic and private). As such, even though the returns on resource utilization may be negative, producers may be resistant to the idea of abandoning farming altogether. The fact that most of the individuals engaged in agriculture in the BVI do so on a part time basis, would also seem to suggest that these perverse DRC ratios, may be explained by a combination of these factors.

Since the DRC measure of competitiveness depends on the non-intervention price for competing products, yields per acre and various cost components, further analysis was carried out to test the sensitivity of the DRC coefficients to changes in these variables. Yield sensitivity tests were aimed at identifying the incremental improvements in yield levels required to make the enterprise competitive (i.e. necessary to generate a DRC coefficient of at least one). The results indicated that based on the prevailing structure of cost and technology, yields for cucumbers and tomatoes will have to improve by better than 700% if these enterprises are to become competitive. The required yield increase in the remaining crops ranged from 160% for eggplants to 490% for melons based on prevailing wages, prices and the level of technology employed in BVI agriculture.

The current low levels of yields in the BVI appear to be related in part, to the low rate of pesticide and other chemical input utilization in agriculture. While much of the BVI's consumer demand is for locally produced 'organic' fresh fruits and vegetables, if agricultural producers are to become truly competitive in the domestic market it will be necessary for beneficiary consumers to pay more for the improved quality of these "near organic" commodities.

Sensitivity analysis was also undertaken to test the robustness of the relationship between the competitiveness rankings and the non-intervention price. The non-intervention price for vegetables and root crops was increased by 15% and 10% respectively, reflecting the upper boundary of price variations after accounting for marketing margins. The results of this simulation are given in Figure B.2. They indicate that increasing the non-intervention price did not result in improved competitiveness for any of the seven commodities investigated. This implies that factors more endemic than the product price are instrumental in affecting the agricultural competitiveness for these seven commodities in the BVI.

The principal focus of this study continues to be the ranking of commodities, as opposed to absolute DRC ratios. In this respect, the results indicate that the ranking of commodities remained unchanged under the NIP simulations. Tomatoes received the highest rank and eggplants the lowest. The results of the sensitivity analysis are therefore consistent with the results obtained from the base model, which suggested that the BVI can save foreign exchange from sourcing its requirements for these commodities from elsewhere.

Computation of the DRC coefficients is based on estimates of the shadow valuation of the factors utilized in the production process. The factor which conventionally received most attention because of its importance (share in total cost) to the overall production costs of the farm-firm, was labour. As such, sensitivity analysis was conducted on the conversion factor (CF) for labour which was assumed to be 0.57 instead of the estimated value of 0.95 for BVI agriculture¹⁰. The results of the simulation are given in Figure B.3.

The results of the simulation suggest that assuming a lower CF for labour leaves unchanged the non-competitive nature of all seven non-traditional enterprises. The DRC coefficients have however, become smaller in absolute value indicating some improvements in individual crop performance. Of greater significance however, is the fact that the rankings of commodities are altered relative to the base model. Both avocados and mangoes, crops which utilize proportionately more labour than the other five enterprises, now rank highest while eggplant continues to occupy the lowest rank. Tomato which previously attained the lowest rank under the base model simulation, now ranks with the watermelon and squash enterprises for which the DRC coefficients were comparatively higher under the base model. In general, the results of the sensitivity analysis indicating the lack of competitiveness in the BVI for the seven crops investigated, were found to be quite robust.

The analysis serves to highlight the complex interaction of factors which underscore competitiveness in the BVI. In general, it appears that the competitiveness of the seven crops included in the present analysis will not be improved without significant structural change in both the level of technology, productivity and the structure of costs in the BVI. The results also suggest that agriculture in the BVI will be hard pressed to be profit maximizing relative to existing non-agricultural alternatives.

¹⁰Justification for the use of this conversion factor (CF) for labour is given in the appendix.

FIGURE B.1. DOMESTIC RESOURCE COSTS - BVI, 1992-93
Selected Commodities

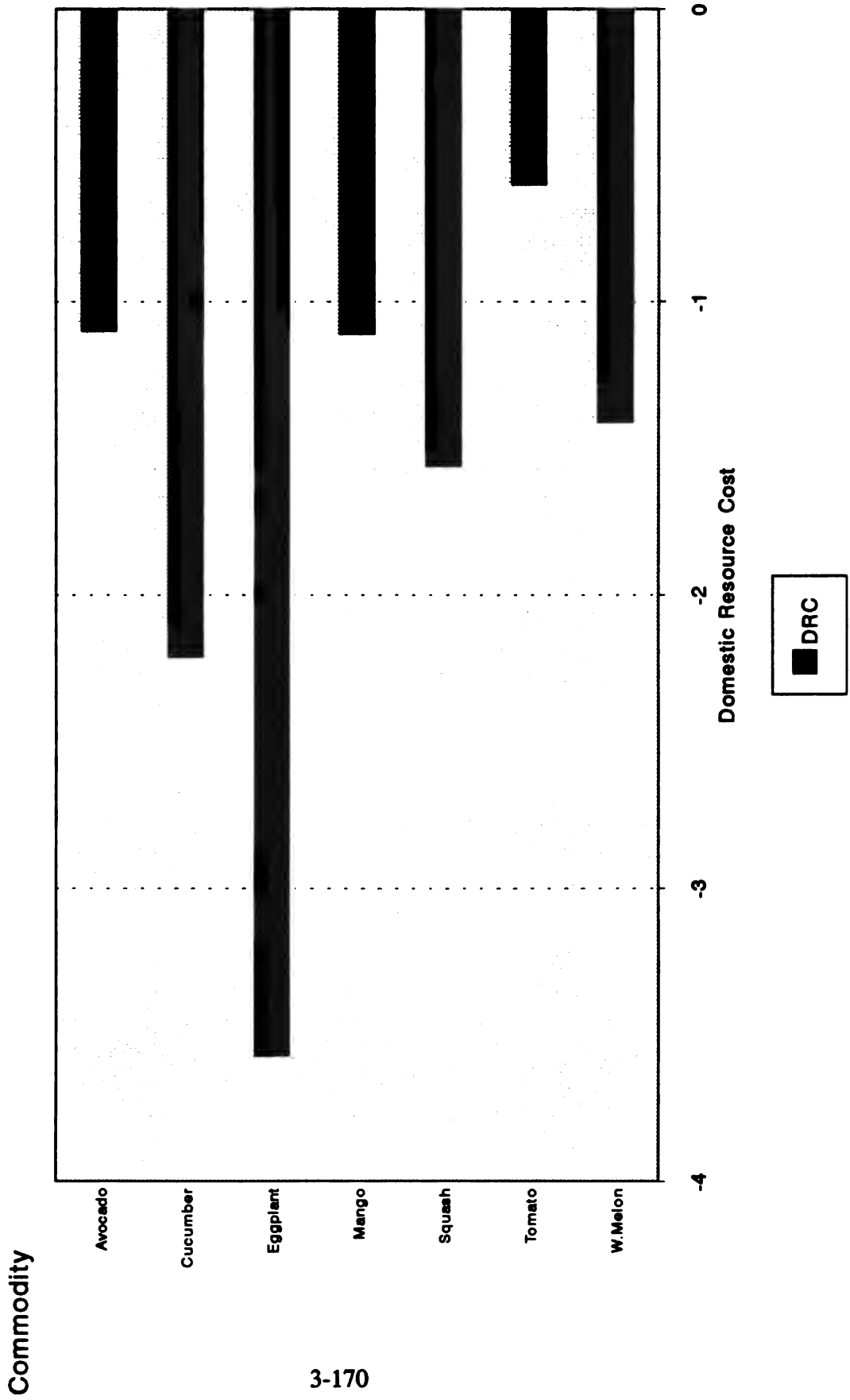


FIGURE B.2. PRICE SENSITIVITY - BVI, 1992-93
Selected Commodities

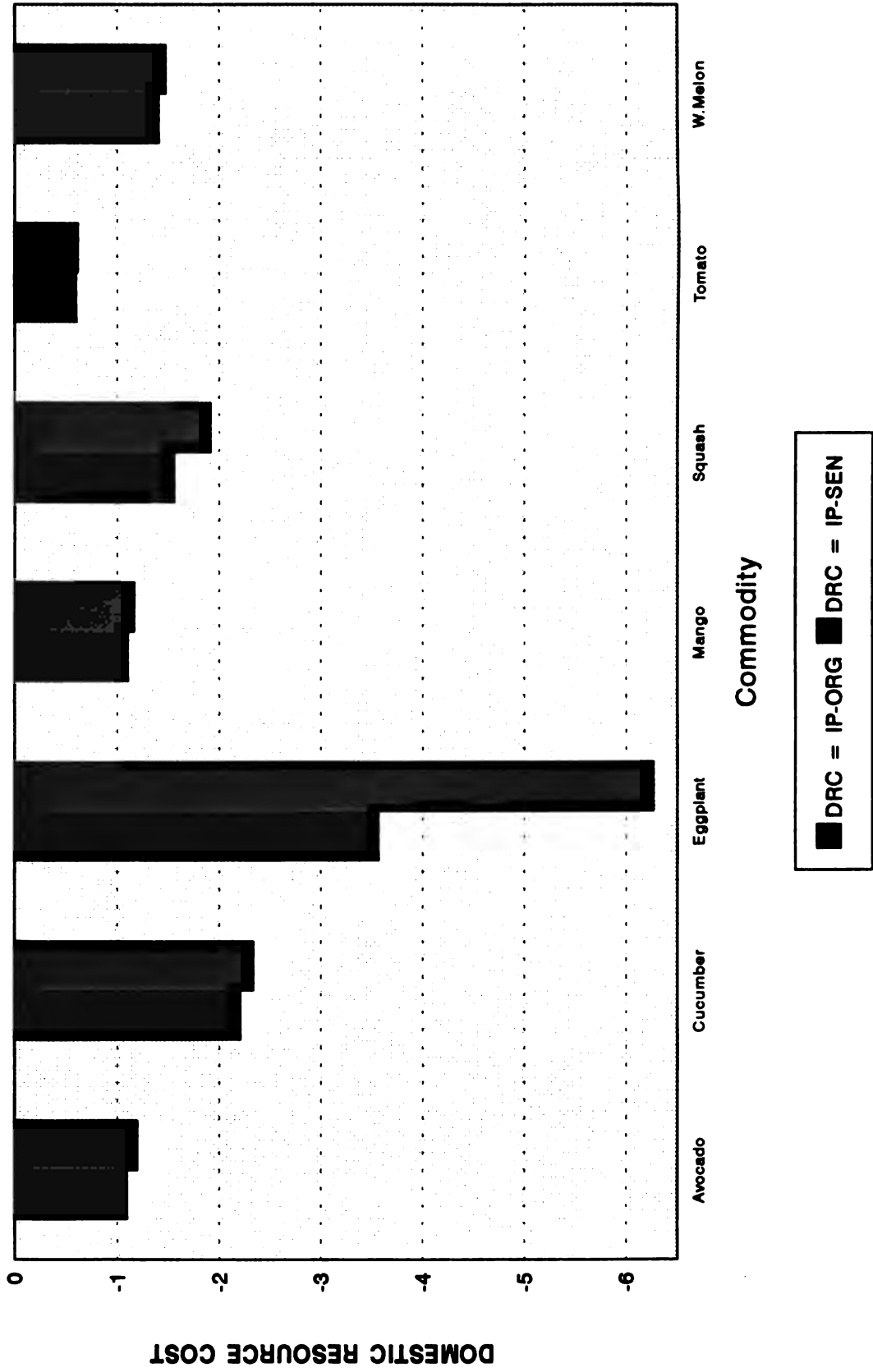
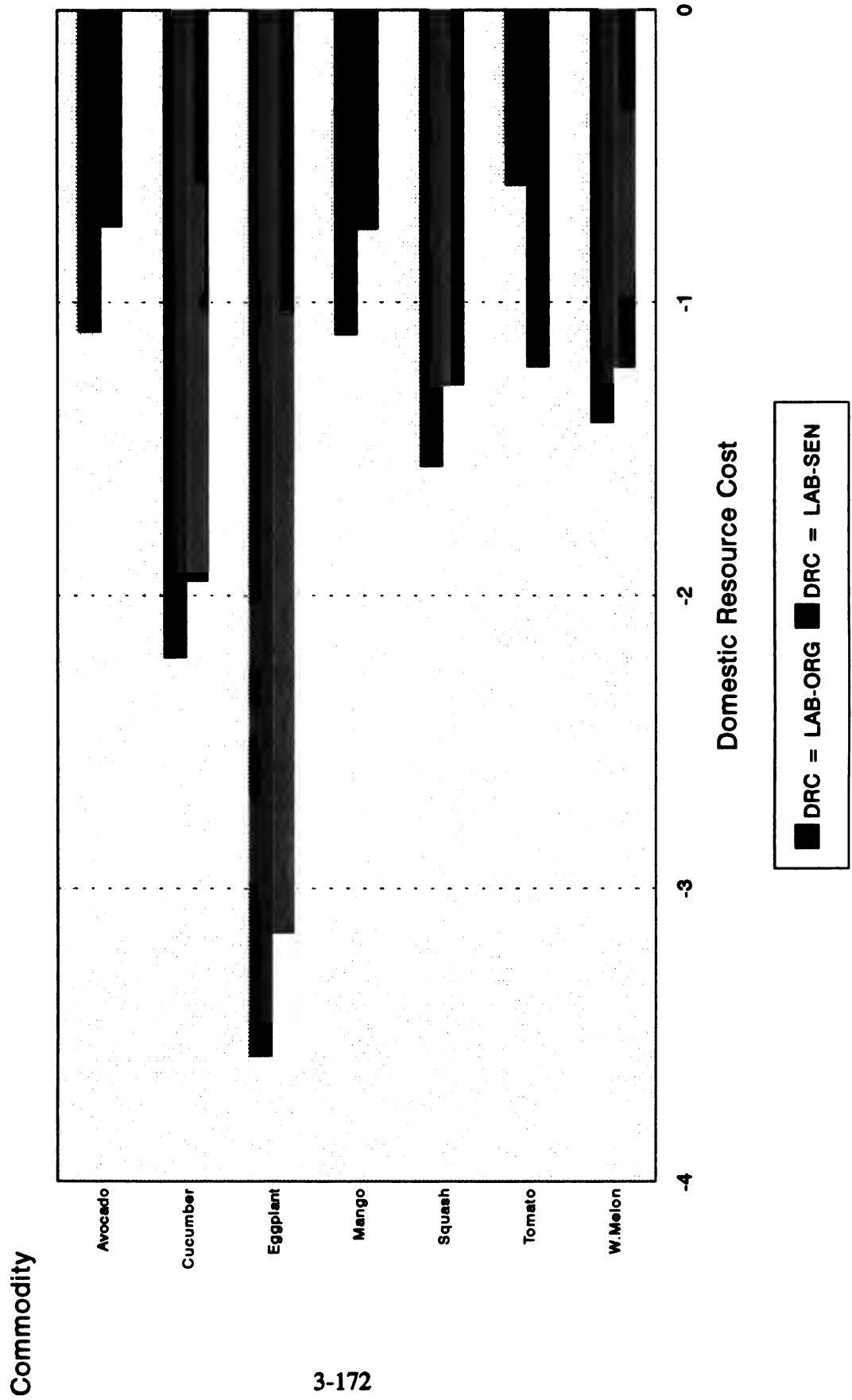


FIGURE B.3. LABOUR SENSITIVITY - BVI, 1992-93
Selected Commodities



DOMINICA

Figures D.1(a)/(b), show that of the fourteen non-traditional commodities included in the analysis, the DRC ratios for eleven of the commodities were positive and less than unity. This suggests that, with the exception of anthuriums and ginger lilies, Dominica has an absolute competitive advantage in the production and trade of the non-traditional crops included in the study. This implies that these eleven non-traditional enterprises compete effectively for resources within Dominica and hence can potentially earn foreign exchange in international trade.

Notwithstanding that eleven of the fourteen commodities possess DRC values of less than one, a wide spread in the absolute values of the DRC is evident from Figures D.1(a)/(b). The spread is indicative of the varying production efficiencies from one diversification enterprise to another. According to the results, papaya had the lowest DRC value and anthurium the highest. The spread in the absolute values of the DRCs can also give an indication of the foreign exchange earning capability of the enterprises. Thus, the social profitability of papaya production is higher relative to all other non-traditional enterprises included in this study.

While the DRCs for breadfruit and golden apple were calculated for Dominica, this was done based on technical coefficients for Grenada and St. Vincent. This was done to assess whether Grenada and St. Vincent had a competitive advantage in the production of these commodities based on unique factors, or whether their competitiveness was based on the natural proliferation of these commodities.

While papaya, avocado and mango appear to be competitive based on the DRCs, such DRCs were calculated on the basis of information for disease-free production. Disease infested acreage however, will result in lower yields and higher per unit costs of production. For acreage affected by bunchy-top and erwinia (papaya) and root-rot and anthracnose (mango and avocado) these DRC estimates may be somewhat misleading. On the basis of sensitivity analysis, the DRC values for avocado and mango were quite sensitive to variations in both yields and pest and disease control. Production decisions on the basis of the DRC results will therefore depend on a case by case analysis which should incorporate these factors to the extent that they impact production. The results suggest that in the absence of pest and disease infestation and based on the current structure of cost and technology, papaya, mango and avocado production and trade in Dominica can potentially result in net foreign exchange earnings/savings.

That the DRC ratios for passionfruit, dasheen, sweet potato and ginger are relatively closer to one than for the other non-traditional commodities is indicative of the high proportion of non-domestic factors in unit costs relative to the non-intervention price (or the price for which similar products can be purchased from major competitors). Lower DRCs and hence higher levels of social profitability therefore could be attained through, inter alia, more efficient utilization of imported inputs and productivity advancements.

The results in Figure D.1(a) also indicate that Dominica is not an efficient producer and therefore does not have a competitive advantage in the production of both pink/red anthurium and ginger lily. The DRCs for these commodities of 1.11/1.44 and 1.63 respectively, imply that while producers are able to earn profits from their production, incremental production of anthuriums and ginger lilies are socially unprofitable. More profitable alternatives may exist for

the resources presently employed in their production, both within agriculture and in other sectors. Based on the high DRCs, producing these commodities appears to be an inefficient means of earning foreign exchange. The results suggest that yields of 6% for pink, 22% for red anthurium and 25% for ginger lily are required to make production of these commodities competitive. Attainment of the requisite yield increases for local pink anthurium should be relatively simple based both on the small magnitude required and the ease with which the existing yield threshold can be raised. Such yield increases if realized, could contribute both to economies of scale in production and to a consequent lowering of unit cost.

To assess whether the competitive advantage rankings were sensitive to changes in the technical coefficients, sensitivity analysis was employed. Increases in the non-intervention prices of 15% for vegetables and 10% for root crops and flowers were simulated. The results of the simulations given in Figures D.2 (a)/ (b) and D.3(a)/(b), indicate that while the absolute values of the DRCs improve (decline in absolute value of the DRC), as a result of the NIP increases, commodity rankings remain fairly consistent relative to their base model positions. This suggests that the DRC results are fairly robust to variations in the non-intervention price. The simulation resulted in another noteworthy change relative to the base model scenario. Pink anthuriums, which were uncompetitive under the base model, become competitive under the simulation model. Red anthurium production however, still remains uncompetitive implying that factors other than the product price, accounted for that commodity's inability to compete.

Measurement of the sensitivity of the DRC coefficients to variations in the conversion factor (CF) for labour was also employed to assess the sensitivity of competitiveness to assumptions made in regard to distortions in the agricultural labour market in Dominica. Estimating correct social prices for labour is important in the computation of the DRC coefficients, particularly where production alternatives differ significantly in their labour requirements and evidence suggests that labour market distortions may be present. The magnitude of these distortions for Dominica may be smaller than in other OECS countries, for instance St.Lucia, due to the absence of a major competing economic sector.

The results of this simulation, presented in Figures D.3(a)/ (b), suggest that if agricultural labour was more inefficient than the estimated value suggests, the absolute value of the DRC for all fourteen commodities included in the study would be smaller. Lower DRC values imply lower social production costs and result in improvements in individual crop competitiveness. Despite reductions in the absolute value of the DRCs resulting from the labour simulation, the ranking of commodities remained consistent with those indicated by the base model. The reduction in the absolute value of the DRC for pink anthurium to unity makes production of the commodity just competitive. Incremental production will therefore result in neither foreign exchange earnings or losses.

In general, the results of the analysis suggest that the non-traditional commodities included in the study for Dominica have fairly good survival prospects in an environment which reduces overall protection for agriculture. Resource concentration in the production of the crops possessing lowest the DRC could result in net foreign exchange earnings for that country.

FIGURE D.1(a). DOMESTIC RESOURCE COSTS - DOMINICA, 1992-93
Selected Commodities

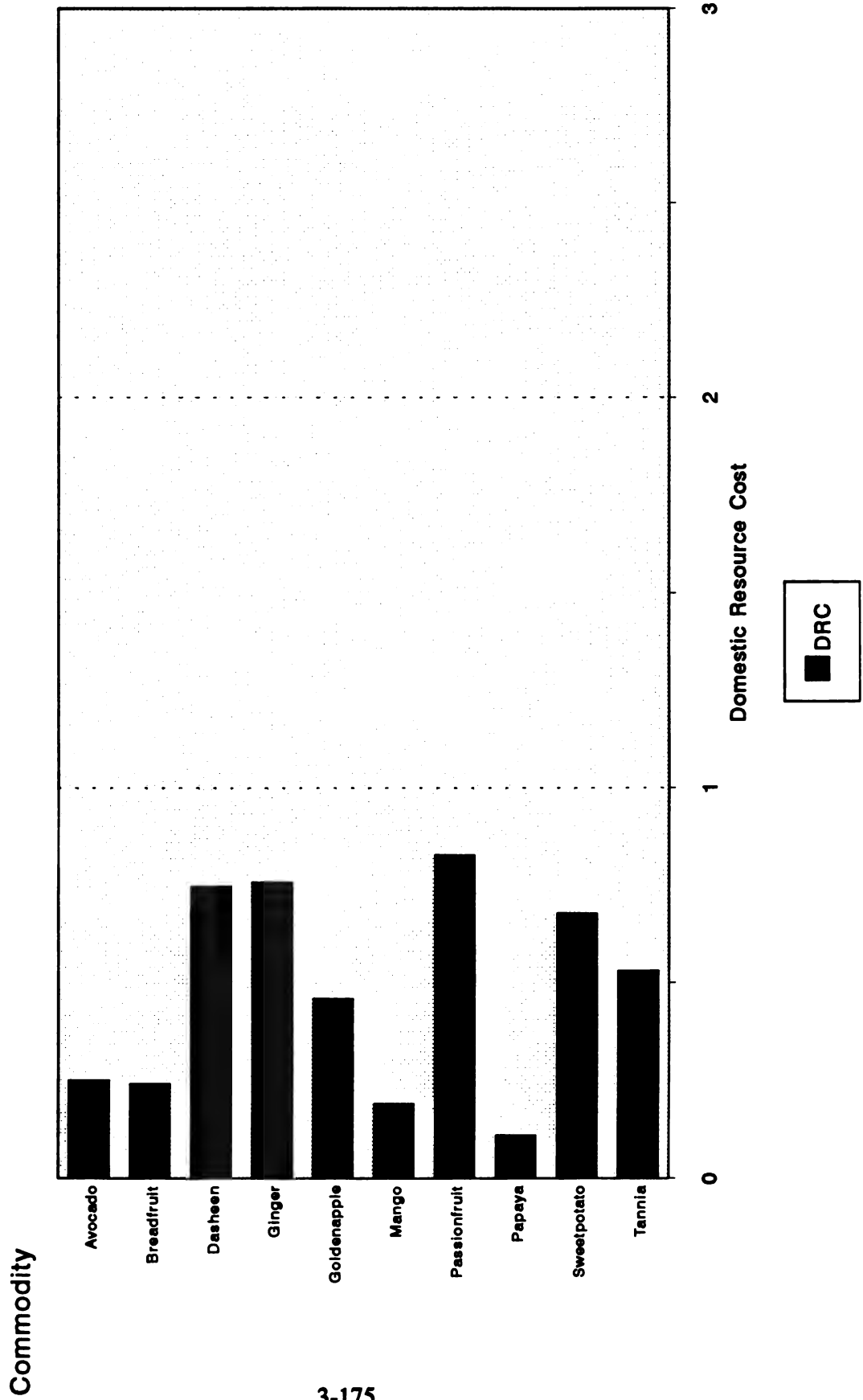


FIGURE D.1(b). DOMESTIC RESOURCE COSTS - DOMINICA, 1992-93
Selected Commodities

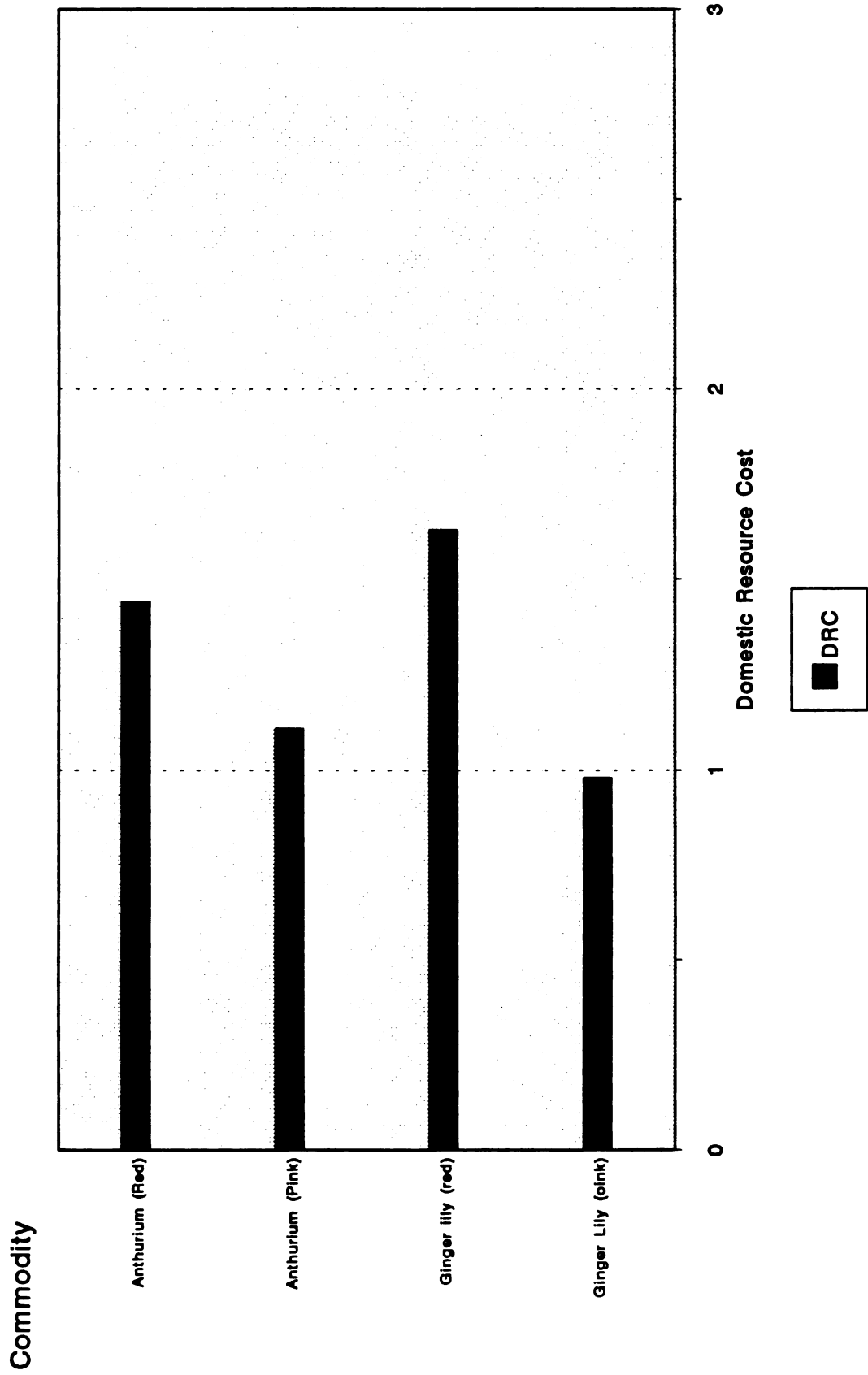


FIGURE D.2.(a). PRICE SENSITIVITY - DOMINICA, 1992-93
Selected Commodities

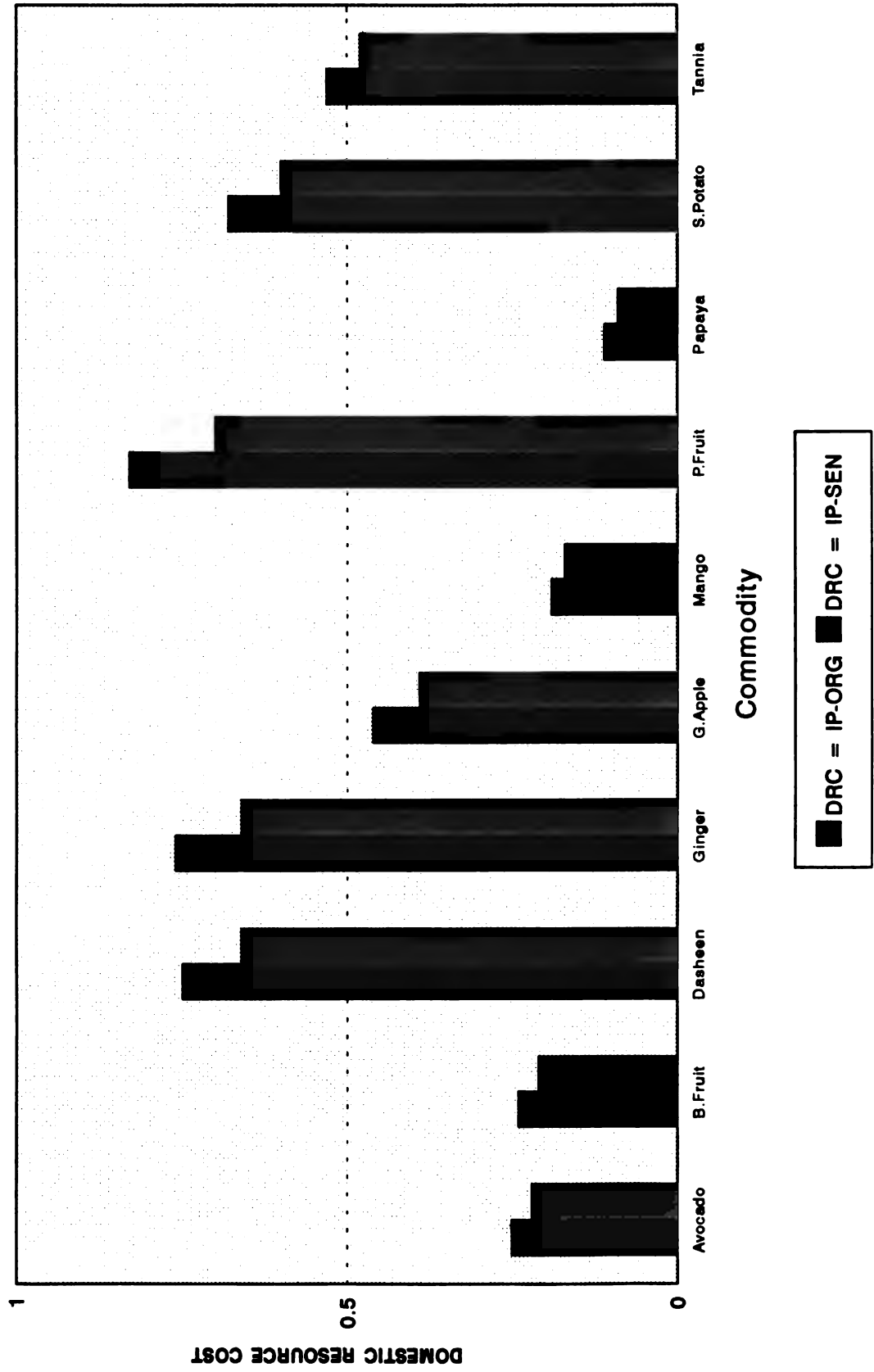


FIGURE D.2.(b). PRICE SENSITIVITY - DOMINICA, 1992-93
Selected Commodities

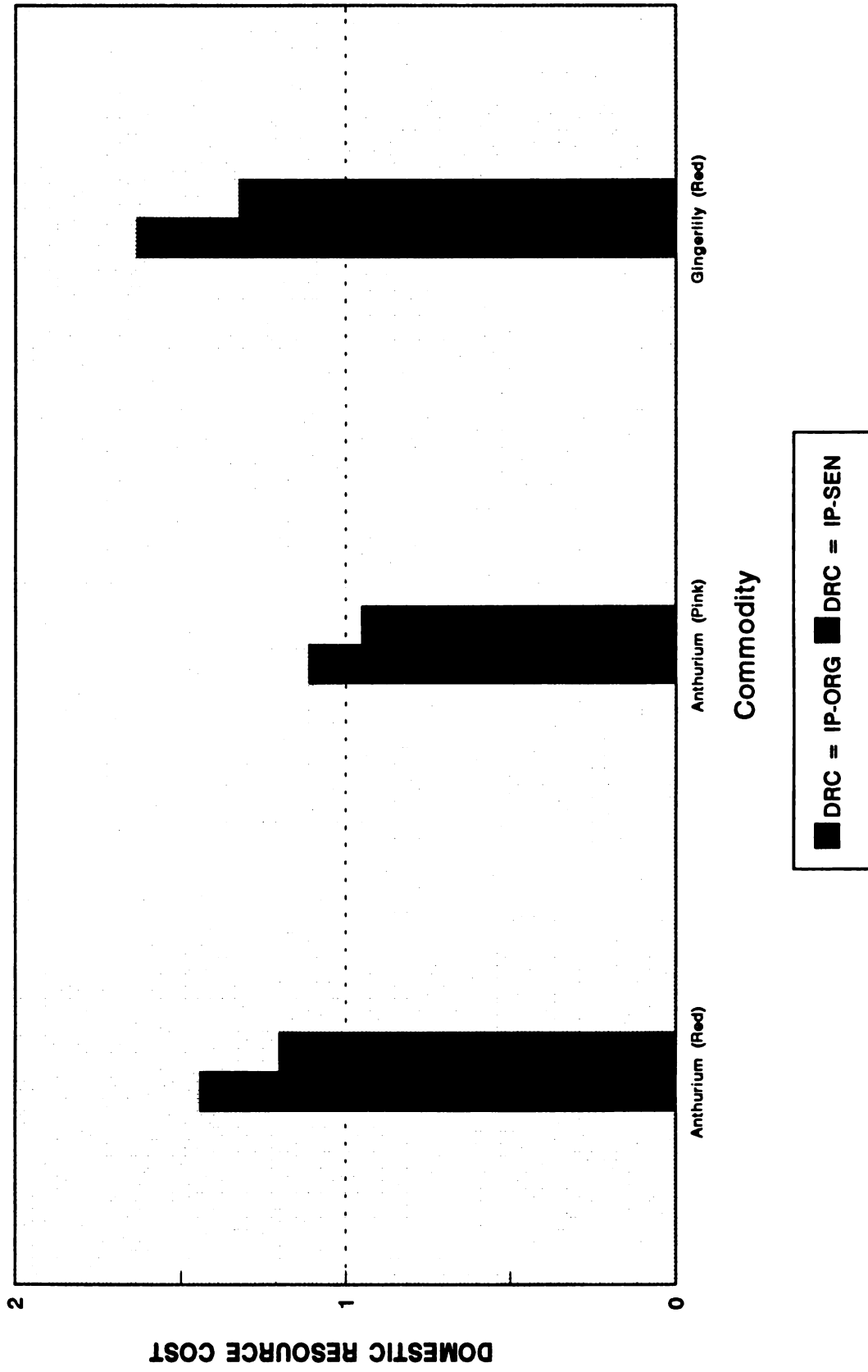


FIGURE D.3(a). LABOUR SENSITIVITY - DOMINICA, 1992-93
Selected Commodities

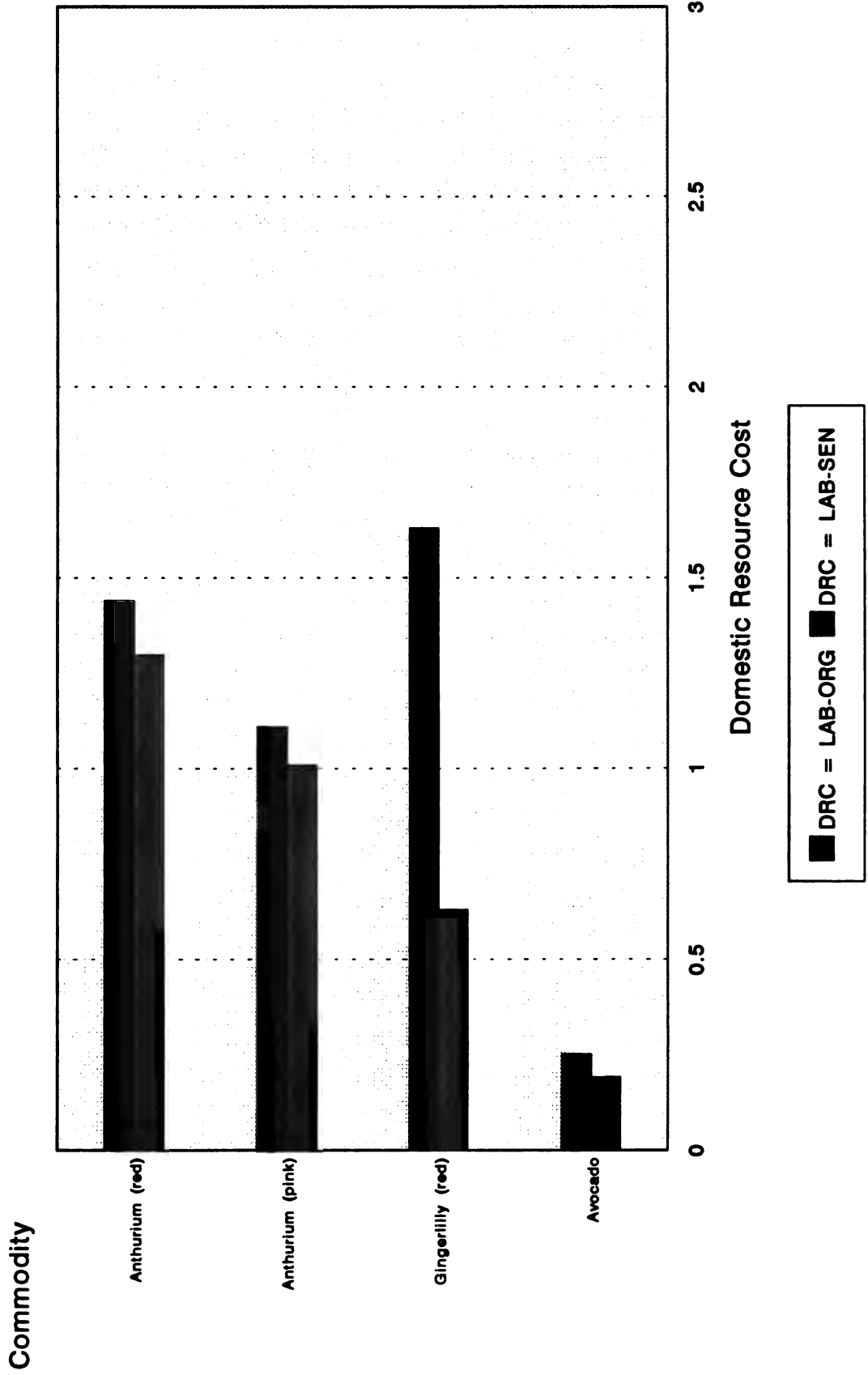
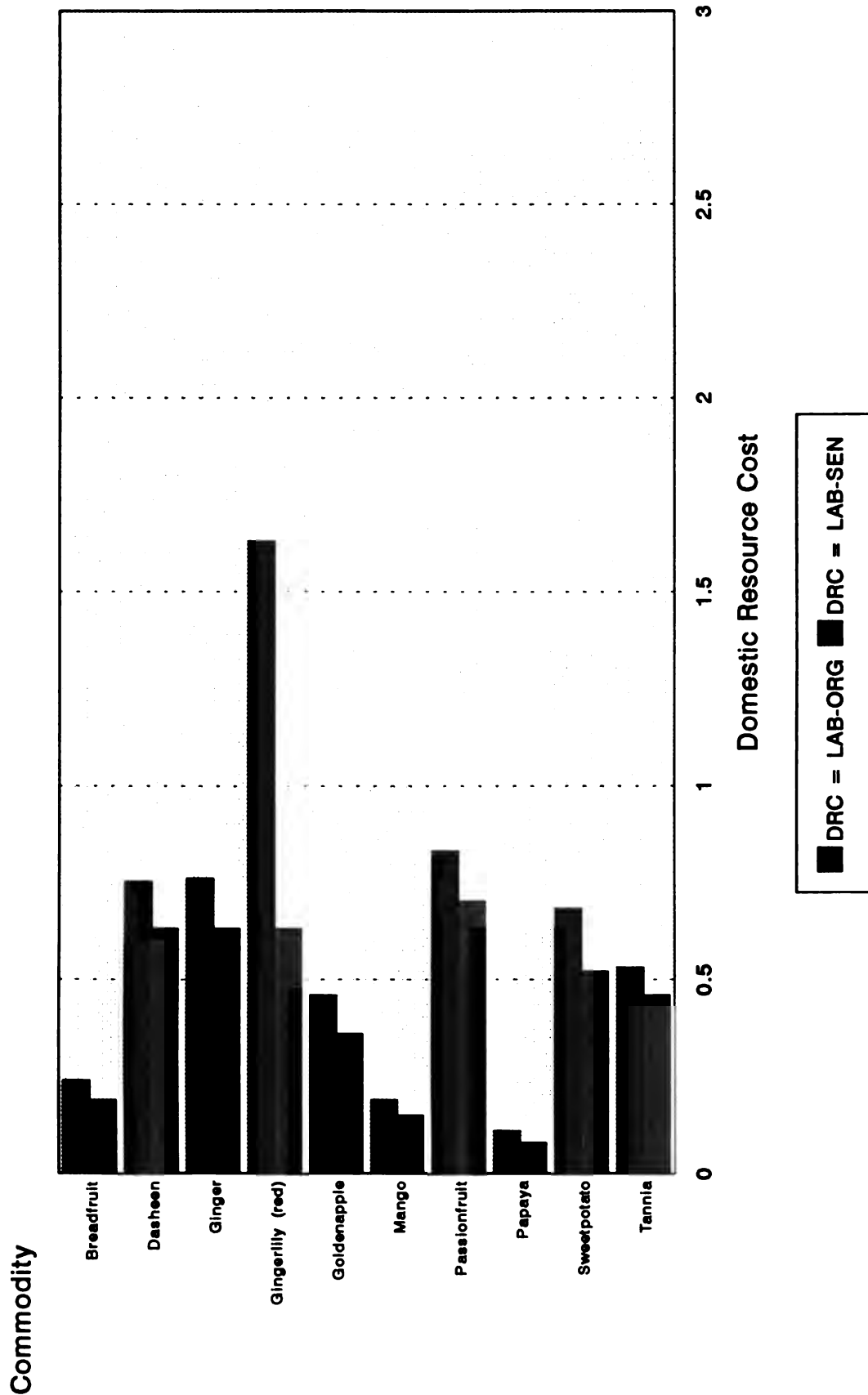


FIGURE D.3(b). LABOUR SENSITIVITY - DOMINICA, 1992-93
Selected Commodities



GRENADA

With the notable exception of anthurium, the results presented in Figure G.1 indicate that the DRC ratios for non-traditional crops in Grenada were less than unity. This implies that in these commodities, Grenada has an absolute competitive advantage. According to the analysis, papaya, avocado, mango and tannia are the commodities with the lowest DRCs and hence the highest degree of competitiveness. This suggests that in the absence of policy intervention, production and export of these commodities will result in foreign exchange earnings/savings. Alternatively, the results suggest that foreign exchange earnings will result from the pursuit of policies aimed at increasing investment in the production of these commodities. Such policies may involve shifting resources from enterprises for which the DRC is greater than one (uncompetitive) to enterprises with DRC ratios which are less than one.

Figure G.1 indicates that variations exist in the absolute values of the DRC coefficients. The spread is indicative of varying production efficiencies between diversification enterprises. Based on the absolute values of the DRC coefficients, it appears that there is the capacity to increase Grenada's competitiveness for cashew, gingerlily, passionfruit, golden apple and dasheen, through, for instance, better crop husbandry, improved management practices and productivity enhancing technical change. According to Figure G.1, papaya had the lowest DRC value (0.17) while the highest value were recorded for anthuriums (-2.61) and gingerlilies (8.99). The social profitability of papaya production is relatively higher than that of the other non-traditional commodities included in the analysis. The spread in the absolute values of the DRC also indicates the foreign exchange earning capability of the diversification enterprises. Based on the DRC values and given the prevailing structure of cost and technology in Grenadian agriculture, further investment in competitive enterprises may well require a reallocation of resources from the uncompetitive anthurium and ginger lily initiatives.

The negative value of the DRC of -2.61 for anthurium is indicative of the high level of imported inputs utilized in production relative to the level of the non-intervention price. This implies that incremental production will result in foreign exchange losses and that the resources devoted to this enterprise have more profitable alternatives within agriculture as well as in other sectors of the Grenadian economy. While being socially unprofitable, anthurium and gingerlily production still results in private profits to producers due to implicit transfers via government policies.

Yield sensitivity was undertaken to identify the improvement in yield levels necessary to make the production of anthurium competitive (i.e. necessary to generate a DRC coefficient of at least one). The results of the yield sensitivity indicate that based on the prevailing structure of cost and technology, yields for anthurium and gingerlilies will have to improve by 136% and 70%, respectively if these enterprises are to become internationally competitive. If however Grenada intends to pursue anthurium and gingerlily production, then increased attention to research and extension prerequisites, including the selection of more modern varieties and strains of planting material, will be critical. Even then, the competitiveness of these commodities will remain uncertain.

Since the DRC measure depends on the non-intervention price for competing products, yields per acre and various cost components, analysis was also conducted to assess the sensitivity of the DRC coefficients to changes in these key variables. The primary purpose of these simulations was to assess whether individual commodity rankings as distinct from absolute DRC ratios per se were robust to changes in these variables (providing they are in the zero to unity range). To assess whether the competitive advantage rankings were sensitive to changes in the non-intervention prices, variation in the NIP of 15% for fruits and vegetables and 10% for root crops and flowers were simulated. The results of the simulation are presented in Figures G.2(a)/(b). These results indicate that while the absolute values of the DRCs have changed as a result of the NIP simulation relative to the base model, commodity rankings have remained fairly consistent. This suggests that the DRC coefficients are fairly robust to variations in the non-intervention price.

A test of the sensitivity of the DRC results to variations in the value of the conversion factor (CF) for labour was also employed to assess the robustness of competitiveness rankings to the assumptions about agricultural labour market distortions in Grenada. The results of this simulation, presented in Figure G.3, suggest that assuming a lower CF for labour also reduces the absolute value of the DRC for all twelve commodities included in the study. Again the ranking of commodities remains unaltered relative to the base model. Anthurium and gingerlily production remains the activities with the lowest rank and of all the commodities, continues to be uncompetitive. The result for passionfruit is fairly consistent throughout the analysis, indicating shifts from borderline competitiveness under the base model, to enhanced competitiveness under both simulations. Cashew production also remains uncompetitive under the two simulations consistent with the results of the base model. This is not surprising since cashew is still perceived as a 'shade crop' and very little research or investment has been undertaken to improve its status.

In general the sensitivity analysis suggests that the DRC results for the twelve non-traditional commodities investigated are quite robust. This implies that for the competitive enterprises, domestic resources are utilized in an efficient manner and foreign exchange can be earned/saved if Grenada concentrates resources in the production of commodities for which the DRC ratios are lowest, i.e its competitiveness highest.

FIGURE G.1. DOMESTIC RESOURCE COSTS - GRENADA, 1992-93
Selected Commodities

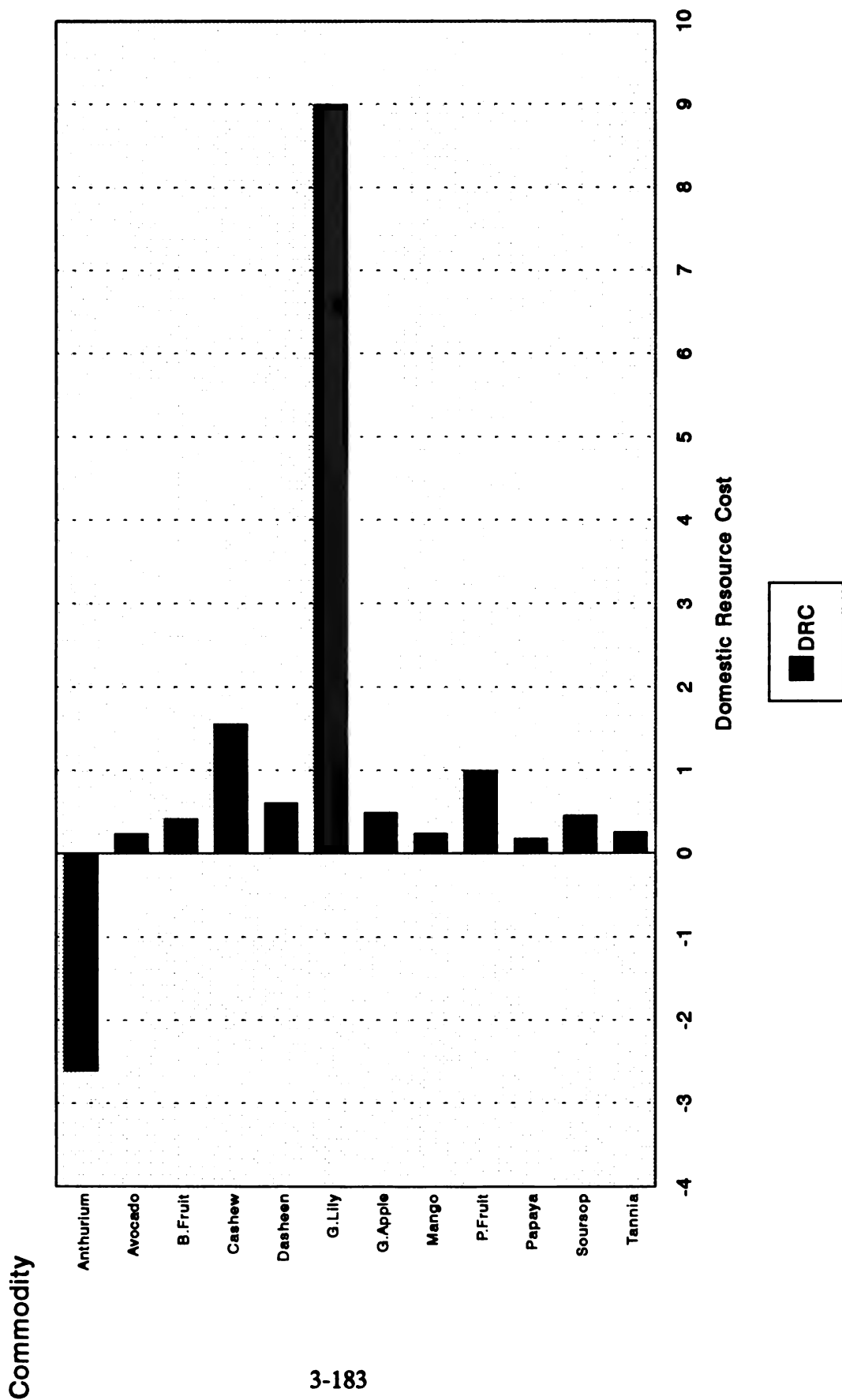


FIGURE G.2.(a). PRICE SENSITIVITY - GRENADA, 1992-93
Selected Commodities

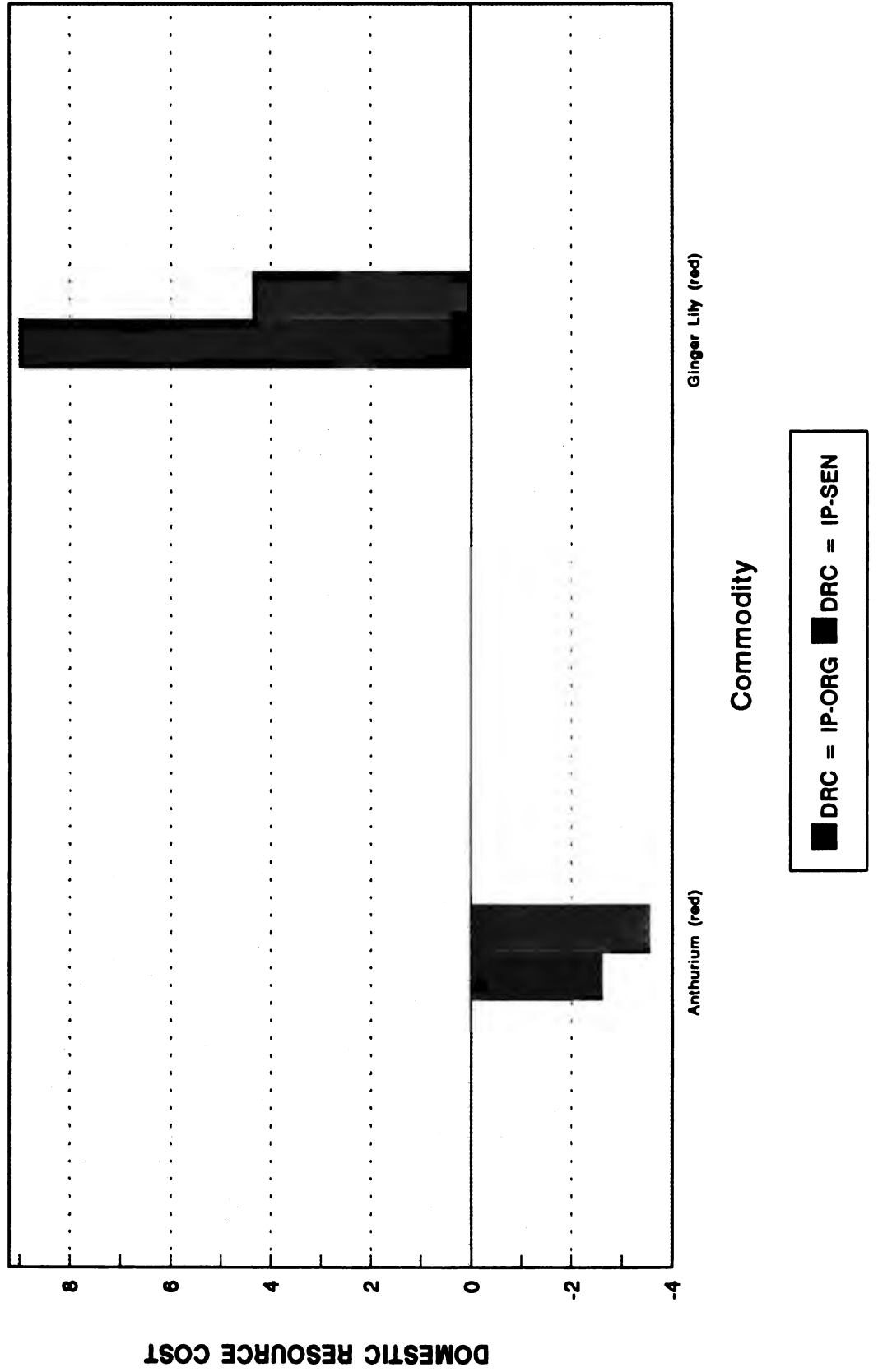


FIGURE G.2.(b). PRICE SENSITIVITY - GRENADA, 1992-93
Selected Commodities

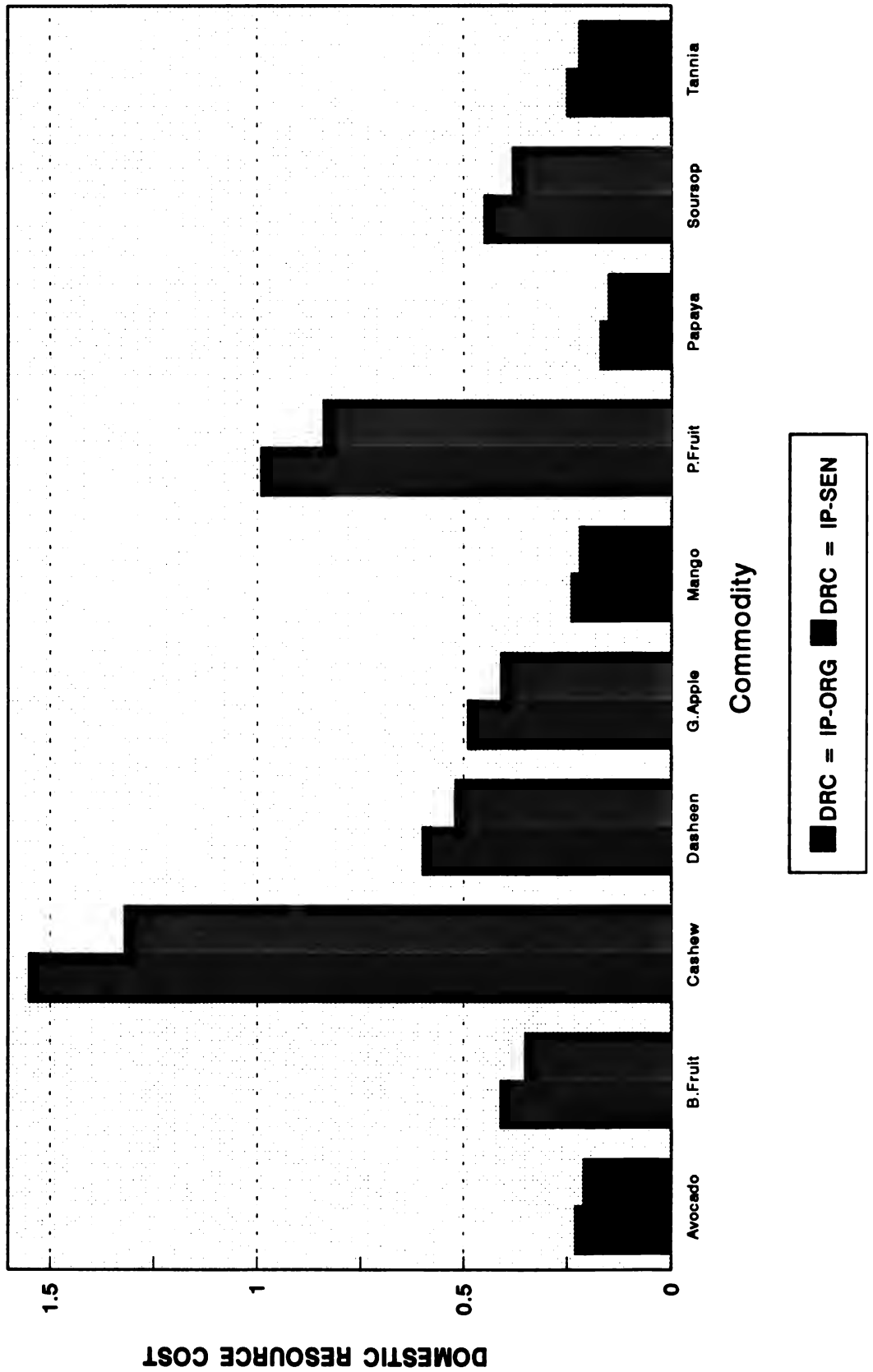
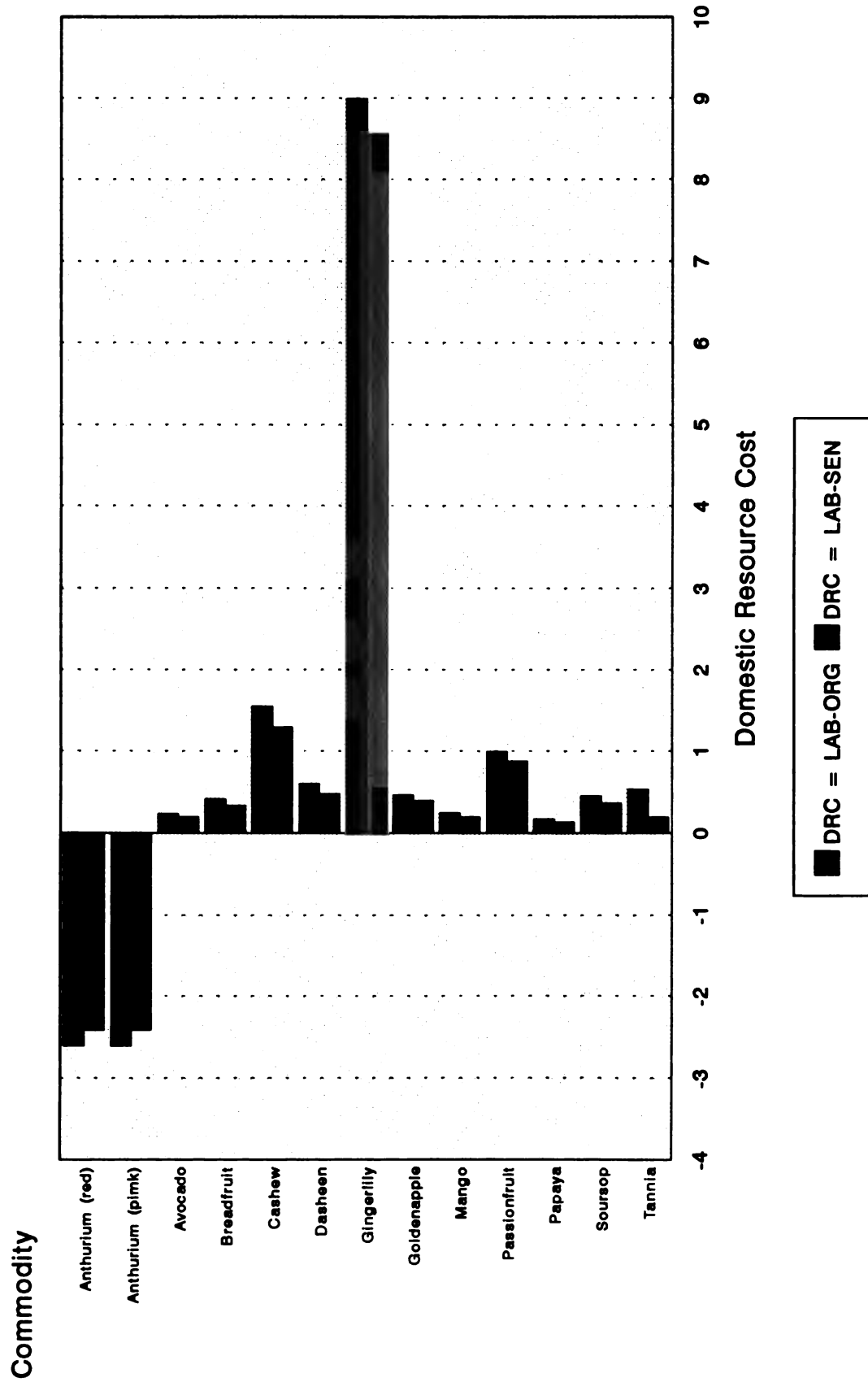


FIGURE G.3. LABOUR SENSITIVITY - GRENADA, 1992-93
Selected Commodities



MONTSERRAT

Figure M.1 indicates that five of the nine commodities included in the study: carrot, onion, pineapple, sweet potato and yam have DRC ratios which are less than unity (are competitive). The low DRC for yam (0.49) and carrot (0.56), relative to the other commodities included in the analysis, suggests that these enterprises employ domestic resources more efficiently than others and hence possess the greatest potential to earn/save foreign exchange.

The results in Figure M.1 also indicate that while being competitive, in that both private and social profits are realized from their production, the DRC ratios for onion (0.98), pineapple (0.85) and sweet potato (0.80) are all closer to one. This is indicative of the greater degree of resource expenditure needed to earn a dollar of foreign exchange than is needed for either yam or carrot. Changes in the technical coefficients (i.e. increases in the international prices of the commodities, cost reductions and yield ratios), could potentially lead to reductions in the absolute values of the DRC for these commodities. In the absence of policy intervention however, the survival prospects of these five commodities remain positive, both as potential candidates for exports and/or import displacement.

The high DRCs for cabbage, cauliflower and white potato of 4.96, 4.12 and 2.79 respectively, suggest that Montserrat is not an efficient producer of these commodities, and that production is highly dependant on implicit grants and government induced support measures. While such protection allows private producers to realize positive rents, continued production inflicts high social costs on the society. The fact that these commodities (cabbage, cauliflower and white potato) are uncompetitive suggests that the resources devoted to their production have more profitable alternatives. For commodities such as cabbage, cauliflower and white potato, the cost of domestic production exceeds the net foreign value added earned from trade. This implies that if foreign exchange earnings constitutes a major objective of the agricultural sector in Montserrat, production of these crops constitutes an expensive method of attaining this goal. Based on the DRC coefficients, importation of cabbage, cauliflower and white potato would represent a more efficient use of domestic resources and would result in net foreign exchange savings.

The results in Figure M.1 also indicate that Montserrat is not presently competitive in the production of tomato, which has a DRC value of 1.24. However, the results of yield sensitivity tests indicate that a 12% increase in yields would be required if the enterprise is to become competitive. Given the low level of technology currently existing in Montserrat agriculture, it does not appear that the required increase in tomato yields is unattainable. This in no way suggests that such yield increases will be automatic. In fact, given the present structure of costs and technology, clear evidence is needed that the implied economies of scale and reductions in costs from yield increases will be forthcoming. In the absence of this evidence, an enterprise with a current high DRC cannot be favored over another with a current lower DRC.

The results of the yield sensitivity for cabbage, carrot and cauliflower indicate that yields will have to increase by 84%, 72% and 69% respectively, for these enterprises to be competitive. Such increases will be more difficult to attain than the increment required for tomatoes, given the present structure of production. An increase of 34% in present yields for white potato will be necessary if this enterprise is to earn net foreign value added sufficient to cover domestic resource cost.

Sensitivity analysis was also carried out to determine if the commodity rankings were sensitive to variations in the non-intervention price. Increases in the NIP were based on the upper boundary recorded for variations in the import price (ex-marketing margins). The upper level of 10% was used for root crops and fruits and 15% for vegetables. The results of the NIP simulation are given in Figure M.2. Generally, the results indicate that the DRC ratios have improved (gotten smaller in absolute value) for all commodities, indicating enhanced competitiveness. The switch in tomato production from being uncompetitive to competitive under the NIP simulation is noteworthy. In terms of commodity rankings, the results suggest that these remain unaltered relative to their base model positions. This suggests that the DRCs are fairly robust to variations in the non-intervention price.

Similar sensitivity analysis was carried out on the conversion factor (CF) for labour in order to assess the sensitivity of the DRC results to variation in assumptions about agricultural labour market distortions. The results of the simulation are presented in Figure M.3. These results suggest that if the divergence between the private and social cost of labour was greater than implied by the estimated CF for agricultural labour in Montserrat (i.e if agricultural labour was more inefficient than the estimated value suggests) then the social cost to society of resource usage and hence the DRC coefficient would be smaller in absolute terms.

The result of the labour simulation is quite similar to the NIP, indicating that, while all enterprises experienced a decline in the DRC coefficient and hence improvements in their competitive position, the ranking of all nine enterprises remain unchanged. In contrast to the NIP simulation, tomato continues to be uncompetitive such that more profitable alternatives exist for resources currently utilized in its production.

FIGURE M.1. DOMESTIC RESOURCE COSTS - MONTSERRAT, 1992-93
Selected Commodities

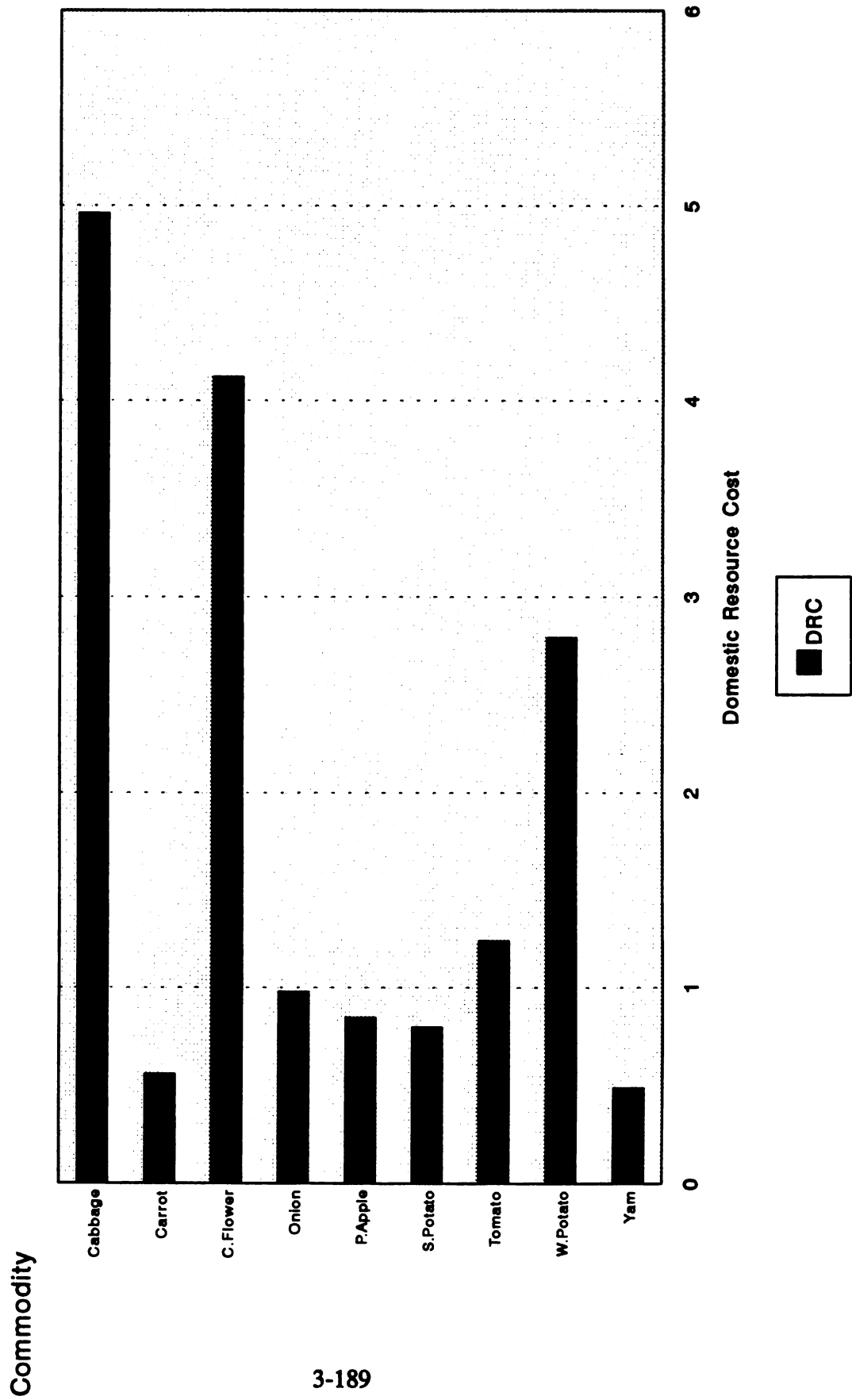


FIGURE M.2. PRICE SENSITIVITY - MONTSERRAT, 1992-93
Selected Commodities

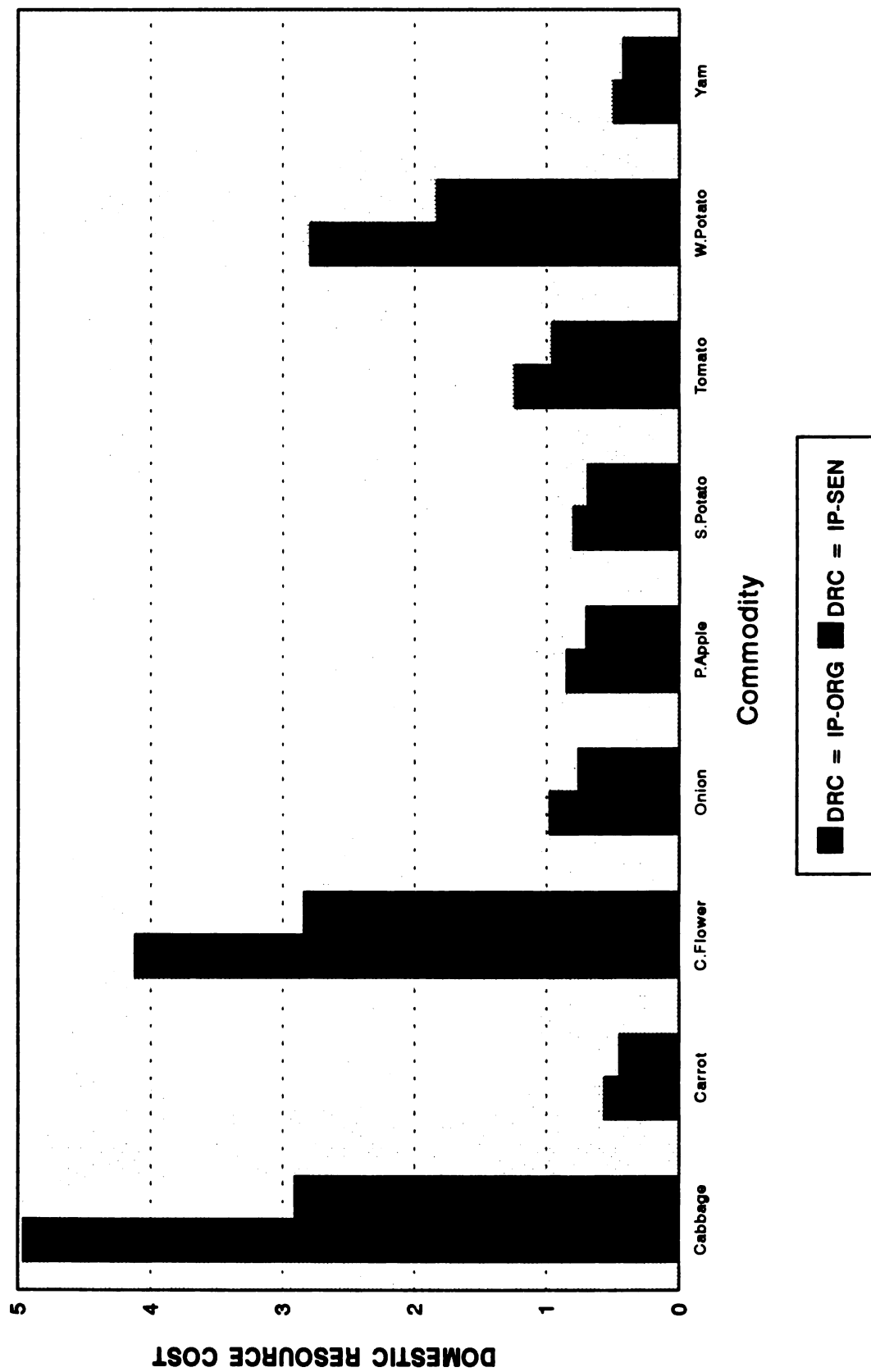
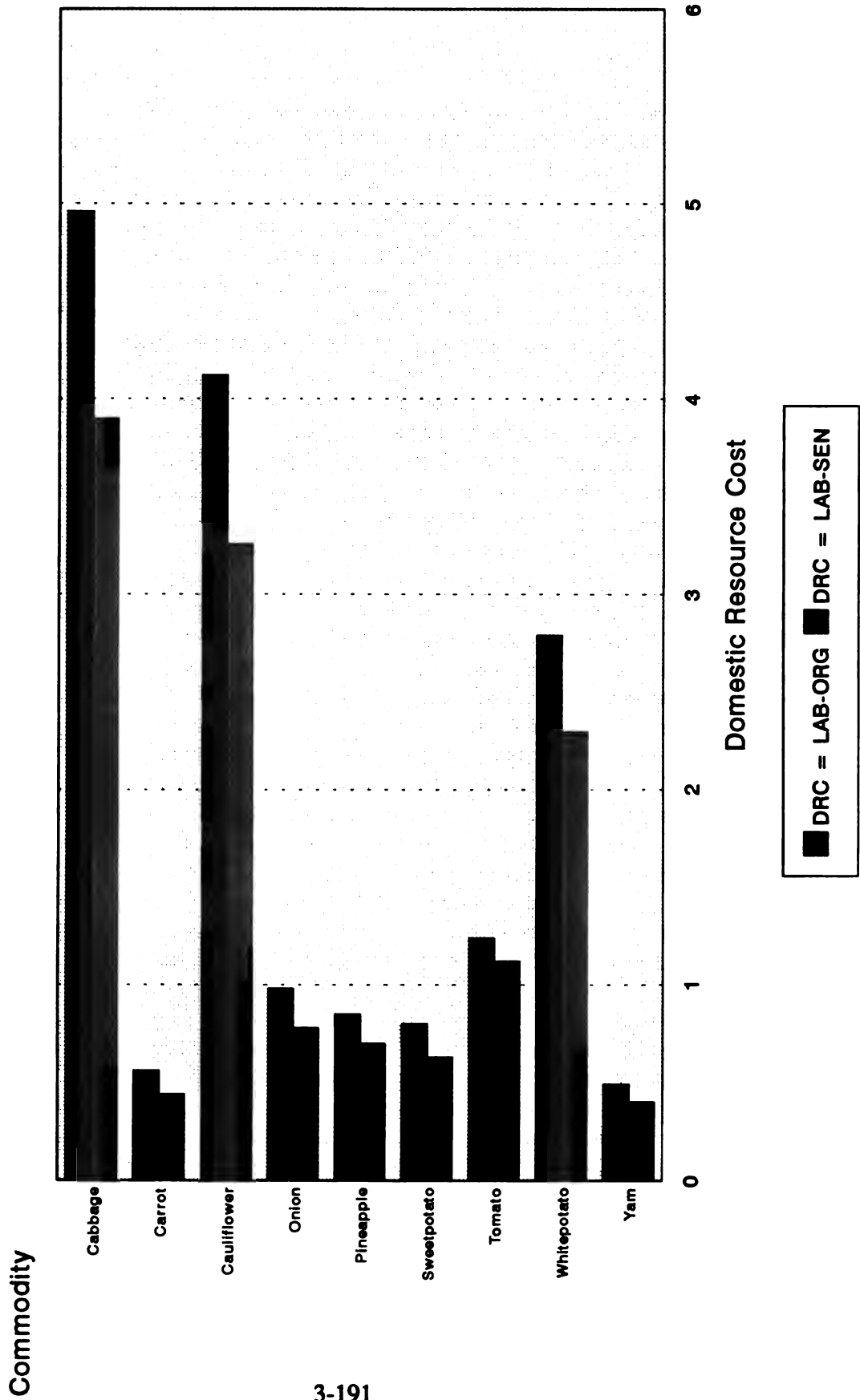


FIGURE M.3. LABOUR SENSITIVITY - MONTSERRAT, 1992-93
Selected Commodities



ST.KITTS/NEVIS

The DRC results for the nine commodities included in the study for St.Kitts/Nevis are given in Figure K.1. The DRC coefficients span the full spectrum of possibilities with respect to commodity competitiveness. While cotton, onion, carrot, sweet potato and white potato have ratios below unity (indicating that the enterprises are competitive), the DRC ratios exceed unity in the case of tomato and yam production. For cabbage and pumpkin, the negative DRC is indicative of negative net value added given the non-intervention price. This negative net value added is not surprising when one considers the comparatively low yields recorded for these two crops relative to the other major OECS competitors.

In terms of competitive advantage, the results suggest that further resource concentration in cabbage and pumpkin production, without the infusion of cost-reducing and productivity-enhancing technologies should be discouraged, since presently they result in foreign exchange losses. Should such initiatives aimed at increasing productivity and reducing cost be instituted, whether or not the enterprise could become competitive still remains in question. The DRC coefficients for tomato and yam while indicating that the domestic costs exceed the international resource cost (indicating competitive disadvantage), hold some promise for improved competitiveness and resource efficiency should the appropriate policy measures be instituted.

Based on the present level of technology and costs in St.Kitts/Nevis, agriculture, cotton, sweet potato, white potato and carrot appear to be appropriate activities, in so far as they generate net foreign exchange earnings and compete favorably for resources both within agriculture and across economic sectors. In efforts to identify initiatives with competitive advantage and export potential, these commodities should constitute the primary focal group. However, identifying a final list of commodities must await the analysis and synthesis of further results based on other techniques and qualitative information.

Sensitivity analysis was employed to assess the robustness of the competitive advantage rankings to changes in various technical coefficients. To assess whether the competitive advantage rankings were sensitive to changes in the non-intervention prices (NIP), variation in the NIP of 15% for vegetables and 10% for root crops and fruits were simulated. The results of the simulation are given in Figure K.2. The results suggest that while the absolute values of the DRCs have changed as a result of the simulation, the ranking of enterprises remains unaltered.

For both cabbage and pumpkin, crops which involved both inefficient utilization of domestic resources and foreign exchange leakage under the base model, the simulation does not result in improvements in the absolute value of the DRC and hence, no improvements in competitiveness. In general, the DRC coefficients for the NIP simulation result in a reduction in the absolute value of the DRCs and in improved competitiveness for all seven remaining enterprises. The DRCs for tomato and yam of 1.12 and 1.18, respectively attained under this simulation lend some support to our previous statements, regarding the need for increased attention to various prerequisites if St.Kitts/Nevis intends to be competitive in the production of

these two commodities. The yield sensitivity tests which sought to identify the increase in yields necessary to generate a DRC value of unity, also support this position.

Based on the yield sensitivity, given the current structure of costs and technology an increase of 16% and 23% will be required in tomato and yam yields respectively, if these enterprises are to achieve a DRC value of unity - to become competitive. In contrast, increases of 94% in cabbage yields and 106% in pumpkin yields will be necessary to achieve a DRC value of unity.

Sensitivity analysis was also conducted on the conversion factor (CF) for labour. The sensitivity results assume a CF of 0.57, the lowest figure recorded for any CARICOM country. If it is assumed that there are greater inefficiencies for agricultural labour in St. Kitts/Nevis than the estimated CF suggests, the results in Figure K.3 indicate that tomatoes and yams, which under the base model exhibited a competitive disadvantage continue to be uncompetitive.

In general, while the absolute value of the DRCs declined moderately for carrot, onion, sweet pepper, cabbage, and pumpkin, the status of these commodities remains largely unaltered. The DRC for cotton which under the base model exhibited greatest competitiveness (lowest value of DRC), increases dramatically in regard to the labour sensitivity analysis. Overall the labour sensitivity was consistent with prior expectations which suggested that commodities which utilized proportionately more labour as a share of production and marketing cost, would be more sensitive to variations in the assumption in regard to the efficiency of agricultural labour markets. In all cases, the commodities which were competitive/uncompetitive under the base model remained competitive/uncompetitive under the simulations.

FIGURE K.1. DOMESTIC RESOURCE COSTS - ST. KITTS/NEVIS, 1992-93
Selected Commodities

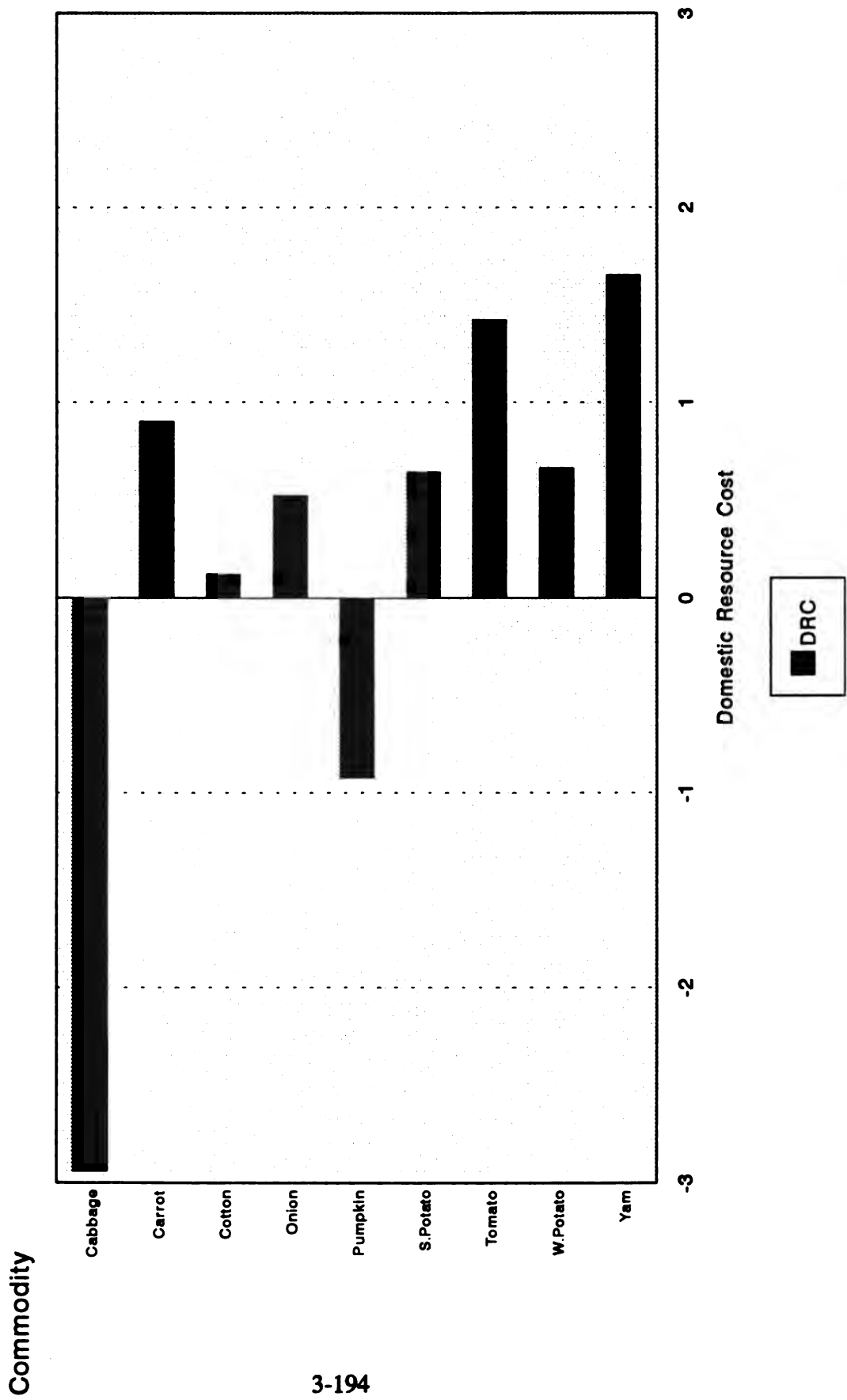


FIGURE K.2. PRICE SENSITIVITY - ST. KITTS/NEVIS, 1992-93
Selected Commodities

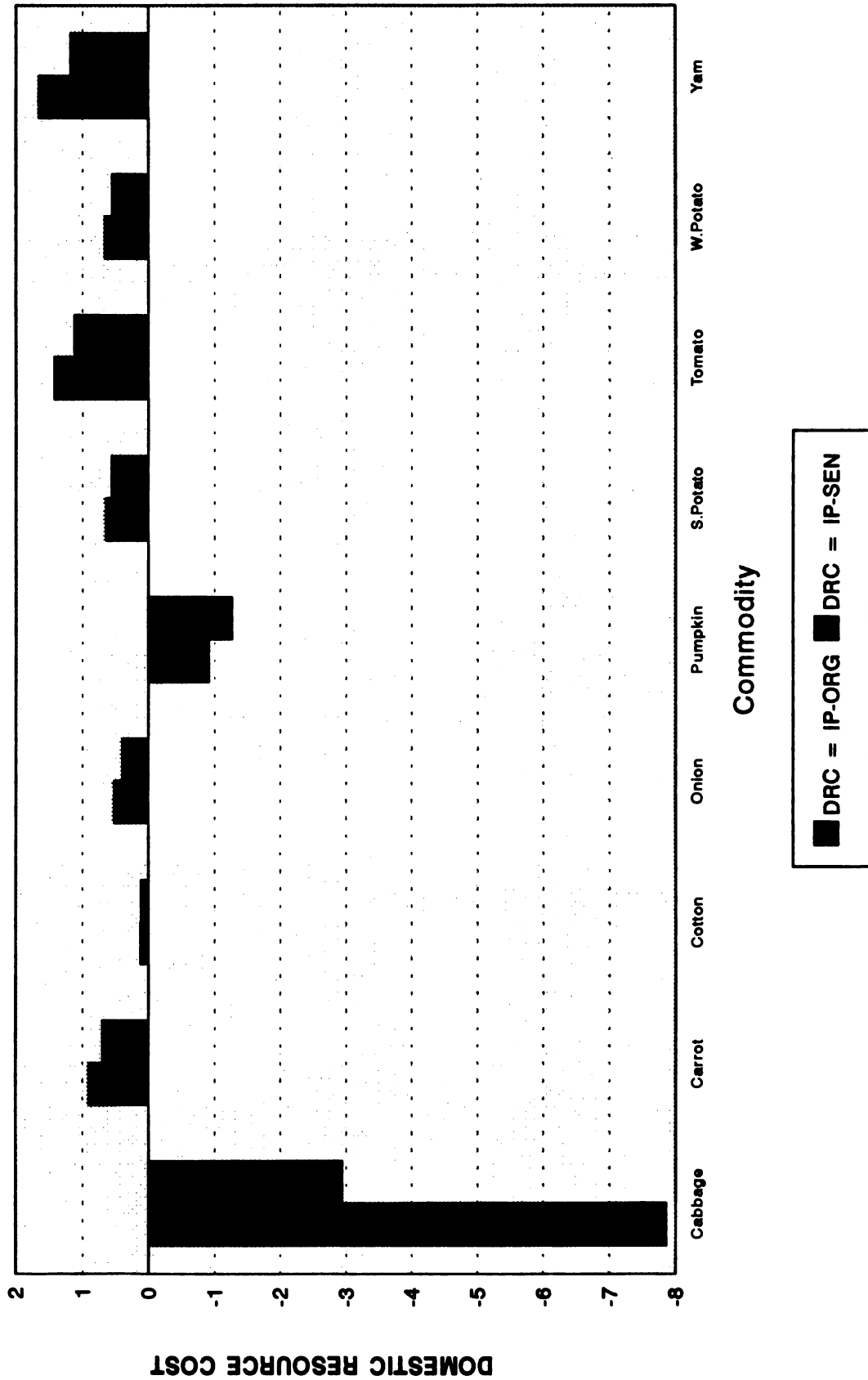
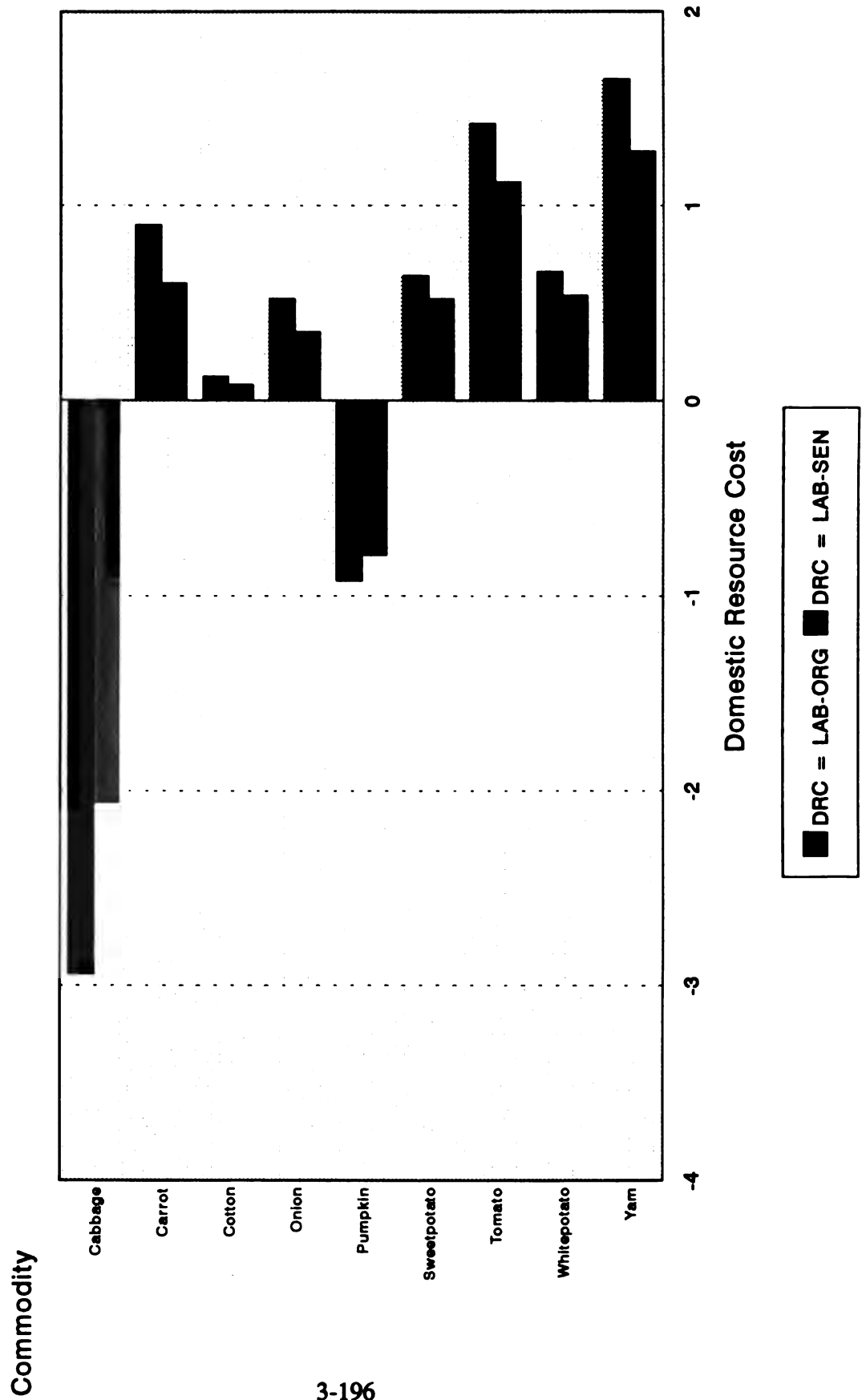


FIGURE K.3. LABOUR SENSITIVITY - ST. KITTS/NEVIS, 1992-93
Selected Commodities



ST.LUCIA

Of the eleven non-traditional commodities selected for inclusion in this study, St.Lucia is an efficient producer of, and hence has an absolute competitive advantage in the production of five. Based on the results presented in Figure L.1, only papaya, breadfruit, ginger, tannia and avocado can compete effectively for resources within St.Lucia. This group of non-traditional crops can potentially earn foreign exchange in international trade.

Of the commodities possessing competitive advantage, the results indicate that the ones with the lowest DRCs were papaya, followed by breadfruit and ginger, all of which had DRC values of less than 0.50. The small magnitudes of the DRC coefficients suggest that domestic factors are used in an efficient manner. In the case of breadfruit, given the natural proliferation of trees in St.Lucia, it would appear that competitiveness may be further enhanced by improvements in tree management (including pruning to enhance tree productivity) and post harvest practices.

The results suggest that St.Lucia is not an efficient producer of dasheen (1.14), hot pepper (1.32), mango (1.50), passionfruit (1.66), soursop (1.56) and pineapple (7.93). The production inefficiencies relative to other non-traditional crops may be attributed to a high cost structure without corresponding high levels of productivity. In spite of producers enjoying positive rents via implicit protection from government subsidies and grants, this group of non-traditional commodities manifests inefficient utilization of domestic resources. Based on the high DRCs, producing these commodities represents an inefficient means of earning foreign exchange.

The results in Figure L.1 suggest however, that while St.Lucia is not presently competitive in the production of dasheen and hot pepper, yield increases of only 6% and 17%, respectively, would be required to make the enterprises competitive. The results of the yield sensitivity tests suggest that a 13% increase in yields for mango and a 9% increase in yields for soursop would be required to make these enterprises competitive. Given the present structure of costs and technology in St.Lucian agriculture, it does not appear that the required increases in yields will be unattainable. This is not to suggest however, that such increases will be either easy or automatic. In the absence of conclusive evidence that the required economies of scale and attendant reduction in overall costs will be forthcoming, enterprises with high current DRCs still cannot be favored over others with DRC ratios which are more favorable.

The results for St.Lucia indicate that the most inefficient and uncompetitive enterprises are pineapple and passionfruit. This implies that more profitable alternatives exist both within agriculture and in other sectors for the resources presently employed in the production of these two commodities. Alternatively stated, more efficient/profitable opportunities exist for the resources employed in the production of these two commodities. As such, foreign exchange earnings may be maximized from the pursuit of policies aimed at shifting resources invested in the production of these two commodities to initiatives with more favorable DRCs. Since the results of yield sensitivity tests indicate that improvements of 16% and 38% would be required for the passionfruit and pineapple enterprises to become competitive, an assessment would have

to be made as to whether such increases can be reasonably attained and if so, at what cost. That labour and other resources still continue to be employed in pineapple and passionfruit is itself indicative of the high level of social transfers which may be keeping producers in operation.

Sensitivity analysis was also conducted to determine whether the commodity rankings were sensitive to variations in the non-intervention price. The results of the NIP simulation which was based on increases of 10% for root crops and fruits and 15% for vegetables are given in Figure L.2. Generally, the results indicate reductions in the value of DRC for all commodities (improved competitiveness). Dasheen, mango and hot pepper, commodities which were uncompetitive under the base model, become competitive under the NIP simulation. That the commodity rankings remain unaltered, relative to their base model positions, suggests that the DRC estimates are fairly robust to variations in the NIP.

Based on the results, the relatively high wage structure which exists for St.Lucian agriculture, induced in part by a booming tourism sector, may have contributed to the non-competitiveness of many of the agricultural enterprises included in this study. Sensitivity analysis was carried out to assess the robustness of the results to the assumptions made about the nature of agricultural labour markets. The simulation results are given in Figure L.3. Assuming there was greater divergence between the private and social wage rates, the DRC coefficients would have been smaller in absolute value and the competitiveness of individual enterprises greater as compared to the base model. The results of this simulation are similar to those obtained for the NIP simulation, generally indicating reductions in the absolute value of the DRCs and hence, improved competitiveness. Hotpepper and dasheen products which were uncompetitive under the base model have become competitive under the labour simulation. This simulation's results suggest that the two commodities are quite sensitive to the assumptions made regarding the efficiency of agricultural labour markets in St.Lucia.

The analysis suggests that if St.Lucia invests domestic resources in the diversification effort, such investments may prove to be more socially profitable if they are directed into non-traditional enterprises exhibiting the highest level of competitiveness. The crops which fall into the category with DRC values of less than unity are papaya, avocado, breadfruit, ginger and tannia. Consistent with the objective of increasing foreign exchange earnings and conditioned on the current structure of costs and technology, it appears that St.Lucia may be able to compete in the production of dasheen and hotpeppers should the requisite improvements in both production and marketing prerequisites be made. Policies aimed at expanding the production of mango, pineapple, passionfruit and soursop without attendant reductions in both production and marketing inefficiencies should be critically reassessed.

FIGURE L.1. DOMESTIC RESOURCE COSTS - ST. LUCIA, 1992-93
Selected Commodities

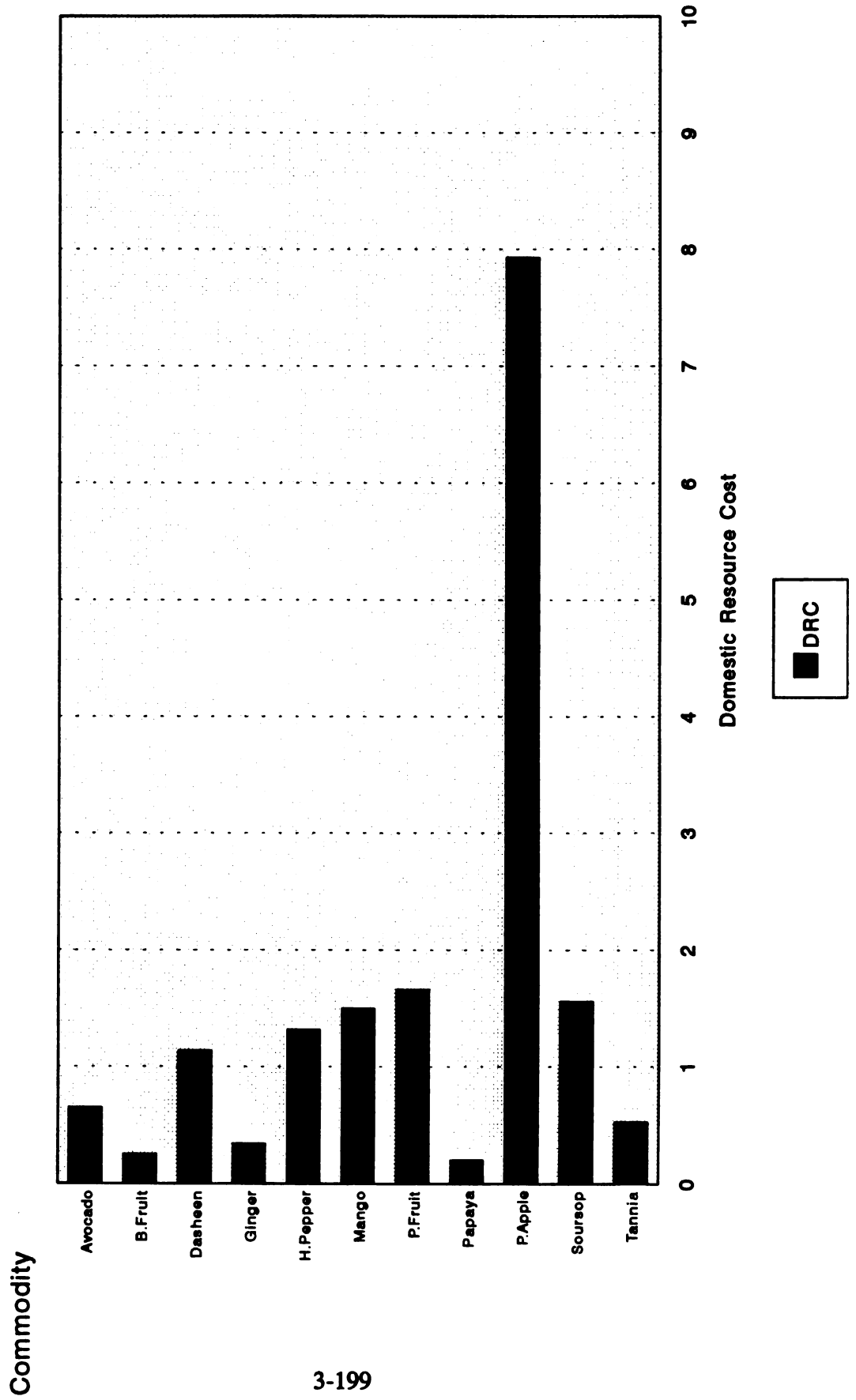


FIGURE L.2. PRICE SENSITIVITY - ST. LUCIA, 1992-93
Selected Commodities

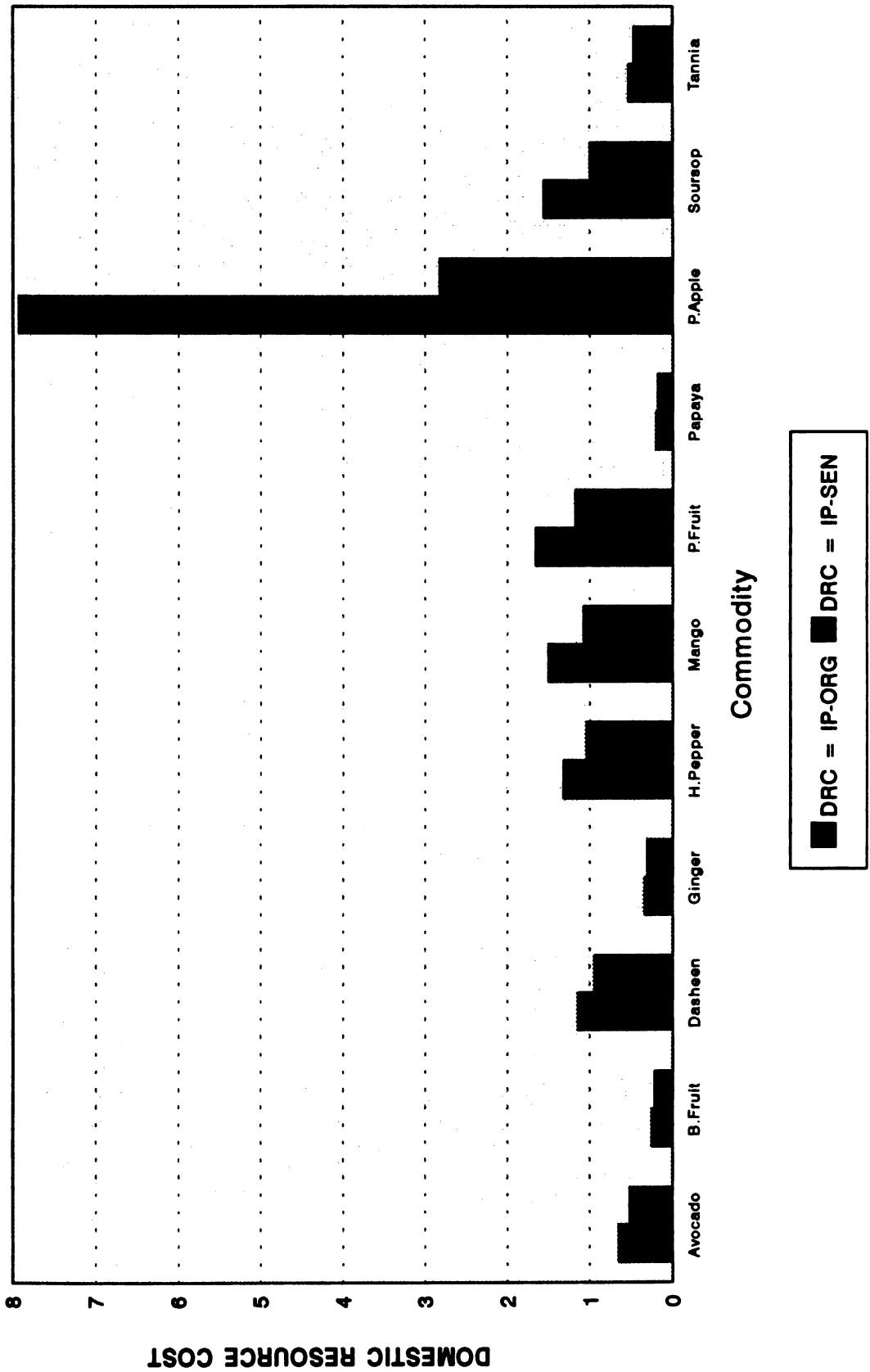
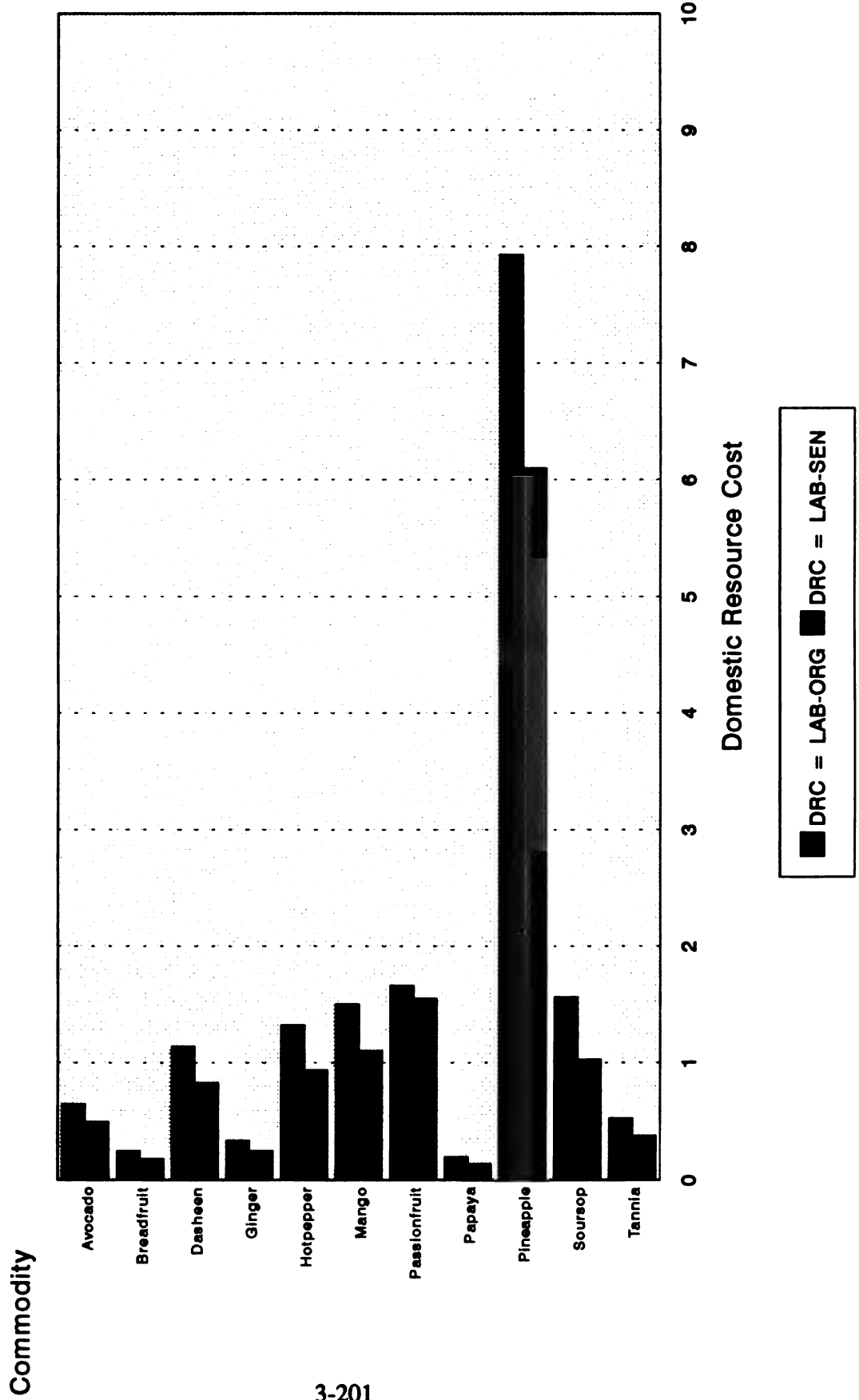


FIGURE L.3. LABOUR SENSITIVITY - ST. LUCIA, 1992-93
Selected Commodities



ST.VINCENT

DRC coefficients for thirteen non-traditional crops produced in St.Vincent are given in Figure V.1. With the exception of anthuriums, passionfruit and pineapples, the DRC ratios are all less than one. This suggests that for the other ten enterprises, St.Vincent possesses a competitive advantage and domestic resources are utilized in a relatively efficient manner. It may be useful to reiterate that the DRC criterion implies that foreign exchange earnings will be maximized if St.Vincent concentrates resources in the production of commodities for which the DRC ratios are lowest and competitiveness is therefore highest. As such there is no conceptual difficulty with several commodities possessing ratios which are less than unity.

The group of commodities which ranked highest, possessed DRC ratios which were less than 0.6. These included papaya, avocado, mango, tannia, soursop, breadfruit, dasheen and golden apple. These were followed by eddoes and ginger which had DRC ratios of 0.78 and 0.85, respectively. The DRC coefficient of unity for pineapple indicates that St.Vincent would neither earn nor save foreign exchange from the production and export of this commodity, while the DRCs for passionfruit (1.34) and anthurium (-2.17) indicate that St.Vincent can save foreign exchange from sourcing its consumption requirements for the seven commodities from elsewhere.

Sensitivity analysis was undertaken to determine the incremental increase in per acre yields which would be required to generate a DRC coefficient of at least unity for anthuriums and passionfruit. The simulation suggested that while an increase of 17.7% would be necessary for passionfruit to become competitive, an increase of 57% would be required in anthurium yields for this enterprise to become competitive, given the existing structure of cost and technology in Vincentian agriculture. Attainment of the requisite yield for passionfruit will be relatively easier, based both on the smaller increase required and the ease with which the existing yield threshold can be improved. Such yield increases, if they are realized, could contribute both to economies of scale in production and to a consequent lowering of unit costs. Whether or not the enterprise could actually become competitive still remains an open question.

Sensitivity analysis was also conducted to test the robustness of the DRC coefficient to increases of 15% in the NIP for vegetables and 10% in the NIP for root crops and anthuriums. The results of the simulation are shown in Figure V.2 (a) and (b). According to the results, the DRC coefficients are smaller than those obtained under the base model, indicating that the competitive advantage of all enterprises is made more favorable. While anthurium and passionfruit remain uncompetitive, pineapple, which had an estimated DRC coefficient of unity under the base model, becomes more favorable vis-a-vis other enterprises. These results serve to underscore the relative importance of increases in the NIP across commodities. The results of this simulation also reinforce the importance of augmenting the DRC analysis with both quantitative and qualitative information on market characteristics and commodity demand both of which influence competitiveness.

Estimating social prices for labour is important in computation of the DRC coefficients, particularly where production alternatives differ significantly in their labour requirements and a-priori evidence suggests that labour market distortions may exist. Analysis was carried out to assess sensitivity of the results to the assumptions made in regard to the efficiency of agricultural labour markets in St. Vincent. Figure V.3 reports the resultant DRC coefficient, assuming there was greater divergence between the private and social wage rates than was indicated by the estimated CF factor for labour. The results of this simulation were quite similar to those obtained under the NIP sensitivity. With the exception of pineapple which reflects a significant reduction in the value of the DRC coefficient and hence an improvement in competitive advantage, the results are consistent with a-priori expectations.

Again, our principal concern is with commodity ranking as opposed to the absolute magnitude of the ratios per se (providing they are in the zero to unity range). In this regard, it is evident from Figure V.3 that with the exception of pineapple, the relative ranking of commodities vis-a-vis each other remain unaltered. Though indicating strong competitive advantage for most of the commodities included in this study, the results give only a partial indication of St. Vincent's export potential. While none of the thirteen enterprises in St. Vincent will be identified in this section as possessing the greatest potential for export, it should be noted that in the absence of a detailed quantification of the net social benefits, an enterprise with a high current DRC cannot be favored over another with a lower current DRC.

FIGURE V.1. DOMESTIC RESOURCE COSTS - ST. VINCENT, 1992-93
Selected Commodities

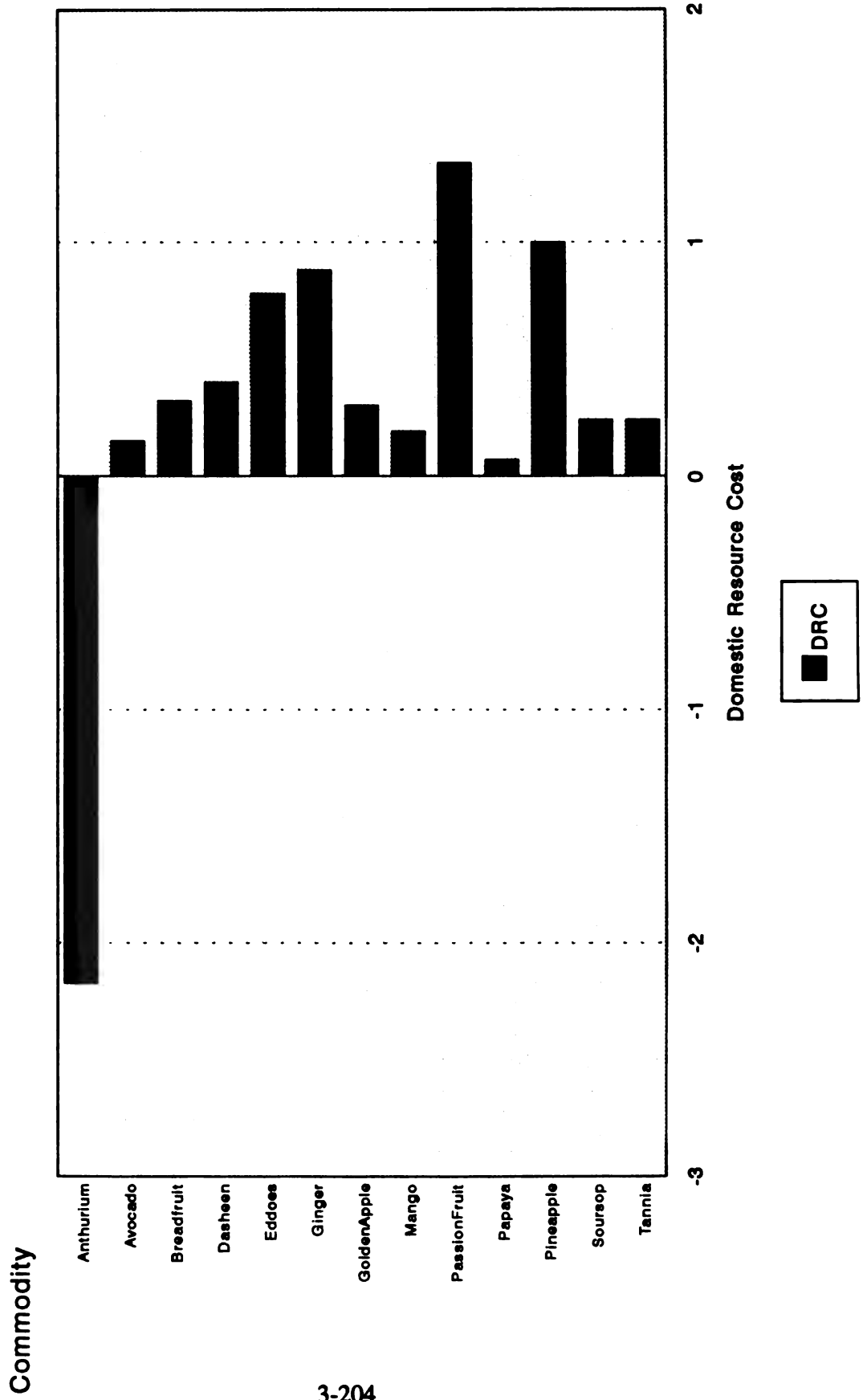


FIGURE V.2.(a). PRICE SENSITIVITY - ST. VINCENT, 1992-93
Selected Commodities

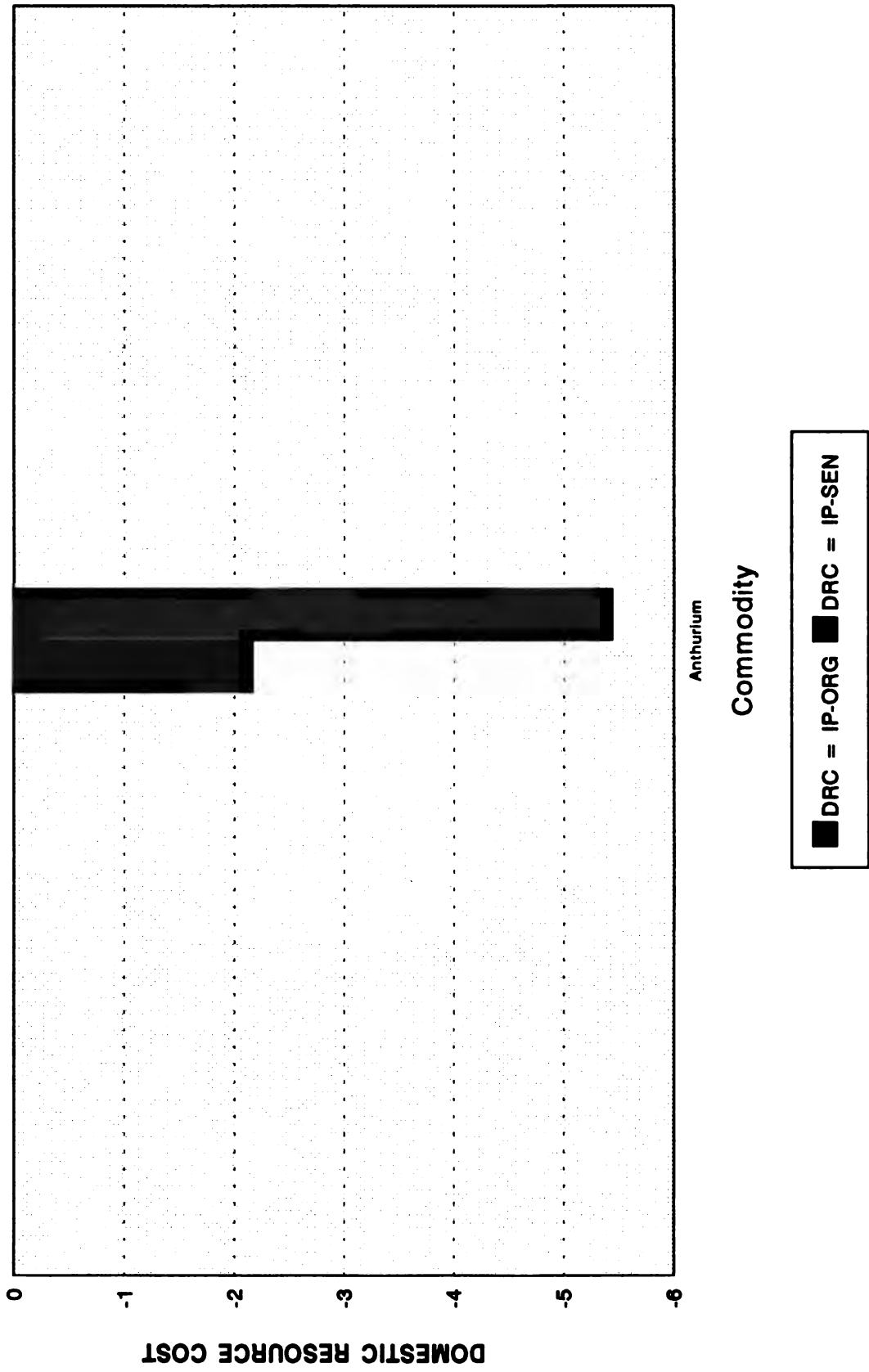


FIGURE V.2.(b). PRICE SENSITIVITY - ST. VINCENT, 1992-93
Selected Commodities

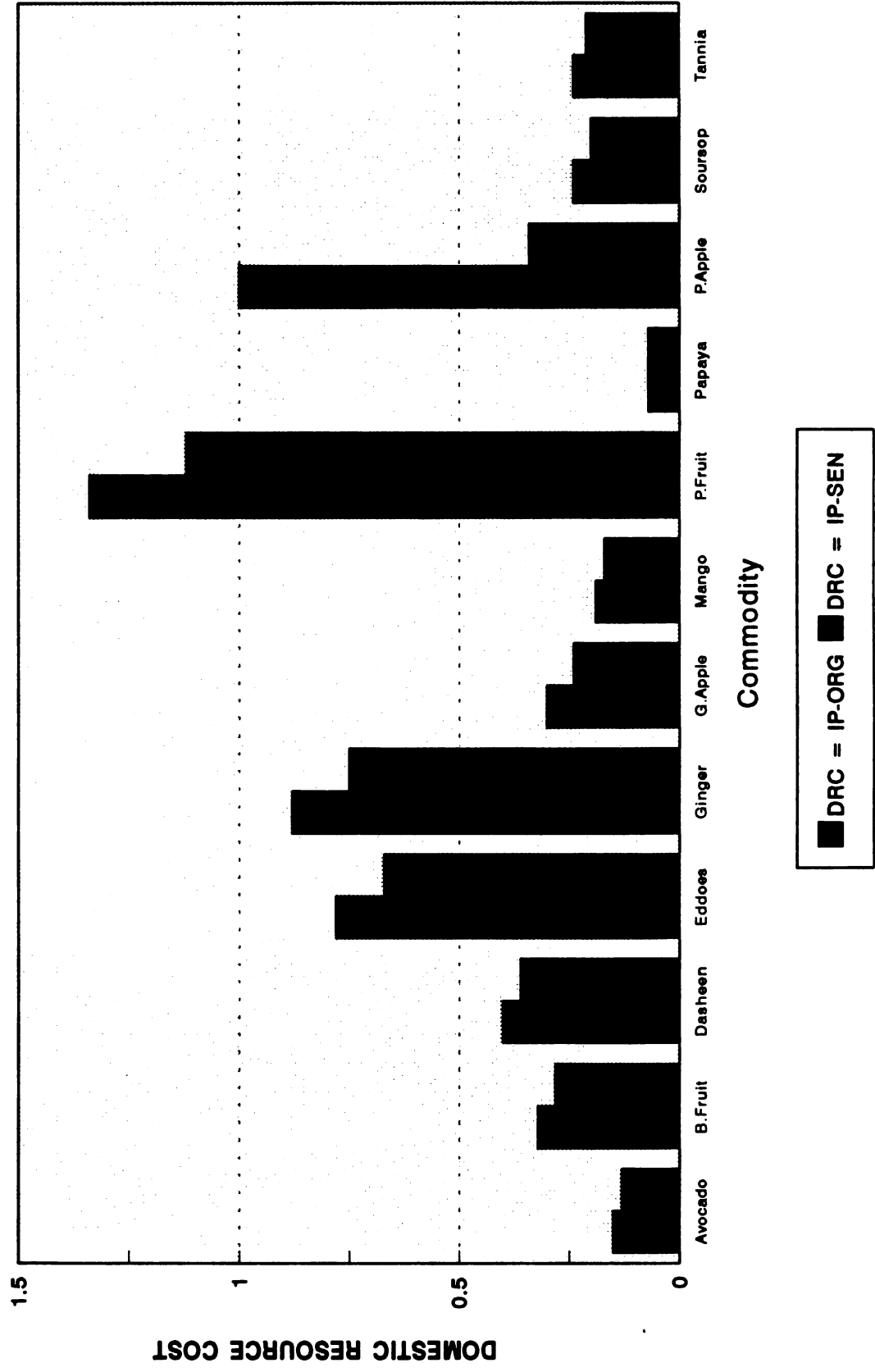
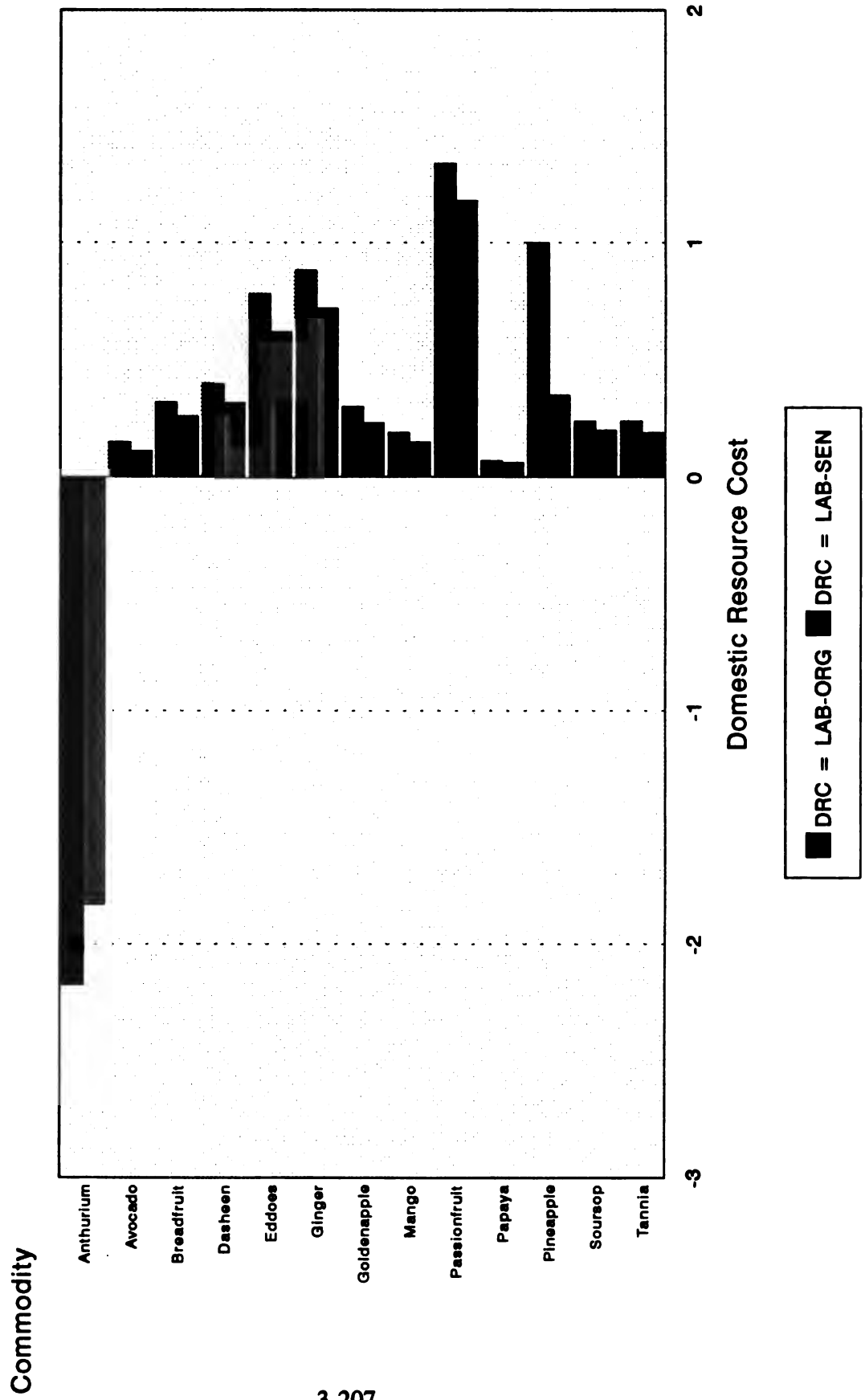


FIGURE V.3. LABOUR SENSITIVITY - ST. VINCENT, 1992-93
Selected Commodities



CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The analysis of the competitiveness of nontraditional agricultural commodities must begin with an examination of economic activities which range from production to export, or even to the consumption by domestic consumers, in the case of import-competing products. As outlined in the study the key issues which must be addressed in this regard are: a) if the OECS is to succeed in its non-traditional export thrust, from which member states, if any, should production emanate? b) what specific improvements, if any, are required to make production competitive? and, c) how feasible are such improvements?

This study calculated domestic resource cost estimates for 32 agricultural commodities produced in the OECS sub-region. Table 4.1 summarizes the results of the DRC analysis by commodity and indicates competitiveness rankings on a country-by-country basis. Based on these estimates an important result of this study is that the OECS countries in general possess a strong potential competitive advantage in the production of certain tropical fruits, root crops and tubers. Results for cut flowers and temperate vegetables are somewhat less encouraging. Of equal importance is the finding that this competitive advantage varied both across countries and commodities.

Except for the commodities which were classified as being moderately competitive there was generally low sensitivity of the results to variations in the cost of labour. This implied that individually, minor variations in labour costs will have a relatively small impact on the commodities which are presently competitive according to the DRC measure.

The sensitivity of the DRC results to variations in yields can be taken to be an indication of the importance of productivity-based factors in determining the competitiveness for OECS non-traditionals. Conversely, the massive improvements in yields needed for many of the commodities which are not presently competitive constitute an incontrovertible indicator of the difficulty which member states of the OECS will encounter in developing export competitiveness for said commodities. For individual roots and tubers as well as for tropical products the results suggested that yields do not constitute a substantial barrier to the attainment of competitiveness. For commodities which are presently competitive, this suggests that in the absence of dynamic considerations, the yield levels are not expected to be a major hinderance to the attainment of competitiveness in the short-run. As would be expected, it was found that extreme volatility in the non-intervention prices for specialty products would impact adversely upon the export competitiveness of OECS non-traditional products. The low sensitivity of the DRC coefficients to observed historic variations in the non-intervention price however, suggests that the results are fairly robust to moderate variation in this critical parameter.

To provide comprehensive conclusions as to the competitiveness of these commodities, however, it is necessary to interpret the estimated DRC within the context of the existing infrastructure within the region as well as the operational characteristics of relevant regional and international markets.

Table 4.1. Country by Commodity Matrix for Selected OECS Non Traditional Agricultural Commodities.

COUNTRY	ANTIGUA	BRITISH VIRGIN ISLANDS	DOMINICA	GRENADA	MONTSERRAT	ST.KITTS	ST. LUCIA	ST. VINCENT
COMMODITY								
Anthurium			Δ	X				X
Avocado	*	X	***	****			**	*****
Breadfruit			****	*			***	**
Cabbage					X	X		
Carrot					**	*		
Cashew				Δ				
Cauliflower					X			
Cucumber	X	X						
Cotton						*		
Dasheen			*	**			Δ	***
Eddoes								*
Eggplant		X						
Ginger			**				***	*
Gingerlily			*	X				
Golden apple			**	*				***
Hot pepper	X						Δ	
Mango	X	X	***	*			Δ	**
Melon	X	X						
Onion	X				*	**		
Passion fruit			**	*			X	Δ
Pawpaw	*		****	***			**	*****
Pineapple	**				***		X	*
Pumpkin	X					X		
Soursop				*			X	**
Squash		X						
Sweet pepper	X							
Sweet potato	Δ		**		*	***		
Tannia			**	***			*	****
Tomato		X			Δ	X		
White potato					X	*		
Yam					*	X		

Note: where * indicates that the commodity is competitive, while increasing numbers of * indicate the relative rank of the country in production of the commodity. Countries with more * than others are relatively more competitive in the production of the specific commodity. X denotes that the commodity was included in the analysis but was found to be non-competitive; and Δ indicates that the commodity was investigated but was found to be marginally non-competitive.

Temperate Vegetables

As shown in Table 4.1, the OECS countries did not appear to possess a strong competitive advantage in the production of most temperate vegetables. The exceptions to this were onion and carrot production in both Montserrat and St. Kitts. For moderately non-competitive commodities, such as hot peppers in St. Lucia and tomatoes in Montserrat, the results of the study indicated that initiatives aimed at fostering efficiency improvements, including agricultural and macro-economic policy reform should be undertaken if these commodities are to be competitive for domestic resources or to be competitive with imports. This implies that initiatives to reduce the divergence between social and private profitability along with the required improvements in production, harvesting, marketing and selling will be critical. In the absence of these improvements, the results of the study suggest that initiatives in this area would result in net-foreign exchange losses and encourage further resource misallocations.

While the DRC estimates for carrot and onions suggest that the export of these commodities to external markets would result in net foreign exchange earnings, structural factors temper the likelihood of successful entry to the U.S. mainland or Europe. This is primarily due to the fact that both Montserrat and St. Kitts are unlikely to produce in the volumes that buyers in large markets such as the U.S. are likely to demand, and that both countries face limited maritime transportation linkages to this market. Additionally, it appears unlikely that either country can meet the competition from Central America (onions) and Mexico (carrots) based on cost or volume.

However, the production of these two commodities offer OECS competitive producers the potential to save foreign exchange by supplying regional markets (including the U.S. Virgin Islands) thereby reducing the region's dependency on foreign imports of these two commodities. For this potential to be realized through intraregional transportation links (both air and sea) must be improved to facilitate efficient product movement. While the basic physiology of carrots and onions makes them less perishable than other temperate vegetables such as tomatoes or peppers, it is still necessary that the product reach its destination in a state which accords with the needs of ultimate consumers. Given current regional maritime transportation links, it appears that at present, this can only be accomplished by moving the product via regional air carriers such as LIAT.

It should also be noted that improved regional market information is required if countries and local suppliers are to efficiently supply regional markets. While the requisite market information appears to exist, efficient collection and dissemination has not yet been achieved. As long as this condition is allowed to persist, market opportunities for producers and potential sources of regional supply for buyers, may go unnoticed.

Roots and Tubers

The DRC estimates for roots crops and tubers reported in Table 4.1 are somewhat mixed. While tannia, ginger and eddoe exhibited strong competitive advantages across all countries, white potato, yam, sweet potato and dasheen, were each non-competitive in at least one OECS territory. The difference in relative cross-country competitiveness raises the distinct possibility for intra-regional trade, from countries which are presently competitive (net foreign exchange earners) for specific commodities to countries which are not (net foreign exchange losers).

The relatively low degree of perishability of these crops, and the growing demand for some of these commodities suggest that some potential may also exist for exports to external markets such as the U.S. As the markets for these commodities are primarily ethnic in origin, volumes required are modest, suggesting that the amount likely to be produced in the OECS may be sufficient to attract the interest of U.S. importers. Additionally, the low perishability of these commodities considerably reduces the market barriers presented by limited maritime transportation links to the U.S. mainland.

The export potential of these crops in the U.S. market is, however, limited to some extent by the increased production of many of these commodities in South Florida. Thus, OECS producers must carefully target production to supply market windows defined by seasonal production in the U.S.

Cut Flowers

In spite of the interest shown by respective OECS territories in developing a viable cut flower industry, it was found that producers of these commodities in the absence of implicit programmatic support from any quarter, will be unable to compete in anthurium production. While Dominican producers with well coordinated infrastructural support may be able to achieve competitiveness over the short term, the prognosis for producers in Grenada and St. Vincent is far less encouraging. Despite this, Dominican producers were found to be competitive in gingerlily production. Their ability to develop the industry beyond its present level however, will be largely dependant on the industry's ability to surmount the same infrastructural shortcomings which continues to retard the competitiveness of anthurium producers.

Cut flowers are highly perishable commodities necessitating air shipment to extraregional markets. However, the high value of these commodities and willingness of markets to receive relatively low volumes of these flowers, make the use of air shipment economically feasible. As Dominica is adequately served by air carriers, transportation of low to moderate volumes of these commodities does not appear to represent a barrier to accessing external markets. Furthermore, there are no phytosanitary barriers inhibiting access to the North America market.

It should be noted, however, that external markets for cut flowers are strongly driven by consumer preferences and are subject to cyclical fluctuations regarding flower types and color. This at least in part, may be a manifestation of the strengthened competition in the form of increased quantity and variety of cut flowers being exported from Europe and from Central America as part of that region's diversification efforts. Against this backdrop, it is important for producers in the OECS to keep close contact with market preferences and position their production activities in such a manner as to be responsive to market changes and the emerging competition from Central America.

Tropical Fruits and Nuts

Of the four broad categories of commodities investigated in this study, OECS produced tropical fruits which exhibited the greatest potential to be competitive for domestic resources, with imports as well as with other economic initiatives. While this is not surprising, what was not obvious was that the DRC's for several commodities in this grouping was as low as .27 for paw paw production in Antigua, .25 for breadfruit production in St. Lucia, .24 for mango production in Grenada, and .15 for avocado production in Grenada. In terms of foreign exchange earnings, to earn U.S \$1.00 worth of foreign exchange, this implies that paw paw producers in Antigua would need to expend EC\$0.30, producers of breadfruit in St. Lucia EC\$0.67, producers of mangoes in Grenada expending EC\$0.65, producers of avocado in St. Vincent expending EC\$0.40 and producers of passion fruit in Dominica expending EC\$0.13; which is clearly less than the exchange rate to the U.S. dollar of EC\$2.70.

The exceptions to this were pineapple and soursop production in St. Lucia which was found to be presently uncompetitive, and production in the BVI which exhibited a strong tendency to be uncompetitive for virtually all the non-traditional commodities examined. Passion fruit production in St. Vincent as well as cashew production in Grenada, were found to be moderately non-competitive; this, despite producers and exporters earning positive net returns due to implicit policy induced transfers.

As a broad commodity category, tropical fruits and nuts fit well with both U.S. market trends and existing transportation linkages. The U.S. market for tropical fruits has expanded rapidly over the past ten years in response to the demand for new "exotic" commodities. As U.S. domestic production for many tropical fruits remains low due to climatic constraints, most of this increased demand has been supplied by imported products. Additionally, the desire by importers to supply the market on a year round basis has resulted in high prices and attempts to source product in low to moderate volumes from numerous foreign producers.

As regards the OECS, this suggests that the moderate volumes the region is able to supply will not be likely to represent a market access barrier. Further, the high value which these commodities earn combined with the high degree of perishability, make air transport both necessary and justifiable on economic grounds. As the region appears to have sufficient air

transport links to the U.S., transportation does not appear to represent a significant barrier to U.S. market access.

There are however, substantial differences in market characteristics that temper these broad market trends and which must be considered in making specific assessments regarding competitiveness. As such, more detailed examination of the commodities comprising the tropical fruit and nut category is required.

Avocado

Based on the DRC estimates, Antigua, Dominica, Grenada, St. Lucia and St. Vincent could all realize net foreign exchange earnings through the export of avocados. However, due to phytosanitary restrictions, only Grenada and St. Vincent have unrestricted access to the U.S. market. Enterability restrictions limit the remaining countries to North Atlantic ports only, effectively closing off much of the U.S. market.

However, given current volumes of avocado production in both Florida and California, it is unlikely that low to moderate levels of avocado exports from Grenada and St. Vincent will provide sufficient incentives to U.S. importers to source from these countries. This situation is further clouded by the possible entry into the U.S. avocado market by Mexico. Though entry is currently prohibited by phytosanitary restrictions, there are some indications that Mexican avocados may gain entrance in the near future. Should this happen, Mexico will dominate the import market for avocados.

Breadfruit, Golden Apple and Paw Paw

There is virtually no U.S. production of these commodities and no existing phytosanitary restrictions inhibiting the importation of these commodities from the OECS. At present, each of these commodities is consumed in small volumes and though consumer acceptance of paw paw (papaya) is growing, markets are primarily ethnic. Combined with this the highly perishable nature of these products, they are therefore unable to command high market prices.

The low market volumes and high prices, justifies on economic grounds air shipment of small volumes from countries such as Dominica, Grenada, St. Lucia and St. Vincent. As the characteristics of the market interface with current production volumes and existing transportation linkages in the region, there appear to be no significant technical barriers to accessing the U.S. market.

However, this apparent potential is tempered somewhat by the fact that OECS producers face regional competition from Jamaica and the Dominican Republic, and international competition from Mexico. The competitive position of OECS producers has yet to be established vis-a-vis these countries. Furthermore, as the market for these commodities is primarily ethnic,

demand growth is likely to be slow due to limited product awareness among the broader consuming market. As such additional supplies placed on the market may create significant downward price pressure that would have adverse effects on the foreign exchange earning capabilities of these commodities.

Mango

Mango has favorable DRC estimates for Dominica, Grenada, and St. Vincent. St. Lucia is marginally competitive. However, phytosanitary restrictions limit entry of untreated mangoes to only Grenada and St. Vincent. At present, Dominica and St. Lucia do not have the hot water treatment facilities requisite for gaining entry to the U.S. market.

Mango consumption in the U.S. market is growing rapidly and consumer acceptance is becoming widespread. Indeed, mango is poised to move from the category of "exotic" to "mainstream" much as the Kiwi fruit did some years ago. In addition to this there has been a substantial increase in U.S. imports of mangoes, with Mexico dominating the market.

The large volumes of mangoes imported into the U.S. from Mexico and other Central American countries place Grenada and St. Vincent at a competitive disadvantage in terms of volume for what may be termed the "generic" mango market. However, where other countries must use hot water treatments for mangoes to gain entry into the U.S. market, Grenada and St. Vincent enjoy "fruit fly-free" status. As such, the potential exists to create a low volume, high value differentiated product market for Grenadian and Vincentian mangoes. This however, must be developed by active market promotion and supported by a consistent and reliable supply of high quality product.

Passion Fruit and Soursop

As can be seen from the DRC estimates in Table 4.1, both passion fruit and soursop have potential to provide net foreign exchange earnings in several countries in the region. As fresh products, however, potential exports markets appear limited. In the case of soursop, the U.S. market is closed due to phytosanitary restrictions on the fresh product.

There does however appear to be some potential for use of these two products in processed form. Both provide excellent juices which can be used to make liquid refreshments as well as frozen desserts. While soursop has yet to find a significant place among processed products found in the U.S., passion fruit is already being used increasingly in frozen desserts such as sherbets and yogurt.

Expansion of the export of these two commodities rests on the ability of the region to develop processing facilities. As the economies of scale for efficient operation of a processing plant are likely to be beyond the production levels of any one country in the OECS, some degree

of regional coordination of supply will be required and the optimal location for a processing facility must be determined.

Pineapple

On the basis of the estimated DRCs, pineapple production competes favorably for domestic resources in Antigua, Montserrat and St. Vincent. While the external markets for pineapple are large and growing, the export potential for this crop in the OECS appears limited. The primary barrier to entrance into external markets is the strong competition and dominance of pineapples exported from Central America. Although DRC estimates have not been formulated for Central America, it is likely that OECS producers would be at a competitive disadvantage. Additionally, pineapple export markets are dominated by multinational firms such as Dole and Del Monte, which further exacerbate the difficulties of OECS entry to the market.

The estimated DRCs do, however, suggest that pineapple production could provide net foreign exchange savings in the region by supplanting imports from countries outside the region. Hence, expanded interregional trade has the potential to encourage market based import substitution. This is especially true if a preference for regionally grown pineapples can be cultivated.

While the OECS does not appear to be able to compete in the "generic" export pineapple market, there may be some potential to develop some small niche markets for "specialty" pineapples such as the Antiguan Black Pineapple. In recent years, the U.S. market has shown increasing interest in specialty items that are supplied in low volumes and command premium prices in the market. Such volumes would interface well with the likely amounts that the countries such as Antigua are able to supply and the high market value of the products would justify movement to the market by air shipment. The development of such specialty markets is a difficult process involving extensive market promotion and increased attention to product quality.

Cashew

At present, none of the OECS countries is clearly competitive in cashew production. However, the estimated DRC for Grenada suggests that only a modest improvement in efficiency is necessary for cashew production to be competitive. As the estimated DRC only accounts for the cashew nut, improvements in efficiency could be obtained by increasing the utilization of the pulp and oil by-products that result when the nut is extracted.

The potential for exporting cashew nuts to external markets appears to be limited. Though no DRC estimates have been prepared for Central and South American countries, the labour intensive nature of decorticating the nut would seem to convey a competitive advantage to these countries as wages rates are much lower than in the OECS. Further, the ability of

countries such as Brazil to supply large quantities to the export market may provide an implicit entry barrier, as the volumes likely to arise from Grenada may be insufficient to attract the attention of importers in the U.S. or Europe.

The above conclusions are based solely on the estimated DRCs and existing market infrastructures and operating characteristics. However, as indicated elsewhere in this study political realities as well as other factors are expected to modify the results of this study, regardless of the economic consequences. For instance, for commodities which are non-competitive there may be a strong incentive to be "self-sufficient", despite the weak economic rationale for self-sufficiency. Additionally, employment considerations, distributional consequences of policy reform, as well as gender sensitive issue may have implications for the choice of crop as OECS Governments seek to re-formulate diversification strategies. Despite this, if a country possesses a competitive advantage in the production of a specific commodity, this affords it an expanded range of options in the planning and formulation of government policy.

Recommendations

1. REGIONAL SPECIALIZATION OF PRODUCTION SHOULD BE UNDERTAKEN

The basic precept of this analysis is that comprehensive ex-ante assessments of the competitive environment should be undertaken prior to countries embarking on export diversification initiatives. In order to enhance the efficient utilization of resources, individual countries should seek to attain increased specialization through a reduction in the number of commodities currently targeted under individual diversification programmes. Emphasis should be placed on developing those commodities which have been shown to have competitive advantages. There exists an inverse relationship between diversification and productivity, particularly in fairly small economies like those of the OECS where economies of scale are not easily realized.

The results of the study provide a basis for identifying the commodities in which individual member states have a competitive advantage and thus *ceteris paribus*, provide the basis for an objective pattern of specialization. If the recommended changes are instituted in the research agenda, both the productivity and competitiveness of OECS agriculture will be enhanced.

2. RE-ASSESSMENT OF THE MACRO-POLICY ENVIRONMENT

If the OECS countries are to enjoy sustained growth from non-traditional agricultural production and trade, a favorable macro-economic policy environment should be created. This requires that the current macroeconomic environment be re-examined. Such a re-

examination should seek to identify the anti-export biases against the agricultural sector caused by policies introduced in other sectors and should seek, in so far as is possible, to harmonize policies across sectors so as to eliminate the sectoral biases which may exist. The existence of conflicting policies and programmes cause producers/exporters to observe distorted prices which may engender resource mis-allocations.

Potential competitiveness will only be translated into actual competitiveness if macroeconomic conditions are conducive to the efficient operation of markets. The evidence is clear that firms which are open to competitive market conditions will achieve higher levels of increased efficiency and productivity growth. Additionally, efficiently functioning markets provide the impetus for sustained growth in productivity and efficiency.

3. DEVELOPMENT OF AGRO-PROCESSING FACILITIES

Agro-processing activities can be promoted through assistance programmes targeted to cottage-industries, or through the forging of linkages with processors in other territories in the CARICOM. There also appears to be an opportunity for involving the private sector in the production of line-ready purees which can be supplied to blenders and processors both regionally and extra-regionally. While several options appear to exist, in-depth analysis will be required to ascertain which if any one of these options is feasible, i.e. whether it passes the litmus test of being net a foreign exchange earner.

In addition to agro-processing of bulk food products, the blending of fertilizer materials also appears desirable as a means of reducing production costs in the region. While adequate assessments of the feasibility of bulk purchasing of blended and bagged fertilizers have been undertaken, the feasibility of purchasing component elements for blending has not been examined sufficiently. Fairly low cost means of sourcing the component elements, and constructing quonset and blending facilities exist. Both the logistics of establishing blending facilities, including the construction of economic size units, as well as the financial viability of such units should be subject to in-depth analysis. This analysis should surpass the cursory examination of cost and returns which typifies much of the research which has been conducted on this subject in the past.

4. EXPANDED EMPHASIS ON MARKETING

The modest volumes of and temporal duration of product supply likely to originate from the region combine to create potential access barriers to external markets. In the fresh horticultural product market, access often proceeds from the market to the producer rather than the converse which is often times implicitly assumed. This suggests that the OECS should formulate proactive strategies to establish strong relationships with import agents in external markets.

By strengthening such relationships the incidence of inconsistent and often sporadic commodity supply which results from producers uncertainty about the availability of export markets will be reduced. Further, such relationships will create higher probabilities of success than exist under current selling strategies which involve sporadic export of relatively small volumes of commodities to "narrow market windows" or "market niches".

Emphasis should also be placed on developing differentiated products in external markets. The tropical connotation associated with the region and the competitiveness of many tropical fruits provide an excellent platform from which an aggressive marketing campaign designed to achieve strong product differentiation can be launched. An example of this would be the active promotion of "Grenadian" or "Vincentian" mangoes as being superior to mangoes imported from other countries, such as Mexico, where the required hot water treatment reduces quality.

Such product differentiation has been shown to be successful in the U.S. market and would afford the creation of strong niche markets and strong price premia.

Efforts should also be increased to further develop local demand for locally grown products. A case in point is that of the British Virgin Islands (BVI). Consumers in the BVI exhibited the strongest preference among all OECS consumers for "local produce". Given the geography and resource endowments of this country, along with the operation of macro-economic forces, it does not appear that this country will be capable of achieving net-export status for any of the commodities examined in the near future. However, the current low duties on imports, the virtual non-existence of non-tariff barriers, the heightened sensitivity of consumers in the BVI to environmental and health hazards from even moderate levels of fertilizer and chemical residues, and the higher level of per capita incomes in this country vis-a-vis the rest of the OECS, augur well for the charging of differentiated consumer prices for local produce which is usually in short supply.

This highlights the potential for charging prices differentiated by source of origin (local produce as against imports) and by commodity (instead of the across the board price of U.S. \$1.00 per pound for all grades, types and varieties of local produce). It is envisaged that there may be high payoffs to the establishment of a BVI Department of Agriculture certified label guaranteeing product quality. Simultaneous with the introduction of these differentiated prices, the BVI Department of Agriculture should seek to reduce the level of government support accorded to agricultural producers, by requiring them to finance a larger proportion of their initial establishment cost. One possible area for such reduction is in relation to the Department's Spraying Unit, which conceivably could begin immediately upon a programme of partial cost recovery by having farmers meet the economic cost of chemical inputs. This, it is envisioned, will reduce the financial burden on the Department, whose budget has not been growing in real terms thus releasing resources for other important initiatives.

5. INVESTIGATION OF REGIONAL DISTRIBUTION FACILITY

Such a facility would provide the requisite infrastructure for storage of highly perishable commodities, for distribution to regional and external markets. The establishment of one or two collection points, one in the Leeward Islands and the other to be located somewhere in the Windward Islands or Barbados should also be considered. The main functions of the regional facility will be the procurement and distribution of OECS non-traditional produce.

The facility will serve the demand for nontraditional products emanating from the tourism sector, and may perform the role of commodity brokering and marketing. The regional facility could also perform the function of supplying produce to the private sector on a contractual basis. This may be effected through collaboration with the Departments/Ministries of Trade, and with agricultural marketing organizations where these exist.

A regional distribution point will also enhance the volume of intra-OECS trade in agricultural commodities by forging linkages between countries possessing strong competitive advantage in certain specific commodities and industries such as tourism spread over several member states. Owing to the problems of transportation, quality, consistency of supply and timeliness of delivery, the problems of economies of scale, and the high per unit cost of developing the requisite infrastructure on an individual country basis, it appears that the only feasible route to establishing this relationship lies in the creation of a clearing house which will act both as a collection point and shipping center.

To support such a facility, the development of a market information system should be pursued. Such systems should be geared toward the provision of information to assist producers in production planning for export. While there are plans to introduce two such systems in the OECS for the European market, no such systems are planned for intra-regional markets or for the U.S. market.

6. INTRAREGIONAL TRANSPORTATION INFRASTRUCTURE INVESTMENT

The analysis revealed that considerable potential exists for intraregional trade. However, the current capabilities for moving perishable products intraregionally via maritime carriers are inadequate to meet the needs of the regional markets. Vessels are of questionable sea worthiness and the reliability of timely product delivery is questionable. If the potential gains from intraregional trade are to materialize, reliable maritime links must be established and maintained.

While LIAT provides some measure of reliable air transport within the region, the cargo capacity of the airline constrains significant expansion of trade flows. Additionally, the expense associated with air shipment can only be justified for high valued commodities.

As expansion of the cargo capacity of LIAT appears unlikely, maritime transportation appears to be essential for expanded intraregional trade.

8. DEVELOPMENT OF ENTREPRENEURSHIP AND TECHNICAL SUPPORT CAPABILITIES

Despite substantial expenditures on improving production technologies in each of the OECS member states, the level of technology continues to be low, placing many of the countries at a decisive disadvantage relative to competitors. Three issues are of vital importance in this regard: 1) the low level of entrepreneurial skills of indigenous producers; 2) the need to concentrate efforts aimed at improving production techniques along the lines of "revealed institutional advantage" and in a manner consistent with the dictates of the DRC results and the market analysis outlined herein; and 3) adaption and training of farmers in technologies which place them on par with producers in other countries and which minimizes per unit cost should be accelerated.

The historical and cultural realities of the region have resulted in the absence of a substantive class of rural entrepreneurs. As such, emphasis should be placed on initiatives aimed at fostering and developing entrepreneurship among producers/exporters as opposed to institution building. While institution building is an important component for developing infrastructure and support capabilities which otherwise may be absent, it cannot be a substitute for developing an entrepreneurial ethic among OECS producers/exporters.

To support such a thrust, research, development and extension programmes operating within individual member countries should be revisited and reformulated such that they offer producers the best possible access to technical expertise, on a cost-effective basis. The regional and international organizations operating within the countries will be required to support this re-organization of the extension service. In this regard, the option of involving the private sector through privatization of the research, development and extension service of the Ministries/Departments of Agriculture with a special window created for supporting bona fide producers who may be disadvantaged should be explored.

As a corollary to the reassessment of the system of research, development and extension delivery, and in order to minimize per unit cost of input delivery, transportation and marketing, the possibility of developing innovative forms of institutional and organizational arrangements for producers, should be explored. In this regard the feasibility of alternative arrangements such as contract farming should also be examined.

9. REDUCTION OR ELIMINATION OF INTRAREGIONAL TRADE BARRIERS

To enhance the potential benefits commensurate with increased intraregional trade in non-traditional commodities and encourage competition within the sub-region, trade barriers should be significantly reduced or eliminated. In this regard non-tariff barriers such as the requirement of "sales licenses", licenses for commodity imports from other OECS countries in periods when domestic production is available, the institution of phytosanitary requirements which have no scientific basis, should all be eliminated. No derogations and/or "snap-back" conditions should be attached to this requirement. While there is a wide range of relative efficiencies of production for certain commodities both within and across producing countries of the OECS, differing government policies in the form of trade interventions and domestic policy distortions preclude these relative differences in economic efficiency from being exploited. This constitutes a major deterrent to member countries of the OECS benefitting from trade.

10. OECS COUNCIL ON COMPETITIVENESS

In light of the numerous challenges to the development of non-traditional export agriculture in the OECS, the formation of an OECS Council on Competitiveness and Productivity (OECS-CCP) to assist in the formulation of policies to address specific constraints which affect the sector at the sub-regional level should be explored. The OECS-CCP should be a non-governmental technical committee and should be comprised of professionals from OECS member countries, as well as from sub-regional and international organizations which are involved in the planning and formulation of agriculture and trade policies for the sub-region.

11. PERIODIC RE-ASSESSMENT OF DOMESTIC RESOURCE COST

There is need for DRC analysis to be undertaken as a matter of course, prior to countries embarking on export-oriented diversification initiatives. This, it is envisaged, will provide producers/exporters with a hedge against financial losses, will assist in minimizing project costs and will reduce the costs to the society of such initiatives, through the minimization of foreign exchange losses.

