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The CPPA Model-Builder

Technical Structure and Programmed Options in Version 1.3

Kim Hjort
Pierre Van Peteghem

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ABSTRACT

The U.S. Department of Agriculture's Economic Research Service has developed the Country Projections and Policy Analysis (CPPA) model-builder to assist analysts in generating projections of agricultural market outcomes and conducting long-term policy analyses. CPPA is a spreadsheet based, program driven system that facilitates the specification of price linkages and economic relationships in agricultural markets. The system generates projections of market outcomes from linkages between domestic prices and exogenous reference prices, given exogenous macroeconomic conditions and user-specified endogenous economic relationships. The model-builder can accommodate 46 cross-linked commodity models, including grains, cotton, sugar, oilseeds and products, animal inventories, and meats, milk, and eggs.

Keywords: Model-builder, spreadsheet modeling, price linkages, projections, long-term policy analysis.

ACKNOWLEDGMENTS

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CONTENTS

GLOSSARY

Base values	Normal levels of variables used as initial or base year prices and supply, demand, and trade components.
Base year	Year immediately preceding the first forecast year.
Circular	Condition whereby the value of one cell depends solely on the value of a second cell which in turn depends solely on the value of the first cell.
CLCU	Constant local currency units.
Code	Commands used in the programming.
Commodity projection block	Portion of the forecast spreadsheet where the quantity projections are generated.
Contributions	The change in the dependent variable due to a change in a single explanatory variable in a Cobb-Douglas function; the computed value of the contribution of an explanatory variable to a dependent variable in a linear function.
Crop intensity index	Measure of the multiple cropping uses of land; usually defined as gross area harvested divided by area available for crop production.
CUS$	Constant U.S. dollars.
Customize, customized, customization	Process whereby unnecessary information is deleted from the forecast and/or history templates.
Default, defaults	Value or string that will be used in response to a prompt if no entry is made.
Equation definitions	Specification of functions used in the forecast spreadsheet.
Function activity menu	Menu used while defining a function in the forecast spreadsheet with options to move the cursor to add, revise, or delete a function definition or enter parameter values in an existing function definition.
Function definition menu	Menu used to move cursor and enter or change an explanatory variable range name while defining a function in the forecast spreadsheet.
IF function	Returns one value if a condition is true and returns another value if the condition is false.
Immediate mode	Use of SC5 commands outside of programming.
Import capacity	Measure of the total quantity of cereals that a country can afford to import based on factors such as cost of imports and availability of funds for importing.
Initialize, initialized	Process whereby the forecast and/or history spreadsheets are altered to reflect the commodity and price coverage needed for a country model; setting of initial values in the spreadsheets.
Key, keying	Process whereby input to a prompt is recorded simply by pressing a keyboard character; differs from entering data which requires pressing the enter key after input.
LCU	Local currency units.
Link, linked, linking	Process whereby SC5 reads data contained in one spreadsheet and uses it in another spreadsheet.
Macros	Programs written in the specific syntax and with the specific codes recognized by SC5.
Memory resident	Spreadsheets that are currently loaded into RAM (random access memory).
Price linkage(s)	Mathematical description of the relationships among reference and domestic prices.
Price policy variables	Policy-related variables determining domestic prices including trade taxes, support price adjustments, and the like.

Prompt, prompts	Statement or question instructing the user what data to enter.
Protect, protected	Command in SC5 that prevents erasure or entry of data in a cell.
Range name	Name assigned to a single cell or group of cells.
Real value base year	Year on which all monetary values are normalized.
Reference prices	Representative commodity prices at common world markets.
Shell	Software that is activated, underlies ongoing operations, and is returned to after ongoing operations are concluded.
Target food consumption	Desired level of cereals used for food.
Titles	Locked column(s) and/or row(s) in the spreadsheet display that provide labels and other reference information while scrolling through the remainder of the screen.
Unlink, unlinked, unlinking	Process whereby the connections or links between spreadsheets are removed.
User-defined variables	Variables added to a country forecast spreadsheet that are not available in the template.

The CPPA Model-Builder

Technical Structure and Programmed Options in Version 1.3

Kim Hjort
Pierre Van Peteghem

INTRODUCTION

The Country Projections and Policy Analysis (CPPA) model-builder has been designed by the Economic Research Service (ERS), U.S. Department of Agriculture (USDA), to assist country analysts in developing long-term projection and policy simulation models of supply, demand, and trade in agricultural products. In its most basic form, the CPPA system is a template for a single-country, multicommodity, exogenous world price projection and simulation model. It contains programmed routines which assist users in completing many of the tedious tasks associated with building, changing, and documenting a spreadsheet model. Use of these programmed routines enables users to customize the template to reflect a specific country's economic and policy environment. At that point, it becomes a powerful tool for generating projections or analyzing alternative policy proposals.

The model-builder was developed in response to an ERS need for a common model structure for country projections and policy analysis. Prior projections of a country's long-term agricultural prospects have been made using a variety of tools, ranging from subjective country-specialist analyses to complex, cross-commodity models. Because the techniques and model structures varied, the compilation of projections through a standard procedure has been tedious. In addition, many of the prior models have been user and country specific, which made difficult the adaptation of an existing model to another country's unique characteristics. Finally, it has been virtually impossible to link the various models to develop a global, price-endogenous system. Therefore, to improve the usefulness of country projections and to facilitate future endogenization of world prices, a common modeling approach and model structure was developed.

The CPPA system was developed under five general guidelines. First, since most country analysts are familiar with spreadsheet programs, the system is housed in SuperCalc 5.0 (SC5), a spreadsheet program.[1] Second, in response to the varying levels of computer skills among analysts and the need for a user-friendly system, tedious tasks such as entering equations have been automated. Third, the model framework had to take into account policy effects on domestic price determination. It does this by accommodating up to seven domestic price levels in each commodity market, with varying degrees of linkage between the world and domestic price levels. Fourth, the model had to reflect linkages within the agricultural sector and, if possible, linkages between agriculture and other sectors in order to take into account resource constraints and substitution possibilities between different sectors of the economy. In response to this consideration, the template includes an analysis of land use, provides a framework for linking crop and livestock production, enables extensive cross-commodity linkages, and has a macroeconomic component. Fifth, the system had to be able to reflect the many different economic institutions and market structures found in

[1] SuperCalc 5.0 is a spreadsheet program licensed to users by Computer Associates, Inc. ERS does not have licensing rights to the SC5 software. Therefore, users of the CPPA system must purchase SC5 from the manufacturer.

various countries around the world. Therefore, the model-builder is flexible enough to allow country analysts to customize the template to reflect unique country characteristics.

These are the broad guidelines. In addition, the CPPA system was developed with a set of structural characteristics in mind. First, we assumed that a user of the system understands the basic forces underlying and guiding responses to economic stimuli. Such an understanding of world and domestic macroeconomic, agricultural, and trade policies and their influence on prices and quantities must necessarily underlie the development of each CPPA model. This is vital because the policy environment determines which variables within a country-specific CPPA model are exogenous and which are endogenous. However, to develop a consistent framework, some general assumptions about the exogeneity and endogeneity of variables had to be made.

The structural framework of the CPPA system is depicted in figure 1. In general, it is assumed that each country views itself as a "small country" and therefore takes ***reference prices***[2] as given. Domestic prices are determined by trade, agricultural, and economic policies, world macroeconomic conditions, and the reference prices. The domestic prices, in conjunction with land, technology, and inputs, determine market supply. Market demand is determined by prices and income. Supply and demand are balanced in each market with a residual.

Within this framework, reference prices, world macroeconomic conditions, policies, technology, inputs, and aggregate land are assumed to be exogenously determined. Reference prices are assumed to be determined by aggregate supply and demand for agricultural commodities and by world macroeconomic conditions. Domestic macroeconomic conditions may be fully exogenous or semiendogenous. Semiendogeneous domestic macroeconomic variables are those determined from both exogenous world conditions and endogenous domestic variables.

The exogeneity of technology means that yield-enhancing technologies, changes in feed conversion coefficients, and other technical variables must be determined outside of the model framework. The assumption of exogeneity of inputs arises because there currently is no capacity within the model-builder to determine most crop and animal product input availabilities and prices. Therefore, the system implicitly imposes a perfectly elastic supply curve on inputs such as fertilizers, chemicals, and labor. And, because input prices are not in the system, there is an implicit assumption that relative input prices remain constant in relation to one another.

The CPPA system can be used on any IBM-compatible computer with at least 3.0 million bytes of random access memory (RAM). In addition, it requires about 7 million bytes of hard disk space to store the SC5 software, CPPA templates, one country system, and a backup of the country system.

The remainder of this report describes the technical structure and operation of version 1.3 of CPPA.[3] But an understanding of the technical structure and operation of the CPPA system does not, by itself, provide a user with a complete understanding of how to use the system. This report is not intended to be a complete user's guide to the CPPA system; the report contains only limited examples of how to use the system. For that reason, this publication should be used along with the forthcoming *An Introductory Guide to Using the CPPA System*, which employs sample spreadsheets to guide a user through the steps necessary to develop a CPPA-based model.

The rest of this report is organized as follows. The technical structure of the system is described in chapter 1. This includes a description of how the three spreadsheets—a program, a forecast, and a history spreadsheet—in the CPPA system interact, and the structure of each of the spreadsheets. In chapter 2, the

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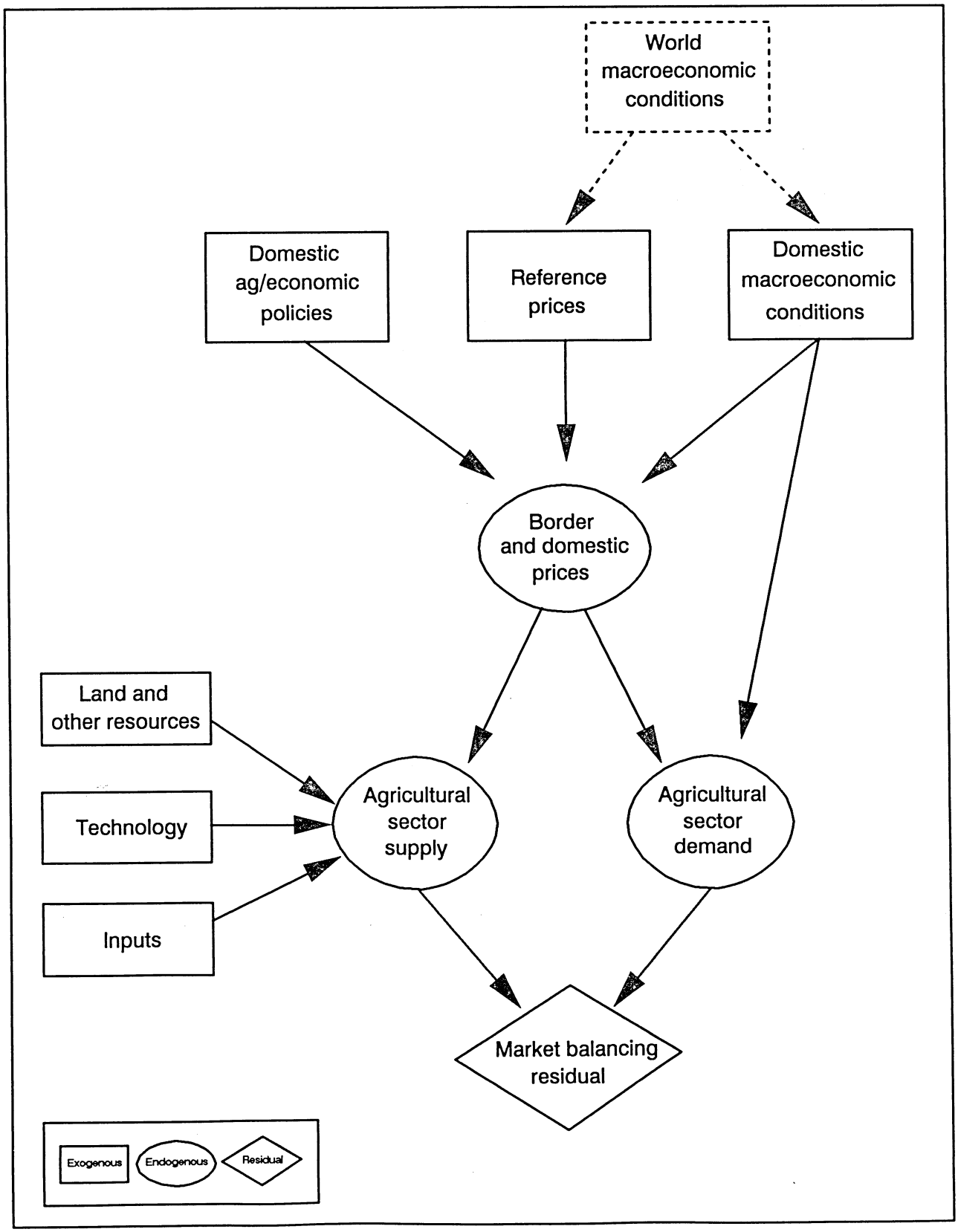
[2] Terms in bold italics are defined in the Glossary.

[3] Version 1.3 differs slightly from earlier versions used at ERS. For an overview of the changes, see Appendix D.

Figure 1--Structural framework of the CPPA model-builder



operation of the programming associated with the forecast spreadsheet is described. Finally, the programming associated with the history spreadsheet is described in chapter 3.

Before proceeding, it is important to note that throughout this report we assume that the reader is familiar with either SC5 or Lotus and basic spreadsheet commands. In particular, it is important to understand how to:

- Use a spreadsheet.
- Enter a formula in a spreadsheet.
- Set and clear ***titles***.
- Move around in a spreadsheet (the GOTO command).
- Define and delete a ***range name***.
- Call manual recalculation.

If these concepts are unfamiliar, we recommend using the manual provided with the spreadsheet software to review these operations.

CHAPTER 1

STRUCTURE OF THE CPPA SYSTEM

The CPPA system contains three spreadsheets: the program spreadsheet, the forecast spreadsheet, and the history spreadsheet. The program spreadsheet contains ***code*** necessary to operate the routines available in the forecast spreadsheet. The forecast spreadsheet, in conjunction with the history spreadsheet, contains all supporting data necessary to generate the projections as well as the projections themselves. The history spreadsheet contains historical production, supply, and disappearance (PSD) data for each of the commodities in the system, as well as historical land use and population data. The history spreadsheet also contains ***macros*** which control the operation of automated routines in that spreadsheet.

SPREADSHEET INTERACTION

The three spreadsheets in the CPPA system are ***linked*** together to enable the contents of one spreadsheet to generate an action or complete a computation in another spreadsheet (see fig. 2). The history and program spreadsheets support operations in the forecast spreadsheet. The process begins with the selection of ***base values*** in the history spreadsheet for each projection commodity. The base values represent normal levels of production, demand, and trade in the ***base year***. The forecast spreadsheet is ***linked*** to the history spreadsheet—it automatically reads the base values and places them in the base year column of the appropriate ***commodity projection block*** in the forecast spreadsheet. Projections of production, demand, and trade are generated in the forecast spreadsheet from the base values and the elasticity-weighted percent changes in explanatory variables. The system is closed by transferring finalized projections to the history spreadsheet so that the results can be aggregated across countries or viewed in relation to historical trends.

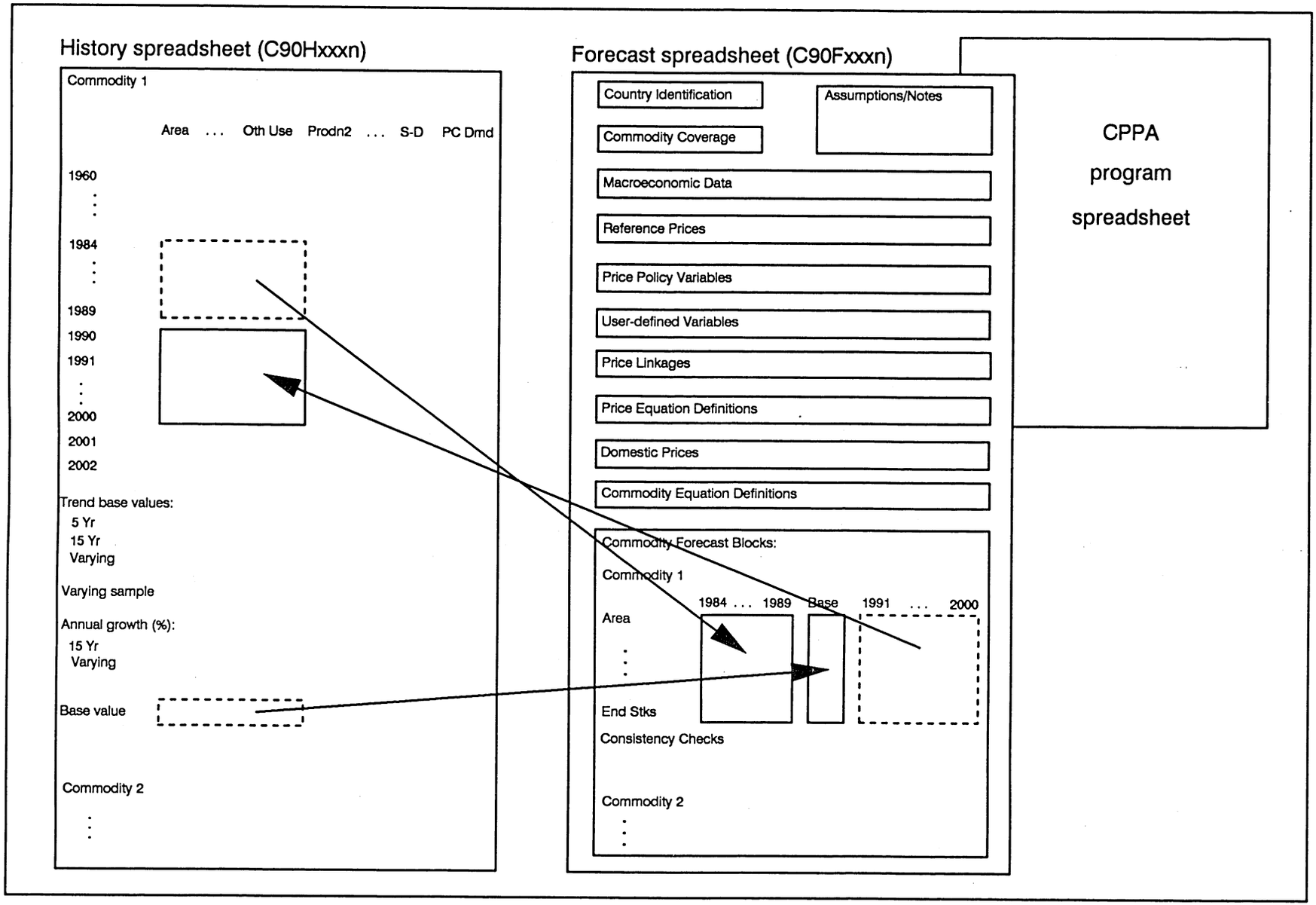
The program spreadsheet is not visible to the user once the forecast spreadsheet is loaded, but it must be ***memory resident*** when the forecast spreadsheet is being used. The program spreadsheet acts as a ***shell***, controlling access to the forecast spreadsheet and, in some cases, to the history spreadsheet. It is linked to the forecast spreadsheet and controls the ***link*** between the forecast and history spreadsheets. The ***macros*** contained in the program spreadsheet enable users to select commodity and price coverage, define price linkages, write equations, choose market-balancing residuals, print the projections, and save the spreadsheets. The operation of these routines is described in chapter 2. A description of the structure of the forecast and history spreadsheets follows.

STRUCTURE OF THE FORECAST SPREADSHEET

The forecast spreadsheet consists of several large organizational blocks in the following order:

- The identification block.
- The commodity coverage block.
- Space for recording assumptions and notes.
- The macroeconomic data.
- The reference prices.
- The ***price policy variables.***
- The ***user-defined variables.***
- The ***price linkage*** blocks.
- The price ***equation definitions.***
- The projected domestic prices.
- The commodity equation definitions.
- The commodity projection blocks.

Figure 2--Technical structure of CPPA



There are three types of blocks—informational, equation definition, and projection—which are distinct in terms of function and structure. The informational blocks serve two purposes. The first is to provide the user of a completed country model with general information about the model, such as the country of analysis, the commodity content, and the price linkages and other assumptions employed in specifying the model. The second function of the informational blocks is to define the dimensions of the spreadsheet and provide control information used in the programming. The equation definition blocks contain the information that must be supplied by the user to automatically write the functions that are entered in the projection blocks. The projection blocks contain either exogenous or endogenous projections of variables. In general, the blocks containing exogenous data are the macroeconomic, reference price, price policy, and user-defined variables blocks. The user-defined variables block, which contains space for country-specific variables that are not already located in the spreadsheet, may also contain endogenous variables. The domestic price and commodity projection blocks generally contain identities and equations that use the exogenous data in the macroeconomic, reference price, price policy, and user-defined variables blocks to generate price and quantity projections.

Structure of the Informational Blocks

There are four informational blocks in the forecast spreadsheet. The first contains general information about the country of analysis. The second identifies the commodity coverage in the current spreadsheet. The third contains space for user notes about the model. The fourth inventories the price linkages between the reference and domestic prices.

The user area of the forecast spreadsheet begins with the first informational block. At the top of the spreadsheet, program control information and a record of when the spreadsheet was saved is stored. Data should not be entered in this area of the spreadsheet nor should the contents of any cells in this area be altered.

The Identification Block

The user area of the spreadsheet begins with the identification block (see fig. 3). The block can be accessed by entering its ***range name***, IDBLOCK, after pressing the GOTO key (the F5 key). The block contains the name of the country, the name of the analyst, the date the spreadsheet was generated, the title of the spreadsheet, the name of the spreadsheet file, and the location of the file.

In figure 3, note that the name of the spreadsheet is entered as C90F*xxxn*, where C90F indicates a CPPA forecast spreadsheet with a 1990 ***base year***, *xxx* is a three character country code, and *n* is a version number. For example, the name of a CPPA forecast file for Mexico with 1990 as the base year would be C90FMEX1, where MEX is the abbreviation for Mexico. The version number is most commonly used to differentiate among various simulations. For example, version 1 could denote a base scenario and version 2, a scenario with alternative exogenous values.

Figure 3--The identification block (IDBLOCK)

Country:	
Analyst:	
Date:	
Title:	
Filename:	C90Fxxxn
File Location:	
First forecast year:	1991
No. of years forecast:	10

The last two entries in IDBLOCK are the first forecast year (1991 in the figure) and the number of years forecast (such as 10 in fig. 3).[4] These two entries define the physical limits of the spreadsheet. They are used repeatedly in the programming to determine the active range of columns in the projection blocks.

The Commodity Coverage Block

The commodity coverage block is used to identify which price and commodity projection blocks are active, thereby giving the user a quick inventory of the contents of the spreadsheet. The projection blocks in version 1.3 of the CPPA system are listed in column A (see fig. 4). The first two "commodities" are

Figure 4--The commodity coverage block (COMMCOV)

A	B	C	D
FORECAST BLOCK	EQN DEF BLOCK	PRICE DEFINED	PROJECT (*=YES)
AGGLAND	CEQNTL	N/A	*
CROPLAND	CEQNCL	N/A	*
CATTLE	CEQNCA	*	*
BEEFVEAL	CEQNBV	*	*
MILK	CEQNMK	*	*
HOGS	CEQNHG	*	*
PORK	CEQNPK	*	*
SHEEP	CEQBSH	*	*
LAMBMUTTON	CEQNLM	*	*
POULTRY	CEQNPL	*	*
EGGS	CEQNPL	N/A	N/A
FEED	CEQNFE	N/A	*
WHEAT	CEQNWH	*	*
RICE	CEQNRI	*	*
COARSEGRAINS	CEQNCG	*	*
CORN	CEQNCO	*	*
SORGHUM	CEQNSR	*	*
BARLEY	CEQNBA	*	*
OTHERCOARSE	CEQNOC	*	*
FOODAID	CEQNFA	N/A	*
COTTON	CEQNCT	*	*
SUGAR	CEQNSU	*	*
TOTALOILSEEDS	CEQNTS	*	*
SOYBEANS	CEQNSB	*	*
GROUNDNUTS	CEQNGN	*	*
SUNFLOWERSEED	CEQNFS	*	*
RAPESEED	CEQNRA	*	*
COTTONSEED	CEQNNS	*	*
OTHEROILSEED	CEQNOS	*	*
TOTALMEALS	CEQNTM	*	*
SOYMEAL	CEQNSM	*	*
GROUNDNUTMEAL	CEQNGM	*	*
SUNFLWRSDMEAL	CEQNFM	*	*
RAPESDMEAL	CEQNRM	*	*
COTTONSDMEAL	CEQNNM	*	*
FISHMEAL	CEQNHM	*	*
OTHERMEAL	CEQNOM	*	*
TOTALOILS	CEQNTO	*	*
SOYOIL	CEQNSO	*	*
GROUNDNUTOIL	CEQNGO	*	*
SUNFLWRSDOIL	CEQNFO	*	*
RAPESDOIL	CEQNRO	*	*
COTTONSDOIL	CEQNNO	*	*
PALM OIL	CEQNPO	*	*
OTHERTROPICAL	CEQNOI	*	*
TOTALTROPICAL	CEQNIO	*	*
OTHEROIL	CEQNOO	*	*

[4] Note that throughout this report, for explanatory purposes, the base year will be 1990 and the first forecast year, 1991.

aggregate land use (AGGLAND) and crop area harvested (CROPLAND). The land blocks are followed by livestock and products, feed, grains, a food aid needs analysis block, cotton, sugar, oilseeds, oilseed meals, and vegetable oils. The coverage block can be viewed by pressing the GOTO key (F5) and entering COMMCOV (commodity coverage).

In column B, the range names of the respective commodity equation definition blocks are listed (see below for a description of these blocks). These names are composed of the code CEQN (commodity equation) plus a two-character commodity code. For example, the range name for the beef and veal commodity equation definition block is CEQNBV, since BV is the code for beef and veal. The two-character codes are very important. They are used extensively in the programming and in the construction of variable range names. They also provide an alternative means of quickly accessing various parts of the spreadsheet.

In column C, those commodities for which prices are defined are marked with an "*." In the template, there is an asterisk for each block except aggregate land, cropland, feed, and food aid which are marked with "N/A." There are no price linkages and associated price information for these blocks because prices are defined for commodities only. In column D, those commodities which are being projected in the spreadsheet are also marked with an "*." Note that eggs are marked "N/A" because egg production is entered in the poultry block.

The entries in column A and column B of COMMCOV provide the user with some important range names and codes used extensively throughout the system. In column A, the range names of the commodity projection blocks are entered. This information tells the user what name to enter in conjunction with the GOTO command to view projection results. For example, to view the projections for beef and veal, the user can GOTO BEEFVEAL.[5] The contents of the COMMCOV block are also crucial to the programming in the system. The entries in column A, with few exceptions, define which projection blocks can be accessed by the system programming. This means that any new projection block added to the template or spreadsheet must be recorded in COMMCOV before the programming can access the new block.

The Assumptions/Notes Block

To the right of IDBLOCK and COMMCOV is a large block labeled Assumptions/Notes. This space has been set aside for the user to record notes, assumptions, or other information which helps to explain the contents of the spreadsheet. The size of this block should not be altered by the insertion or deletion of rows or columns. The block can be accessed by GOTO ASSUMP.

The Price Linkage Blocks

The price linkage blocks contain an inventory of the specification of price relationships in the model. The CPPA system permits the specification of up to seven domestic price levels in each market. The user is given the option of omitting a price level, choosing from two preprogrammed price linkages, or specifying the price linkage as a function. The preprogrammed options were determined by an analysis of the price determination process prevailing in most countries under the basic assumption that each country takes reference prices as given.

Price Determination

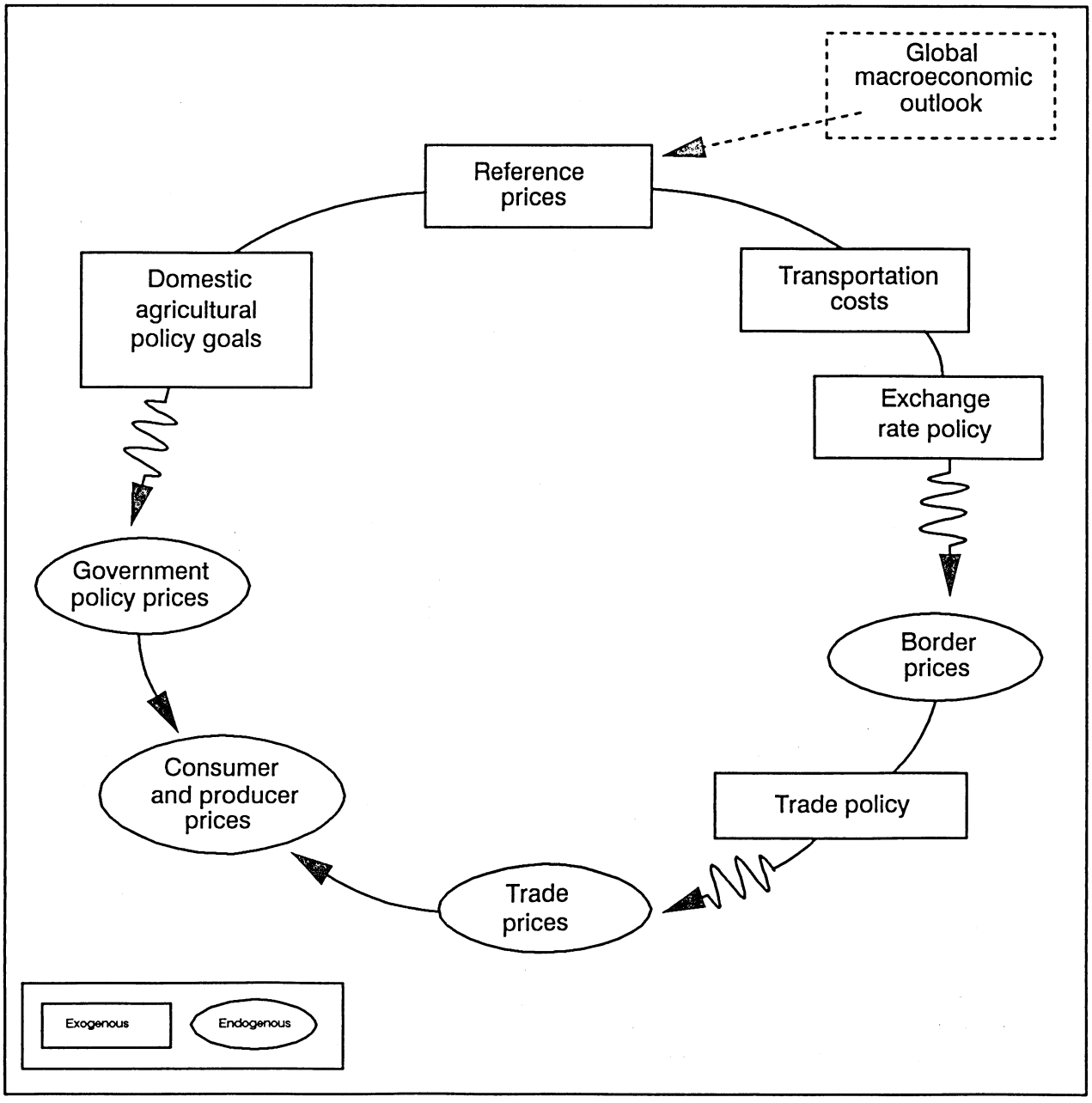
While countries may act as price-takers, it is also recognized that because of policy intervention, transmission of international price signals into domestic markets may be distorted. If there is full price transmission in a market, the domestic value of a good is determined by world market conditions. If there is partial price transmission, the domestic value of the good is determined by the external value and the

[5] The GOTO BEEFVEAL notation used here and subsequently is shorthand for pressing the GOTO key (F5), typing the range name of the desired destination, and then pressing the Enter key.

distortions introduced by domestic policies. If there is no transmission of external price signals, the domestic value of a good is determined by internal market conditions and policies.

There are three primary means by which international price signals may be distorted. The first arises at the border. By definition, a border price is equal to the reference price plus the cost of transporting the good to the country's border. The local currency equivalent of this price is obtained by multiplying it by the exchange rate. Exchange rates are frequently policy variables, and so the exchange rate is the first source of distortion (see fig. 5). The second source of distortion arises through trade policy. If trade

Figure 5--Price linkages in CPPA



taxes or subsidies are added to border prices, international price signals become further diluted. The final source of distortion enters through government policy prices. Many governments offer incentives to agricultural producers by establishing support prices for commodities. At the same time, many governments in less developed countries subsidize consumers of agricultural goods by selling some commodities at below world or open market prices. These government producer and consumer prices are usually functions of domestic agricultural policy goals. Such prices also frequently reflect the general trend in reference prices, especially where maintaining an artificially high or low price will unduly distort and/or strain resource use. Therefore, government policy prices are often functions of agricultural policy goals and the reference price, as shown in the upper left corner of figure 5. Exchange rate, trade, and agricultural pricing policy therefore contribute to the determination of domestic producer and consumer market prices, which in turn determine supply and demand for agricultural goods.

Price Linkages

The price determination process described above is reflected in the price linkage options available in CPPA. There are seven domestic price levels: border, import, export, consumer, producer, government consumer, and government producer. The user is provided with four options per price level that describe the linkages among the prices. In all cases, selection of option 0 signifies that the price level is not applicable (for example, if a country does not export wheat, the wheat export price option will be 0). Also, in all cases, selection of option 3 signifies that the price is defined by a user-specified function (see table 1). The user-specified function may be a constant growth rate function, or it may be a linear or Cobb-Douglas function of explanatory variables. Options 1 and 2 include a mix of preprogrammed functions that cannot be written by the equation writer. In addition, in three cases, the user is given the option of entering assumed prices.

Table 1--Price linkage options

Price	Option 0	Option 1	Option 2	Option 3
RP (Reference)	N/A	Default	User-entry	f(...)
BP (Border)	N/A	RER*(RP+TC)	(RER*RP)^a	f(...)
MP (Import)	N/A	BP+UT	BP*(AVT/100+1)	f(...)
XP (Export)	N/A	BP-UT	BP*(1-AVT/100)	f(...)
CP (Consumer)	N/A	PP+MMPC	GC	f(...)
PP (Producer)	N/A	CP-MMPC	GP	f(...)
GC (Government consumer)	N/A	r_c*GC(-1)	User-entry	f(...)
GP (Government producer)	N/A	r_p*GP(-1)	User-entry	f(...)

Note: N/A = Not applicable. RER = Real exchange rate. TC = Transportation cost. a = Transportation cost coefficient. UT = Unit tax. AVT = Ad valorem tax. MMPC = Marketing margin, producer to consumer. r_c = 1 + the rate of change in GC. r_p = 1 + the rate of change in GP. f(...) = Generic function.

The preprogrammed reference price options are either the default (option 1) or user-entry (option 2). When the CPPA system is used in ERS, default reference prices are loaded into the forecast spreadsheet. Therefore, the default option simply uses these preloaded reference prices. The user-entry option gives users the opportunity to enter their own reference prices. If this option is chosen, preloaded reference prices for the commodity will be deleted, and the user will be prompted to enter new reference prices.

The preprogrammed border price options are either the local currency equivalent of the sum of the reference price and transportation costs (option 1) or the local currency value of the reference price adjusted exponentially by a transportation cost coefficient (option 2). Import and export prices may be defined as the border price adjusted by a unit tax (option 1) or by an ad valorem tax (option 2). The

preprogrammed consumer price options are either the producer price plus a marketing margin (option 1) or the government consumer price (option 2). The preprogrammed producer price options are either the consumer price less a marketing margin (option 1) or the government producer price (option 2). Note that choosing option 1 for both the consumer and producer prices will result in a ***circular*** reference between these two prices and therefore an indeterminate price for both. The only preprogrammed option for government consumer and producer prices is a simple growth rate function with an annually varying rate of change (denoted by r_c and r_p).

The Price Linkage Blocks

The price linkage blocks (PRLINK*n*) are designed to give the user a quick inventory of the linkages chosen for each commodity market. There are six subblocks (such that $n=1,...,6$), with each containing a record of linkage choices for up to eight commodities. Each commodity occupies two columns in the subblock. Each row of the subblock refers to one price level, beginning with the reference price (RP) and ending with the government producer price (GP). Once the template has been ***initialized*** by selecting the commodity and price coverage, each commodity for which prices will be forecast is automatically assigned an entry in these blocks. For example, if wheat and rice are the only commodities being forecast, the block will look like that depicted in figure 6.

In figure 6, note that the default wheat reference prices are being used. The border price (BP) is defined by option 1, which is the real exchange rate times the sum of the reference price and transportation cost to the border. The import price (MP) is equal to the border price plus a unit tax. The export price (XP) and government producer price (GP) are not applicable for wheat, so there are no entries for these prices. The consumer price (CP) is equal to the government consumer price (GC). The producer price (PP) is determined by a user-specified function (option 3). Finally, option 1 was chosen for the government consumer price (GC); it is equal to a user-specified rate of change in the government consumer price.

The price linkage blocks are the last of the informational blocks contained in the spreadsheet. The next group of blocks that will be described are the equation definition blocks, which are used to define the option 3 price linkages as well as the quantity functions which project supply, demand, and trade.

Structure of the Equation Definition Blocks

The structure of the equation definition blocks reflects the generic functional form used in the CPPA system. Therefore, before describing the structure of the equation definition blocks, the functional form will be reviewed.

The Functional Form

In order to program the equation writer, a specific functional form had to be chosen. The resulting form encompasses a multiple linear, an autoregressive, and a dynamic Cobb-Douglas constant elasticity function. While these are the only functional forms that can be written by the equation writer, it should not be implied that other functional forms are not appropriate. In fact, if the generic form is too restrictive, it is assumed that the user will manually specify and enter a more appropriate function. The generic functional form used in the equation writer is:

$$Y_t=a_1 \cdot X1_t+a_2 \cdot X2_t+a_3 \cdot X3_t+c \cdot Y_{t-1}(1+e_1 \cdot \hat{Z}1+e_2 \cdot \hat{Z}2+e_3 \cdot \hat{Z}3+e_4 \cdot \hat{Z}4+e_5 \cdot \hat{Z}5),$$

where: Y_t is the dependent variable in year t,
a_i, c, and e_j are parameters (i=1,2,3 and j=1,...,5),
Xi_t are linear independent variables in year t (i=1,2,3), and
$\hat{Z}j$ is the percent change in a Cobb-Douglas independent variable, which is defined as:
$(Zj_t - Zj_{t-1})/Zj_{t-1}$ (j=1,...,5).

Figure 6--The price linkage block (PRLINKn)

PRICE LINKAGE BLOCK 1 (PRLINK1)

Function Range Name:	PRLKWHV	PRLKRIV			...	
Commodity:	Wheat	Rice			...	
	Option Description	Option Description	Option Description	Option Description	...	Option Description
RP	(1) Default	(1) Default				
BP	(1) RER*(RP+TC)	(2) (RER*RP)^a				
MP	(1) BP+UT	(1) BP+UT				
XP						
CP	(2) GC	(3) f(...)				
PP	(3) f(...)	(3) f(...)				
GC	(1) rc*GC(-1)	(1) rc*GC(-1)				
GP						

.
.
.

PRICE LINKAGE BLOCK 6 (PRLINK6)

Function Range Name:						
Commodity:						
	Option Description	Option Description	Option Description	Option Description	...	Option Description
RP						
BP						
MP						
XP						
CP						
PP						
GC						
GP						

The multiple linear regression is accessed by setting $c=e_j=0$, such that:

$$Y_t=a_1 \cdot X1_t+a_2 \cdot X2_t+a_3 \cdot X3_t.$$

The autoregressive or simple growth rate function is accessed by setting $a_i=e_j=0$, such that:

$$Y_t=c \cdot Y_{t-1}.$$

Note that a multiple linear regression with a lagged dependent variable can be specified by setting all $e_j=0$, such that:

$$Y_t=a_1 \cdot X1_t+a_2 \cdot X2_t+a_3 \cdot X3_t+c \cdot Y_{t-1}.$$

The Cobb-Douglas function is accessed by setting $a_i=0$ and setting $c=1$ to yield:

$$Y_t=Y_{t-1}(1+e_1 \cdot \hat{Z1}+e_2 \cdot \hat{Z2}+e_3 \cdot \hat{Z3}+e_4 \cdot \hat{Z4}+e_5 \cdot \hat{Z5}).$$

Note that the c parameter acts as a switch to activate the Cobb-Douglas specification—that is, c must equal 1 when the Cobb-Douglas function is being used.

Note that the Cobb-Douglas form is specified as a dynamic relationship; the current period value of the dependent variable is equal to the lagged dependent value adjusted for changes in the independent variables. In this form, the e_i are elasticities. To see this, consider the Cobb-Douglas function where:

$$Y_t=Z1_t^{e_1} \cdot Z2_t^{e_2} \cdot Z3_t^{e_3} \cdot Z4_t^{e_4} \cdot Z5_t^{e_5}.$$

The double-log form of this function:

$$\ln Y_t=e_1 \ln Z1_t+e_2 \ln Z2_t+e_3 \ln Z3_t+e_4 \ln Z4_t+e_5 \ln Z5_t,$$

is log linear in the Zj. Differentiating both sides of this equation with respect to time yields:

$$\hat{Y}=e_1 \cdot \hat{Z1}+e_2 \cdot \hat{Z2}+e_3 \cdot \hat{Z3}+e_4 \cdot \hat{Z4}+e_5 \cdot \hat{Z5},$$

where ^ denotes the growth rate of the variable. Note that a key feature of the Cobb-Douglas functional form is that it allows one to express the growth rate of the dependent variable (Y) as the weighted sum of the growth rates of the independent variables (the Zj). Also note that the parameters (e_j) are elasticities because each equals the percent change in Y divided by the percent change in the Zj. Therefore, all parameters in the Cobb-Douglas part of the generic function should be regarded as elasticities.

Varying Parameters

At times, it may be desirable for a parameter or elasticity in a function to vary over time. A varying parameter can be used to capture the effects of a declining income elasticity for food as incomes rise, a declining rate of growth in yield-enhancing technologies, or an increasing degree of price transmission as a country liberalizes trade policy over the years. To allow for such cases, the equation writer in CPPA enables the user to vary one linear parameter or the autoregressive parameter or one Cobb-Douglas parameter in any function. The parameter then takes the form of $f_t = f_0 \cdot (1 + r)^t$, where f_0 is the initial value of the parameter, r is the annual compound growth rate, and t is an index beginning with 0 in the first forecast year and incremented by 1 for each subsequent year.

Equation Definition Blocks

The equation definition blocks are structured to facilitate the selection of a linear, autoregressive, Cobb-Douglas, or combination function with or without a varying parameter. The equation definition block contains the names of variables and the associated parameters that define a function. The price equation definitions are contained in 42 subblocks with range names of the form PEQN*cc* (price equations), where *cc* denotes the two-character commodity codes listed in COMMCOV and in table 2 (see page 19). The macro and commodity (quantity) equation definitions are contained in 47 subblocks with range names of the form CEQN*cc* (with CEQNMA denoting the macroeconomic equation definition subblock). The price and quantity equation definition blocks have the same structure.

Each subblock has 17 columns, which accommodate up to eight equation definitions. Eight equations are generally sufficient for modeling behavior in a market. However, the equation definition blocks associated with cropland and, in some cases, with the cattle, hogs, sheep, beef and veal, and lamb and mutton projection blocks allow for up to 16 definitions. In a similar manner, up to 24 macroeconomic equations can be defined, and up to 40 feed-related equations can be defined.

The name of the commodity for which price or quantity equations are being defined is entered in column A (such as WHEAT in fig. 7). The range name of the function being defined is entered in the row labeled "Function Range Name"; it is followed by a description of the variable in the row labeled "Function Description." Each function definition is composed of two columns. The ***range names*** of the explanatory variables are entered in the column labeled "Variable." The second column, labeled "Parameter," is where the user enters the slope or elasticity associated with each explanatory variable. In the main body of the subblock, there are 10 rows labeled "X1,...,X3", "YLAG", "Z1,...,Z5", and "Varying Parameter." The X_i rows correspond to the linear regression variables in the generic functional form (see above). The YLAG row corresponds to the lagged dependent variable. The Z_i rows correspond to the Cobb-Douglas variables in the generic form. The Varying Parameter row is used to identify one variable in the function that varies systematically over time.

Through an automated routine, the user defines a function by supplying both the range name of an explanatory variable and its associated parameter. The user controls movement of the cursor up and down the Variable column. By moving the cursor from row to row, the user specifies whether the function is linear, autoregressive, Cobb-Douglas, or some combination of the three. In figure 7, the wheat producer price has been defined as a function. It is a linear function, since the explanatory variable names are in the X_i rows. For example, the wheat producer price is defined as PRPPWH = -52.5+.95*PRMPWH, where PRMPWH is the wheat import price. If these functions were Cobb-Douglas, there would be entries in the YLAG and Z_i rows.

Structure of the Projection Blocks

The macroeconomic data, reference prices, price policy variables, user-defined variables, domestic price projections, and commodity projection blocks have the same common structure. Each projection block contains a description of variables in the block, the units of the variable, the range names of the variables, five columns for historical data, a base year column, and then the projection columns. The common structure of the projection blocks will be described first, and then each of the blocks will be described in more detail below.

Projection blocks are identified in the upper left corner (see fig. 8). Each variable in a projection block occupies one row in the block; its description is entered in column A. In column B, the units in which the variable is measured are entered. It is important to take note of these units when entering data in any of the projection blocks because preprogrammed formulas are written and formatted to take those units into account. For example, the formulas which compute per capita income or demand assume that population is entered in thousands. If population is entered in millions, the computation will be off by three decimals.

Figure 7--The price and commodity equation definition blocks (PEQNcc, CEQNcc)

PRICE EQUATION DEFS (PEQNWH)

Function Range Name: PRPPWH
Function Description: Producer price

WHEAT		Variable	Parameter	Variable	Parameter	Variable	Parameter	Variable	Parameter	...	Variable	Parameter
	X1	CONSTANT	-52.50000									
	X2	PRMPWH	.95000									
	X3											
	YLAG											
	Z1											
	Z2											
	Z3											
	Z4											
	Z5											
		Variable	Agg % Chg	Variable	Agg % Chg	Variable	Agg % Chg	Variable	Agg % Chg	...	Variable	Agg % Chg
Varying Parameter:			.00000		.00000		.00000		.00000	...		.00000

COMMODITY EQUATION DEFS (CEQNWH)

Function Range Name:
Function Description:

WHEAT		Variable	Parameter	Variable	Parameter	Variable	Parameter	Variable	Parameter	...	Variable	Parameter
	X1											
	X2											
	X3											
	YLAG											
	Z1											
	Z2											
	Z3											
	Z4											
	Z5											
		Variable	Agg % Chg	Variable	Agg % Chg	Variable	Agg % Chg	Variable	Agg % Chg	...	Variable	Agg % Chg
Varying Parameter:			.00000		.00000		.00000		.00000	...		.00000

Figure 8--Example of a commodity projection block

COARSE GRAINS	UNITS	Range Name	1985	...	1989	BASE	1991	1992	1993	1994	1995	1996	...	2000
Area Harvested	1000 Ha	CRAHCGTO				0	0	0	0	0	0	0	...	0
Yield	Tons/Ha	CRYLCGTO												
Production	1000 Tons	CRPRCGTO	0	...	0	0	0	0	0	0	0	0	...	0
Beginning Stocks	1000 Tons	CRBSCGTO	0	...	0	0	0	0	0	0	0	0	...	0
Government	1000 Tons	CRBSCGGV					0	0	0	0	0	0	...	0
Private	1000 Tons	CRBSCGPV	0	...	0	0	0	0	0	0	0	0	...	0
Imports	1000 Tons	CRIMCGTO	0	...	0	0	0	0	0	0	0	0	...	0
Commercial imports*	1000 Tons	CRIMCGCM				0	0	0	0	0	0	0	...	0
Food aid receipts	1000 Tons	CRIMCGFA				0								
Exports	1000 Tons	CREXCGTO				0								
Consumption Demand	1000 Tons	CRDMCGTO				0	0	0	0	0	0	0	...	0
Food Demand	1000 Tons	CRDMCGFD	0	...	0	0								
Feed Demand	1000 Tons	CRDMCGFE				0	0	0	0	0	0	0	...	0
Other Demand	1000 Tons	CRDMCGOT				0								
Ending Stocks	1000 Tons	CRESCGTO				0								
Government	1000 Tons	CRESCGGV												
Private*	1000 Tons	CRESCGPV	0	...	0	0	0	0	0	0	0	0	...	0
Consistency Checks:														
End Stks/Consumption	%	CRSCCGTO	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Food/Consumption Dmd	%	CRFCCGTO	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Imps/Consumption Dmd	%	CRICCGTO	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Exps/Production	%	CREPCGTO	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Per Cap Production	Kg/Person	CRPQCGTO	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Pct Change in Prodn	%	CR_PCGTO		...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Per Cap Total Cons	Kg/Person	CRPCCGTO	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Per Cap Food	Kg/Person	CRPCCGFD	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Per Cap Feed	Kg/Person	CRPCCGFE	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Per Cap Other	Kg/Person	CRPCCGOT	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Pct Change in Cons	%	CR_CCGTO		...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR

Each variable in the projection blocks, with the exception of some consistency checks, has a unique ***range name***, which is listed in column C. The range name of a variable allows access to that variable from anywhere in the spreadsheet. In addition, the variable range names are the primary means by which the programmed activities in the system are controlled. Therefore, it is important to understand how and where a variable range is defined in the system: each variable range is defined as a single cell in the column corresponding to the first forecast year (not the base year) in the row reserved for that variable. For example, in figure 8, area harvested of coarse grains is assigned the name CRAHCGTO. The range CRAHCGTO is defined as a single cell in the 1991 column of that row. Therefore, by entering GOTO CRAHCGTO, the user will be taken to the 1991 coarse grain area harvested.

Range Naming Convention

The range names entered in column C of all of the projection blocks except the macroeconomic data block are constructed from a standard range naming convention (see table 2 and fig. 8). The standardized range names are from 6 to 10 characters long; most are 8 characters. Each range name can be broken down into two-character components. The first two characters are used to denote the group code (such as crops, feed, livestock, land use, meats, and prices). The next two characters denote the variable (such as DM for demand). The fifth and sixth characters denote the commodity (such as CG for coarse grains). The remaining characters are additional clarifiers.

The additional clarifiers in positions seven and eight are used to differentiate totals from subcategories. For example, the range name for total demand for coarse grain is CRDMCGTO, where CR denotes a crop variable, DM denotes demand, CG denotes coarse grain, and TO denotes total (demand). By changing the additional clarifier from TO to FE, the variable becomes demand for coarse grains for feed rather than for all uses. A 'B' in position nine is used to denote a base value from the history spreadsheet. For example, the range name CRDMCGTOB is the code for the base value of total demand for coarse grain.[6] The additional clarifiers in positions 9 and 10 also act to further distinguish one subdifferentiated variable from another. In the food aid analysis block, where food aid needs are computed based on alternative assumptions, the 9th and 10th characters indicate which assumption applies. For example, feed demand in the food aid analysis block is derived under three alternative assumptions equal to the most recent 3-year average, most recent 10-year average, and a market demand solution. These three variables are distinguished from one another with the range names CRDMFAFE03, CRDMFAFE10, and CRDMFAFEMD, respectively.

The variables contained in each projection block are those that should be considered and/or will most commonly be needed to generate the supply, demand, and trade projections. The contents of the macroeconomic and price-related projection blocks reflect the assumptions and preprogrammed options available to the user. In the commodity projection blocks, the variable content reflects the market structure. Since the template was designed to accommodate many different market and country characteristics, the projection blocks may include more detail than necessary to adequately project a market outcome. Therefore, the variable content of each projection block should be thought of as a standard starting point for model development. It should not be considered a complete nor rigid list of all the variables to be projected.

For this reason, in some blocks, only some of the variables will need to be projected. Those variables that are not needed may be ignored or, alternately, the projection block may be ***customized*** by deleting the unnecessary information from the template. If a variable is not needed, the row for that variable may be deleted from the spreadsheet. However, if the row is deleted, the range name associated with that variable should be deleted as well. Also, new variables may be inserted in any projection block. But, if a variable is added to a projection block, a unique standardized range name must be defined for it as a single cell in the first forecast year column of the appropriate row.

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[6] The range CRDMCGTOB is actually in the history spreadsheet. However, to avoid confusion, the B extension should not be used to define a variable in the forecast spreadsheet.

Table 2--Range naming convention in version 1.3 of CPPA

Characters 1-2: Group codes

CR	Crops	LU	Land use
FE	Feed	MT	Meat
LS	Livestock	PR	Price

Characters 3-4: Variable codes

AG	Agricultural land	MC	Import capacity
AH	Area harvested	MM	Marketing margin
AL	Arable land	MP	Import price
BI	Beginning inventory	MR	Import requirement
BP	Border price	MX	Import tax
BR	Birth rate	NB	Net birth rate
BS	Beginning stocks	NC	Nutrition-based caloric requirement
BT	Births	NT	Net trade rate
CC	Coefficient of change	PC	Per capita consumption
CE	Cereals conversion coefficient	PP	Producer price
CP	Consumer price	PQ	Per capita production
DA	Domestic availability net of food aid	PR	Production
DE	Deaths of animals	RP	Reference price
DM	Demand (consumption)	RQ	Protein requirement
DR	Death rate of animals	SC	End stocks/consumption
EA	Exponential transportation coefficient	SG	Share of grains in diet
		SI	Slaughter/inventory
EE	Export enhancement bonus	SL	Slaughter
EI	Ending inventory	TC	Transportation cost
EP	Exports/production	TL	Total land
ER	Expected gross return	US	U.S. internal price
ES	Ending stocks	XP	Export price
EX	Exports	XX	Export tax
FC	Food use/consumption or crush/consumption	YE	Expected yield
		YL	Yield
FN	Food aid need	_C	Percent change in consumption
FT	Food consumption target	_F	Percent fed
GC	Government consumer price	_I	Percent change in inventories
GP	Government producer price	_P	Percent change in production
GQ	Grain requirement		
IC	Imports/consumption		
IM	Imports		
MA	U.S.-reference point margin		

Continued--

Table 2--Range naming convention in version 1.3 of CPPA--Continued

Characters 5-6: Commodity codes

BA	Barley	NS	Cottonseed
BF	Beef	OA	Other crops
BV	Beef and veal	OC	Other coarse grains
CA	Cattle	OI	Other tropical oils
CG	Coarse grains	OM	Other meal
CO	Corn	OO	Other oil
CT	Cotton	OP	Other protein
EG	Eggs	OS	Other oilseeds
FA	Food aid	PK	Pork
FM	Sunflowerseed meal	PL	Poultry
FO	Sunflowerseed oil	PO	Palm oil
FS	Sunflowerseed	RA	Rapeseed
GM	Groundnut meal	RI	Rice
GN	Groundnuts	RM	Rapeseed meal
GO	Groundnut oil	RO	Rapeseed oil
HG	Hogs	SB	Soybeans
HM	Fish meal	SH	Sheep
IO	Tropical oils	SM	Soybean meal
LA	Land	SO	Soybean oil
LB	Lamb	SR	Sorghum
LM	Lamb and mutton	SU	Sugar
MK	Milk	TM	Total meals
MT	Meat	TO	Total oils
NM	Cottonseed meal	TS	Total oilseeds
NO	Cottonseed oil	VL	Veal
		WH	Wheat

Continued--

Table 2--Range naming convention in version 1.3 of CPPA--Continued

Characters 7-8: Additional clarifiers

AC	Cropped arable land	H1	Harvest 1
AG	Agricultural land	H2	Harvest 2
AL	Arable land	H3	Harvest 3
AV	Ad valorem tariff	IR	Irrigated
BE	(Sugar) beets	LB	Lamb
BF	Beef	MD	Market demand
BD	Breeding	MK	Milk
CI	Crop intensity index	MU	Mutton
CM	Commercial imports	NC	Permanent crops
CN	(Sugar) cane	NF	Nonfood uses
CS	Crush	NP	Permanent pasture
EX	Export	NR	Nutritional requirement
FA	Food aid receipts	OT	Other
FD	Food	PB	Percent breeding
FE	Feed	PM	Producer-consumer margin
FW	Forestry and woodlands	PT	Protein
GA	Gross cropped arable land	PV	Private
GC	Government consumer price	SQ	Status quo
GP	Government producer price	TO	Total
GR	Grain	TP	Temporary pasture
GV	Government	UT	Unit tax
GZ	Grazing land	VL	Veal
		_B	Percent kept for breeding

Characters 9+: Additional clarifiers (base values and food aid block)

B	Base year	03	3-year average
MD	Market demand	10	10-year average

Note: The naming convention in version 1.3 differs slightly from earlier versions. See Appendix D for more details.

Unlike the rows, the order and content of the columns in the CPPA system should not be altered. Columns D through H in each projection block are reserved for historical data (see fig. 8). The base year is in column I. In figure 8, the base year is 1990. Note that this is 1 year before the first forecast year entered in IDBLOCK. The projections begin in column J. The current template is configured for a maximum of 11 projection years; future refinements to the system will allow a variable number of projection years.

Each projection block also contains some preprogrammed formulas. If a cell is occupied by a preprogrammed formula, there will be either a 0 or ERROR in the cell. For example, in figure 8, production of coarse grains is preprogrammed. Because a formula already occupies these cells, production does not need to be defined as a function; it will be computed automatically when area and yield projections are generated. However, the user does need to supply projections for any variable that is not a preprogrammed product of other variables and that will be used to determine another variable. For example, yield is needed to determine production. Therefore, the user will need to generate projections of coarse grain yields. This can be done by using the equation writer to generate yields from other variables in the spreadsheet (such as prices or a trend).

The Macroeconomic Block

The macroeconomic block, which is shown in figure 9, contains selected world economic indicators, domestic income and national accounts data, aggregate price and exchange rate information, and balance of payments data. The data in this block are exogenous to the agricultural commodity supply, demand, and trade projections. In general, the variables in the group labelled EXTERNAL MACRO ASSUMPTIONS are exogenously determined. The remaining variables in this block may be semi-endogenized by specifying them as a function of other variables in the spreadsheet. For example, gross domestic product (GDP) could be projected as a function of industrial country GDP (ICGDP) and the price of oil (PROIL). The equation writing feature of the CPPA system can be used to specify and write such a function in the DGDP row in the macro block, thus generating the projections from ICGDP and PROIL.

The first two variables in the macro block (CONSTANT and TREND) are placed there for convenience only; they may be used when defining functions. The base nominal exchange rate is the local currency per US$ rate in the ***real value base year***. It is used to convert real local currency GDP to real US$ GDP. In the applications at ERS, all prices and values are in 1980 constant dollars or 1980 constant local currency units (denoted CUS$ and CLCU, respectively). Therefore, the real value base year is 1980 and the base nominal exchange rate for Mexico would be the peso/US$ rate in 1980.

The external macro variables section contains some general indicators of the world economic situation. The U.S. GDP deflator (USDEF) is used to calculate the real exchange rate (RER). The RER may be used in the determination of border prices. Therefore, if border prices are defined as a function of the real exchange rate, and, if border prices are needed to project other domestic prices or commodity supply, demand, or trade directly, projections of the U.S. GDP deflator must be provided. The remaining external macro variables may or may not be necessary, depending on the model specification for the country being analyzed.

Domestic national accounts data and population are entered in the next grouping. Preprogrammed formulas are entered to compute domestic GDP growth, the US$ equivalent of GDP, per capita local and dollar equivalent GDP, and per capita consumption expenditure. Preprogrammed formulas also ensure that consumption and investment equal domestic absorption (NADA), and that the national accounts balance (by computing investment (NAINV) as a residual).

The domestic prices and exchange rate grouping contains the domestic GDP deflator and CPI, nominal and real import and export price indices, and nominal and real exchange rates. The real import and export prices are defined as nominal import and export prices deflated by the domestic GDP deflator. The real exchange rate is defined as the nominal exchange rate (NER) times the relative GDP deflators (that is,

Figure 9--The macroeconomic data block (MACRO)

MACROECONOMIC DATA (MACRO)	UNITS	Range Name	1985	...	1989	BASE	1991	1992	1993	1994	1995	1996	...	2000
Constant		CONSTANT	1	...	1	1	1	1	1	1	1	1	...	1
Trend		TREND	85	...	89	90	91	92	93	94	95	96	...	100
Base nominal exch rate		NERBASE												
EXTERNAL MACRO ASSUMPTIONS														
US GDP	Mil CUS$	USGDP												
Industrial country GDP	Mil CUS$	ICGDP												
Ind country GDP growth	%	ICGDPGR	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
US GDP deflator	1980=100	USDEF												
US CPI	1980=100	USCPI												
G-5 export price index	1980=100	PMG5												
Interest Rate (Libor)	%	INRATE												
Oil price	CUS$/bbl	PROIL												
Official capital grants	Mil CUS$	WOKG												
DOM NAT'L ACCTS AND POP														
Population	Thou	POP												
Domestic GDP	Mil CLCU	DGDP												
Domestic GDP growth	%	DGDPGR	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Per capita GDP, local	CLCU/Capita	PCDGDP	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Domestic GDP, dollars	Mil CUS$	DGDPUSD	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Per capita GDP, dollars	CUS$/Capita	PCDGDPUSD	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Imports	Mil CLCU	NAIM												
NAEX														
Domestic absorption	Mil CLCU	NADA	0	...	0	0	0	0	0	0	0	0	...	0
Consumption	Mil CLCU	NACON												
Per cap consumption	CLCU/Capita	PCCONS	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Investment	Mil CLCU	NAINV	0	...	0	0	0	0	0	0	0	0	...	0
Gov. Deficit (Surplus)	Mil CLCU	GODEF												
External Debt	Mil CLCU	EXDEBT												
DOM PRICES AND EXCH RATE														
Dom GDP deflator	1980=100	DOMDEF												
Domestic CPI	1980=100	DOCPI												
Import price index	1980=100	PMINDEX												
Real import price		PMREAL	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Export price index	1980=100	PXINDEX												
Real export price		PXREAL	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Nominal Exchange Rate	LCU/US$	NER												
Nom ER (Calculated)	LCU/US$	NERC	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Real Exchange Rate	LCU/US$	RER	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Change in RER	%	CHGRER	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR

Continued--

Figure 9--The Macroeconomic data block (MACRO)--Continued

MACROECONOMIC DATA (MACRO)	UNITS	Range Name	1985	...	1989	BASE	1991	1992	1993	1994	1995	1996	...	2000
BAL OF PAYMENTS AND DEBT														
Reserves, Jan 1	Mil CUS$	BEGR		...	0	0	0	0	0	0	0	0	...	0
Inflows:	Mil CUS$	INFL	0	...	0	0	0	0	0	0	0	0	...	0
Exports of goods & serv	Mil CUS$	XGS												
Merchandise exports	Mil CUS$	MERCHEX												
Long term loans, net	Mil CUS$	LTLN	0	...	0	0	0	0	0	0	0	0	...	0
Disbursements	Mil CUS$	LTLD												
Repayments	Mil CUS$	LTLR												
Interest	Mil CUS$	LTLI												
Workers' remittances	Mil CUS$	WKRM												
Official capital grants	Mil CUS$	OKG												
Other inflows	Mil CUS$	OTHF												
Imports of Goods & Serv	Mil CUS$	MGS												
Merchandise imports	Mil CUS$	MERCHIM												
Reserves, Dec 31	Mil CUS$	ENDR	0	...	0	0	0	0	0	0	0	0	...	0
Change in reserves	Mil CUS$	CHGR	0	...	0	0	0	0	0	0	0	0	...	0

USDEF/DOMDEF). Therefore, depending on the price linkages used in projecting commodity quantities, projections of the NER and the domestic GDP deflator may also be necessary.

Rather than project an NER, the user may want to project an RER directly. In that case, the formula in the RER row may be overwritten either manually or by a function. The nominal equivalent of the real exchange rate is computed in NERC as RER*(DOMDEF/USDEF). Note that if the RER is calculated from the NER, NER and NERC will be identical.

The last grouping in the macro block includes balance of payments and debt. The content of this grouping reflects the needs of a specific project at ERS. In the ERS application, net foreign exchange inflows are defined as the sum of all balance-of-payments transactions except imports of goods and services. Therefore, inflows include exports of goods and services, net long-term loans, workers' remittances, official capital grants, and such matters as other transfers and other capital transactions. Ending reserves are determined as the sum of beginning reserves (BEGR) plus inflows (INFL) less imports (MGS). Formulas ensure adding up for reserves, inflows, and net long-term loans; the change in reserves is also preprogrammed. However, the user needs to supply an initial (1985) or base year beginning reserves value so that subsequent reserve levels can be automatically computed. Note that for more generic uses, the variable content of this group may be customized to reflect a more traditional accounting of balance-of-payments data.

Reference Prices

Reference prices are defined as the sum of U.S. internal prices plus a marketing margin that values the commodity at its reference point. This linear relationship is explicitly entered into the system with the use of three reference price subblocks. The first subblock, which contains space for forecasts of real U.S. farm or U.S. cash market prices, is the PRUS block (see fig. 10). The second block (PRMA) contains price margins in constant dollars from the U.S. internal point to an internationally recognized reference point. Note that, in addition to the margins, the PRMA block includes a row for entering an assumed wheat bonus under the U.S. export enhancement program (that is, PREEWH). The reference price block (PRRP) contains preprogrammed formulas which sum U.S. internal prices and the margins (and subtracts the export enhancement bonus in the case of wheat). Note that in addition to providing reference prices for individual commodities, space is allocated for a reference price for coarse grains, total oilseeds, total meals, and total oils. Reference prices for these aggregates are not preprogrammed; they are left to the user to specify, if desired.[7]

The Price Policy Variables Block

The price policy variables block (PRPV) contains projected values of variables which may be needed to compute domestic price levels. The variables is this block are exogenous in the sense that the equation-writing feature of the model-builder does not access this block. Therefore, the user must either manually enter values for these variables or endogenously generate the variable from a user-entered formula.

The price policy instruments and variables apply to each forecast commodity, so there is a 10-row subblock for each commodity being forecast (see fig. 11). Each subblock contains a row for:

- A unit import tax (subsidy if less than 0)—PRMX*cc*UT.
- An ad valorem import tax (subsidy if less than 0)—PRMX*cc*AV.
- A unit export tax (subsidy if less than 0)—PRXX*cc*UT.
- An ad valorem export tax (subsidy if less than 0)—PRXX*cc*AV.
- An exponential transportation coefficient (that is, an elasticity approximating the addition of a transportation cost to the local currency equivalent of the reference price)—PREA*cc*.

[7] For example, the user can customize these aggregate prices by entering formulas to compute a country-specific weighted average of the individual commodity prices.

Figure 10--The reference price blocks (PRUS, PRMA, PRRP)

U.S. INT. PRICES (PRUS)	UNITS	Range Name	1985	...	1989	BASE	1991	1992	1993	1994	1995	1996	...	2000
Cattle	CUS$/Hd	PRUSCA												
Beef & Veal	CUS$/Ton	PRUSBV												
Milk	CUS$/Ton	PRUSMK												
Hogs	CUS$/Hd	PRUSHG												
Pork	CUS$/Ton	PRUSPK												
Sheep	CUS$/Hd	PRUSSH												
Lamb & Mutton	CUS$/Ton	PRUSLM												
Poultry	CUS$/Ton	PRUSPL												
Eggs	CUS$/Ton	PRUSEG												
Wheat	CUS$/Ton	PRUSWH												
Rice	CUS$/Ton	PRUSRI												
Coarse Grains	CUS$/Ton	PRUSCG												
Corn	CUS$/Ton	PRUSCO												
Sorghum	CUS$/Ton	PRUSSR												
Barley	CUS$/Ton	PRUSBA												
Other	CUS$/Ton	PRUSOC												
Cotton	CUS$/Ton	PRUSCT												
Sugar	CUS$/Ton	PRUSSU												
Soybeans	CUS$/Ton	PRUSSB												
Groundnuts	CUS$/Ton	PRUSGN												
Sunflower Seed	CUS$/Ton	PRUSFS												
Rapeseed	CUS$/Ton	PRUSRA												
Cottonseed	CUS$/Ton	PRUSNS												
Other Oilseeds	CUS$/Ton	PRUSOS												
Soybean Meal	CUS$/Ton	PRUSSM												
Groundnut Meal	CUS$/Ton	PRUSGM												
Sunflowerseed Meal	CUS$/Ton	PRUSFM												
Rapeseed Meal	CUS$/Ton	PRUSRM												
Cottonseed Meal	CUS$/Ton	PRUSNM												
Fish Meal	CUS$/Ton	PRUSHM												
Other Meals	CUS$/Ton	PRUSOM												
Soybean Oil	CUS$/Ton	PRUSSO												
Groundnut Oil	CUS$/Ton	PRUSGO												
Sunflowerseed Oil	CUS$/Ton	PRUSFO												
Rapeseed Oil	CUS$/Ton	PRUSRO												
Cottonseed Oil	CUS$/Ton	PRUSNO												
Palm Oil	CUS$/Ton	PRUSPO												
Other Tropical Oils	CUS$/Ton	PRUSOI												
Other Oils	CUS$/Ton	PRUSOO												

Continued--

Figure 10--The reference price blocks (PRUS, PRMA, PRRP)--Continued

MARGIN TO REF. PT. (PRMA)	UNITS	Range Name	1985	...	1989	BASE	1991	1992	1993	1994	1995	1996	...	2000
Cattle	CUS$/Hd	PRMACA												
Beef & Veal	CUS$/Ton	PRMABV												
Milk	CUS$/Ton	PRMAMK												
Hogs	CUS$/Hd	PRMAHG												
Pork	CUS$/Ton	PRMAPK												
Sheep	CUS$/Hd	PRMASH												
Lamb & Mutton	CUS$/Ton	PRMALM												
Poultry	CUS$/Ton	PRMAPL												
Eggs	CUS$/Ton	PRMAEG												
Wheat	CUS$/Ton	PRMAWH												
Rice	CUS$/Ton	PRMARI												
Coarse Grains	CUS$/Ton	PRMACG												
Corn	CUS$/Ton	PRMACO												
Sorghum	CUS$/Ton	PRMASR												
Barley	CUS$/Ton	PRMABA												
Other	CUS$/Ton	PRMAOC												
Cotton	CUS$/Ton	PRMACT												
Sugar	CUS$/Ton	PRMASU												
Soybeans	CUS$/Ton	PRMASB												
Groundnuts	CUS$/Ton	PRMAGN												
Sunflower Seed	CUS$/Ton	PRMAFS												
Rapeseed	CUS$/Ton	PRMARA												
Cottonseed	CUS$/Ton	PRMANS												
Other Oilseeds	CUS$/Ton	PRMAOS												
Soybean Meal	CUS$/Ton	PRMASM												
Groundnut Meal	CUS$/Ton	PRMAGM												
Sunflowerseed Meal	CUS$/Ton	PRMAFM												
Rapeseed Meal	CUS$/Ton	PRMARM												
Cottonseed Meal	CUS$/Ton	PRMANM												
Fish Meal	CUS$/Ton	PRMAHM												
Other Meals	CUS$/Ton	PRMAOM												
Soybean Oil	CUS$/Ton	PRMASO												
Groundnut Oil	CUS$/Ton	PRMAGO												
Sunflowerseed Oil	CUS$/Ton	PRMAFO												
Rapeseed Oil	CUS$/Ton	PRMARO												
Cottonseed Oil	CUS$/Ton	PRMANO												
Palm Oil	CUS$/Ton	PRMAPO												
Other Tropical Oils	CUS$/Ton	PRMAOI												
Other Oils	CUS$/Ton	PRMAOO												

Continued--

Figure 10--The reference price blocks (PRUS, PRMA, PRRP)--Continued

REFERENCE PRICES (PRRP)	UNITS	Range Name	1985	...	1989	BASE	1991	1992	1993	1994	1995	1996	...	2000
Cattle	CUS$/Hd	PRRPCA	0	...	0	0	0	0	0	0	0	0	...	0
Beef&Veal	CUS$/Ton	PRRPBV	0	...	0	0	0	0	0	0	0	0	...	0
Milk	CUS$/Ton	PRRPMK	0	...	0	0	0	0	0	0	0	0	...	0
Hogs	CUS$/Hd	PRRPHG	0	...	0	0	0	0	0	0	0	0	...	0
Pork	CUS$/Ton	PRRPPK	0	...	0	0	0	0	0	0	0	0	...	0
Sheep	CUS$/Hd	PRRPSH	0	...	0	0	0	0	0	0	0	0	...	0
Lamb & Mutton	CUS$/Ton	PRRPLM	0	...	0	0	0	0	0	0	0	0	...	0
Poultry	CUS$/Ton	PRRPPL	0	...	0	0	0	0	0	0	0	0	...	0
Eggs	CUS$/Ton	PRRPEG	0	...	0	0	0	0	0	0	0	0	...	0
Wheat	CUS$/Ton	PRRPWH	0	...	0	0	0	0	0	0	0	0	...	0
Rice	CUS$/Ton	PRRPRI	0	...	0	0	0	0	0	0	0	0	...	0
Coarse Grains	CUS$/Ton	PRRPCG												
Corn	CUS$/Ton	PRRPCO	0	...	0	0	0	0	0	0	0	0	...	0
Sorghum	CUS$/Ton	PRRPSR	0	...	0	0	0	0	0	0	0	0	...	0
Barley	CUS$/Ton	PRRPBA	0	...	0	0	0	0	0	0	0	0	...	0
Other	CUS$/Ton	PRRPOC	0	...	0	0	0	0	0	0	0	0	...	0
Cotton	CUS$/Ton	PRRPCT	0	...	0	0	0	0	0	0	0	0	...	0
Sugar	CUS$/Ton	PRRPSU	0	...	0	0	0	0	0	0	0	0	...	0
Total Oilseeds	CUS$/Ton	PRRPTS												
Soybeans	CUS$/Ton	PRRPSB	0	...	0	0	0	0	0	0	0	0	...	0
Groundnuts	CUS$/Ton	PRRPGN	0	...	0	0	0	0	0	0	0	0	...	0
Sunflower Seed	CUS$/Ton	PRRPFS	0	...	0	0	0	0	0	0	0	0	...	0
Rapeseed	CUS$/Ton	PRRPRA	0	...	0	0	0	0	0	0	0	0	...	0
Cottonseed	CUS$/Ton	PRRPNS	0	...	0	0	0	0	0	0	0	0	...	0
Other Oilseeds	CUS$/Ton	PRRPOS	0	...	0	0	0	0	0	0	0	0	...	0
Total Meals	CUS$/Ton	PRRPTM												
Soybean Meal	CUS$/Ton	PRRPSM	0	...	0	0	0	0	0	0	0	0	...	0
Groundnut Meal	CUS$/Ton	PRRPGM	0	...	0	0	0	0	0	0	0	0	...	0
Sunflowerseed Meal	CUS$/Ton	PRRPFM	0	...	0	0	0	0	0	0	0	0	...	0
Rapeseed Meal	CUS$/Ton	PRRPRM	0	...	0	0	0	0	0	0	0	0	...	0
Cottonseed Meal	CUS$/Ton	PRRPNM	0	...	0	0	0	0	0	0	0	0	...	0
Fish Meal	CUS$/Ton	PRRPHM	0	...	0	0	0	0	0	0	0	0	...	0
Other Meals	CUS$/Ton	PRRPOM	0	...	0	0	0	0	0	0	0	0	...	0
Total Oils	CUS$/Ton	PRRPTO												
Soybean Oil	CUS$/Ton	PRRPSO	0	...	0	0	0	0	0	0	0	0	...	0
Groundnut Oil	CUS$/Ton	PRRPGO	0	...	0	0	0	0	0	0	0	0	...	0
Sunflowerseed Oil	CUS$/Ton	PRRPFO	0	...	0	0	0	0	0	0	0	0	...	0
Rapeseed Oil	CUS$/Ton	PRRPRO	0	...	0	0	0	0	0	0	0	0	...	0
Cottonseed Oil	CUS$/Ton	PRRPNO	0	...	0	0	0	0	0	0	0	0	...	0
Palm Oil	CUS$/Ton	PRRPPO	0	...	0	0	0	0	0	0	0	0	...	0
Other Tropical Oils	CUS$/Ton	PRRPOI	0	...	0	0	0	0	0	0	0	0	...	0
Tropical Oils	CUS$/Ton	PRRPIO												
Other Oils	CUS$/Ton	PRRPOO	0	...	0	0	0	0	0	0	0	0	...	0

Figure 11--The price policy variables block (PRPV)

PRICE POLICY VARS. (PRPV)	UNITS	Range Name	1985	...	1989	BASE	1991	1992	1993	1994	1995	1996	...	2000
CATTLE														
Unit Import Tax	CLCU/Hd	PRMXCAUT												
Ad Valorem Imp Tax	%	PRMXCAAV												
Unit Export Tax	CLCU/Hd	PRXXCAUT												
Ad Valorem Exp Tax	%	PRXXCAAV												
RP/BP Transmission		PREACA												
Coeff of Chg in GC		PRCCCAGC												
Coeff of Chg in GP		PRCCCAGP												
Transportation Cost	CUS$/Hd	PRTCCA												
Prod-Cons Mktg Margin	CLCU/Hd	PRMMCAPM												
BEEF & VEAL														
Unit Import Tax	CLCU/Ton	PRMXBVUT												
Ad Valorem Imp Tax	%	PRMXBVAV												
Unit Export Tax	CLCU/Ton	PRXXBVUT												
Ad Valorem Exp Tax	%	PRXXBVAV												
RP/BP Transmission		PREABV												
Coeff of Chg in GC		PRCCBVGC												
Coeff of Chg in GP		PRCCBVGP												
Transportation Cost	CUS$/Ton	PRTCBV												
Prod-Cons Mktg Margin	CLCU/Ton	PRMMBVPM												
.														
.														
.														
OTHER OILS														
Unit Import Tax	CLCU/Ton	PRMXOOUT												
Ad Valorem Imp Tax	%	PRMXOOAV												
Unit Export Tax	CLCU/Ton	PRXXOOUT												
Ad Valorem Exp Tax	%	PRXXOOAV												
RP/BP Transmission		PREAOO												
Coeff of Chg in GC		PRCCOOGC												
Coeff of Chg in GP		PRCCOOGP												
Transportation Cost	CUS$/Ton	PRTCOO												
Prod-Cons Mktg Margin	CLCU/Ton	PRMMOOPM												

- A coefficient of change in the government consumer price specified as 1 + annual percent change/100—PRCC*cc*GC.
- A coefficient of change in the government producer price specified as 1 + annual percent change/100—PRCC*cc*GP.
- The transportation cost from the reference point to the border—PRTC*cc*.
- The marketing margin between the domestic producer and consumer price—PRMM*cc*PM.

The user must supply a projection for those price policy variables that are needed to satisfy the price linkage definitions. For example, using the wheat price linkages shown in figure 7, projections of the wheat transportation cost, import unit tax, and the rate of change in government consumer prices will need to be entered. Note that if government consumer prices are expected to increase by 2 percent annually, the value entered in the PRCCWHGC row will be 1.02. For rice, projections of the transportation elasticity (PREARI), a unit import tax, and the rate of change in government consumer prices are needed.

The User-Defined Variables Block

Since such diverse countries will be modeled in the CPPA framework, there will probably be some country-specific variables that the user will wish to access in the equation writer. To allow for this possibility, the user-defined variables block (UDVAR), which can accommodate up to 80 country-specific variables, has been included in the template (see fig. 12). User-defined variables may be anything, ranging from an exogenous fertilizer price to the lagged value of a projection variable. Projections of user-defined variables are entered by the user either within the equation-writing routine or outside the system programming. For example, within the equation writer, if the name of a variable that does not already reside in the template is entered, the user is given the option of adding that variable to the spreadsheet in the UDVAR block. This feature is described in more detail in chapter 2. The user may also enter a country-specific variable in UDVAR in ***immediate mode*** by:

1. Entering a description of the variable in column A.
2. Entering the units of measure in column B.
3. Entering a unique range name (15 characters maximum) in column C.
4. Entering formulas to project the variable or entering a predetermined value for the variable in the forecast year columns.
5. Finally, and most important, defining a range name for the new variable as a single cell in the first forecast year column (1991 in figure 12).[8]

If the new, country-specific variable can be derived as a function of existing variables in the template, it is advantageous to predefine the variable before calling it in the equation writer because a formula cannot be entered while in the equation writer. For example, in figure 12, the beginning stocks of total grain (CRBSTGTO) has been entered as a user-defined variable. The range CRBSTGTO has been defined as a single cell in column J. Because this variable is equal to the beginning stocks of wheat, rice, and coarse grains, the formula CRBSWHTO+CRBSRITO+CRBSCGTO can be entered in column J and then copied to the historical, base, and forecast year columns, thereby generating the new variable from variables that already exist in the template.

The Projected Domestic Prices

The price linkage choices that are recorded in PRLINK*n* and defined in the price equation definition blocks are written in the projected prices block. The overall organizational block is named PRPR. It consists of commodity-specific subblocks, each with a range name of the form PRPR*cc*. Each subblock consists of seven rows, one for each of the domestic price levels (see fig. 13).

[8] To define a single-cell range in immediate mode, position the cursor on the cell, press /NC, enter a unique range name, and then press the Enter key to record the current cell as the range address.

Figure 12--The user-defined variables block (UDVAR)

USER-DEFINED VARS. (UDVAR)	UNITS	Range Name	1985	...	1989	BASE	1991	1992	1993	1994	1995	1996	...	2000
Total grain beg. stocks	1000 Tons	CRBSTGTO	0	...	0	0	0	0	0	0	0	0	...	0
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
.														
.														
.														
75														
76														
77														
78														
79														
80														

Figure 13--The projected prices block (PRPR)

FORECAST PRICES (PRPR(cc))	UNITS	Range Name	1985	...	1989	BASE	1991	1992	1993	1994	1995	1996	...	2000
CATTLE														
Border Price	CLCU/Hd	PRBPCA												
Import Price	CLCU/Hd	PRMPCA												
Export Price	CLCU/Hd	PRXPCA												
Consumer Price	CLCU/Hd	PRCPCA												
Producer Price	CLCU/Hd	PRPPCA												
Gov't Cons Price	CLCU/Hd	PRGCCA												
Gov't Producer Price	CLCU/Hd	PRGPCA												
BEEF & VEAL														
Border Price	CLCU/Ton	PRBPBV												
Import Price	CLCU/Ton	PRMPBV												
Export Price	CLCU/Ton	PRXPBV												
Consumer Price	CLCU/Ton	PRCPBV												
Producer Price	CLCU/Ton	PRPPBV												
Gov't Cons Price	CLCU/Ton	PRGCBV												
Gov't Producer Price	CLCU/Ton	PRGPBV												
.														
.														
.														
OTHER OILS														
Border Price	CLCU/Ton	PRBPOO												
Import Price	CLCU/Ton	PRMPOO												
Export Price	CLCU/Ton	PRXPOO												
Consumer Price	CLCU/Ton	PRCPOO												
Producer Price	CLCU/Ton	PRPPOO												
Gov't Cons Price	CLCU/Ton	PRGCOO												
Gov't Producer Price	CLCU/Ton	PRGPOO												

The Commodity Projection Blocks

The supply, demand, and trade projections are generated in the commodity projection blocks. There are 47 commodity blocks in the version 1.3 template. While the specific content of the blocks varies with the commodity, the basic structure is the same. In each block, residuals are identified by an * at the end of the variable name in column A (see fig. 14). The * marks both market-balancing residuals (for example, commercial imports in the grain blocks) and subcategory residuals (for example, privately held stocks in the grain blocks). Each block contains several preprogrammed consistency checks, such as the stock-to-consumption ratio and per capita consumption, which can be used as an analysis aid.

Figure 14 shows what the blocks look like when the template is initially loaded, before any projection functions have been defined. Note that some of the cells have either a 0 or ERROR in them. These cells contain preprogrammed formulas which will be automatically computed when the supporting data have been entered in the spreadsheet. The incidence of zeros or ERROR's conveys an important piece of information: the user does not need to define a projection function for that variable. This rule applies when the default market-balancing residual is acceptable. If the default residual is not acceptable, another variable will have to be defined as the residual, and the user will have to specify a projection function for the default residual. For example, in the grain blocks, commercial imports are the default residual. If ending stocks are a more appropriate market-balancing residual, stocks should be defined as the residual, and commercial imports should be projected from a user-specified function.

Rather than describe each projection block with the aid of a figure like that for coarse grains, each block will be described with the aid of a table. The formulas that result in the zeros and ERROR's in the blocks are explicitly stated in the tables. The formulas are listed in terms of the range names of the variables. For example, in table 3, the production of coarse grains in the forecast years is equal to CRAHCGTO*CRYLCGTO, or area harvested times yield. A (-1) after the range name indicates that the base year value of variable is used; a (-n) indicates that the value in the first forecast year less n years is used. For example, beginning stocks are defined as CRESCGTO(-1), which is the ending stocks of coarse grains in the previous year. In the base year column, most variable range names are preceded with HIST!, which indicates that the source of this value is the history spreadsheet. The other clue that these ranges are in the history spreadsheet is the B at the end of the range name. An entry of "Subresidual" or "Balancing residual" in the base year column means that the variable is computed from other variables in that column. For example, private beginning stocks of coarse grains are equal to total stocks less government stocks. Likewise, total beginning stocks are equal to the sum of exports, total consumption demand, and total ending stocks less production and total imports. An entry of ". . ." indicates that the formula entered to the right, adjusted for the year content, applies. If a cell is empty in the base or forecast year columns, the user must either define a function or manually enter data for that variable.

The Expected Returns Blocks

When the CPPA model was being developed, it was noted that although real prices of agricultural products are declining, the area under crops may not decline. This is due to yield-enhancing technologies, which tend to offset the effect of declining real prices. One way of capturing the offsetting impact of technology in area response functions is to specify area as a function of the expected return from the crop and alternative uses of the land. To facilitate this type of specification in the model, a simple measure of gross expected returns is automatically computed.

Assuming naive expectations with respect to prices, the expected gross return to a hectare of land is:

$$\text{producer price}_{t-1} \cdot E(\text{yield}),$$

where E() is the expectations operator. It is assumed that producers anticipate yield growth on the basis of historical trends. Therefore, expected yields are estimated in the EXYIELD block by applying a 15-year semi-log trend growth rate, which is computed in the history spreadsheet (CRYE*cc*RG) to the previous year's expected yield (for example, CRYEWHTO(-1)). The expected yield in the base year is the user-selected ***base value***. The expected return is then computed in the EXRETURN block as specified above

Figure 14--The coarse grains projection block (COARSEGRAINS, CGF)

COARSE GRAINS	UNITS	Range Name	1985	...	1989	BASE	1991	1992	1993	1994	1995	1996	...	2000
Area Harvested	1000 Ha	CRAHCGTO				0	0	0	0	0	0	0	...	0
Yield	Tons/Ha	CRYLCGTO												
Production	1000 Tons	CRPRCGTO	0	...	0	0	0	0	0	0	0	0	...	0
Beginning Stocks	1000 Tons	CRBSCGTO	0	...	0	0	0	0	0	0	0	0	...	0
Government	1000 Tons	CRBSCGGV					0	0	0	0	0	0	...	0
Private	1000 Tons	CRBSCGPV	0	...	0	0	0	0	0	0	0	0	...	0
Imports	1000 Tons	CRIMCGTO	0	...	0	0	0	0	0	0	0	0	...	0
Commercial imports*	1000 Tons	CRIMCGCM				0	0	0	0	0	0	0	...	0
Food aid receipts	1000 Tons	CRIMCGFA				0								
Exports	1000 Tons	CREXCGTO				0								
Consumption Demand	1000 Tons	CRDMCGTO				0	0	0	0	0	0	0	...	0
Food Demand	1000 Tons	CRDMCGFD	0	...	0	0								
Feed Demand	1000 Tons	CRDMCGFE				0	0	0	0	0	0	0	...	0
Other Demand	1000 Tons	CRDMCGOT				0								
Ending Stocks	1000 Tons	CRESCGTO				0								
Government	1000 Tons	CRESCGGV												
Private*	1000 Tons	CRESCGPV	0	...	0	0	0	0	0	0	0	0	...	0
Consistency Checks:														
End Stks/Consumption	%	CRSCCGTO	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Food/Consumption Dmd	%	CRFCCGTO	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Imps/Consumption Dmd	%	CRICCGTO	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Exps/Production	%	CREPCGTO	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Per Cap Production	Kg/Person	CRPQCGTO	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Pct Change in Prodn	%	CR_PCGTO		...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Per Cap Total Cons	Kg/Person	CRPCCGTO	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Per Cap Food	Kg/Person	CRPCCGFD	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Per Cap Feed	Kg/Person	CRPCCGFE	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Per Cap Other	Kg/Person	CRPCCGOT	ERROR	...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR
Pct Change in Cons	%	CR_CCGTO		...	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	ERROR	...	ERROR

Table 3--Contents of the coarse grains (COARSEGRAINS) block

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
COARSE GRAINS	UNITS	Range Name	Historical	Base year	Forecast years
Area Harvested	1000 Ha	CRAHCGTO		HIST!CRAHCGTOB	LUAHCGTO
Yield	Tons/Ha	CRYLCGTO		HIST!CRYLCGTOB	
Production	1000 Tons	CRPRCGTO	...	...	CRAHCGTO*CRYLCGTO
Beginning Stocks	1000 Tons	CRBSCGTO	...	Balancing residual	CRESCGTO(-1)
Government	1000 Tons	CRBSCGGV			CRESCGGV(-1)
Private	1000 Tons	GRBSCGPV	...	Subresidual	CRESCGPV(-1)
Imports	1000 Tons	CRIMCGTO	...	...	CRIMCGCM+CRIMCGFA
Commercial imports*	1000 Tons	CRIMCGCM		HIST!CRIMCGCMB	CRESCGTO+CRDMCGTO+CREXCGTO-CRBSCGTO -CRPRCGTO-CRIMCGFA
Food aid receipts	1000 Tons	CRIMCGFA		HIST!CRIMCGFAB	
Exports	1000 Tons	CREXCGTO		HIST!CREXCGTOB	
Consumption Demand	1000 Tons	CRDMCGTO		HIST!CRDMCGTOB	CRDMCGFD+CRDMCGFE+CRDMCGOT
Food Demand	1000 Tons	CRDMCGFD	...	Subresidual	
Feed Demand	1000 Tons	CRDMCGFE		HIST!CRDMCGFEB	FEDMCGTO
Other Demand	1000 Tons	CRDMCGOT		HIST!CRDMCGOTB	
Ending Stocks	1000 Tons	CRESCGTO		HIST!CRESCGTOB	
Government	1000 Tons	CRESCGGV			
Private*	1000 Tons	CRESCGPV	...	...	CRESCGTO-CRESCGGV
Consistency Checks:					
End Stks/Consumption	%	CRSCCGTO	...	...	CRESCGTO/CRDMCGTO*100
Food/Consumption Dmd	%	CRFCCGTO	...	...	CRDMCGFD/CRDMCGTO*100
Imps/Consumption Dmd	%	CRICCGTO	...	...	CRIMCGTO/CRDMCGTO*100
Exps/Production	%	CREPCGTO	...	...	CREXCGTO/CRPRCGTO*100
Per Cap Production	Kg/Person	CRPQCGTO	...	...	CRPRCGTO*1000/POP
Pct Change in Prodn	%	CR_PCGTO	...	...	(CRPRCGTO/CRPRCGTO(-1)-1)*100
Per Cap Total Cons	Kg/Person	CRPCCGTO	...	...	CRDMCGTO*1000/POP
Per Cap Food	Kg/Person	CRPCCGFD	...	...	CRDMCGFD*1000/POP
Per Cap Feed	Kg/Person	CRPCCGFE	...	...	CRDMCGFE*1000/POP
Per Cap Other	Kg/Person	CRPCCGOT	...	...	CRDMCGOT*1000/POP
Pct Change in Cons	%	CR_CCGTO	...	...	(CRDMCGTO/CRDMCGTO(-1)-1)*100

(see table 4). Note that no cells in these blocks are empty; therefore, no user entry is needed in either of these blocks.

Aggregate Land Use

The aggregate stock of land is fixed. However, the distribution of land to agricultural and nonagricultural uses, as well as the distribution of agricultural land between crops and animals, varies, depending on market and other conditions. In the aggregate land use block, the user is taken through a series of steps that allocate land among competing uses. The block is structured to be compatible with the United Nations Food and Agriculture Organization's (FAO's) land use database. The standard process is depicted in figure 15.

Aggregate land area is composed of three broad aggregates: agricultural, forestry and woodlands, and other land. Agricultural land can also be broken down into three aggregates: permanent crops, permanent pasture, and arable land. The permanent crops category contains land used to produce crops such as cocoa, coffee, and rubber. The FAO defines permanent pasture as land that has been used 5 years or more for herbaceous forage crops. Arable land can be cropped, used temporarily for pasture, or be used for other purposes such as fallow, temporarily idled, or kitchen gardens. The distribution of arable land to these uses is the third step in the aggregate land allocation process. Note that the various uses of arable land depend primarily on technical factors and on agricultural market conditions. For example, the use of land for crops or temporary pasture may depend on the expected profitability or return to producers from the two activities. The use of land for fallow or other noncropped uses may be a function of soil types or other technical factors.

At each of the three steps in the aggregate land allocation process, one of the land uses is a residual to ensure that the total stock of land is not exceeded. In the template, it is assumed that agricultural land, arable land, and cropped arable land are the residuals. Ultimately, the choice of the most appropriate residuals depends on the country being analyzed and the supporting data available.

The last step in the process determines the gross quantity of land available for the production of annual crops. Cropped arable land is a net measure of area because some land produces crops two or three times a year. To account for multiple cropping, a ***crop intensity index*** is introduced. The crop intensity index depends primarily on the availability of water, and so it is often a function of the amount of agricultural land under irrigation. Such land is also projected within the aggregate land use block. Once a projection of the crop intensity index is obtained, it is multiplied by cropped arable land to yield gross cropped arable land. Gross cropped arable land is then distributed among specific crops by user-specified economic functions.

The aggregate land use block is structured to correspond to the description above (see table 5). The first subblock distributes total land to agricultural, forestry and woodlands, and other uses. In the second subblock, agricultural land is distributed among arable, permanent crops, and permanent pasture uses. A related variable, the amount of irrigated agricultural land, is also part of this subblock. In the arable land subblock, land is distributed among cropped arable, temporary pasture, and other arable uses. At the bottom of the block, the cropped arable land forecast is repeated, followed by the cropping intensity index. Also contained in this block are several consistency checks designed to check trends in aggregate land use.

All of the base values needed in the aggregate land use block are either obtained automatically from the history spreadsheet or computed. Therefore, base values need not be entered in the template in this block. Note that when using the default residuals, projection formulas are needed for forestry and woodlands, other land, permanent crops, permanent pasture, temporary pasture, fallow and other land, and the crop intensity index. Irrigated agricultural land may also be forecast.

Cropland

The cropland block is designed to provide a convenient means of checking the proportion of forecast crop area to the total area available for annual crops. The block begins with gross cropped arable land, which

Table 4--Content of expected yield (EXYIELD) and expected returns (EXRETURN) blocks

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
EXPECTED YIELDS (EXYIELD)	UNITS	Range Name	Historical	Base year	Forecast years
Wheat	Tons/Ha	CRYEWHTO		HIST!CRYLWHTOB	(1+$CRYEWHRG/100)*CRYEWHTO(-1)
Rice	Tons/Ha	CRYERITO		HIST!CRYLRITOB	(1+$CRYERIRG/100)*CRYERITO(-1)
Coarse Grains	Tons/Ha	CRYECGTO		HIST!CRYLCGTOB	(1+$CRYECGRG/100)*CRYECGTO(-1)
Corn	Tons/Ha	CRYECOTO		HIST!CRYLCOTOB	(1+$CRYECORG/100)*CRYECOTO(-1)
Sorghum	Tons/Ha	CRYESRTO		HIST!CRYLSRTOB	(1+$CRYESRRG/100)*CRYESRTO(-1)
Barley	Tons/Ha	CRYEBATO		HIST!CRYLBATOB	(1+$CRYEBARG/100)*CRYEBATO(-1)
Other	Tons/Ha	CRYEOCTO		HIST!CRYLOCTOB	(1+$CRYEOCRG/100)*CRYEOCTO(-1)
Oilseeds	Tons/Ha	CRYETSTO		HIST!CRYLTSTOB	(1+$CRYETSRG/100)*CRYETSTO(-1)
Soybeans	Tons/Ha	CRYESBTO		HIST!CRYLSBTOB	(1+$CRYESBRG/100)*CRYESBTO(-1)
Groundnuts	Tons/Ha	CRYEGNTO		HIST!CRYLGNTOB	(1+$CRYEGNRG/100)*CRYEGNTO(-1)
Sunflower Seed	Tons/Ha	CRYEFSTO		HIST!CRYLFSTOB	(1+$CRYEFSRC/100)*CRYEFSTO(-1)
Rapeseed	Tons/Ha	CRYERATO		HIST!CRYLRATOB	(1+$CRYERARC/100)*CRYERATO(-1)
Cottonseed	Tons/Ha	CRYENSTO		HIST!CRYLNSTOB	(1+$CRYENSRG/100)*CRYENSTO(-1)
Other Oilseeds	Tons/Ha	CRYEOSTO		HIST!CRYLOSTOB	(1+$CRYEOSRG/100)*CRYEOSTO(-1)
Sugar	Tons/Ha	CRYESUTO		HIST!CRYLSUTOB	(1+$CRYESURG/100)*CRYESUTO(-1)
Cotton	Tons/Ha	CRYECTTO		HIST!CRYLCTTOB	(1+$CRYECTRG/100)*CRYECTTO(-1)
EXPECTED RETURNS (EXRETURN)	UNITS	Range Name	Historical	Base year	Forecast years
Wheat	CLCU/Ha	CRERWHTO		...	PRPPWH(-1)*CRYEWHTO
Rice	CLCU/Ha	CRERRITO		...	PRPPRI(-1)*CRYERITO
Coarse Grains	CLCU/Ha	CRERCGTO		...	PRPPCG(-1)*CRYECGTO
Corn	CLCU/Ha	CRERCOTO		...	PRPPCO(-1)*CRYECOTO
Sorghum	CLCU/Ha	CRERSRTO		...	PRPPSR(-1)*CRYESRTO
Barley	CLCU/Ha	CRERBATO		...	PRPPBA(-1)*CRYEBATO
Other	CLCU/Ha	CREROCTO		...	PRPPOC(-1)*CRYEOCTO
Oilseeds	CLCU/Ha	CRERTSTO		...	PRPPTS(-1)*CRYETSTO
Soybeans	CLCU/Ha	CRERSBTO		...	PRPPSB(-1)*CRYESBTO
Groundnuts	CLCU/Ha	CRERGNTO		...	PRPPGN(-1)*CRYEGNTO
Sunflower Seed	CLCU/Ha	CRERFSTO		...	PRPPFS(-1)*CRYEFSTO
Rapeseed	CLCU/Ha	CRERRATO		...	PRPPRA(-1)*CRYERATO
Cottonseed	CLCU/Ha	CRERNSTO		...	PRPPNS(-1)*CRYENSTO
Other	CLCU/Ha	CREROSTO		...	PRPPOS(-1)*CRYEOSTO
Sugar	CLCU/Ha	CRERSUTO		...	PRPPSU(-1)*CRYESUTO
Cotton	CLCU/Ha	CRERCTTO		...	PRPPCT(-1)*CRYECTTO

Figure 15--Land use in CPPA

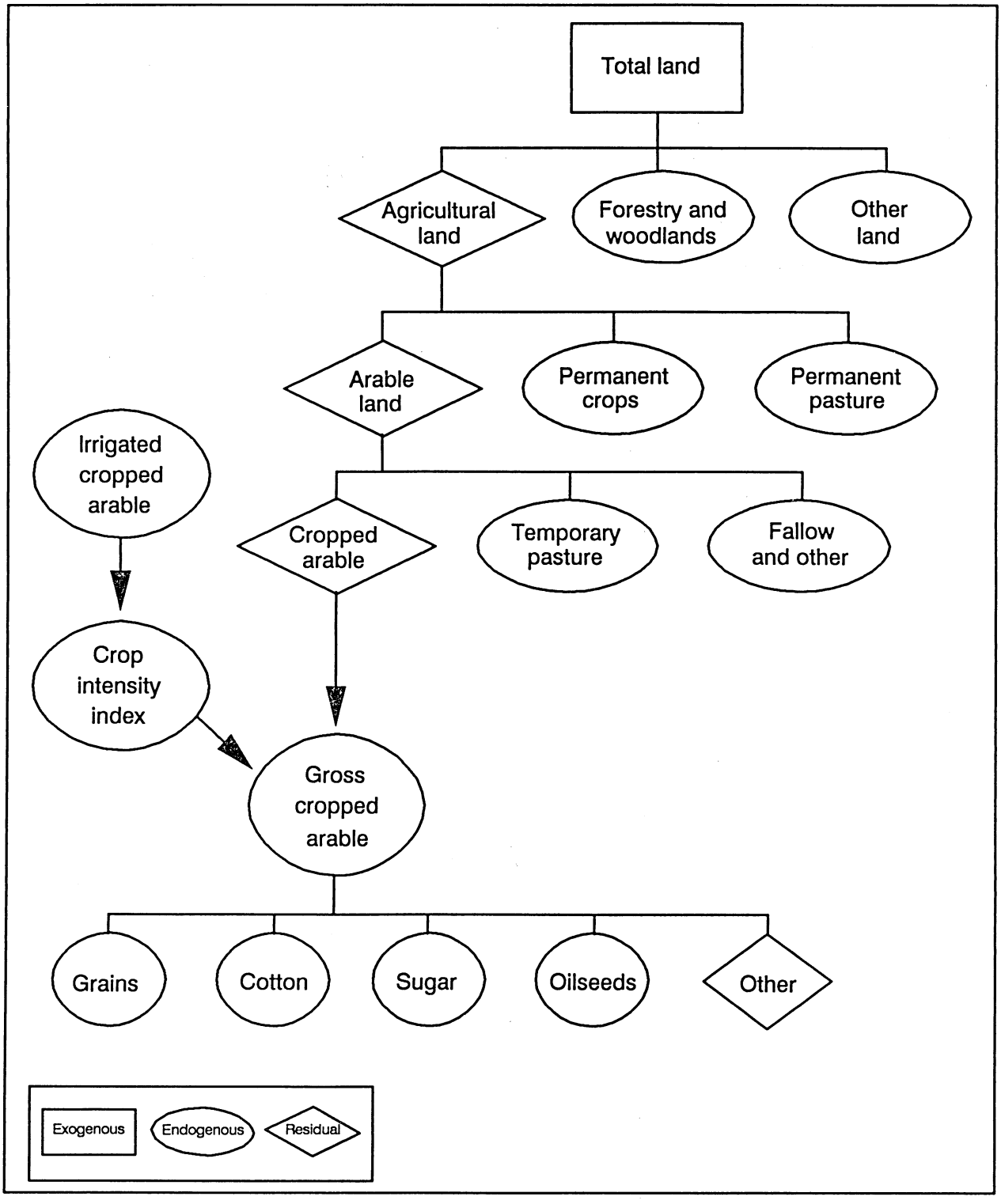

Table 5--Contents of aggregate land use (AGGLAND) block

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
AGGREGATE LAND USE	UNITS	Range Name	Historical	Base year	Forecast years
Total Land	1000 Ha	LUTLLATO		HIST!LUTLLATOB	LUTLLATO(-1)
Agricultural Land*	1000 Ha	LUTLLAAG		...	LUTLLATO-LUTLLAFW-LUTLLAOT
Forestry & Woodlands	1000 Ha	LUTLLAFW		HIST!LUTLLAFWB	
Other Land	1000 Ha	LUTLLAOT		HIST!LUTLLAOTB	
Consistency:					
Ag/Total	%		...	...	LUTLLAAG/LUTLLATO*100
F&W/Total	%	...	...		LUTLLAFW/LUTLLATO*100
Other/Land	%	...	...		LUTLLAOT/LUTLLATO*100
Agricultural Land	1000 Ha	LUAGLATO	...	...	LUTLLAAG
Arable Land*	1000 Ha	LUAGLAAL	...	...	LUAGLATO-LUAGLANC-LUAGLANP
Permanent Crops	1000 Ha	LUAGLANC		HIST!LUAGLANCB	
Permanent Pasture	1000 Ha	LUAGLANP		HIST!LUAGLANPB	
Irrigated Ag Land	1000 Ha	LUAGLAIR		HIST!LUAGLAIRB	
Consistency:					
Arable/Ag	%	...	...		LUAGLAAL/LUAGLATO*100
Perm Crops/Ag	%	...	...		LUAGLANC/LUAGLATO*100
Perm Pasture/Ag	%	...	...		LUAGLANP/LUAGLATO*100
Irrigated/Ag	%	...	...		LUAGLAIR/LUTLLAAG*100
Arable Land	1000 Ha	LUALLATO	...	...	LUAGLAAL
Cropped Arable*	1000 Ha	LUALLAAC	...	...	LUALLATO-LUALLATP-LUALLAOT
Temp Pasture	1000 Ha	LUALLATP		HIST!LUALLATPB	
Fallow & Other	1000 Ha	LUALLAOT		HIST!LUALLAOTB	
Consistency:					
Cropped Ar/Arable	%	...	...		LUALLAAC/LUALLATO*100
Temp Past/Arable	%	...	...		LUALLATP/LUALLATO*100
Fallow & Other/Arable	%	...	...		LUALLAOT/LUALLATO*100
Grazing Land	1000 Ha	LUAGLAGZ	...	...	LUAGLANP+LUALLATP
Permanent Pasture	1000 Ha	...	...		LUAGLANP
Temp Pasture	1000 Ha	...	...		LUALLATP
Cropped Arable	1000 Ha	...	...		LUALLAAC
Cr Intensity Index		LUAHLACI		HIST!LUAHLACIB	

is computed from data in the aggregate land block (see table 6). It is followed by the area harvested of each of the annual grain, oilseed, cotton, and sugar crops. Note that rice area may be projected for up to three harvests; also note that sugar area may be broken down into cane and beet areas. The difference between gross cropped area and the sum of the area under the forecast crops is allocated to all other crops (such as vegetables, other fibers, and so forth). Users may need to check the size of the other crops area to validate the distribution of available land. Preprogrammed consistency checks that compute the share of various forecast crops and other crops in the total also aid in validation.

Base values in this block are taken from the history spreadsheet, except for the individual rice harvests, sugar beet, and sugar cane area. Base values for these variables are not available in the history spreadsheet. Therefore, if the rice harvests, sugar beet, and/or sugarcane area are being projected, base area values will have to be entered manually in the base year column. Note that preprogrammed formulas ensure that the parts sum to the whole if rice harvest 2 and 3 and sugar beet area are entered.

In the forecast years, the user must define functions to determine area for each of the individual crops. If harvest detail in rice is not necessary, either harvest 1 (LUAHRIH1) or aggregate rice area (LUAHRITO) can be projected. If aggregate rice area is being projected, the spreadsheet can be customized by first deleting the range names associated with the harvest variables (that is, LUAHRIH1, LUAHRIH2, and LUAHRIH3) and then deleting the rows occupied by those variables. The same applies to sugar beets, sugarcane, or any other row that is not needed in the template.

Cattle, Hogs, and Sheep

The cattle, hogs, and sheep blocks contain inventory flow models. The inventory flow model sums beginning inventories, births, and imports to derive total animal supplies. Deaths, exports, and slaughter are subtracted from total supply to derive ending inventories as a residual. There are two forms of the inventory flow model: an extended version and an abbreviated version. The extended version contains complete inventory submodels for animals classified as breeding, milking (for cattle only), and other (slaughter). The abbreviated model excludes animal type detail.

In table 7, the contents of the extended and abbreviated cattle models are shown; the hog and sheep templates are similar. In the extended model, beginning inventory is broken down into breeding stock, milking stock, and other stock. Births are defined as the birth rate, in calves, lambs, or pigs per head, times the reproductive stock (breeding plus milking animals, if applicable). Note that the template accommodates differing birth rates for breeding and milking animals. Some proportion of births are kept for augmenting the reproductive stock, while the rest are channeled into the slaughter flow. For example, common rate is assumed for additions to both the breeding and milking stock and that the addition rate should be entered in head kept per 100 births. Deaths are defined as the death rate times the aggregate beginning inventory; a common death rate is assumed to apply to all types of animals. Total slaughter is derived as the sum of young (veal in cattle, lamb in sheep), breeding, milking, and other animals slaughtered. Ending inventories in aggregate and of the breeding, milking, and other stock are residuals. Base values for the extended inventory flow models are automatically read from the history spreadsheet for most, but not all, variables. Those obtained from the history spreadsheet include aggregate, breeding, and milking beginning inventories, the aggregate birth rate, aggregate deaths, total imports, total exports, total slaughter, calf or lamb slaughter, and other slaughter. In addition, base values are computed for other animals for beginning inventories, all births, the death rate, all deaths, other imports, other exports, other slaughter, and aggregate and type of animal ending inventories. Base values that are not obtained from the history spreadsheet or calculated from other entries, and which therefore must be entered manually, include breeding and milking birth rates, births kept for breeding or milking, imports and exports of breeding and milking animals, and slaughter of breeding animals.

The user must supply some base values in the animal blocks because the history spreadsheet does not include those variables. They are not found in the history spreadsheet because the Foreign Agriculture Service's (FAS) country database, which is the source of historical data for the analyses undertaken at ERS, does not contain these data. The omission of some type of animal detail may prevent many analysts

Table 6--Contents of the cropland use (CROPLAND) block

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
CROPLAND USE	UNITS	Range Name	Historical	Base year	Forecast years
Gross Cropped Area	1000 Ha	LUAHLAGA	...	...	LUALLAAC*LUAHLACI/100
Wheat	1000 Ha	LUAHWHTO	CRAHWHTO(-n)	HIST!CRAHWHTOB	
Rice	1000 Ha	LUAHRITO	CRAHRITO(-n)	HIST!CRAHRITOB	LUAHRIH1+LUAHRIH2+LUAHRIH3
Harvest 1	1000 Ha	LUAHRIH1	...	Subresidual	
Harvest 2	1000 Ha	LUAHRIH2	CRAHRIH2(-n)		
Harvest 3	1000 Ha	LUAHRIH3	CRAHRIH3(-n)		
Coarse Grains	1000 Ha	LUAHCGTO	CRAHCGTO(-n)	HIST!CRAHCGTOB	LUAHCOTO+LUAHSRTO+LUAHBATO+LUAHOCTO
Corn	1000 Ha	LUAHCOTO	CRAHCOTO(-n)	HIST!CRAHCOTOB	
Sorghum	1000 Ha	LUAHSRTO	CRAHSRTO(-n)	HIST!CRAHSRTOB	
Barley	1000 Ha	LUAHBATO	CRAHBATO(-n)	HIST!CRAHBATOB	
Other	1000 Ha	LUAHOCTO	CRAHOCTO(-n)	HIST!CRAHOCTOB	
Oilseeds	1000 Ha	LUAHTSTO	CRAHTSTO(-n)	HIST!CRAHTSTOB	LUAHSBTO+LUAHGNTO+LUAHFSTO +LUAHRATO+LUAHNSTO+LUAHOSTO
Soybeans	1000 Ha	LUAHSBTO	CRAHSBTO(-n)	HIST!CRAHSBTOB	
Groundnuts	1000 Ha	LUAHGNTO	CRAHGNTO(-n)	HIST!CRAHGNTOB	
Sunflower Seed	1000 Ha	LUAHFSTO	CRAHFSTO(-n)	HIST!CRAHFSTOB	
Rapeseed	1000 Ha	LUAHRATO	CRAHRATO(-n)	HIST!CRAHRATOB	
Cottonseed	1000 Ha	LUAHNSTO	CRAHNSTO(-n)	HIST!CRAHNSTOB	
Other Oilseeds	1000 Ha	LUAHOSTO	CRAHOSTO(-n)	HIST!CRAHOSTOB	
Sugar	1000 Ha	LUAHSUTO	CRAHSUTO(-n)	HIST!CRAHSUTOB	LUAHSUBE+LUAHSUCN
Beets	1000 Ha	LUAHSUBE	CRAHSUBE(-n)		
Cane	1000 Ha	LUAHSUCN	...	Subresidual	
Cotton	1000 Ha	LUAHCTTO	CRAHCTTO(-n)	HIST!CRAHCTTOB	
Other Crops*	1000 Ha	LUAHOATO	...	Balancing residual	LUAHLAGA-LUAHWHTO-LUAHRITO-LUAHCGTO -LUAHTSTO-LUAHSUTO-LUAHCTTO
Consistency checks:					
Wheat/Gross Cropped	%		...	...	LUAHWHTO/LUAHLAGA*100
Rice/Gross Cropped	%		...	...	LUAHRITO/LUAHLAGA*100
Co Grs/Gross Cropped	%		...	...	LUAHCGTO/LUAHLAGA*100
Oilseeds/Gross Cropped	%		...	...	LUAHTSTO/LUAHLAGA*100
Sugar/Gross Cropped	%		...	...	LUAHSUTO/LUAHLAGA*100
Cotton/Gross Cropped	%		...	...	LUAHCTTO/LUAHLAGA*100
Other/Gross Cropped	%		...	...	LUAHOATO/LUAHLAGA*100

Table 7--Contents of the extended and abbreviated cattle (CATTLE) blocks

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
CATTLE (EXTENDED)	UNITS	Range Name	Historical	Base year	Forecast years
Beginning Inventory	1000 Hd	LSBICATO		HIST!LSBICATOB	LSEICATO(-1)
Breeding	1000 Hd	LSBICABD		HIST!LSBICABDB	LSEICABD(-1)
Milking	1000 Hd	LSBICAMK		HIST!LSBICAMKB	LSEICAMK(-1)
Other	1000 Hd	LSBICAOT	...	Subresidual	LSEICAOT(-1)
Birth Rate	Calves/Hd	LSBRCATO		HIST!LSBRCATOB	LSBTCATO/(LSBICABD+LSBICAMK)
Breeding	Calves/Hd	LSBRCABD			
Milking	Calves/Hd	LSBRCAMK			
Kept for breeding/milk	Hd/100	LSBRCA_B			
Births	1000 Hd	LSBTCATO	...	(LSBICABD(-1)+LSBICAMK(-1))* LSBRCATO(-1)	LSBTCABD+LSBTCAMK+LSBTCAOT
For Breeding	1000 Hd	LSBTCABD	...	...	LSBICABD*LSBRCABD*LSBRCA_B/100
For Milking	1000 Hd	LSBTCAMK	...	...	LSBICAMK*LSBRCAMK*LSBRCA_B/100
For Other	1000 Hd	LSBTCAOT	...	Subresidual	(LSBICABD*LSBRCABD+LSBICAMK*LSBRCAMK)* (1-LSBRCA_B/100)
Death Rate	Hd/100	LSDRCATO	...	LSDECATO(-1)/LSBICATO (-1)*100	
Deaths	1000 Hd	LSDECATO		HIST!LSDECATOB	LSDECABD+LSDECAMK+LSDECAOT
Breeding	1000 Hd	LSDECABD	...	LSDECATO(-1)/100* LSBICABD (-1)	LSDRCATO/100*LSBICARB
Milking	1000 Hd	LSDECAMK	...	LSDECATO(-1)/100* LSBICAMK(-1)	LSDRCATO/100*LSBICAMK
Other	1000 Hd	LSDECAOT	...	Subresidual	LSDRCATO/100*LSBICAOT
Imports	1000 Hd	LSIMCATO		HIST!LSIMCATOB	LSIMCABD+LSIMCAMK+LSIMCAOT
Breeding	1000 Hd	LSIMCABD			
Milking	1000 Hd	LSIMCAMK			
Other	1000 Hd	LSIMCAOT	...	Subresidual	
Exports	1000 Hd	LSEXCATO		HIST!LSEXCATOB	LSEXCABD+LSEXCAMK+LSEXCAOT
Breeding	1000 Hd	LSEXCABD			
Milking	1000 Hd	LSEXCAMK			
Other	1000 Hd	LSEXCAOT	...	Subresidual	
Slaughter	1000 Hd	LSSLCATO		HIST!LSSLCATOB	LSSLCABD+LSSLCAMK+LSSLCAOT
Veal	1000 Hd	LSSLCAVL		HIST!LSSLCAVLB	
Breeding	1000 Hd	LSSLCABD			
Milking	1000 Hd	LSSLCAMK	...	subresidual	
Other	1000 Hd	LSSLCAOT		HIST!LSSLCAOTB	
Ending Inventory*	1000 Hd	LSEICATO	...	...	LSEICABD+LSEICAMK+LSEICAOT
Breeding*	1000 Hd	LSEICABD	...	...	LSBICABD+LSBTCABD-LSDECABD+LSIMCABD -LSEXCABD-LSSLCABD
Milking*	1000 Hd	LSEICAMK	...	...	LSBICAMK+LSBTCAMK-LSDECAMK+LSIMCAMK -LSEXCAMK-LSSLCAMK
Other*	1000 Hd	LSEICAOT	...	...	LSBICAOT+LSBTCAOT-LSDECAOT+LSIMCAOT -LSEXCAOT-LSSLCAVL-LSSLCAOT

Continued--

Table 7--Contents of the extended and abbreviated cattle (CATTLE) blocks--Continued

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
CATTLE (EXTENDED)	UNITS	Range Name	Historical	Base year	Forecast years
Consistency Checks					
Slaughter/inventory	%	LSSICATO	...	...	LSSLCATO/LSBICATO*100
Pct Change in Inv	%	LS_ICATO	...	...	((LSBICATO/LSBICATO(-1))-1)*100
Net Birth Rate	%	LSNBCATO	...	...	(LSBTCATO-LSDECATO)/LSBICATO*100
Net Trade Rate	%	LSNTCATO	...	...	(LSEXCATO-LSIMCATO)/LSBICATO*100
CATTLE	UNITS	Range Name	Historical	Base year	Forecast years
Beginning Inventory	1000 Hd	LSBICATO		HIST!LSBICATOB	LSEICATO(-1)
Percent Breeding	%	LSBICAPB		(HIST!LSBICABRB+HIST!LSBICAMKB)/ LSBICATO(-1)*100	
Birth Rate	Calves/Hd	LSBRCATO	...	LSBTCATO(-1)/(LSBICATO(-1)* LSBICAPB(-1)/100)	
Births	1000 Hd	LSBTCATO		HIST!LSBTCATOB	LSBICATO*LSBICAPB/100*LSBRCATO
Death Rate	Hd/100	LSDRCATO	...	LSDECATO(-1)/LSBICATO(-1)*100	
Deaths	1000 Hd	LSDECATO		HIST!LSDECATOB	LSBICATO*LSDRCATO/100
Imports	1000 Hd	LSIMCATO		HIST!LSIMCATOB	
Exports	1000 Hd	LSEXCATO		HIST!LSEXCATOB	
Slaughter	1000 Hd	LSSLCATO		HIST!LSSLCATOB	
Ending Inventory*	1000 Hd	LSEICATO	...	...	LSBICATO+LSBTCATO-LSDECATO+LSIMACTO -LSEXCATO-LSSLCATO
Consistency Checks					
Slaughter/inventory	%	LSSICATO	...	...	LSSLCATO/LSBICATO*100
Pct Change in Inv	%	LS_ICATO	...	...	((LSBICATO/LSBICATO(-1))-1)*100
Net Birth Rate	%	LSNBCATO	...	...	(LSBTCATO-LSDECATO)/LSBICATO*100
Net Trade Rate	%	LSNTCATO	...	...	(LSEXCATO-LSIMCATO)/LSBICATO*100

from using the extended model unless they have access to a more detailed database consistent with FAS historical data. Therefore, if type of animal detail is important and historical data are available, the user should choose the extended model. Otherwise, the abbreviated model should be used.

The abbreviated model has the same structure, but without the type of animal detail, as the extended model. However, because of the omission of reproductive stock inventories from this block, the proportion of births kept for reproductive activities need not be specified. Instead, the percentage of reproductive stock in beginning inventories is projected directly. Therefore, births are computed in aggregate as beginning inventories times the percent breeding times the birth rate.

Beef and Veal, Pork, Lamb and Mutton

As in the case with the extended animal flow models, the beef and veal and the lamb and mutton forecast blocks are available in extended or abbreviated form. There is no extended model for pork. The extended meat model specifications assume that extended inventory flow models are also being projected. In addition, it is assumed that the user has access to data not contained in the FAS database, since meat production, trade, and consumption are not broken down into beef, veal, lamb, and mutton. The beef and veal block is shown in table 8; the pork and the lamb and mutton blocks are similar.

The meat supply-demand models begin with slaughter. In the extended model, slaughter is broken down into calves for veal, breeding, milking, and other stock. The yield of meat from slaughter is also broken down into the same detail. Production of veal is defined as the product of calf slaughter and veal yield; production of beef is defined as the sum of the products of breeding, milking, and other slaughter times breeding, milking, and other animal yields. Beginning stocks of meat are equal to ending stocks in the previous year. Exports, consumption, and ending stocks are modeled for beef and veal individually, leaving imports as the default market-balancing residual. The preprogrammed consistency checks, applicable to both the extended and abbreviated versions, include per capita production and consumption, the percent change in production and consumption, and the ratio of imports and exports to consumption, expressed as a percentage.

In the extended model, base year values are computed or automatically read from the history spreadsheet for all slaughter, aggregate yield, all beginning stocks, all production, aggregate imports, exports, consumption, and ending stocks, and veal imports, exports, consumption, and ending stocks. Because of limitations in the FAS database, the user must manually enter base values for the yields of the different types of animals, as well as ending stocks, imports, exports, and consumption of beef if the extended model is used.

The abbreviated model has the same structure as the extended model, but it lacks the type of meat detail. Note that all base values in the abbreviated model are either read from the history spreadsheet or computed, so manual entry of base values is not needed. If the default specification (that is, imports as the market-balancing residual) is appropriate, projections need to be made for yield, exports, consumption, and ending stocks.

Milk

In the current version of CPPA, the milk block is limited to the supply side (see table 9). Production is preprogrammed as the product of the inventory of milking cows and the yield. The default specification assumes that the extended cattle model is being used. If the extended cattle model is being projected, the inventory of milking animals can be read from that block. In that case, a function to project milk yield is all that is needed to complete this block. On the other hand, if the extended cattle model is not being used but milk production is being projected, in addition to the yield, the inventory of milking animals will have to be projected. The consistency checks in this block are limited to the percent change in production and per capita production.

Table 8--Contents of the extended and abbreviated beef and veal (BEEFVEAL) blocks

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
BEEF AND VEAL (EXTENDED)	UNITS	Range Name	Historical	Base year	Forecast years
Slaughter	1000 Hd	MTSLBVTO	LSSLCATO(-n)	HIST!LSSLCATOB	LSSLCATO
Vealers	1000 Hd	MTSLBVVL	LSSLCAVL(-n)	HIST!LSSLCAVLB	LSSLCAVL
Breeding	1000 Hd	MTSLBVBD	...	...	LSSLCABD
Milking	1000 Hd	MTSLBVMK	...	Subresidual	LSSLCAMK
Other	1000 Hd	MTSLBVOT		HIST!LSSLCAOTB	LSSLCAOT
Yield	Kg/Hd	MTYLBVTO		HIST!MTYLBVTOB	MTPRBVTO/MTSLBVTO*1000
Vealers	Kg/Hd	MTYLBVVL			
Breeding	Kg/Hd	MTYLBVBD			
Milking	Kg/Hd	MTYLBVMK			
Other	Kg/Hd	MTYLBVOT			
Beginning Stocks	1000 Tons	MTBSBVTO	...	Balancing residual	MTESBVTO(-1)
Beef	1000 Tons	MTBSBVBF	...	Balancing residual	MTESBVBF(-1)
Veal	1000 Tons	MTBSBVVL	...	Balancing residual	MTESBVVL(-1)
Production	1000 Tons	MTPRBVTO	...	MTSLBVTO(-1)*MTYLBVTO(-1)/1000	MTPRBVBF+MTPRBVVL
Beef	1000 Tons	MTPRBVBF	...	Subresidual	(MTSLBVBD*MTYLBVBD+MTSLBVMK*MTYLBVMK+ +MTSLBVOT*MTYLBVOT)/1000
Veal	1000 Tons	MTPRBVVL	...	MTSLBVVL(-1)*MTYLBVVL(-1)/1000	MTSLBVVL*MTYLBVVL/1000
Imports*	1000 Tons	MTIMBVTO		HIST!MTIMBVTOB	MTIMBVBF+MTIMBVVL
Beef*	1000 Tons	MTIMBVBF		MTEXBVBF+MTDMBVBF+MTESBVBF -MTBSBVBF-MTPRBVBF	
Veal*	1000 Tons	MTIMBVVL	...	Subresidual	MTEXBVVL+MTDMBVVL+MTESBVVL -MTBSBVVL-MTPRBVVL
Exports	1000 Tons	MTEXBVTO		HIST!MTEXBVTOB	MTEXBVBF+MTEXBVVL
Beef	1000 Tons	MTEXBVBF			
Veal	1000 Tons	MTEXBVVL	...	Subresidual	
Consumption	1000 Tons	MTDMBVTO		HIST!MTDMBVTOB	MTDMBVBF+MTDMBVVL
Beef	1000 Tons	MTDMBVBF			
Veal	1000 Tons	MTDMBVVL	...	Subresidual	
Ending Stocks	1000 Tons	MTESBVTO		HIST!MTESBVTOB	MTESBVBF+MTESBVVL
Beef	1000 Tons	MTESBVBF			
Veal	1000 Tons	MTESBVVL	...	Subresidual	
Consistency Checks					
Per Cap Production	Kg/Person	MTPQBVTO	...	...	MTPRBVTO/POP*1000
Pct Change in Prodn	%	MT_PBVTO	...	...	((MTPRBVTO/MTPRBVTO(-1))-1)*100
Per Cap Consumption	Kg/Person	MTPCBVTO	...	...	MTDMBVTO/POP*1000
Pct Change in Cons	%	MT_CBVTO	...	...	((MTDMBVTO/MTDMBVTO(-1))-1)*100
Imports/Consumption	%	MTICBVTO	...	...	MTIMBVTO/MTDMBVTO*100
Exports/Production	%	MTEPBVTO	...	...	MTEXBVTO/MTPRBVTO*100

Continued--

Table 8--Contents of the extended and abbreviated beef and veal (BEEFVEAL) blocks--Continued

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
BEEF AND VEAL	UNITS	Range Name	Historical	Base year	Forecast years
Slaughter	1000 Hd	MTSLBVTO	LSSLCATO(-n)	HIST!LSSLCATOB	LSSLCATO
Yield	Kg/Hd	MTYLBVTO		HIST!MTYLBVTOB	
Beginning Stocks	1000 Tons	MTBSBVTO	...	Balancing residual	MTESBVTO(-1)
Production	1000 Tons	MTPRBVTO	...	MTSLBVTO(-1)*MTYLBVTO(-1)/1000	MTSLBVTO*MTYLBVTO/100
Imports*	1000 Tons	MTIMBVTO		HIST!MTIMBVTOB	MTEXBVTO+MTDMBVTO+MTESBVTO -MTBSBVTO-MTPRBVTO
Exports	1000 Tons	MTEXBVTO		HIST!MTEXBVTOB	
Consumption	1000 Tons	MTDMBVTO		HIST!MTDMBVTOB	
Ending Stocks	1000 Tons	MTESBVTO		HIST!MTESBVTOB	
Consistency Checks					
Per Cap Production	Kg/Person	MTPQBVTO	...	...	MTPRBVTO/POP*1000
Pct Change in Prodn	%	MT_PBVTO	...	...	((MTPRBVTO/MTPRBVTO(-1))-1)*100
Per Cap Consumption	Kg/Person	MTPCBVTO	...	...	MTDMBVTO/POP*1000
Pct Change in Cons	%	MT_CBVTO	...	...	((MTDMBVTO/MTDMBVTO(-1))-1)*100
Imports/Consumption	%	MTICBVTO	...	...	MTIMBVTO/MTDMBVTO*100
Exports/Production	%	MTEPBVTO	...	...	MTEXBVTO/MTPRBVTO*100

Table 9--Contents of the milk (MILK) block

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
MILK	UNITS	Range Name	Historical	Base year	Forecast years
Milking Herd	1000 Hd	MTBICAMK	LSBICAMK(-n)	HIST!LSBICAMKB	LSBICAMK
Milk Yield	Tons/Hd	MTYLMKTO		HIST!MTYLMKTOB	
Milk Production	1000 Tons	MTPRMKTO	...	...	MTBICAMK*MTYLMKTO
Consistency Checks					
Per Cap Production	Kg/Person	MTPQMKTO	...	...	MTPRMKTO*1000/POP
Pct Change in Prodn	%	MT_PMKTO	...	...	((MTPRMKTO/MTPRMKTO(-1))-1)*100

Poultry Meat and Eggs

The poultry meat block is structured the same as the abbreviated red meat blocks; the consistency checks are also the same (see table 10). Production is defined as slaughter times yield. Beginning stocks are defined as lagged ending stocks. Imports are the market-balancing residual. Note that the production of eggs is also modeled in this block as a reduced form. All poultry and egg base values are either computed or derived from the history spreadsheet. Therefore, user input in this block is limited to specifying economic functions that project poultry slaughter, yield, exports, consumption, ending stocks, and egg production.

Feed

The CPPA template links grain and oilseed meal feed demand to the production of animal products in the feed block. The approach determines the quantity of feed needed to yield a given level of meat, milk, and egg production.[9] The starting point in this process is the production of animal products (see fig. 16). Note that the determination of animal product production is endogenous in the system but exogenous to this specific block.

The first step in determining feed demand, given some level of meat, milk, and egg production, is to determine the percentage of that production which is derived from fed animals. The proportion of animals fed depends on the structure of the livestock industry in the country. If feeding is used in conjunction with range production, the decision to feed animals depends on such variables as relative feed/meat prices and technology. Therefore, the proportion of fed animals may be modeled by using an economic function or may be assumed by the user. Once the proportion fed is projected, the percentage is applied to total animal product production to derive the quantity of meat, milk, and eggs produced by fed animals.

The second step in the process requires the specification of feed conversion coefficients. Feed conversion coefficients are the tons of energy (grain) or protein (meal) required to produce a ton of meat, milk, or eggs. These coefficients are technical, varying only with advances in technology, and so they are assumed to be exogenous. The coefficients are multiplied by the production of meat, milk, and eggs from fed animals to derive the total amount of grain and protein required to support the projections of animal product production. The total requirement for grain and meal can then be distributed among the individual grains and meals with user-specified economic functions.

The structure of the feed block follows the process outlined above. The projections of meat, milk, and egg production that are derived in the respective meat blocks are repeated at the top of the feed block (see table 11). The template includes space for the percentage of production from fed animals by type of product as well as both the grain and protein feed conversion coefficients by type of product. The feed requirements by type of animal are summed to yield total grain (energy) and total meal (protein) feed needs. These are then allocated among the forecast grains and meals, yielding residuals in each category, which can be used to assess the validity of the feed demand projection functions. For example, if the computed value of the residual is negative, too much of the feed requirement is being met by the forecast commodities. If the residual is very large, too little of the feed requirement may be being met by the forecast commodities. In addition to the residuals, the proportion of grain and protein in total feed use is computed at the bottom of the block as an alternative consistency check.

Base values for animal product production, the grain and protein feed requirements, and grain and protein feed demand are either read automatically from the history spreadsheet or calculated. In contrast, the user must manually enter base values for the percentage of production from fed animals and the energy and protein feed conversion coefficients. The variables that the user needs to project in the forecast years are the percentage of production from fed animals, the feed conversion requirements, and the demand functions.

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[9] Note that this approach excludes feed required for herd maintenance.

Table 10--Contents of the poultry meat and eggs (POULTRY) block

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
POULTRY MEAT & EGGS	UNITS	Range Name	Historical	Base year	Forecast years
Poultry Slaughter	1000 Hd	MTSLPLTO		HIST!MTSLPLTOB	
Yield	Kg/Hd	MTYLPLTO		HIST!MTYLPLTOB	
Beginning Stocks	1000 Tons	MTBSPLTO	...	Balancing residual	MTESPLTO(-1)
Poultry Meat Production	1000 Tons	MTPRPLTO		HIST!MTPRPLTOB	MTSLPLTO*MTYLPLTO/1000
Imports*	1000 Tons	MTIMPLTO		HIST!MTIMPLTOB	MTEXPLTO+MTDMPLTO+MTESPLTO -MTBSPLTO-MTPRPLTO
Exports	1000 Tons	MTEXPLTO		HIST!MTEXPLTOB	
Consumption	1000 Tons	MTDMPLTO		HIST!MTDMPLTOB	
Ending Stocks	1000 Tons	MTESPLTO		HIST!MTESPLTOB	
Eggs, Production	1000 Tons	MTPREGTO		HIST!MTPREGTOB	
Consistency Checks (Poultry Meat):					
Per Cap Production	Kg/Person	MTPQPLTO	...	...	MTPRPLTO*1000/POP
Pct Change in Prodn	%	MT_PPLTO	...	...	(MTPRPLTO/MTPRPLTO(-1)-1)*100
Per Cap Consumption	Kg/Person	MTPCPLTO	...	...	MTDMPLTO*1000/POP
Pct Change in Cons	%	MT_CPLTO	...	...	(MTDMPLTO/MTDMPLTO(-1)-1)*100
Imports/Consumption	%	MTICPLTO	...	...	MTIMPLTO/MTDMPLTO*100
Exports/Production	%	MTEPPLTO	...	...	MTEXPLTO/MTPRPLTO*100
Consistency Checks (Eggs):					
Per Cap Production	Kg/Person	MTPQEGTO	...	...	MTPREGTO/POP*1000
Pct Change in Prodn	%	MT_PEGTO	...	...	(MTPREGTO/MTPREGTO(-1)-1)*100

Figure 16--Feed-livestock linkages in CPPA

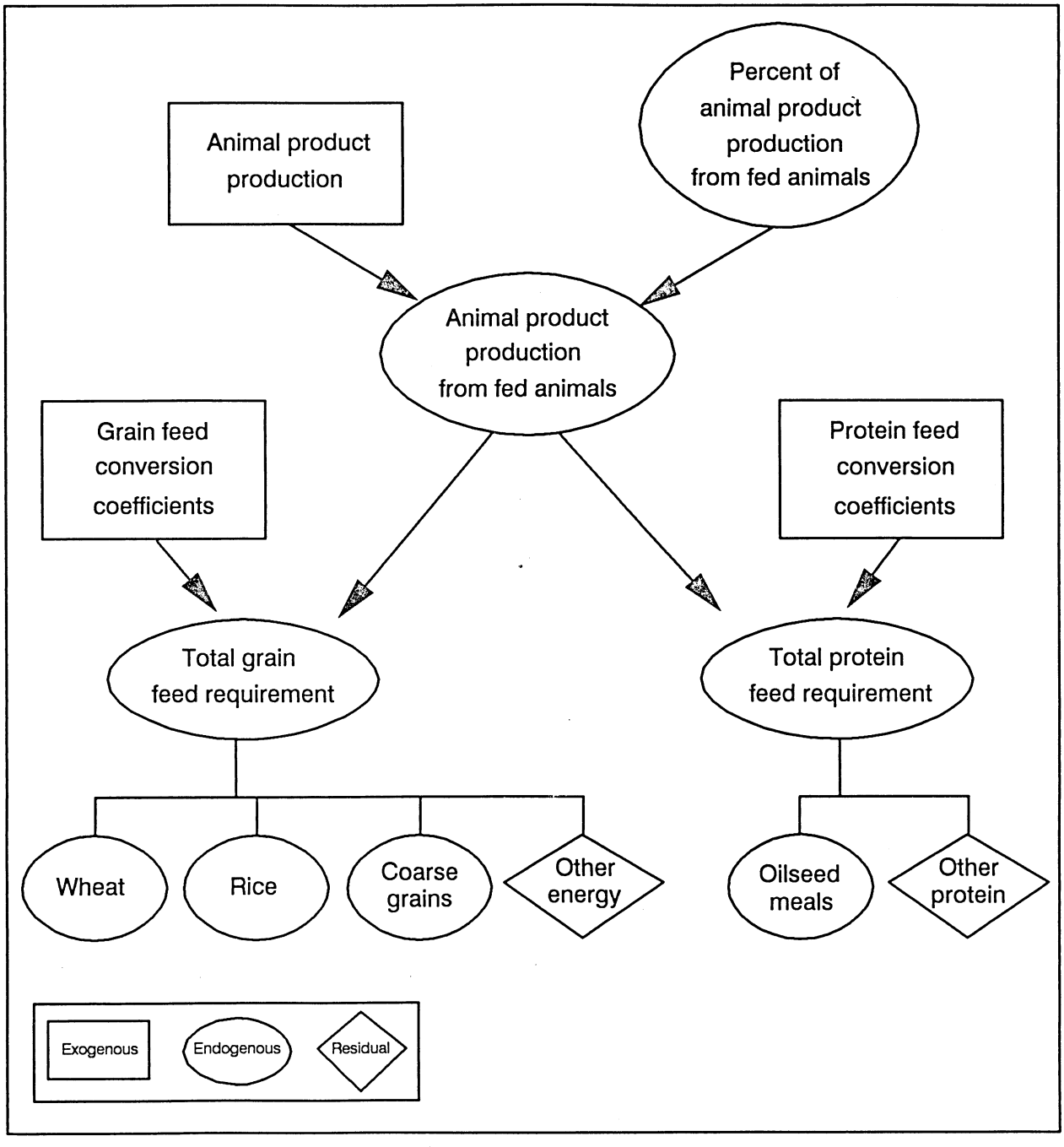


Table 11--Contents of the feed demand (FEED) block

(A) FEED DEMAND	(B) UNITS	(C) Range Name	(D)-(H) Historical	(I) Base year	(J)-(T) Forecast years
Meat Production	1000 Tons		...	...	MTPRBVTO+MTPRMKTO+MTPRPKTO+MTPRLMLB +MTPRPLTO+MTPREGTO
Beef&Veal	1000 Tons		...	...	MTPRBVTO
Beef	1000 Tons		...	...	MTPRBVBF
Veal	1000 Tons		...	...	MTPRBVVL
Milk	1000 Tons		...	...	MTPRMKTO
Pork	1000 Tons		...	...	MTPRPKTO
Lamb	1000 Tons		...	...	MTPRLMLB
Poultry	1000 Tons		...	...	MTPRPLTO
Eggs	1000 Tons		...	...	MTPREGTO
% of Production from Fed Animals					
Beef&Veal	%	FE_FBVTO			
Beef	%	FE_FBVBF			
Veal	%	FE_FBVVL			
Milk	%	FE_FMKTO			
Pork	%	FE_FPKTO			
Lamb	%	FE_FLMLB			
Poultry	%	FE_FPLTO			
Eggs	%	FE_FEGTO			
Grain Req. per Ton Anim. Product					
Beef&Veal	Tons	FEGQBVTO			
Beef	Tons	FEGQBVBF			
Veal	Tons	FEGQBVVL			
Milk	Tons	FEGQMKTO			
Pork	Tons	FEGQPKTO			
Lamb	Tons	FEGQLMLB			
Poultry	Tons	FEGQPLTO			
Eggs	Tons	FEGQEGTO			
Grain Feeding Requirement					
Total	1000 Tons	FEDMMTGR	...	...	FEDMBVGR+FEDMMKGR+FEDMPKGR+FEDMLBGR +FEDMPLGR+FEDMEGGR
Beef&Veal	1000 Tons	FEDMBVGR	...	...	MTPRBVTO*FE_FBVTO/100*FEGQBVTO
Beef	1000 Tons	FEDMBFGR	...	...	MTPRBVBF*FE_FBVBF/100*FEGQBVBF
Veal	1000 Tons	FEDMVLGR	...	...	MTPRBVVL*FE_FBVVL/100*FEGQBVVL
Milk	1000 Tons	FEDMMKGR	...	...	MTPRMKTO*FE_FMKTO/100*FEGQMKTO
Pork	1000 Tons	FEDMPKGR	...	...	MTPRPKTO*FE_FPKTO/100*FEGQPKTO
Lamb	1000 Tons	FEDMLBGR	...	...	MTPRLMLB*FE_FLMLB/100*FEGQLMLB
Poultry	1000 Tons	FEDMPLGR	...	...	MTPRPLTO*FE_FPLTO/100*FEGQPLTO
Eggs	1000 Tons	FEDMEGGR	...	...	MTPREGTO*FE_FEGTO/100*FEGQEGTO

Continued--

Table 11--Contents of the feed demand (FEED) block--Continued

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
FEED DEMAND	UNITS	Range Name	Historical	Base year	Forecast years
Grain Feed Demand					
Wheat	1000 Tons	FEDMWHTO	CRDMWHFE(-n)	HIST!CRDMWHFEB	
Rice	1000 Tons	FEDMRITO	CRDMRIFE(-n)	HIST!CRDMRIFEB	
Coarse Grains	1000 Tons	FEDMCGTO	CRDMCGFE(-n)	HIST!CRDMCGFEB	FEDMCOTO+FEDMSRTO+FEDMBATO+FEDMOCTO
Corn	1000 Tons	FEDMCOTO	CRDMCOFE(-n)	HIST!CRDMCOFEB	
Sorghum	1000 Tons	FEDMSRTO	CRDMSRFE(-n)	HIST!CRDMSRFEB	
Barley	1000 Tons	FEDMBATO	CRDMBAFE(-n)	HIST!CRDMBAFEB	
Other Coarse Grains	1000 Tons	FEDMOCTO	CRDMOCFE(-n)	HIST!CRDMOCFEB	
Other*	1000 Tons	FEDMOGTO	...	...	FEDMMTGR-FEDMWHTO-FEDMRITO-FEDMCGTO
Protein Req. per Ton Anim. Product					
Beef&Veal	Tons	FERQBVTO			
Beef	Tons	FERQBVBF			
Veal	Tons	FERQBVVL			
Milk	Tons	FERQMKTO			
Pork	Tons	FERQPKTO			
Lamb	Tons	FERQLMLB			
Poultry	Tons	FERQPLTO			
Eggs	Tons	FERQEGTO			
Protein Feeding Requirement					
Total	1000 Tons	FEDMMTPT	...	...	FEDMBVPT+FEDMMKPT+FEDMPKPT+FEDMLBPT +FEDMPLPT+FEDMEGPT
Beef&Veal	1000 Tons	FEDMBVPT	...	...	MTPRBVTO*FE_FBVTO/100*FERQBVTO
Beef	1000 Tons	FEDMBFPT	...	...	MTPRBVBF*FE_FBVBF/100*FERQBVBF
Veal	1000 Tons	FEDMVLPT	...	...	MTPRBVVL*FE_FBVVL/100*FERQBVVL
Milk	1000 Tons	FEDMMKPT	...	...	MTPRMKTO*FE_FMKTO/100*FERQMKTO
Pork	1000 Tons	FEDMPKPT	...	...	MTPRPKTO*FE_FPKTO/100*FERQPKTO
Lamb	1000 Tons	FEDMLBPT	...	...	MTPRLMLB*FE_FLMLB/100*FERQLMLB
Poultry	1000 Tons	FEDMPLPT	...	...	MTPRPLTO*FE_FPLTO/100*FERQPLTO
Eggs	1000 Tons	FEDMEGPT	...	...	MTPREGTO*FE_FEGTO/100*FERQEGTO
Protein Feed Demand					
Soybean Meal	1000 Tons	FEDMSMTO	CRDMSMFE(-n)	HIST!CRDMSMFEB	
Groundnut Meal	1000 Tons	FEDMGMTO	CRDMGMFE(-n)	HIST!CRDMGMFEB	
Sunflowerseed Meal	1000 Tons	FEDMFMTO	CRDMFMFE(-n)	HIST!CRDMFMFEB	
Rapeseed Meal	1000 Tons	FEDMRMTO	CRDMRMFE(-n)	HIST!CRDMRMFEB	
Cottonseed Meal	1000 Tons	FEDMNMTO	CRDMNMFE(-n)	HIST!CRDMNMFEB	
Fish Meal	1000 Tons	FEDMHMTO	CRDMHMFE(-n)	HIST!CRDMHMFEB	
Other Meals	1000 Tons	FEDMOMT	CRODMOMFE(-n)	HIST!CRDMOMFEB	
Other Protein*	1000 Tons	FEDMOPTO	...	...	FEDMMTPT-FEDMSMTO-FEDMGMTO-FEDMFMTO -FEDMRMTO-FEDMNMTO-FEDMHMTO-FEDMOMTO
Consistency Checks:					
% Grain in Feed Req.	%		...	...	FEDMMTGR/(FEDMMTGR+FEDMMTPT)*100
% Protein in Feed Req.	%		...	...	FEDMMTPT/(FEDMMTPT+FEDMMTGR)*100

There are two important user notes applicable to this block. The first is that if feed conversion rates have been computed on the basis of total meat production (not fed meat production), then the value that should be entered in the percent fed block is 100 percent, regardless of the actual proportion fed. This is necessary because in that case, the feed conversion coefficients have already been adjusted to reflect the normal proportion of animals that are fed. The second point relates to the specification of the grain and protein feed requirements. If two tons of grain are required to produce one ton of beef, the entry in the beef row for the grain requirement per ton of animal product subblock is 2.0.

Grains

The basic structure of the grain (wheat, rice, coarse grains, corn, sorghum, barley, and other coarse grains) blocks assumes that (1) area harvested has been forecast in the cropland block, (2) production is the product of area harvested and yield, (3) feed demand has been forecast in the feed block, and (4) commercial imports are the market-balancing residual. The rice block, shown in table 12, has the same structure as the wheat and coarse grain blocks except that it allows the user to specify multiple harvest area and yields to account for different trends in different production seasons.

Base year values are either computed or derived from the history spreadsheet for all variables except government stocks. In addition, in the case of rice, the yields by harvest period are not available from the FAS database. If the breakdown in stocks and multiple harvest yields are being projected, base values will have to be entered manually for these variables. In the default specification, yield(s), food aid receipts, exports, food demand, other demand, and total and government ending stocks must be projected to derive commercial imports as the market-balancing residual.

The consistency checks in these blocks are more extensive than in preceding blocks. They include the ending stocks-to-consumption ratio, food demand as a percentage of total demand, imports as a percentage of consumption, exports as a percentage of production, the percent change in production and consumption, and some measures of per capita production and consumption. These indicators can be used to assess the validity of the projection functions.

Food Aid Needs Analysis

The food aid needs analysis block is designed to project long-term food aid needs arising from a long-term assessment of cereal production, demand, and trade prospects.[10] It is based on the assumption that the gap between a ***target food consumption*** level and the availability of cereals for food consumption represents the food aid need of the country. The process by which food aid needs are computed is depicted in figure 17. The availability of cereals for food use is defined as supply (production plus stock change) less an allowance for nonfood uses (exports, feed, and other nonfood use. The availability of cereals for food use is subtracted from target food consumption, yielding the quantity of cereals that need to be imported to meet target consumption. If the import requirement is negative, food aid is not needed because availability exceeds the target. If the import requirement is positive, the ***import capacity*** of the country is subtracted from requirements. If this subtraction yields a negative number (that is, capacity exceeds requirements), food aid is not needed. However, if import capacity is less than import requirements, the country has a food aid need.

Within this simple model, there are five alternative projections of food aid needs. The alternatives are derived from three measures of target food consumption and from two means of deriving an allowance for nonfood uses. The food use target is computed as (1) a status quo equivalent which will maintain recent per capita consumption levels, (2) a nutrition-based caloric requirement, or (3) a market demand equivalent. Two status quo food use targets are computed, the first based on the average per capita

[10] This block is designed to facilitate the analysis of long-term food aid needs undertaken in the *Global Food Assessment* (GFA-1, U.S. Dept. Agr., Econ. Res. Serv., Nov., 1990). A more detailed description of the methodology that underlies the structure of this block, as well as examples of its use, will be found in that publication.

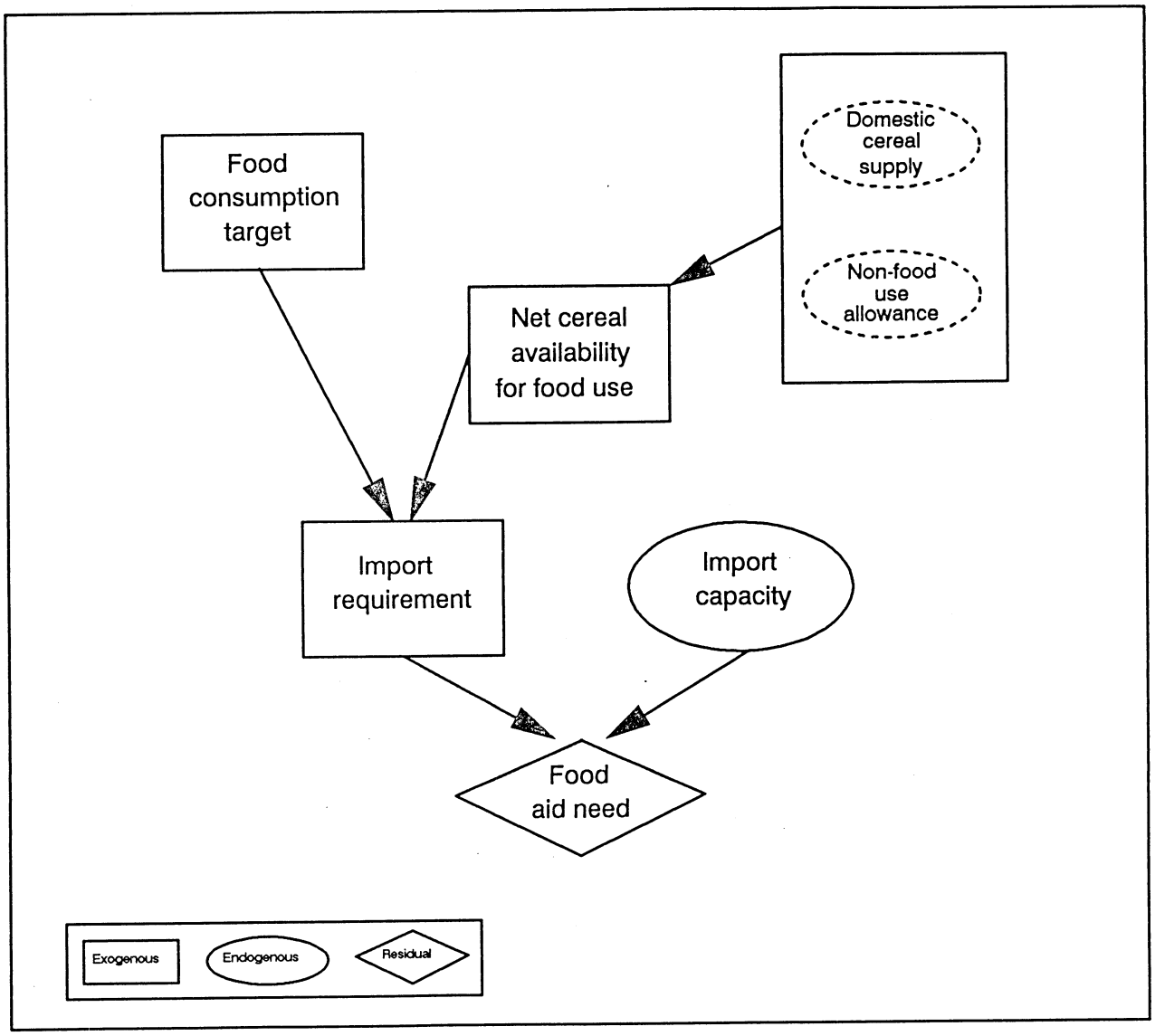
Table 12--Contents of the rice (RICE) block

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
RICE	UNITS	Range Name	Historical	Base year	Forecast years
Area Harvested	1000 Ha	CRAHRITO		HIST!CRAHRITOB	LUAHRITO
Harvest 1	1000 Ha	CRAHRIH1	...	Subresidual	LUAHRIH1
Harvest 2	1000 Ha	CRAHRIH2			LUAHRIH2
Harvest 3	1000 Ha	CRAHRIH3			LUAHRIH3
Yield	Tons/Ha	CRYLRITO		HIST!CRYLRITOB	CRPRRITO/CRAHRIT
Harvest 1	Tons/Ha	CRYLRIH1			
Harvest 2	Tons/Ha	CRYLRIH2			
Harvest 3	Tons/Ha	CRYLRIH3			
Production	1000 Tons	CRPRRITO	...	CRAHRITO(-1)*CRYLRITO(-1)	CRAHRIH1*CRYLRIH1+CRAHRIH2*CRYLRIH2 +CRAHRIH3*CRYLRIH3
Beginning Stocks	1000 Tons	CRBSRITO	...	Balancing residual	CRESRITO(-1)
Government	1000 Tons	CRBSRIGV			CRESRIGV(-1)
Private	1000 Tons	CRBSRIPV	...	Subresidual	CRESRIPV(-1)
Imports	1000 Tons	CRIMRITO	...	...	CRIMRICM+CRIMRIFA
Commercial imports*	1000 Tons	CRIMRICM		HIST!CRIMRICMB	CRESRITO+CRDMRITO+CREXRITO-CRBSRITO -CRPRRITO-CRIMRIFA
Food aid receipts	1000 Tons	CRIMRIFA		HIST!CRIMRIFAB	
Exports	1000 Tons	CREXRITO		HIST!CREXRITOB	
Consumption Demand	1000 Tons	CRDMRITO		HIST!CRDMRITOB	CRDMRIFD+CRDMRIFE+CRDMRIOT
Food Demand	1000 Tons	CRDMRIFD	...	Subresidual	
Feed Demand	1000 Tons	CRDMRIFE		HIST!CRDMRIFEB	FEDMRITO
Other Demand	1000 Tons	CRDMRIOT		HIST!CRDMRITOB	
Ending Stocks	1000 Tons	CRESRITO		HIST!CRESRITOB	
Government	1000 Tons	CRESRIGV			
Private*	1000 Tons	CRESRIPV	...	CRESRITO-CRESRIGV	
Consistency Checks:					
End Stks/Consumption	%	CRSCRITO	...	...	CRESRITO/CRDMRITO*100
Food/Consumption Dmd	%	CRFCRITO	...	...	CRDMRIFD/CRDMRITO*100
Imps/Consumption Dmd	%	CRICRITO	...	...	CRIMRITO/CRDMRITO*100
Exps/Production	%	CREPRITO	...	...	CREXRITO/CRPRRITO*100
Per Cap Production	Kg/Person	CRPQRITO	...	...	CRPRRITO*1000/POP
Pct Change in Prodn	%	CR_PRITO	...	...	(CRPRRITO/CRPRRITO(-1)-1)*100
Per Cap Total Cons	Kg/Person	CRPCRITO	...	...	CRDMRITO*1000/POP
Per Cap Food	Kg/Person	CRPCRIFD	...	...	CRDMRIFD*1000/POP
Per Cap Feed	Kg/Person	CRPCRIFE	...	...	CRDMRIFE*1000/POP
Per Cap Other	Kg/Person	CRPCRIOT	...	...	CRDMRIOT*1000/POP
Pct Change in Cons	%	CR_CRITO	...	...	(CRDMRITO/CRDMRITO(-1)-1)*100

consumption in the 3 years preceding the base year, and the second based on the 10 years preceding the base year. Nonfood use allowances are computed as (1) a status quo equivalent which maintains growth in nonfood use at a rate equal to population growth and (2) a market demand rate. As in the status quo consumption target computation, the status quo nonfood use rates are computed as both a 3- and a 10-year average. The five alternative measures of food aid needs are:

- 3-year average status quo consumption with 3-year average nonfood use allowance rates.
- 10-year average status quo consumption with 10-year average nonfood use allowance rates.
- Caloric requirement consumption with 3-year average nonfood use allowance rates.
- Caloric requirement consumption with 10-year average nonfood use allowance rates.
- Market demand consumption with market demand nonfood use.

Figure 17--Food aid needs in CPPA



The food aid needs analysis block requires very little user input. Most of the data needed in this block come from the grain blocks or are computed from data contained in the history spreadsheet. Two exceptions are possible to this rule. First, if commercial import capacity differs from projected commercial imports, the user will need to project capacity. Capacity may differ from imports if imports are determined as the marketing-balancing residual. In that case, an assumed level of food aid receipts has either explictly or implicitly been specified, which may or may not reflect food aid needs. In addition, the capacity to import may differ from the level of imports needed to close a supply-demand gap because financial considerations may prevent commercial purchase of the entire quantity gap. Such a function can be specified by using the equation-writing feature.

The second area needing user input is in the computation of the nutrition-based caloric requirement consumption target. The target is defined as:

CRNCFA*365*POP*CRSGFA/100/CRCEFA/1000,

where CRNCFA is the per capita daily caloric requirement, POP is the population (in thousands), CRSGFA is the share of grains in the diet, and CRCEFA is a conversion coefficient measuring the average calories contained in 1 kilogram of aggregate cereals. Therefore, in order to calculate the caloric requirement target, CRNCFA, CRSGFA, and CRCEFA must be entered at the bottom of the block for the base and forecast years (see table 13). The values of these variables for selected developing countries are contained in appendix C.

An additional technical note should also be mentioned. The food aid need computations are made with *IF functions*. Therefore, if the projected import capacity exceeds the import requirement, the food aid need will be reported as zero rather than the negative number implied by the subtraction.

Cotton

The basic structure of the cotton block assumes that (1) area has been forecast in the cropland block, (2) production equals area times yield, and (3) imports are the market-clearing residual. All base values in this block are either computed or derived from the history spreadsheet (see table 14). If the default specification is appropriate, projection functions must be defined for yield, exports, consumption demand, and ending stocks, leaving imports as the residual.

Sugar

The sugar block is structured like the blocks for grains and cotton (table 15). Base values are automatically obtained for most of the variables. However, as in the rice block, the user must supply base values for sugar beet area, both beet and cane yields, and government beginning and ending stocks, if this detail is desired. Projection functions for yield(s), exports, consumption, total ending stocks, and government ending stocks also need to be supplied. The default market-balancing residual is imports.

Oilseeds and Products

The oilseed and product blocks are similar to those for grains, cotton, and sugar (see tables 16, 17, and 18). As in those blocks, imports are assumed to be the market-balancing residual. In the oilseed and meal blocks, all base values are derived from the history spreadsheet or else computed by preprogrammed formulas. In the oil blocks, a base value for government beginning and ending stocks must be entered manually if those are being projected. Forecasting functions need to be defined for yields, exports, demands, and ending stocks. Note that production of meal or oil is usually the product of oilseed crush and yield. The exceptions to this rule are fish meal, palm oil, other tropical oils, and total tropical oils, where production is forecast directly.

Table 13--Contents of the food aid needs analysis (FOODAID) block

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
FOOD AID NEEDS ANALYSIS	UNITS	Range Name	Historical	Base year	Forecast years
CEREALS SUPPLY					
Beginning Stocks	1000 Tons	CRBSFATO	...	CRBSWHTO(-1)+CRBSRITO(-1) +CRBSCOTO(-1)+CRBSSRTO(-1) +CRBSBATO(-1)+CRBSOCTO(-1)	CRESFATO(-1)
Ending Stocks	1000 Tons	CRESFATO	...	...	CRESWHTO+CRESRITO+CRESCOTO+CRESSRTO +CRESBATO+CRESOCTO
Production	1000 Tons	CRPRFATO	...	...	CRPRWHTO+CRPRRITO+CRPRCOTO+CRPRSRTO +CRPRBATO+CRPROCTO
Commercial Imports	1000 Tons	CRIMFACM	...	...	CRIMWHCM+CRIMRICM+CRIMCOCM+CRIMSRCM +CRIMBACM+CRIMOCCM
NON-FOOD CEREALS USE: 10 YR AVG BASE					
Exports	1000 Tons	CREXFATO10	...	...	CRPCFAEX10*POP/1000
Feed	1000 Tons	CRDMFAFE10	...	...	CRPCFAFE10*POP/1000
Other Non-food	1000 Tons	CRDMFAOT10	...	...	CRPCFAOT10*POP/1000
Total	1000 Tons	CRDMFANF10	...	...	CREXFATO10+CRDMFAFE10+CRDMFAOT10
NON-FOOD CEREALS USE: 3 YR AVG BASE					
Exports	1000 Tons	CREXFATO03	...	...	CRPCFAEX03*POP/1000
Feed	1000 Tons	CRDMFAFE03	...	...	CRPCFAFE03*POP/1000
Other Non-food	1000 Tons	CRDMFAOT03	...	...	CRPCFAOT03*POP/1000
Total	1000 Tons	CRDMFANF03	...	...	CREXFATO03+CRDMFAFE03+CRDMFAOT03
NON-FOOD CEREALS USE: MARKET DEMAND					
Exports	1000 Tons	CREXFATOMD	...	...	CREXWHTO+CREXRITO+CREXCOTO+CREXSRTO +CREXBATO+CREXOCT
Feed	1000 Tons	CRDMFAFEMD	...	...	CRDMWHFE+CRDMRIFE+CRDMCOFE+CRDMSRFE +CRDMBAFE+CRDMOCFE
Other Non-food	1000 Tons	CRDMFAOTMD	...	...	CRDMWHOT+CRDMRIOT+CRDMCOOT+CRDMSROT +CRDMBAOT+CRDMOCOT
Total	1000 Tons	CRDMFANFMD	...	...	CREXFATOMD+CRDMFAFEMD+CRDMFAOTMD
FOOD AID NEED: STATUS QUO//10 YR					
Food Consumption Target	1000 Tons	CRTAFASQ10	...	...	CRPCFAFD10*POP/1000
Net avail from dom source	1000 Tons	CRDAFASQ10	...	...	CBSFATO-CRESFATO+CRPRFATO-CRDMFANF10
Import requirement	1000 Tons	CRMRFASQ10	...	...	CRTAFASQ10-CRDAFASQ10
Import capacity	1000 Tons	CRMCFASQ10	...	...	CRIMFACM
Status quo aid need	1000 Tons	CRFNFASQ10	...	...	IF(CRMCFASQ10-CRMRFASQ10>=0,0, CRMRFASQ10-CRMCFASQ10)

Continued--

Table 13--Contents of the food aid needs analysis (FOODAID) block--Continued

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
FOOD AID NEEDS ANALYSIS	UNITS	Range Name	Historical	Base year	Forecast years
FOOD AID NEED: CALORIC REQ//10 YR					
Food Consumption Target	1000 Tons	CRTAFANR10	...	...	CRNCFA*365*POP*CRSGFA/100/CRCEFA/1000
Net Domestic Availability	1000 Tons	CRDAFANR10	...	...	CRDAFASQ10
Import requirement	1000 Tons	CRMRFANR10	...	...	CRTAFANR10-CRDAFANR10
Import capacity	1000 Tons	CRMCFANR10	...	...	CRIMFACM
Caloric req need	1000 Tons	CRFNFANR10	...	...	IF(CRMCFANR10-CRMRFANR10>=0,0,
FOOD AID NEED: STATUS QUO//3 YR					
Food Consumption Target	1000 Tons	CRTAFASQ03	...	...	CRPCFAFD03*POP/1000
Net avail from dom source	1000 Tons	CRDAFASQ03	...	...	CRBSFATO-CRESFATO+CRPRFATO-CRDMFANF03
Import requirement	1000 Tons	CRMRFASQ03	...	...	CRTAFASQ03-CRDAFASQ03
Import capacity	1000 Tons	CRMCFASQ03	...	...	CRIMFACM
Status quo aid need	1000 Tons	CRFNFASQ03	...	...	IF(CRMCFASQ03-CRMRFASQ03>=0,0, CRMRFASQ03-CRMCFASQ03)
FOOD AID NEED: CALORIC REQ//3 YR					
Food Consumption Target	1000 Tons	CRTAFANR03	...	...	CRTAFANR10
Net Domestic Availability	1000 Tons	CRDAFANR03	...	...	CRDAFASQ03
Import requirement	1000 Tons	CRMRFANR03	...	...	CRTAFANR03-CRDAFANR03
Import capacity	1000 Tons	CRMCFANR03	...	...	CRIMFACM
Caloric req need	1000 Tons	CRFNFANR03	...	...	IF(CRMCFANR03-CRMRFANR03>=0,0, CRMRFANR03-CRMCFANR03)
FOOD AID NEED: MARKET DEMAND					
Food Consumption Target	1000 Tons	CRTAFAMD	...	...	CRDMWHFD+CRDMRIFD+CRDMCOFD+CRDMSRFD +CRDMBAFD+CRDMOCFD
Net Domestic Availability	1000 Tons	CRDAFAMD	...	...	CRBSFATO-CRESFATO+CRPRFATO-CRDMFANFMD
Import requirement	1000 Tons	CRMRFAMD	...	...	CRTAFAMD-CRDAFAMD
Import capacity	1000 Tons	CRMCFAMD	...	...	CRIMFACM
Market demand need	1000 Tons	CRFNFAMD	...	...	IF(CRMCFAMD-CRMRFAMD>=0,0,CRMRFAMD -CRMCFAMD)
SUPPORTING DATA: STATUS QUO					
Per Cap Export	Kg/person	CRPCFAEX10	...	...	CREXFA10/$POP10*1000
Per Cap Feed	Kg/person	CRPCFAFE10	...	...	CRFEFA10/$POP10*1000
Per Cap Other Non-food	Kg/person	CRPCFAOT10	...	...	CROTFA10/$POP10*1000
Per Cap Food	Kg/person	CRPCFAFD10	...	...	CRFDFA10/$POP10*1000

Continued--

Table 13--Contents of the food aid needs analysis (FOODAID) block--Continued

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
FOOD AID NEEDS ANALYSIS	UNITS	Range Name	Historical	Base year	Forecast years
Per Cap Export	Kg/person	CRPCFAEX03	...	...	CREXFA03/$POP03*1000
Per Cap Feed	Kg/person	CRPCFAFE03	...	...	CRFEFA03/$POP03*1000
Per Cap Other Non-food	Kg/person	CRPCFAOT03	...	...	CROTFA03/$POP03*1000
Per Cap Food	Kg/person	CRPCFAFD03	...	...	CRFDFA03/$POP03*1000
SUPPORTING DATA: CALORIC REQ					
Min. Caloric Requirement	Cal/person	CRNCFA			
Share of Grains in Diet	Percent	CRSGFA			
Cereal Conversion Rate	Cal/kg	CRCEFA			

Table 14--Contents of the cotton (COTTON) block

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
COTTON	UNITS	Range Name	Historical	Base year	Forecast years
Area Harvested	1000 Ha	CRAHCTTO		HIST!CRAHCTTOB	LUAHCTTO
Yield	Tons/Ha	CRYLCTTO		HIST!CRYLCTTOB	
Production	1000 Tons	CRPRCTTO	...	...	CRAHCTTO*CRYLCTTO
Beginning Stocks	1000 Tons	CRBSCTTO	...	Balancing residual	CRESCTTO(-1)
Imports*	1000 Tons	CRIMCTTO		HIST!CRIMCTTOB	CREXCTTO+CRDMCTTO+CRESCTTO-CRPRCTTO -CRBSCTTO
Exports	1000 Tons	CREXCTTO		HIST!CREXCTTOB	
Consumption Demand	1000 Tons	CRDMCTTO		HIST!CRDMCTTOB	
Ending Stocks	1000 Tons	CRESCTTO		HIST!CRESCTTOB	
Consistency Checks:					
End Stks/Consumption	%	CRSCCTTO	...	...	CRESCTTO/CRDMCTTO*100
Imps/Consumption Dmd	%	CRICCTTO	...	...	CRIMCTTO/CRDMCTTO*100
Exps/Production	%	CREPCTTO	...	...	CREXCTTO/CRPRCTTO*100
Per Cap Production	Kg/Person	CRPQCTTO	...	...	CRPRCTTO/POP*1000
Pct Change in Prodn	%	CR_PCTTO	...	...	(CRPRCTTO/CRPRCTTO(-1)-1)*100
Per Cap Consumption	Kg/Person	CRPCCTTO	...	...	CRDMCTTO/POP*1000
Pct Change in Cons	%	CR_CCTTO	...	...	(CRDMCTTO/CRDMCTTO(-1)-1)*100

Table 15--Contents of the sugar (SUGAR) block

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
SUGAR	UNITS	Range Name	Historical	Base year	Forecast years
Area Harvested	1000 Ha	CRAHSUTO		HIST!CRAHSUTOB	LUAHSUTO
Beets	1000 Ha	CRAHSUBE			LUAHSUBE
Cane	1000 Ha	CRAHSUCN	...	Subresidual	LUAHSUCN
Yield	Tons/Ha	CRYLSUTO		HIST!CRYLSUTOB	CRPRSUTO/CRAHSUTO
Beets	Tons/Ha	CRYLSUBE			
Cane	Tons/Ha	CRYLSUCN			
Production	1000 Tons	CRPRSUTO		HIST!CRPRSUTOB	CRAHSUBE*CRYLSUBE+CRAHSUCN*CRYLSUCN
Beginning Stocks	1000 Tons	CRBSSUTO	...	Balancing residual	CRESSUTO(-1)
Government	1000 Tons	CRBSSUGV			CRESSUGV(-1)
Private	1000 Tons	CRBSSUPV	...	Subresidual	CRESSUPV(-1)
Imports*	1000 Tons	CRIMSUTO		HIST!CRIMSUTOB	CREXSUTO+CRDMSUTO+CRESSUTO-CRPRSUTO -CRBSSUTO
Exports	1000 Tons	CREXSUTO		HIST!CREXSUTOB	
Consumption Demand	1000 Tons	CRDMSUTO		HIST!CRDMSUTOB	
Ending Stocks	1000 Tons	CRESSUTO		HIST!CRESSUTOB	
Government	1000 Tons	CRESSUGV			
Private*	1000 Tons	CRESSUPV	...	...	CRESSUTO-CRESSUGV
Consistency Checks:					
End Stks/Consumption	%	CRSCSUTO	...	...	CRESSUTO/CRDMSUTO*100
Imps/Consumption Dmd	%	CRICSUTO	...	...	CRIMSUTO/CRDMSUTO*100
Exps/Production	%	CREPSUTO	...	...	CREXSUTO/CRPRSUTO*100
Per Cap Production	Kg/Person	CRPQSUTO	...	...	CRPRSUTO/POP*1000
Pct Change in Prodn	%	CR_PSUTO	...	...	(CRPRSUTO/CRPRSUTO(-1)-1)*100
Per Cap Consumption	Kg/Person	CRPCSUTO	...	...	CRDMSUTO/POP*1000
Pct Change in Cons	%	CR_CSUTO	...	...	(CRDMSUTO/CRDMSUTO(-1)-1)*100

Table 16--Contents of the soybean (SOYBEANS) block

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
SOYBEANS	UNITS	Range Name	Historical	Base year	Forecast years
Area Harvested	1000 Ha	CRAHSBTO		HIST!CRAHSBTOB	LUAHSBTO
Yield	Tons/Ha	CRYLSBTO		HIST!CRYLSBTOB	
Production	1000 Tons	CRPRSBTO	...	...	CRAHSBTO*CRYLSBTO
Beginning Stocks	1000 Tons	CRBSSBTO	...	Balancing residual	CRESSBTO(-1)
Imports*	1000 Tons	CRIMSBTO		HIST!CRIMSBTOB	CREXSBTO+CRDMSBTO+CRESSBTO -CRPRSBTO-CRBSSBTO
Exports	1000 Tons	CREXSBTO		HIST!CREXSBTOB	
Consumption Demand	1000 Tons	CRDMSBTO		HIST!CRDMSBTOB	CRDMSBOT+CRDMSBCS
Crush Demand	1000 Tons	CRDMSBCS		HIST!CRDMSBCSB	
Other Demand	1000 Tons	CRDMSBOT	...	Subresidual	
Ending Stocks	1000 Tons	CRESSBTO		HIST!CRESSBTOB	
Consistency Checks:					
End Stks/Consumption	%	CRSCSBTO	...	...	CRESSBTO/CRDMSBTO*100
Crush/Consumption Dmd	%	CRFCSBTO	...	...	CRDMSBCS/CRDMSBTO*100
Imps/Consumption Dmd	%	CRICSBTO	...	...	CRIMSBTO/CRDMSBTO*100
Exps/Production	%	CREPSBTO	...	...	CREXSBTO/CRPRSBTO*100
Per Cap Production	Kg/Person	CRPQSBTO	...	...	CRPRSBTO/POP*1000
Pct Change in Prodn	%	CR_PSBTO	...	...	(CRPRSBTO/CRPRSBTO(-1)-1)*100
Per Cap Total Cons	Kg/Person	CRPCSBTO	...	...	CRDMSBTO/POP*1000
Per Cap Crush	Kg/Person	CRPCSBCS	...	...	CRDMSBCS/POP*1000
Per Cap Other	Kg/Person	CRPCSBOT	...	...	CRDMSBOT/POP*1000
Pct Change in Cons	%	CR_CSBTO	...	...	(CRDMSBTO/CRDMSBTO(-1)-1)*100

Table 17--Contents of the soybean meal (SOYMEAL) block

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
SOY MEAL	UNITS	Range Name	Historical	Base year	Forecast years
Yield		CRYLSMTO		HIST!CRYLSMTOB	
Production	1000 Tons	CRPRSMTO	...	...	CRYLSMTO*CRDMSBCS
Beginning Stocks	1000 Tons	CRBSSMTO	...	Balancing residual	CRESSMTO(-1)
Imports*	1000 Tons	CRIMSMTO		HIST!CRIMSMTOB	CREXSMTO+CRDMSMTO+CRESSMTO -CRPRSMTO-CRBSSMTO
Exports	1000 Tons	CREXSMTO		HIST!CREXSMTOB	
Consumption Demand	1000 Tons	CRDMSMTO		HIST!CRDMSMTOB	CRDMSMFE+CRDMSMOT
Feed Demand	1000 Tons	CRDMSMFE		HIST!CRDMSMFEB	FEDMSMTO
Other Demand	1000 Tons	CRDMSMOT	...	Subresidual	
Ending Stocks	1000 Tons	CRESSMTO		HIST!CRESSMTOB	
Consistency Checks:					
End Stks/Consumption	%	CRSCSMTO	...	...	CRESSMTO/CRDMSMTO*100
Imports/Consumption Dmd	%	CRICSMTO	...	...	CRIMSMTO/CRDMSMTO*100
Exports/Production	%	CREPSMTO	...	...	CREXSMTO/CRPRSMTO*100
Per Cap Consumption	Kg/Person	CRPCSMTO	...	...	CRDMSMTO/POP*1000
Per Cap Feed	Kg/Person	CRPCSMFE	...	...	CRDMSMFE/POP*1000
Per Cap Other	Kg/Person	CRPCSMOT	...	...	CRDMSMOT/POP*1000
Pct Change in Cons	%	CR_CSMTO	...	...	(CRDMSMTO/CRDMSMTO(-1)-1)*100
Per Cap Production	Kg/Person	CRPQSMTO	...	...	CRPRSMTO/POP*1000
Pct Change in Prodn	%	CR_PSMTO	...	...	(CRPRSMTO/CRPRSMTO(-1)-1)*100

Table 18--Contents of the soybean oil (SOYOIL) block

(A)	(B)	(C)	(D)-(H)	(I)	(J)-(T)
SOY OIL	UNITS	Range Name	Historical	Base year	Forecast years
Yield		CRYLSOTO		HIST!CRYLSOTOB	
Production	1000 Tons	CRPRSOTO	...	...	CRYLSOTO*CRDMSBCS
Beginning Stocks	1000 Tons	CRBSSOTO	...	Balancing residual	CRESSOTO(-1)
Government	1000 Tons	CRBSSOGV			CRESSOGV(-1)
Private	1000 Tons	CRBSSOPV	...	Subresidual	CRESSOPV(-1)
Imports*	1000 Tons	CRIMSOTO		HIST!CRIMSOTOB	CREXSOTO+CRDMSOTO+CRESSOTO -CRPRSOTO-CRBSSOTO
Exports	1000 Tons	CREXSOTO		HIST!CREXSOTOB	
Consumption Demand	1000 Tons	CRDMSOTO		HIST!CRDMSOTOB	CRDMSOFD+CRDMSOOT
Food Demand	1000 Tons	CRDMSOFD		HIST!CRDMSOFDB	
Other Demand	1000 Tons	CRDMSOOT	...	Subresidual	
Ending Stocks	1000 Tons	CRESSOTO		HIST!CRESSOTOB	
Government	1000 Tons	CRESSOGV			
Private*	1000 Tons	CRESSOPV	...	...	CRESSOTO-CRESSOGV
Consistency Checks:					
End Stks/Consumption	%	CRSCSOTO	...	...	CRESSOTO/CRDMSOTO*100
Imports/Consumption Dmd	%	CRICSOTO	...	...	CRIMSOTO/CRDMSOTO*100
Exports/Production	%	CREPSOTO	...	...	CREXSOTO/CRPRSOTO*100
Per Cap Total Cons	Kg/Person	CRPCSOTO	...	...	CRDMSOTO/POP*1000
Per Cap Food	Kg/Person	CRPCSOFD	...	...	CRDMSOFD/POP*1000
Per Cap Other	Kg/Person	CRPCSOOT	...	...	CRDMSOOT/POP*1000
Pct Change in Cons	%	CR_CSOTO	...	...	(CRDMSOTO/CRDMSOTO(-1)-1)*100
Per Cap Production	Kg/Person	CRPQSOTO	...	...	CRPRSOTO/POP*1000
Pct Change in Prodn	%	CR_PSOTO	...	...	(CRPRSOTO/CRPRSOTO(-1)-1)*100

STRUCTURE OF THE HISTORY SPREADSHEET

The structure of the history spreadsheet reflects two considerations. The first is the annual need to move the base year forward. This means that updated historical data need to be loaded into the history template on a regular basis (see below). Since most of the historical data are available in electronic form from the official FAS production, supply, and disappearance (PSD) database, the design of the history spreadsheet reflects the structure of that database. In addition, the visible and underlying structure of the spreadsheet facilitates interaction with the forecast spreadsheet.

As noted above, the history spreadsheet interacts with the forecast spreadsheet by providing base values. The choice of base values is a very important step in successfully using the CPPA system. In this and other projection or simulation models, base year values should be representative of a longrun equilibrium. Therefore, no exogenous shocks, such as bad weather or an oil crisis, should influence the determination of these values; they should represent a normal or average year.

One means of identifying a normal value for the base year is to compute the underlying trend in a variable. Therefore, trend values of production, demand, and trade for the base year are automatically computed in the history spreadsheet. There are two standard computations for each variable. The first computes a base year value from a linear trend based on the last 5 historical years. The second computes a base year value from a semi-log trend based on the last 15 historical years. In addition to the standard computations, the user may also choose to compute a base year value from a semi-log trend, using a user-specified or varying sample. As a byproduct of these computations, the user is also provided with the compound annual growth rate implied by the 15-year semi-log trend and the varying sample semi-log trend. Recall that the 15-year growth rate in yields is used to compute expected yields in the forecast spreadsheet.

The trend base year values provide the user with up to three alternative base values for each variable. Any of the trend base year values may be used, or the user may supply another value. Regardless, the base values for each projection variable for each projection commodity are entered manually by the user in a specific location in the spreadsheet.

Visible Structure of the History Spreadsheet

In version 1.3 of CPPA, the history spreadsheet contains 46 commodity-specific PSD blocks. Of these, two are aggregates which are not available in the forecast spreadsheet (total grains and total meats). The history spreadsheet also contains a land use block and a population/aggregate indicators block. Each block can accommodate historical data beginning in 1960 as well as projections through 2002. The columns contained in each PSD block are identical for commodities within a commodity group (such as wheat, rice, and coarse grains in the grains group) and are similar across commodity groups.

The wheat block, depicted in figure 18, will be used to describe the structure of the PSD blocks. The first seven data columns (cols. B-H) contain standard PSD data: area, yield, production, imports, exports, total consumption, and ending stocks. The next four columns contain disaggregated use data. The four use classifications available are feed, food, oilseed crush, and other use. The column labeled PRODN2 is reserved for alternative measures of production, such as the paddy equivalent of milled rice production. Column N is labeled BLANK. It is available to the user for entry and trend analysis of country-specific supplemental data.[11]

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[11] This column can be used for additional information that will assist the user in projecting production, demand, or trade. For example, wheat imports may depend on the level of government-held stocks. In that case, government stocks could be entered in this column, enabling the computation of base year trend values plus linkage to the forecast spreadsheet for that country-specific variable.

Figure 18--Structure of the wheat commodity block in the history spreadsheet

WH		WHEAT																	
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)	(S)	(T)
	YEARS	AREA	YIELD	PRODN	IMPORTS	EXPORTS	TOTCONS	ENDSTKS	FEED USE	FOOD USE	(CRUSH)	OTH USE	(PRODN2)	BLANK	NET TRD	STKS/ CONS	S-D	PC FOOD	COMM IMPS	FOOD AID
	1960		.00							0					0	.00%	0	.0	0	
	1961		.00							0					0	.00%	0	.0	0	
	1962		.00							0					0	.00%	0	.0	0	
	1963		.00							0					0	.00%	0	.0	0	
	1964		.00							0					0	.00%	0	.0	0	
	1965		.00							0					0	.00%	0	.0	0	
	1966		.00							0					0	.00%	0	.0	0	
	1967		.00							0					0	.00%	0	.0	0	
	1968		.00							0					0	.00%	0	.0	0	
	1969		.00							0					0	.00%	0	.0	0	
	1970		.00							0					0	.00%	0	.0	0	
	1971		.00							0					0	.00%	0	.0	0	
	1972		.00							0					0	.00%	0	.0	0	
	1973		.00							0					0	.00%	0	.0	0	
	1974		.00							0					0	.00%	0	.0	0	
	1975		.00							0					0	.00%	0	.0	0	
	1976		.00							0					0	.00%	0	.0	0	
	1977		.00							0					0	.00%	0	.0	0	
	1978		.00							0					0	.00%	0	.0	0	
	1979		.00							0					0	.00%	0	.0	0	
	1980		.00							0					0	.00%	0	.0	0	
	1981		.00							0					0	.00%	0	.0	0	
	1982		.00							0					0	.00%	0	.0	0	
	1983		.00							0					0	.00%	0	.0	0	
	1984		.00							0					0	.00%	0	.0	0	
	1985		.00							0					0	.00%	0	.0	0	
	1986		.00							0					0	.00%	0	.0	0	
	1987		.00							0					0	.00%	0	.0	0	
	1988		.00							0					0	.00%	0	.0	0	
	1989		.00							0					0	.00%	0	.0	0	
	1990	0	.00	0	0	0	0	0	0	0	0	0	0	0	0	.00%	0	.0	0	0
	1991	0	.00	0	0	0	0	0	0	0	0	0	0	0	0	.00%	0	.0	0	0
	1992	0	.00	0	0	0	0	0	0	0	0	0	0	0	0	.00%	0	.0	0	0
	1993	0	.00	0	0	0	0	0	0	0	0	0	0	0	0	.00%	0	.0	0	0
	1994	0	.00	0	0	0	0	0	0	0	0	0	0	0	0	.00%	0	.0	0	0
	1995	0	.00	0	0	0	0	0	0	0	0	0	0	0	0	.00%	0	.0	0	0
	1996	0	.00	0	0	0	0	0	0	0	0	0	0	0	0	.00%	0	.0	0	0
	1997	0	.00	0	0	0	0	0	0	0	0	0	0	0	0	.00%	0	.0	0	0
	1998	0	.00	0	0	0	0	0	0	0	0	0	0	0	0	.00%	0	.0	0	0
	1999	0	.00	0	0	0	0	0	0	0	0	0	0	0	0	.00%	0	.0	0	0
	2000	0	.00	0	0	0	0	0	0	0	0	0	0	0	0	.00%	0	.0	0	0
	2001	0	.00	0	0	0	0	0	0	0	0	0	0	0	0	.00%	0	.0	0	0
	2002	0	.00	0	0	0	0	0	0	0	0	0	0	0	0	.00%	0	.0	0	0
Trend base values:																				
	5 Yr			XXXXXX							XXXXXX		XXXXXX		XXXXXX		XXXXXX			
	15 Yr			XXXXXX							XXXXXX		XXXXXX		XXXXXX		XXXXXX			
	Varying			XXXXXX							XXXXXX		XXXXXX		XXXXXX		XXXXXX			
Varying Sample				XXXXXX							XXXXXX		XXXXXX		XXXXXX		XXXXXX			
Annual growth (%):																				
	15 Yr			XXXXXX							XXXXXX		XXXXXX		XXXXXX		XXXXXX			
	Varying			XXXXXX							XXXXXX		XXXXXX		XXXXXX		XXXXXX			
							Beg Stks-->		0											
BASE VALUE				0				0		0	XXXXXX		XXXXXX		0	.00%	0	.0	0	

The next four columns (O-R) contain consistency checks to assist the user in assessing the projections relative to historical patterns. The consistency checks included are:

- Net trade, defined as the sum of exports less imports (NET TRD).
- Ending stocks as a percentage of total consumption (STKS/CONS).
- Supply-demand balance check: beginning stocks plus production and imports, less exports, total consumption, and ending stocks, which by definition should equal zero (S-D).
- Per capita food or total use (PC FOOD in grain and oil blocks and PC CONS in oilseeds, meal, cotton, sugar, and meat blocks).

The last two columns contain commercial imports and food aid receipts. Commercial imports (COMM IMPS) are defined as total imports less food aid. These two columns apply only to grain blocks and only when the food aid analysis is being undertaken in the projection period; they are not available for oilseeds, meals, oils, cotton, sugar, or meats.

In figure 18, note that there are zero entries in the yield, food use, net trade, stocks/consumption, supply-demand, per capita food, and commercial imports columns. The zeros in the historical years (for example, 1960-1989 in fig. 18) are the product of formulas. The formulas in columns O-R are self-explanatory; the formulas in the yield and food use columns ensure consistency in the historical data. For example, the yield formula ensures that production equals area times yield, and the formula in the food use column ensures that total consumption equals the sum of feed, food, and other use. The incidence of the consistency formulas will vary, depending on the commodity block and the variable coverage in the forecast spreadsheet. For example, in the oilseed blocks, the OTH USE column contains a formula ensuring that total consumption of oilseeds equals the sum of crush and other use. The cells containing formulas are ***protected*** to remind the user that they should not be overwritten. The formulas will compute the residuals and consistency checks automatically once the supporting data are entered in the spreadsheet.

Note that the column headings in figure 18 for crush and production 2 (PRODN 2) are in parentheses. The parentheses indicate that those variables are not applicable to that commodity. A variable is not applicable because there is no corresponding entry for that variable in the forecast spreadsheet template. For example, wheat is not crushed, so the CRUSH column heading is in parentheses. On the other hand, oilseeds are crushed and may be used for feed, food, and other purposes. However, in the forecast spreadsheet, uses other than crush are not disaggregated, and so the column headings for FEED USE and FOOD USE in the oilseed blocks are in parentheses to remind the user that these variables are not included in the forecast template. The parentheses also indicate which use variables are omitted from the residual use calculation.

The marking of omitted variables in this manner does not preclude the projection of such variables. If more detailed use data are available for a country, they may be entered in the appropriate column. However, care must be taken to ensure that the residual use component is correctly calculated. For example, in the case of oilseeds, if feed use data are available, the formula defining other use must be changed to reflect the disaggregation of feed use. Therefore, the formula in the other use column would have to be revised to TOTCONS-FEED USE-CRUSH instead of TOTCONS-CRUSH.

Below each data block are several rows where the base year trends, growth rates, and base values are entered. The first subgroup of rows, "Trend base values," contains the base year equivalent of:

- A linear trend based on the 5 years preceding the base year (5 Yr),[12]
- A semi-logarithmic trend based on the 15 years preceding the base year (15 Yr), and
- An optional semi-logarithmic trend based on a varying, user-specified, sample period (Varying).

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[12] Land use data generally lag 1 year behind the PSD data. Therefore, the trends in the land block are based on 5 and 15 year samples that exclude the last historical year. For example, if 1990 is the base year, the 5-year land use trends are based on 1984-1988 and the 15-year trends on 1974-1988.

The row labeled "Varying Sample" is used to record the years in the varying sample regression. The compound annual growth rates associated with the 15-year semi-log trend and the varying sample semi-log trend are entered in the second subgroup of rows labeled "Annual Growth (%)."

In this part of the commodity block, note that the trend base values, varying sample, and annual growth cells in the production, crush, production 2, net trade, and supply-demand columns are filled with XXXXXX. This marking forces the trend computation routines to skip those variables because they either are products of other variables in the block or are not needed in the forecast template. For example, grain production is the product of area and yield. Computing a trend on production would be redundant, so production is omitted from the automatic trend computation. However, if area and yield data were not available but production data were, omission of trend value computations for area and yield and inclusion of that for production can be accommodated by entering XXXXXX's in the area and yield columns and deleting the XXXXXX's in the production column. The same adjustment can be made to any of the columns in any of the commodity blocks, enabling the user to ***customize*** each PSD block to enable or omit trend computations. Using the example above, if oilseed feed use has been entered, and computation of trend values is desired to assist in the choice of a base feed use value, the XXXXXX markings in the feed use column should be removed. Trend computation omissions can be made by entering the XXXXXX markings in the appropriate column. To reduce the time required to compute the automatic trends, trend computations should be omitted in this manner when base value trend indicators are not needed.

The BASE VALUE row in the commodity blocks is the row in which the user enters the base values that are read by the forecast spreadsheet and are used to initialize the projections. A base value must be entered for each variable that will be projected in the forecast spreadsheet which is not computed by a formula. For example, in figure 18, base values must be entered for area, yield, imports, exports, total consumption, feed use, and other use. If the food needs analysis is being undertaken in the forecast spreadsheet, a base value should also be entered for food aid (in the grain blocks only). If a PSD block has been customized by entering country-specific user data in the BLANK column, a base value may also be entered for that variable.

The base value cells occupied by a formula (including production, beginning stocks, ending stocks, food use, net trade, the stocks/consumption ratio, supply-demand balance, per capita food use, and commercial imports) are protected preprogrammed products of other base values. As in the case of the historical data, these preprogrammed products ensure consistency in base value choices. Therefore, a base value need not be supplied for these variables. However, note that if the residual use computation has been altered as described above, the formula in the base value row will also have to be altered.

As in the trend computation rows, there are cells in the base value row occupied by XXXXXX's. When using the standard template, base values are not needed for these variables because there is no corresponding entry in the forecast spreadsheet. However, using the example above, if oilseed feed use data have been entered and other use has been redefined to exclude feed use, the XXXXXX marking in the feed use column will need to be overwritten with a base value.

While the composition of the animal, land, and population blocks are very different from the grain blocks, the composition of the oilseeds, meals, oils, cotton, sugar, and meats commodity group blocks are very similar to that of grains (see table 19). Columns C-Q are identical, although the pattern of omission from the forecast spreadsheet and/or trend computation (such as the placement of the XXXXXX markings) varies with the commodity group. The content of column B varies. It contains area for grains, oilseeds, cotton, and sugar. In the case of meals and oils, it contains the crush of the corresponding oilseed (such as soybean crush for soymeal and soyoil). In the meat blocks, slaughter takes the place of area.

In table 19, note that the column headings and content of the animal blocks (cattle, hogs, and sheep) are very different. These blocks contain inventory flow data rather than supply-demand data. The inventory flow data start with beginning inventories, including total and up to two types of breeding animals (milk and beef cows for cattle, sows for hogs, and ewes for sheep). Inventories are supplemented by births of calves, piglets, and lambs (col. F). Births are equal to the birth rate in column E times the sum of the breeding inventories. Slaughter, which is entered in columns I-L, is broken down into total, breeding stock, young (that is, calf or lamb), and

other livestock. Ending inventories in column N are computed as total beginning inventory plus births and imports, less the sum of exports, total slaughter, and death loss.

The consistency checks in the animal blocks are slightly different from those in the other blocks. Instead of the stocks-to-consumption ratio, the ratio of slaughter to ending inventories is computed in column P. The last column in the animal blocks replaces the per capita demand indicator with the hectares of permanent and temporary pasture land per animal in the beginning inventory. This computation is made to assist the user in assessing the historical and projected linkage between land and animal product production.

The column content of the land use block, by definition, is also very different from the other blocks (see table 19). The content of this block is defined by the availability of data in the FAO land use database. In that database, total land (col. B) is composed of agricultural area, forestry and woodlands, and other land, including urban areas (cols. C-E). Agricultural land is composed of arable agricultural land, land under permanent crops such as coffee and tea, and permanent pasture (cols. G-I). Arable agricultural land is further broken down into cropped arable, temporary pasture, and fallow and other land (cols. J-L). The amount of irrigated agricultural land is entered in column F. Column M is reserved for the ***crop intensity index***. The crop intensity index is not available in the FAO database and therefore must be entered by the user. Column N is available for country-specific land use data. Note that total agricultural area, arable agricultural land, and cropped arable land are residuals to ensure consistency.

The consistency checks in this block are unique. The first is the percentage of irrigated area in total agricultural area. The second is the share of arable agricultural land in total agricultural land. The third is the percentage of cropped arable land to total agricultural land. The last consistency check is the share of pasture land, both permanent and temporary, in total agricultural land.

The last block in the history spreadsheet is the population and aggregate indicators block. It is informational only and can be expanded to include country-specific aggregate indicators. Because population is exogenous in the CPPA system, there is no need to choose base values and project population in the same manner as is done for PSD and land variables. Therefore, there are no trend computations made for this block nor are base values needed.

The block currently contains four columns labeled POP, CROP AREA HARV, OTH USE ARABLE, and PP HA/ANIMAL. The first contains historical and projected population. The second column sums the historical and projected area under forecast crops: grains, oilseeds, and cotton. In the third column, the residual cropped arable area is computed; it is equal to total cropped arable land less the area under the forecast crops. The last column measures the hectares of permanent pasture available per grazing animal. The grazing animal population is defined as the simple sum of cattle and sheep beginning inventories; the populations are not weighted into consuming units.

Below the population block are control codes and programming that direct the automated routines available in the history spreadsheet. The macros and codes in this area should not be altered except under specific circumstances, and then only by a user with a full understanding of the programming. In future versions of the CPPA system, the programming and codes will be moved to the program spreadsheet.

Underlying Technical Structure of the History Spreadsheet

Underlying each commodity block described above are ***range names*** that allow a user to go quickly to a single block, print a single block, or load all or part of a commodity block into another spreadsheet. To facilitate these actions, there are four major ranges within each commodity block. The first range, denoted by the commodity code entered above each PSD block (such as WH for wheat in fig. 18), encompasses the entire block, beginning with the code in the upper left corner and ending two rows below the base valuefor food aid. In the lower left corner of this range is a page advance code that is visually seen as : : on the screen. This code is used in one of the programmed routines in the history spreadsheet and must be present in the two-character code range.

Table 19--Content of the commodity blocks by major commodity groups

	(B) Area	(C) Yield	(D) Pro-duc-tion	(E) Im-ports	(F) Ex-ports	(G) Total con-sump-tion	(H) Ending stocks	(I) Feed use	(J) Food use	(K) Crush	(L) Other use	(M) Pro-duc-tion 2	(N) Blank	(O) Net trade	(P) Stocks/ cons-sumption	(Q) Supply less demand	(R) Per capita total demand
Grains		F							F	N/A		N/A		F	F	F	F[2]
Oilseeds		F						N/A	N/A		F	N/A		F	F	F	F
Cotton		F						N/A	N/A	N/A	N/A	N/A		F	F	F	F
Sugar	N/A[1]	N/A[1]						N/A	N/A	N/A	N/A	N/A		F	F	F	F

	(B) Crush	(C) Yield	(D) Pro-duction	(E) Im-ports	(F) Ex-ports	(G) Total con-sump-tion	(H) Ending stocks	(I) Feed use	(J) Food use	(K) Crush	(L) Other use	(M) Pro-duc-tion 2	(N) Blank	(O) Net trade	(P) Stocks/ cons-sumption	(Q) Supply less demand	(R) Per capita total demand
Meals	F[3]	F							N/A	N/A	F	N/A		F	F	F	F
Oils	F[3]	F						N/A		N/A	F	N/A		F	F	F	F[2]

	(B) Slaughter	(C) Yield	(D) Pro-duc-tion	(E) Im-ports	(F) Ex-ports	(G) Total con-sump-tion	(H) Ending stocks	(I) Feed use	(J) Food use	(K) Crush	(L) Other use	(M) Pro-duc-tion 2	(N) Blank	(O) Net trade	(P) Stocks/ cons-sumption	(Q) Supply less demand	(R) Per capita total demand
Meats	F[4]	F						N/A	N/A	N/A	N/A	N/A		F	F	F	F

	(B) Total begin. stocks	(C) Breeding 1 animals begin. stocks	(D) Breeding 2 animals begin. stocks	(E) Birth rate	(F) Pro-duction of young	(G) Im-Imports	(H) Ex-Exports	(I) Total slaugh-ter	(J) Breeding slaugh-ter	(K) Young slaugh-ter	(L) Other slaugh-ter	(M) Death loss	(N) Ending inven-tory	(O) Net trade	(P) Slaughter/ ending inven-tory	(Q) Supply less demand	(R) Hectares per animal
Cattle				F					F				F	F	F	F	F
Hogs			N/A	F					F	N/A			F	F	F	F	N/A
Sheep			N/A	F					F				F	F	F	F	F

See notes at the end of the table

Continued--

Table 19--Content of the commodity blocks by major commodity groups--continued

Table 19--Content of the commodity blocks by major commodity groups--continued

	(B) Land area	(C) Agri-cul-tural area	(D) Forestry woodlnds	(E) Other land	(F) Irri-gated ag land	(G) Arable agri-cultural land	(H) Per-manent crops	(I) Per-manent pasture	(J) Cropped arable	(K) Tem-porary pasture	(L) Fallow and other arable	(M) Crop inten-sity index	(N) Blank	(O) Irrig/ ag	(P) Arable/ ag	(Q) Cropped arable/ ag	(R) Pasture/ ag
Land		F				F			F					F	F	F	F

	(B) Pop	(C) Crop area harvested	(D) Other uses of arable land	(E) Permanent pasture ha/ animal	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)
Population		F	F	F													

Note: F denotes formula; N/A denotes either not available in USDA PSD database or not applicable due to omission from forecast spreadsheet.

1 Not available in the USDA PSD database; production is refined equivalent.

2 Per capita food demand instead of per capita total demand.

3 Formula cross-references crush in the appropriate oilseed block.

4 Formula cross-references total slaughter in the appropriate animal inventory block.

The second range is the commodity code plus the letter A (*cc*A[13]), where the A denotes all data. The *cc*A range begins with the commodity code in the upper left corner. In the grain blocks, it extends through the entry for food aid in 2002; in the other blocks, it extends through the formula for the last consistency check (that is, either per capita food use or per capita total consumption). The third range, which separates the historical data from the projected data, is denoted by the commodity code plus the letter H (*cc*H). It begins with area in the first historical year (1960 in fig. 18). In the grain blocks, it extends through food aid in the last historical year (1989 in fig. 18). In the other blocks, the *cc*H range extends through the last historical year of the last consistency check. The last range, which contains the projected data, is denoted by the commodity code plus the letter P (*cc*P). It begins with area in the base year (1990 in fig. 18) and ends with food aid in the year 2002 for grains and with the last consistency check in the year 2002 for the other commodities. Note that the projection range initially contains zeros in every cell.

These underlying range names are used in the history sheet programming. They also provide a quick and easy means of moving around in the spreadsheet. For example, when base values are being entered, the user will need to move through the blocks to those which correspond to the forecast commodities. This can be done by pressing the F5 (GOTO) key and then entering the two-character commodity code. The commodity codes used in both the history and forecast spreadsheet are summarized for convenience in table 20. Note that some of the codes are applicable only to the history or the forecast spreadsheet.

Customizing the History Spreadsheet

In applications at ERS, CPPA users are provided with history spreadsheets that have been preloaded with historical USDA Foreign Agricultural Service (FAS) PSD data, historical U.N. FAO land use data, and historical and projected ERS population data. Since the commodities that will be projected will vary depending on the country of analysis, the history spreadsheet may require some customization.

The customization process is composed of two steps. The first is to compute country-specific "others." The PSD data are loaded for individual commodities, excluding other coarse grains, other oilseeds, other meals, and other oils. Historical data are also loaded for aggregate coarse grains, total oilseeds, total meals, and total oils. This enables the user to define country-specific others. For example, suppose that corn and other coarse grains will be projected to derive total coarse grains. By definition, other coarse grains is equal to total coarse grains less corn. Therefore, other coarse grains area, production, and the like can be computed by subtracting corn from total coarse grains. To do so, GOTO OCH (other coarse grains history data range) and manually enter the formula to compute the 1960 area as total coarse grain area in 1960 less corn area in 1960. Once this formula is entered, it can be copied to OCH, filling the entire historical range with the formula. The copied formulas may be calculated by pressing F9, the calculation key, or by holding down the ALT key, pressing K, and then entering OC. The ALT K routine recalculates all of the formulas in the OC range. The last step in this stage of the customization process is to value the formulas (that is, to convert the formulas to their numeric equivalent), but only after the block has been recalculated. To value the formulas in the OCH range, press /COCH(enter)OCH,V (be sure to press the comma after the second OCH). This process can be repeated for all "others," substituting the appropriate code for OC in the example above.

The second step in customization involves removing unneeded data from the spreadsheet. The less data in the history spreadsheet, the greater is the available memory and the faster is the load time and the computation time of the 5- and 15-year trends. Each history range (*cc*H) with full data uses about 10,000 bytes of RAM. If only 10 of the 46 commodities are being projected, 360,000 bytes of RAM can be saved by erasing the historical data in the nonprojection commodity blocks. In the example above, where corn and other coarse grains are being projected to derive total coarse grain projections, sorghum and barley data are not needed. Therefore, data in these two blocks can be erased by pressing /BSRH,C(enter) and

[13] The *cc* is a generic representation of the two-character commodity code; the population block code is POPL.

/BBAH,C(enter). This process can be repeated for other nonprojection commodity blocks, although note that for applications at ERS, total coarse grains historical data should not be erased.

Table 20--Commodity codes in the history and forecast spreadsheets

Commodity	Code	Commodity	Code
Aggregate land[1]	TL	Other tropical oils	OI
Barley	BA	Palm oil	PO
Beef and veal	BV	Pork	PK
Cattle	CA	Poultry	PL
Coarse grains	CG	Rapeseed	RA
Corn	CO	Rapeseed meal	RM
Cotton	CT	Rapeseed oil	RO
Cottonseed	NS	Rice	RI
Cottonseed meal	NM	Sheep	SH
Cottonseed oil	NO	Sorghum	SR
Cropland[1]	CL	Soybeans	SB
Eggs	EG	Soybean meal	SM
Fishmeal	HM	Soybean oil	SO
Foodgrains[2]	FG	Sugar	SU
Groundnuts	GN	Sunflowerseed	FS
Groundnut meal	GM	Sunflowerseed meal	FM
Groundnut oil	GO	Sunflowerseed oil	FO
Hogs	HG	Total grains[2]	TG
Lamb and mutton	LM	Total meals	TM
Land use[2]	LU	Total meats[2]	TA
Milk	MK	Total oils	TO
Other coarse grains	OC	Total oilseeds	TS
Other meals	OM	Tropical oils	IO
Other oils	OO	Wheat	WH
Other oilseeds	OS		

[1] Not available in the history spreadsheet.
[2] Not available in the forecast spreadsheet.

Before proceeding with this last step in customization, it is important to make sure that the erasure of data will not create problems later. For example, if other meals have been calculated in step one of the customization process as total meals less soybean meal and groundnut meal, but the other meal formulas have not been valued, erasure of the total meals data will yield negative other meal data when the spreadsheet is next calculated. Therefore, it is important to value customized formulas before erasing data from the spreadsheet. Another problem may arise if data are erased from a commodity block that provides data to another block. For example, slaughter in the cattle inventory block provides the slaughter data in the beef and veal block. If beef and veal are being projected but cattle are not, the natural inclination is to erase the cattle data. However, this will lead to zero historical production in the beef and veal block. Therefore, if the following blocks are being projected, do not erase data from the associated block:

Projection commodity	Associated block
Soybean meal	Soybeans
Groundnut meal	Groundnuts

Sunflowerseed meal	Sunflowerseed
Rapeseed meal	Rapeseed
Cottonseed meal	Cottonseed
Soybean oil	Soybeans
Groundnut oil	Groundnuts
Sunflowerseed oil	Sunflowerseed
Rapeseed oil	Rapeseed
Cottonseed oil	Cottonseed
Beef and veal	Cattle
Milk	Cattle
Pork	Hogs
Lamb and mutton	Sheep

While memory cannot be saved under these circumstances, automatic trend computation time can be reduced by following the instructions related to positioning of the XXXXXXs on the "Trend base values" lines (see p. 66).

Updating the Block Ranges

Due to the nature of the history spreadsheet, its data contents are updated annually. In addition to loading new data into the template, the underlying block ranges must be redefined to include 1 additional year in the historical data range (that is, in *cc*H) and 1 less year in the projection range (that is, in *cc*P). This is accomplished with the aid of a nonmenu accessible program in the history spreadsheet. To use the routine, the range HEND (history end year) must be reset. For example, if the history spreadsheet is being updated from a 1990 base year to a 1991 base year, the new value of HEND is 1991. In addition to changing the value of HEND, the contents of HBEG, PEND, and NOCOLS (history beginning year, projection end year, and number of columns, respectively) may also need to be changed. The current values of these ranges are 1960, 2002, and 18. If additional historical data, projection years, or columns have been added, these values may need to be revised. Once the appropriate values have been entered in these four ranges, the range-defining routine can be activated by holding down the ALT key while pressing A. The entire process will take about 1 hour. Note that this routine can only be used as long as each of the commodity blocks have the same structure (such as number of years and number of columns).

Base Value Range Names

In addition to the block ranges described above, each base value cell in columns B-L in each commodity block, plus columns S-T in the grain blocks, has an underlying range name. These range names are used in the forecast spreadsheet to read the base values entered in the history spreadsheet. The names are composed of the corresponding variable range name in the forecast spreadsheet plus the letter B. For example, using the range-naming convention described above, the range name for the wheat area base value is CRAHWHTOB, where CR denotes crop, AH denotes area harvested, WH denotes the commodity wheat, TO is the additional explanatory code denoting total, and B denotes a base value. Note that this name is distinct from the range CRAHWHTO in the forecast spreadsheet.

A range name also underlies the base value cell in the BLANK column. The name of this range does not follow the naming convention since it is not known which, if any, variable will occupy this space. The range name associated with this cell is *cc*USER where *cc* denotes the two-character commodity codes listed in table 20 (for example, WH for wheat). To access the contents of this cell in the forecast spreadsheet, the user must enter the linking formula HIST!*cc*USER in an appropriate cell in the forecast spreadsheet. This formula will enter the contents of the *cc*USER range from the HISTory spreadsheet in that cell in the forecast spreadsheet.

The history spreadsheet structure is more rigid than that of the forecast spreadsheet because it is designed to enable aggregation of historical and projected data across countries. Therefore, it is important to keep consistent the spacing of the blocks and the column ordering of the blocks. This does not prevent the addition of new rows or columns to blocks. However, the consequences of any such additions should be

carefully considered. The block ranges *cc*, *cc*A, *cc*H, and *cc*P will not be affected by the addition of columns within columns B-R, but these will need to be redefined if an addition is made outside of that range. In addition, base value cell ranges will need to be added to new columns. And, the addition of one column or one row to one block should be accompanied by the same addition to all commodity blocks (except for column additions in the population/aggregate indicators block). These factors should be kept in mind when considering a change in the structure of the history spreadsheet.

CHAPTER 2

PROGRAMMING IN THE FORECAST SPREADSHEET

To access the CPPA system, it must be loaded into SC5.[14] The system requires at least 3 million bytes of RAM. A computer with 3 million bytes of RAM is sufficient to have in memory either a full commodity forecast spreadsheet or all three CPPA spreadsheets for an "average" country. An average country contains 10-15 commodity projection blocks. For countries with more than 15 forecast commodities, it may not be possible to have both the forecast and history spreadsheets in memory at the same time, and therefore the transfer utility may not be usable. In some cases, a small increment in available memory may be sufficient to enable all three spreadsheets to be ***memory resident***. An additional 200,000-250,000 bytes of memory can be obtained by turning SC5's graphics capability off. This can be done by loading SC5 and then pressing /GONGNQ, saving this configuration with /GKY, and then exiting SC5. The next time SC5 is loaded, the graphics capability will not be available. This means that the graphics-related routines in the history spreadsheet (described in chapter 3) will not operate, but all other programming will be unaffected. Graphics capability can be restored by pressing /GONGYQ, saving the configuration with /GKY, exiting SC5, and then reloading SC5.

As noted earlier in chapter 1, the operations available to the user in the forecast spreadsheet are controlled by programming in the CPPA spreadsheet. Therefore, to access the routines available in the forecast spreadsheet, the CPPA spreadsheet is loaded into SC5. To maximize the amount of memory available to SC5, SC5 should be loaded outside of all other programming, such as WordPerfect Library and DesqView. Once CPPA is loaded, the loading of subsequent spreadsheets is controlled by user response to various questions. The sequence that is followed to load the forecast spreadsheet (assuming that SC5 and the CPPA files are on the D: drive) is:

Action	Screen Display
Exit Library, DesqView, and so forth	C:>
Select D drive	C:>d: (enter)
Select subdirectory	D:>cd\sc5\cppa (enter)
Load SC5 and CPPA	D:\SC5\CPPA>sc5 cppa (enter)

When the CPPA spreadsheet is loaded, the error message "File not found. Unsatisfied disk linkages exist." will appear and then be replaced by a welcome screen with the current programming version and date. At the bottom of the screen, a series of ***prompts*** will appear, which enable loading and linking of the forecast and history spreadsheets. The prompts are an instruction statement or question. Below the prompt and answer line is a message line. The message tells the user what the ***default*** response is; that is, what will be used if the Enter key is pressed. The first prompt and message is:

```
ENTER DEFAULT DRIVE AS DRIVE:\DIR\SUBDIR (RETURN IF OK)
 1>_
EDIT  DEFAULT DRIVE=D:\SC5\CPPA
```

The default drive is the drive that was used the last time CPPA was accessed. In the templates, the default drive is assumed to be D:\SC5\CPPA. If the CPPA system has been installed on the default drive, simply press the Enter key to continue. If the spreadsheets have been stored on another drive, the drive, directory, and, if applicable, subdirectory must be entered at this point. The entry in response to this prompt will be the default the next time CPPA is accessed. Therefore, a typed response to this prompt should be necessary only once.

---

[14] See Appendix A for instructions on installing SC5, the CPPA templates, and supporting files.

The second prompt:

```
SPECIFY FORECAST SPREADSHEET NAME (ENTER IF OK)
 1>_
EDIT  DEFAULT FORECAST SHEET=C90Fxxxn
```

requests the name of the forecast spreadsheet. The default is the name of the last forecast spreadsheet used. If the default is correct, press the Enter key. If the default is incorrect, enter the name of the desired forecast spreadsheet. Note that the default may be incorrect if more than one CPPA model is being accessed on the same machine. For example, if both a Mexico and an India CPPA model are being used, the default will alternate between C90FMEXn and C90FINDn, depending on which was last accessed.

When the forecast spreadsheet name is entered, SC5 will load the forecast spreadsheet. Depending on the size of the model, it will take from 2 to 10 minutes to load. Once the forecast spreadsheet is loaded, the third prompt will appear at the bottom of the welcome screen:

```
WHAT HISTORY SPREADSHEET LINK DO YOU WANT (ENTER IF OK)
 1>_
EDIT  DEFAULT HISTORY SHEET =C90Hxxxn
```

The history spreadsheet template is stored as C90Hxxxn. If no history spreadsheet has been generated for the country being analyzed, simply press the Enter key at this point. If a country-specific history sheet is available, enter the name of that spreadsheet. The final load prompt is:

```
DO YOU WANT THE HISTORY SHEET RESIDENT (Y/N)?
Width: 12  Memory:  332  Last Col/Row:R1163
 1>_
READY  IF MEMORY < 1100, ANSWER N
```

The answer to this question determines whether the history spreadsheet will be loaded. If the available memory (shown on the line below the prompt) is less than 1,100, there is insufficient memory to load the history spreadsheet. In that case, the answer to this question will be N. If there is sufficient memory (more than 1,100), then the history spreadsheet may be loaded. However, in general, it is neither necessary nor desirable to have the history spreadsheet ***memory resident***. There are two exceptions to this rule. The first is when fine-tuning forecasts. At that stage of model development, it may be useful to have the history spreadsheet resident so that base values can be readily adjusted.[15] The second exception occurs when the forecasts are ready to be transferred to the history spreadsheet. At that time, the history spreadsheet must be resident. In these two cases, with memory permitting, the answer to this prompt will be Y.

When the prompt is answered, either the history spreadsheet will be loaded or the forecast and program spreadsheets will be linked to the history spreadsheet on disk. Once the load/link is complete, the programming will either automatically enter the ***initialization*** process or the main menu will be displayed. Initialization refers to the generation of a country-specific forecast spreadsheet; it is needed whenever the full template is loaded. The main menu will appear after the initialization process has been completed.

INITIALIZING THE FORECAST SPREADSHEET

The forecast spreadsheet template contains full commodity and price coverage. In order to speed operation of the automated routines and to reduce the time required to load the spreadsheets, each

---

[15] A user can move among the spreadsheets in memory by holding down the CTRL key and pressing the - (minus) key to go to the previous sheet or the + (plus) key to go to the next sheet. By continually pressing either CTRL + or CTRL -, you can cycle through all open spreadsheets, returning to the one you started with. Note that you must use the + and - keys on the numeric pad.

forecast spreadsheet must be initialized by selecting the commodity and price coverage for the country under analysis. Therefore, the first time the spreadsheet is loaded, the user will be prompted to:

- Enter identifying information in IDBLOCK.
- Select the commodity coverage.
- Select the price coverage.

Entering Identifying Information

The first step in initializing the spreadsheet is to enter information in the identification block (IDBLOCK; see fig. 3 on p. 7). The cursor is positioned in column C, and the user is prompted with ENTER...*xxxx*...(RETURN IF OK; -B TO BLANK), where *xxxx* is the row label. If the current entry is correct, press the Enter key. A new entry is made by typing the requested information. To delete an entry, type -B, and then press the Enter key.

The 1990 template (C90HXXXN) is preprogrammed with 1991 as the first forecast year and a projection horizon of 10 years (to 2000). These two entries define the physical limits of the spreadsheet. If a new first forecast year is entered, the year headings in the spreadsheet will be automatically relabeled when the spreadsheet is recalculated (when F9 is pressed). The number of years forecast regulates the number of columns over which equations are written and for which projections are transferred. The maximum number of years is limited to the maximum number of years in the projection range in the history spreadsheet. The current version can accommodate projections through 2002. If the number of years is greater than 11, any values beyond an 11-year projection horizon will not have a column heading. Therefore, in the current version of CPPA, it is best to not exceed 11 forecast years.

Selecting the Commodity Coverage

In the second initialization step, the user is presented with the commodity coverage list (COMMCOV; see fig. 4 on p. 8). The cursor is positioned in column D, starting on the AGGLAND row, and the prompt WILL YOU FORECAST...AGGLAND (Y/N)? appears at the bottom of the screen. If the aggregate land block is not being forecast, press N; if aggregate land use will be projected, press Y. If N is pressed, the * will be deleted from the AGGLAND row in column D of COMMCOV. If Y is pressed, the * will remain. The cursor moves down one row, and the user is presented with the prompt again until the question has been answered for each entry in column A of COMMCOV. The process differs slightly for those commodities for which extended or abbreviated models are available. If Y is pressed in response to the prompt for cattle, beef and veal, hogs, sheep, and lamb and mutton, the prompt DO YOU WANT (X) EXTENDED OR (A) ABBREVIATED MODEL (X/A)? will appear. Depending on the user's response to this prompt, either an X or an A will temporarily be entered in column D of COMMCOV.

> CAUTION: While it is tempting to anticipate the prompt in this selection routine and enter a series of Y or N, doing so will generate an error in the programming. It is essential that the prompt be displayed before any key is pressed in response to the prompt.

After proceeding through the list of commodities in COMMCOV, the user is presented with a screen that lists the commodity blocks that will be deleted from the spreadsheet. This provides an opportunity to check the commodity coverage selection. If an error has been made in selection, answering N to the prompt SATISFIED (Y/N)? will take the user back through the selection routine. If Y is entered, the commodity block deletion routine is activated. Deletion of one block takes about 5 minutes.

CAUTION: In the current version of CPPA, there is no capacity for recalling blocks that have been deleted. Therefore, make sure the list includes only those blocks you want deleted.

When all unwanted commodity blocks have been deleted, the user is prompted with DO YOU WANT TO END SESSION NOW (Y/N)? This question is necessitated by a technical constraint in the SC5 software that tends to reduce memory available for operations when rows are deleted. To counteract this problem, the spreadsheet should be saved at this point, and the user should exit SC5. SuperCalc and CPPA can then be reloaded to recover the "lost" memory and to continue the initialization process. Therefore, if more than 10 commodities have been deleted from the template and/or the RAM of the computer is less than 3 million bytes, the user must answer Y to this prompt. To reload SC5 and the forecast spreadsheet, follow the instructions above.

CAUTION: Failure to end the session at this point can result in, at best, very slow operation of the programming, and at worst, a scrambled spreadsheet.

Selecting the Price Coverage

The third step in initializing the forecast spreadsheet is selection of the price coverage. The user is once again taken to COMMCOV, and the cursor is positioned in column C, beginning with CATTLE. For each commodity, the user must answer the prompt WILL YOU FORECAST PRICE FOR...xxxxx (Y/N)? A response of Y will generate an * in that cell. When the user has responded to this prompt for all entries in COMMCOV, the list of those commodities for which price-related blocks will be deleted is shown. Again, if an error has been made in the selection process, N should be entered in response to the prompt SATISFIED (Y/N)? If Y is entered, the price blocks for the listed commodities will be deleted. Each price deletion takes about 5 minutes.

When all unwanted price-related blocks are deleted, the prompt DO YOU WANT TO END SESSION NOW (Y/N)? again appears. If more than 10 commodity price blocks have been deleted, answer Y to this prompt. Reload SC5 and the CPPA program spreadsheet as instructed above. The next time the spreadsheet is loaded, control information that allows the user to define price linkages will be generated. This process can take up to 10 minutes. The user is then presented with a menu which provides access to the automated routines.

AUTOMATED ROUTINES IN THE FORECAST SPREADSHEET

The CPPA spreadsheet contains programming that assists the user in the following operations in the forecast spreadsheet:

- Revision of entries in IDBLOCK.
- Specification of price linkages.
- Entry of new macroeconomic, price, and commodity equations.
- Revision of existing macroeconomic, price, and commodity equations.
- Deletion of macroeconomic, price, and commodity equations.
- Input of parameters in macroeconomic and commodity equations.
- Specification of the market-clearing residual for each commodity block.
- Hard copy output of each of the organizational or commodity specific blocks in the

spreadsheet.
- Saving of the forecast, program, and history spreadsheets.
- Exit from the spreadsheet files and SC5.

Operations that may be needed in the forecast spreadsheet that are not controlled by programming include:

- Calculation/recalculation of the spreadsheet.
- Entry of nonendogenous macroeconomic data.
- Entry of nonendogenous reference prices and historical domestic prices.
- Entry of nonendogenous price policy variables.
- Entry of technical coefficients used in projections and not defined by a function (for example, feed conversion coefficients).
- Entry of base values for prices forecast from a Cobb-Douglas function.
- Entry of base values for forecast variables not in the history spreadsheet.

These activities are described in more detail in the forthcoming *An Introductory Guide to Using the CPPA System.*

Selecting Automated Routines

The programming is accessed through the main menu. When an initialized forecast spreadsheet is loaded, the main menu will automatically appear. At other times, the main menu can be called by holding down the ALT key and pressing M (ALT M). If the user has exited the automated routines, ALT M must be used to recall the automated routines.

The main menu has seven options:

QUIT_MENU UPDATE IDBLOCK OUTPUT TRANSFER SAVE EXIT

where:
- QUIT_MENU exits from the programming and turns control over to the user.
- UPDATE accesses the macroeconomic, price, and commodity (quantity) equation-writing feature and the residual selection routine.
- IDBLOCK prompts the user for revisions to the content of IDBLOCK.
- OUTPUT accesses the hard copy output routines.
- TRANSFER copies the projections to the history spreadsheet.
- SAVE saves the memory resident spreadsheets.
- EXIT ends the current session by removing the user from the spreadsheets and SC5.

The menu options can be chosen either by placing the cursor on the option and pressing the Enter key or by ***keying*** the first letter in the option name.

Selecting QUIT_MENU

QUIT_MENU takes the user into ***immediate mode*** and displays a brief message. The message reminds the user how to return to the programmed options, how to calculate the spreadsheet, and how to move around the spreadsheet to perform specific actions. Any portion of the spreadsheet can be accessed by pressing the GOTO key and then entering the range name of the block to be viewed. For convenience, the block names are summarized below:

Block	Range Name
Identification data	IDBLOCK
Commodity coverage	COMMCOV
Assumptions and notes	ASSUMP

Macroeconomic data	MACRO
U.S. internal prices	PRUS(*cc*)
U.S.-reference point margins	PRMU(*cc*)
Reference prices	PRRP(*cc*)
Price policy variables	PRPV(*cc*)
User-defined variables	UDVAR
Price linkage descriptions	PRLINK*n*
Price equation definitions	PEQN*cc*
Projected prices	PRPR(*cc*)
Commodity equation definitions	CEQN*cc*
Commodity forecast blocks	*commname* or *cc*F,

where (*cc*) denotes an optional entry for a commodity-specific range[16]; *cc* denotes the two-character commodity codes (see table 20); *n* is a number where 1 contains price linkage descriptions for the first eight forecast commodities, 2 for the next eight, and so forth, up to *n*=6; and *commname* is the commodity range name listed in the first column of the commodity coverage block (see fig. 4).

Selecting UPDATE

The UPDATE routine enables the user to customize the forecast spreadsheet by writing equations and selecting market-balancing residuals. Each of these actions are accessed by selecting a single option on subsequent menus. When UPDATE is selected, the UPDATE submenu:

COMMODITY PRICE MACRO RESIDUAL QUIT

is displayed.

Selecting COMMODITY

The UPDATE/COMMODITY routine allows the user to change, add, or delete commodity function definitions and to enter parameters for previously defined functions (see fig. 19). The commodity that will be UPDATEd—that is, for which an equation will be written or altered—is chosen by highlighting the commodity name in COMMCOV with the aid of the ***commodity selection menu***:

DOWN5 UP5 NEXT PREVIOUS SELECT QUIT.

The first four options in the commodity selection menu move the cursor up and down the list of commodities in column A of COMMCOV. DOWN5 and UP5 move the cursor five rows at a time, NEXT moves the cursor down one row, and PREVIOUS moves the cursor up one row. When the name of the desired commodity is highlighted, the user keys SELECT to continue. Keying QUIT will return the user to the UPDATE submenu.

The Function Activity Menu

The SELECTion of a commodity takes the user to the equation definition block (described on p. 15) for that commodity. The cursor is placed in column B on the Function Range Name row. At the bottom of the screen, the ***function activity menu*** will be displayed:

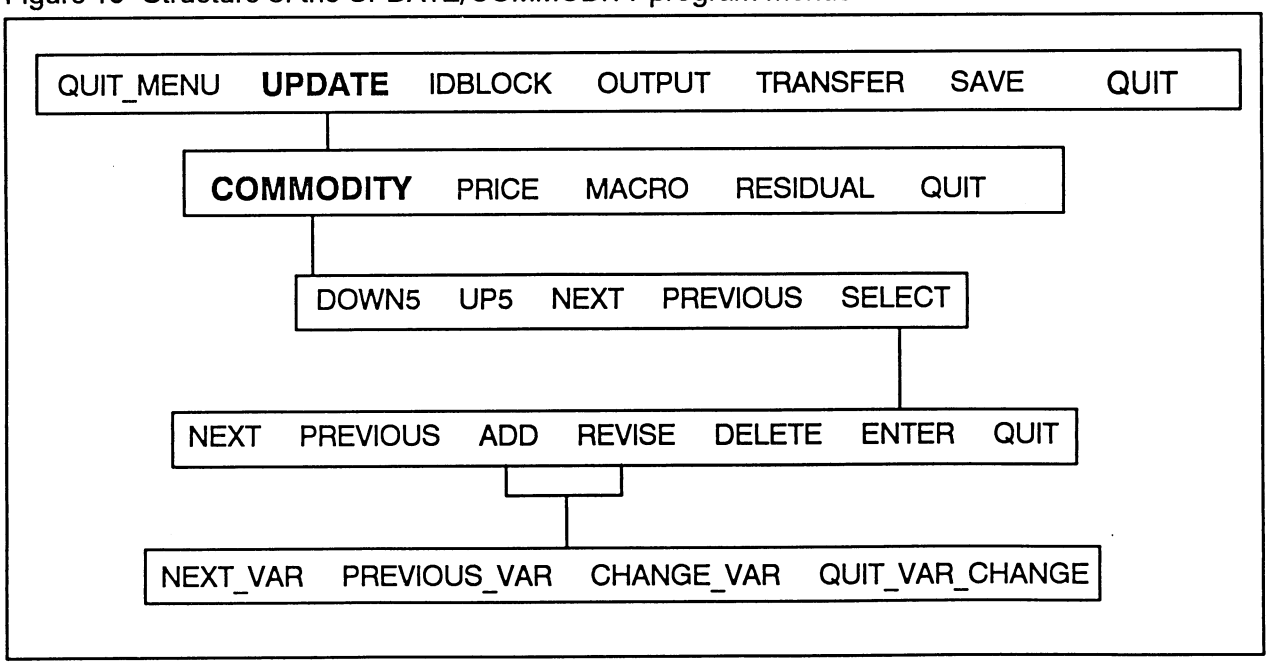
NEXT PREVIOUS ADD REVISE DELETE ENTER QUIT

[16] If *cc* is omitted, the user is taken to the beginning of the block rather than to a commodity-specific portion of the block.

with the following options:

- NEXT moves the cursor right two columns to the next function definition.
- PREVIOUS moves the cursor left two columns to the previous function definition.
- ADD allows the user to enter a new function.
- REVISE allows the user to change an existing function definition.
- DELETE erases the function definition as well as the formula written in the commodity block.
- ENTER allows the user to change parameter values in an existing function.[17]
- QUIT takes the user back to the UPDATE submenu.

Figure 19--Structure of the UPDATE/COMMODITY program menus



Selecting NEXT and PREVIOUS. The keys NEXT and PREVIOUS are used to position the cursor in the equation definition block, moving from left to right. The cursor must be placed on the name of an existing function if REVISE, DELETE, or ENTER are selected. If ADD is selected, the cursor must be placed in an empty function range name cell. If the user erroneously selects ADD when the cursor is not in an empty cell, or selects REVISE, ENTER, or DELETE when the cursor is in an empty cell, the message INVALID SELECTION--RETURN TO CONTINUE will be displayed. Pressing the Enter key will return the user to the function activity menu.

Selecting ADD. If ADD is selected, the user is prompted for the range name of the variable which will be defined by a function. Note that selection of the ADD option can be canceled at this point by entering C. If a nonexistent range name is entered, the user will be given the message RE-ENTER--INVALID RANGE NAME and be prompted to try another name. When a valid range name is entered, the programming will write the variable description in the Function Description row, enter the variable range name on the YLAG row, position the cursor in the Parameter column on the YLAG row, and prompt the user with ENTER NEW PARAMETER VALUE. Recall that the value of the YLAG parameter

[17] Note that parameter changes need not be made through the UPDATE/COMMODITY routine. Parameter changes can and should be made in ***immediate mode***.

determines whether the function is linear, autoregressive, or Cobb-Douglas. A 0 should be entered if the function will be linear; a 1 should be entered if the function will be Cobb-Douglas; an autoregressive coefficient should be entered if the function is linearly autoregressive. The cursor is then positioned in the Variable column on the X1 row. For example, when defining a Cobb-Douglas function for wheat per capita food demand, this activity results in a screen display of:

```
================================================================================================================
EQUATION DEFINITIONS                        (CEQNWH)
================================================================================================================
Function Range Name:                        CRPCWHFD
Function Description:                         Per capita food
                                            ----------------------------    ----------------------------
       WHEAT                                Variable          Parameter     Variable          Parameter
                                            ----------------------------    ----------------------------
                                    X1
                                    X2
                                    X3
                                   YLAG     CRPCWHFD            1.00000
                                    Z1
                                    Z2
                                    Z3
                                    Z4
                                    Z5
                                            Variable          Agg % Chg     Variable          Agg % Chg
                        Varying Parameter:
                                                                .00000                            .00000

NEXT_VAR   PREVIOUS_VAR   CHANGE_VAR   QUIT_VAR_CHANGE
  1>_
MENU  Goto next variable                                                    Main Menu
```

with the ***function definition menu*** displayed at the bottom of the screen. The first two options in the function definition menu control movement of the cursor in the Variable column. If a linear function is being defined, NEXT_VAR is selected until the cursor is positioned in an X_i cell. If an autoregressive function is being defined, NEXT_VAR should be keyed to position the cursor on the YLAG row. If a Cobb-Douglas function is being defined, the cursor must be moved to a Z_i cell. NEXT_VAR is also keyed to position the cursor on the Varying Parameter row (see below).

Selecting CHANGE_VAR allows the user to enter or change an explanatory variable's range name in the Variable column. If the cell is occupied, the current range name is deleted, and then the user is prompted for the new range name. If the user enters a range name that is not defined, the user is given the option of adding a user-defined variable to the spreadsheet (see below). If the range name is predefined, the cursor is automatically positioned in the Parameter column and the user is prompted for the parameter.

The variable on the YLAG row is restricted to the dependent variable. If CHANGE_VAR is selected when the cursor is on the YLAG row, the cursor is automatically moved to the parameter column, and the user is prompted for the parameter value. If the new value of the parameter is 0 (that is, the YLAG variable is not needed because the user is specifying a linear function), the dependent variable range name will be automatically deleted from the YLAG variable cell.

The above procedure is performed until the function is fully specified. Writing of the newly specified equation will occur when QUIT_VAR_CHANGE is keyed. An inventory of the function contents is made, and if there is more than one explanatory variable, the user will be asked if the ***contributions*** of the individual explanatory variables should be written. Answering Y to this prompt will enable the user to analyze the contributions of each of the explanatory variables to the total change in the dependent variable. The equation is written in the commodity projection block, and then the ***function activity menu*** is redisplayed at the bottom of the screen.

A varying parameter is specified by positioning the cursor on the Varying Parameter row with the aid of NEXT_VAR. To activate this feature of the equation writer, the user must supply the name of the variable for which the parameter will vary and the aggregate percent change in the parameter over the

entire forecast period. The name of the varying parameter variable must be present in one of the X_i, YLAG, or Z_i rows. For example, a 10-percent decline in the income elasticity of demand for wheat can be specified as:

```
================================================================================================================
EQUATION DEFINITIONS                        (CEQNWH)
================================================================================================================
Function Range Name:                        CRPCWHFD
Function Description:                         Per capita food
                                            ------------------------------    ------------------------------
       WHEAT                                Variable            Parameter     Variable            Parameter
                                            ------------------------------    ------------------------------
                                     X1
                                     X2
                                     X3
                                   YLAG     CRPCWHFD              1.00000
                                     Z1     PCDGDP                 .50000
                                     Z2
                                     Z3
                                     Z4
                                     Z5
                                            Variable            Agg % Chg     Variable            Agg % Chg
                        Varying Parameter:  PCDGDP              -10.00000
                                                                   .00000                                .00000
NEXT_VAR   PREVIOUS_VAR   CHANGE_VAR   QUIT_VAR_CHANGE
  1>
MENU  Goto next variable                                                      Main Menu
```

Note that when the spreadsheet is next calculated, the compound annual rate of change will be computed immediately below the aggregate change.

If a range name that is not currently defined in the spreadsheet is entered as an explanatory variable, the user is implicitly invoking a routine that adds user-defined variables to the spreadsheet. This routine begins with the prompt:

```
DO YOU WANT TO (1) RE-ENTER; (2) DEFINE RANGE
  1>_
EDIT  INVALID RANGE NAME
```

Pressing 1 allows reentry of a misspelled range name. Pressing 2 sends the user to the user-defined variables block of the spreadsheet (see p. 30 for a description of this block). Subsequent prompts ask for a short description of the new variable, the units of measure, and whether the user wants to enter the values of the variables now. If N is keyed to the entry question, the user is returned to the commodity equation definition block and prompted for the parameter value for the user-defined variable. If Y is keyed in response to the last prompt, the user will be asked to enter the value of the new variable for each of the projection years before returning to be prompted for the parameter value.

> CAUTION: To avoid generating an error in the programming, do not get ahead of the prompts in this input routine. Wait until the prompt is displayed before entering the next value.

Selecting REVISE. The REVISE option on the function activity menu invokes the function definition menu and the equation-writing routine for an existing function. This routine should be used only when the variable content of a function has to be changed. It should not be used to change parameter values. The procedure is the same as that used in ADD except that specification of the dependent variable is not needed. Both the varying parameter and user-defined variable options are available as well.

Selecting DELETE. The DELETE routine removes an existing function definition. The user is prompted with ARE YOU SURE YOU WANT TO DELETE THIS FUNCTION (Y/N)? If Y is entered, the

equation is removed from both the function definition block and the projection block, and then the user is returned to the equation activity menu. If N is entered in response to the prompt, the user is returned to the equation activity menu.

Selecting ENTER. The ENTER routine is designed to assist analysts in entering parameter values for a previously defined function. The cursor moves down the parameter column, prompting the user for a value for each explanatory variable. When parameters have been supplied for all entries in the variable column, the user is returned to the equation activity menu. Note that parameter values can be changed at any time in immediate mode, and it is not necessary to use the ENTER routine to do so.

Selecting QUIT. Selecting QUIT returns the user to the UPDATE submenu, which permits reselection of the COMMODITY option or selection of the PRICE and RESIDUAL update options.

Selecting PRICE

The PRICE routine on the UPDATE submenu allows the user to enter or revise price linkages. This is accomplished through the series of menus outlined in figure 20. The first step in the process is to identify which commodity's price linkages will be defined. This is accomplished with the commodity selection menu in conjunction with the commodity list in COMMCOV, and carried out in the same manner as in the UPDATE/COMMODITY routine. When the commodity has been selected, the user is taken to the price linkage screen, which outlines the options available and/or currently selected for the commodity (see p. 11 to review the options). The first time the price linkage option is selected for a commodity, the screen display will be:

COMMODITY: commname

PRICE	#	Option 1	Option 2	Option 3
RP	1	Default	User-entry	f(...)
BP	0	RER*(RP+TC)	(RER*RP)^a	f(...)
MP	0	BP+UT	BP*(AVT/100+1)	f(...)
XP	0	BP-UT	BP*(1-AVT/100)	f(...)
CP	0	PP+MMPC	GC	f(...)
PP	0	CP-MMPC	GP	f(...)
GC	0	r_c*GC(-1)	User-entry	f(...)
GP	0	r_p*GC(-1)	User-entry	f(...)

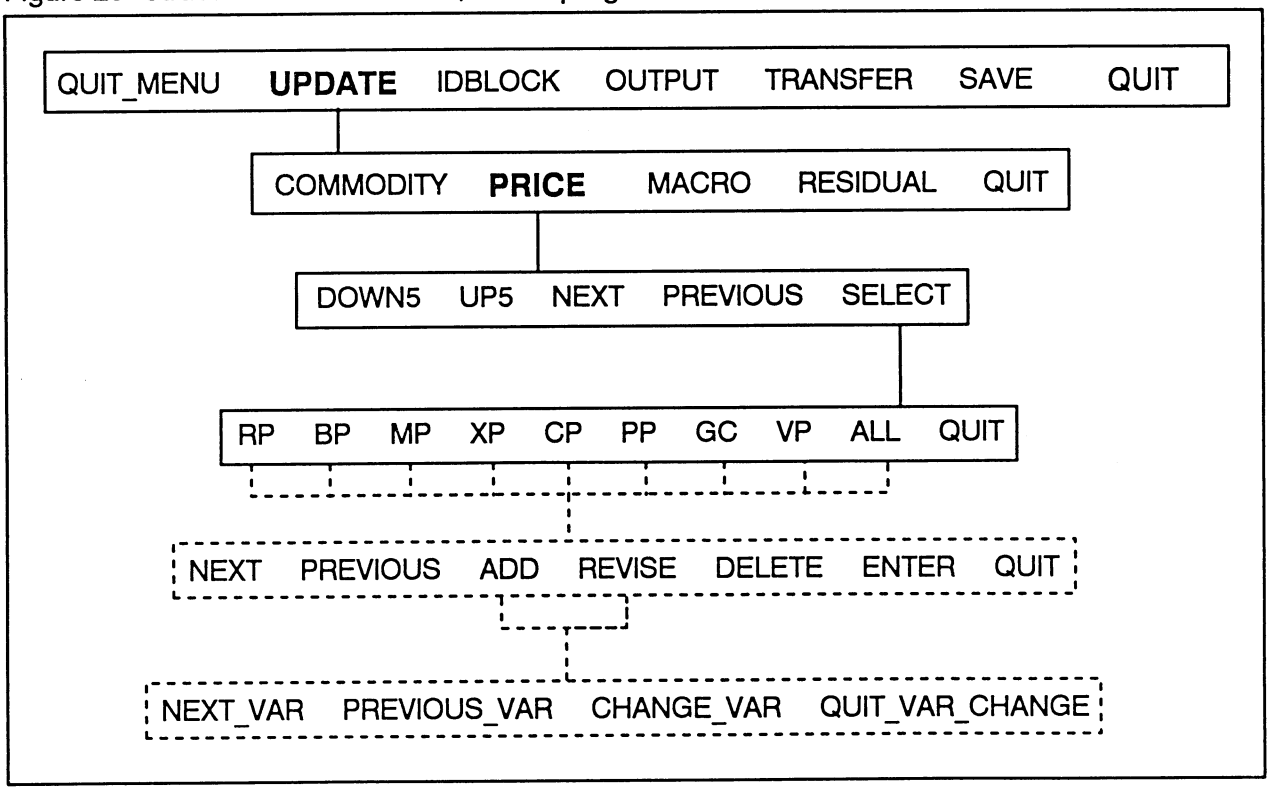
RP BP MP XP CP PP GC VP ALL QUIT
1>
MENU Reference price

where *commname* is the name of the current commodity. Note that the price linkages are initially set at the default (option 1) for reference prices and are not applicable (option 0) for the other prices. At the bottom of the screen, the PRICE submenu is displayed. This menu gives the user the option of defining either one price linkage (that is, by selecting RP, BP, MP, XP, CP, PP, GC, or VP[18]) or cycling through ALL of the prices. If an individual price is chosen, the cursor moves to the # column for that price in the option table, and the user is prompted to ***key*** an option number. If ALL is selected, the user will be

[18] The menu code for GP, the government producer price, is VP. Recall that menu options can be chosen by keying the first letter of the option. Since the code GC is used to denote the government consumer price, a substitute letter had to be chosen for the government producer price. Therefore, the GP price may be chosen by keying V.

prompted to key an option number for each of the prices, beginning with RP and ending with GP. If an option number is correct, simply rekey it; if an option is incorrect, key the new option number. When all of the price linkage option entries have been completed, keying QUIT on the PRICE submenu will return the user to the UPDATE submenu.

Figure 20--Structure of the UPDATE/PRICE program menus



If a preprogrammed option is chosen (such as option 1 for all prices and option 2 for BP, MP, XP, CP, and PP), the linkage will automatically be written without further input from the user. If option 2 is chosen for RP, GC, or GP, the user is taken to that row in the spreadsheet, the cursor is positioned in the base year column, and the user is asked whether the data will be entered now. If the answer to the question is Y, the user will be prompted for a value for the base year and for each forecast year and then will be returned to the price linkage options table.

> CAUTION: Do not get ahead of the prompts in this routine; doing so will generate an immediate error in the programming and may result in an error the next time the PRICE routine is called. Therefore, it is important to wait until each prompt is fully displayed before responding.

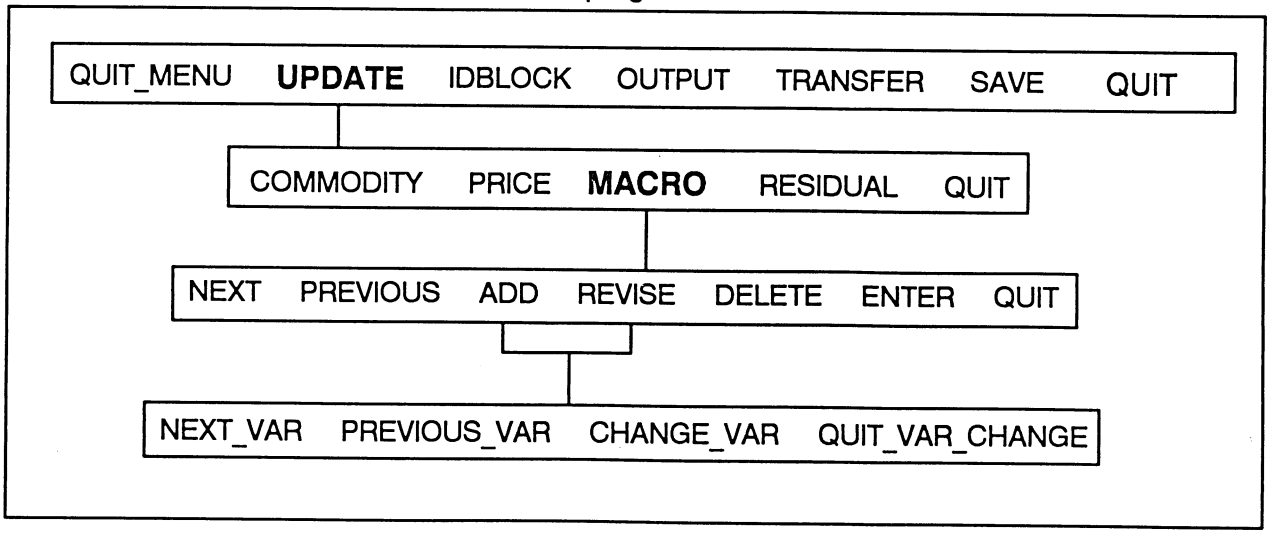
If option 3 is chosen, the user will be taken through the function definition routine. The function definition routine transfers the user to the price equation definition block (see p. 15 for a description of these blocks). Similar to the action generated when ADD is chosen on the UPDATE/COMMODITY function activity menu, the name of the price variable is automatically entered on the Function Range

Name row, its description is also entered, and the name of the price variable is automatically entered on the YLAG row. The user is prompted for a parameter value for the lagged dependent variable. Again, a 0 should be entered if the function will be linear; a 1 should be entered if the function will be Cobb-Douglas; an autoregressive coefficient should be entered if the function is linearly autoregressive. After entry of the parameter value, the user is presented with the function definition menu, which is used to specify the explanatory variables and parameters of the price function. Both the varying parameter and the user-defined variable entry options are available in the same manner as in the UPDATE/COMMODITY routine. The user also has the option of writing the contributions of the explanatory variables to the change in the price variable.

Selecting MACRO

Selecting MACRO on the UPDATE submenu provides the user with equation-writing capability for any variable in the macroeconomic data block. The user is taken to the macroeconomic variables equation definition block (CEQNMA). The cursor is positioned on the first equation definition range, and the ***function activity menu*** is displayed, which allows the user to choose the ADD, REVISE, DELETE, or ENTER options (see fig. 21). If ADD or REVISE is selected, the function definition menu is used to move the cursor up and down the Variable list from X1 through Varying Parameter to define the function. Once the equation is written, the user is returned to the function activity menu, where another function may be ADDed, REVISEd, DELETEd, or parameters ENTERed; QUIT also may be keyed to return to the UPDATE submenu.

Figure 21--Structure of the UPDATE/MACRO program menus



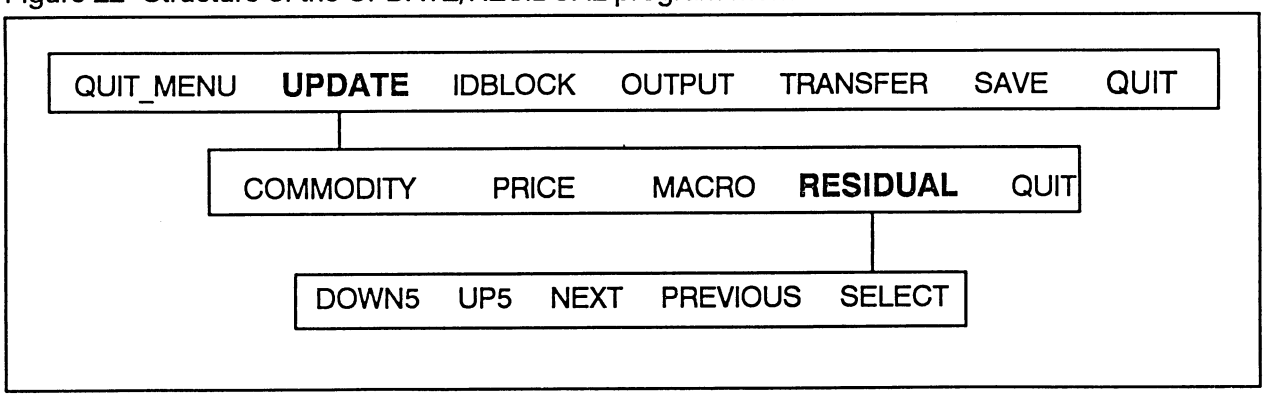
Selecting RESIDUAL

The RESIDUAL routine on the UPDATE submenu allows the user to change the market-balancing residual for one commodity. The commodity is chosen with the aid of COMMCOV and the commodity selection menu used in the UPDATE/COMMODITY and UPDATE/PRICE routines (see fig. 22). The user is advised to wait momentarily while the current residuals are inventoried and then presented with the residual screen. For example, if the residual in the wheat block is being revised, the residual screen will appear as:

```
NEW RESIDUAL
-----------------------------------------
PLUS                MINUS
-----------------------------------------
                                        1
                                        2
                                        3
                                        4
                                        5
-----------------------------------------
CURRENT RESIDUALS:
-------------------------------------------------------------------------------------------------------------
CRIMWHCM =  CREXWHTO+CRDMWHTO+CRESWHTO-CRBSWHTO-CRPRWHTO-CRIMWHFA
CRESWHPV =  CRESWHTO-CRESWHGV
-------------------------------------------------------------------------------------------------------------
```

with all residuals currently defined in the wheat block listed in terms of the range names of the variables. In this block, there are two residuals: market-balancing commercial imports (CRIMWHCM) and private ending stocks (CRESWHPV). This information is provided so that the user can see the range names of the variables that must be used to define a new residual.

Figure 22--Structure of the UPDATE/RESIDUAL program menus



The cursor is positioned in the cell adjacent to the label "NEW RESIDUAL", and the user is prompted to ENTER RANGE NAME OF NEW RESIDUAL. After entering this information, the user is taken to the first row in the PLUS column and prompted to ENTER RANGE NAME OF VARIABLE. All of the positive components of the residual are entered in this column. For example, if exports are the new residual, the first variable to be entered in the PLUS column will be CRBSWHTO, followed by CRPRWHTO and CRIMWHTO. After entering each range name, the user is prompted with ANOTHER IN THIS COLUMN (Y/N)? Answering Y moves the cursor down one cell in the PLUS column. Answering N moves the cursor to the MINUS column. The procedure is repeated in the MINUS column, with entry of the negative components of the residual (for example, CRESWHTO and CRDMWHTO). When these entries are complete, answering N to ANOTHER IN THIS COLUMN (Y/N)? will terminate the residual routine and activate the writing of the new residual.

When the new residual is written, the user is returned to COMMCOV, and a message at the bottom of the screen reminds the user that there may be two market-balancing residuals defined. This may occur because the RESIDUAL routine does not operate on the old residual. To remove the old residual formula, the user can redefine the old market-clearing residual as a function (that is, use UPDATE/COMMODITY/ADD). This action is appropriate if, for example, ending stocks were chosen as the new residual. In that case, in order to derive ending stocks, a projection of imports is needed, so the user will have to define an import function. Alternatively, the user can manually delete the old residual formula. This action is appropriate in a case where, for example, the new residual is exports and there are no imports. Either way, it is important to remove the old residual definition; otherwise, the spreadsheet

will not calculate properly because there is a ***circular*** reference. Pressing the Enter key after reading the message returns the user to the UPDATE submenu.

Selecting QUIT

Selecting QUIT on the UPDATE submenu will return the user to the main menu (see p. 78).

Selecting IDBLOCK

The IDBLOCK routine on the main menu allows the user to update the information contained in the identification block. The procedure is the same as that used when the spreadsheet is initialized (see pp. 75-76).

Selecting OUTPUT

The OUTPUT routine on the main menu prints various sections of the forecast spreadsheet. When OUTPUT is selected, the user is presented with the message:

```
To use the OUTPUT option, the following conditions must apply:

      o you have a wide carriage printer
      o you have wide paper in the printer
      o your printer is supported by SuperCalc

If these conditions do not apply, you cannot use this option
```

These restrictions are necessary because of the width of the projection blocks. The last condition is a reminder that a printer driver should have been chosen when SC5 was installed on your computer (see Appendix A for instructions). If these conditions are not met, you must answer N to the prompt DO YOU WANT TO CONTINUE (Y/N)? If the OUTPUT conditions are met, the OUTPUT submenu:

PRICES COMMODITIES OTHER QUIT

is displayed at the bottom of the screen. The user selects one of these options based on the criteria outlined below.

Selecting PRICES

The OUTPUT/PRICES routine proceeds through a series of menus that identify which price-related block is to be printed and, in some cases, which commodity-specific price-related block as well (see fig. 23). The price block to be printed is selected from the OUTPUT/PRICE submenu:

REFERENCE PROJECTIONS LINKAGES FNDEFS VARS/POLICY QUIT,

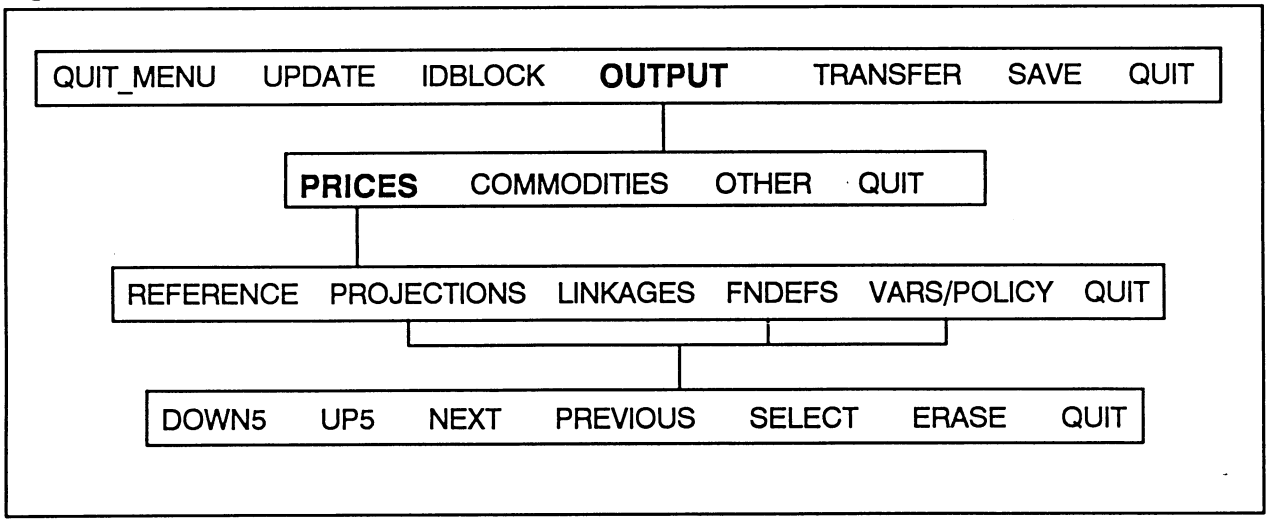
where
- REFERENCE prints all of the reference prices.
- PROJECTIONS prints either all or selected commodity price projections.
- LINKAGES prints an inventory of the user selected linkages.
- FNDEFS prints price equation definitions for all or selected commodities.
- VARS/POLICY prints the price policy variables for either all or selected commodities.
- QUIT returns the user to the OUTPUT submenu.

If REFERENCE or LINKAGES is chosen, the output is generated without further user input. If PROJECTIONS, FNDEFS, or VARS/POLICY is selected, the commodity for which output is desired must be identified. The user will be taken to COMMCOV and prompted with DO YOU WANT ALL PRICES/COMMODITIES (Y/N)? If Y is keyed, the selected data are printed for all commodities for which an * appears in the PRICE DEFINED column of COMMCOV. If N is pressed, the user is prompted with a menu that enables selection of specific commodities. The menu options are:

DOWN5 UP5 NEXT PREVIOUS SELECT ERASE QUIT.

The first four options—DOWN5, UP5, NEXT, and PREVIOUS—are used to scroll up and down column A in COMMCOV. When the cursor is positioned on the name of a commodity for which output is desired, the user should key SELECT. This marks the commodity name with a +. If a commodity has been erroneously SELECTed, the + can be removed by keying ERASE. When all of the desired commodities have been marked, the user should key QUIT to activate printing.

Figure 23--Structure of the OUTPUT/PRICES program menus



Selecting COMMODITIES

The OUTPUT/COMMODITIES routine produces output for commodity-related blocks. The routine is structured similar to that for OUTPUT/PRICES (see fig. 24). The COMMODITIES submenu is:

COVERAGE PROJECTIONS FNDEFS QUIT

where
- COVERAGE prints the commodity coverage block (COMMCOV).
- PROJECTIONS prints the commodity projection blocks for either all or selected commodities.
- FNDEFS prints the commodity function definitions for either all or selected commodities.
- QUIT returns the user to the OUTPUT submenu.

Selection of COVERAGE on the submenu requires no further user input. However, as in OUTPUT/PRICES, keying PROJECTIONS or FNDEFS will invoke the commodity selection menu used in the OUTPUT/PRICES routine described above.

Selecting OTHER

The OUTPUT/OTHER routine accesses output for nonprice and noncommodity blocks (see fig. 25). The OUTPUT/OTHER submenu is:

IDBLOCK DATA/MACRO EQNS/MACRO UDVARS ASSUMPTIONS QUIT

where
- IDBLOCK prints the identification block.
- DATA/MACRO prints the macroeconomic data block.

- EQNS/MACRO prints the macroeconomic equation definition block.
- UDVARS prints the user-defined variables block.
- ASSUMPTIONS prints the notes entered by the user in the assumptions block.
- QUIT returns the user to the previous menu.

Selection of these output options requires no further input from the user.

Figure 24--Structure of the OUTPUT/COMMODITIES program menus

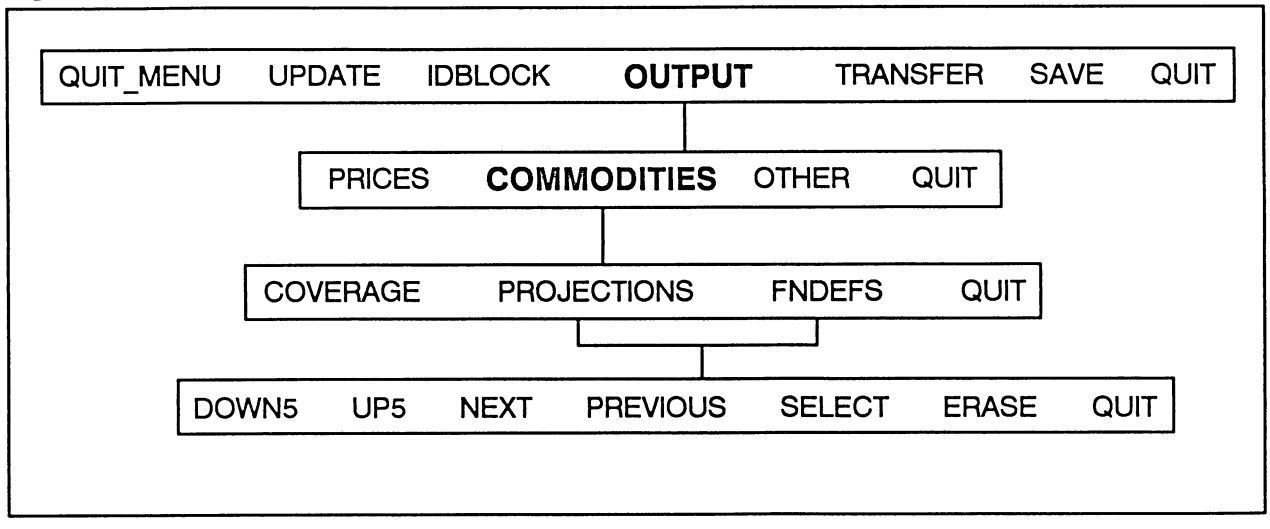
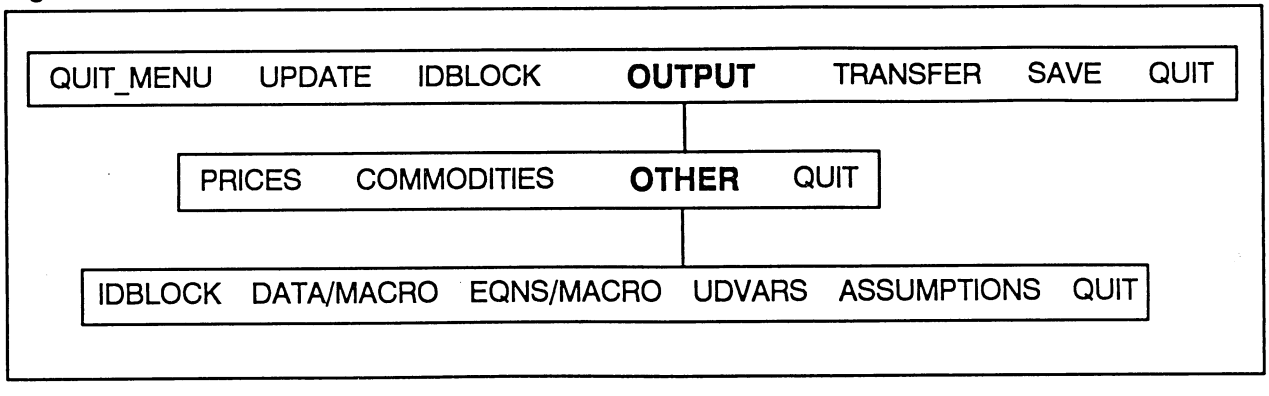


Figure 25--Structure of the OUTPUT/OTHER program menus



Selecting QUIT

When QUIT is selected on the OUTPUT submenu, the user is returned to the main menu.

Selecting TRANSFER

The TRANSFER utility available on the main menu requires that both the history and forecast spreadsheets be in memory at the time the option is executing. The programming checks to see whether the history spreadsheet is ***memory resident***. If it is not, the user is presented with a reminder that the transfer option cannot be used if the available memory is less than 1,100 (thousand bytes). Note that if there is insufficient memory in the machine, the graphics capability can be turned off to generate an additional 200,000-250,000 bytes of RAM, or the CPPA files can be taken to another machine with sufficient memory for the transfer process. If the available memory is greater than 1,100, an answer of Y

can be keyed in response to the prompt DO YOU WANT TO CONTINUE (Y/N)? When Y is entered, the history spreadsheet currently linked to the forecast spreadsheet is loaded.

The TRANSFER submenu is:

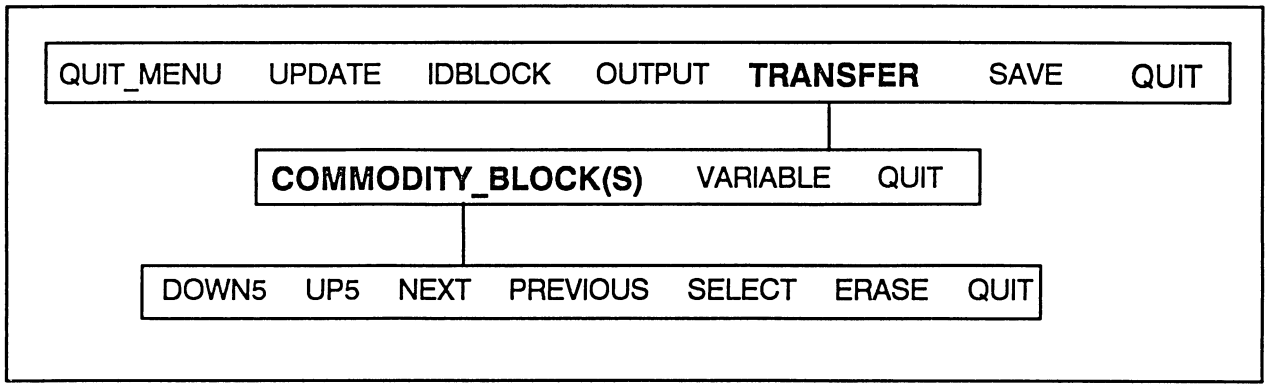
COMMODITY_BLOCK(S) VARIABLE QUIT,

where COMMODITY_BLOCK(S) transfers all the variables (such as area, yield, and so forth) for one or more commodities, and VARIABLE transfers a single variable (such as area) for one commodity. selecting COMMODITY_BLOCK(S). If COMMODITY_BLOCK(S) is selected, the user is taken to COMMCOV and prompted to select the commodity block(s) for which projections will be transferred with the commodity selection menu (see fig. 26):

DOWN5 UP5 NEXT PREVIOUS SELECT ERASE QUIT.

The first four options—DOWN5, UP5, NEXT, and PREVIOUS—control movement of the cursor in the list of commodities. The commodities to be transferred are chosen by keying SELECT when the cursor is positioned on the commodity name. The commodity will then automatically be marked with a +. If a commodity is erroneously chosen, its marker may be removed by selecting ERASE. When all transfer commodities have been marked, the user can activate the routine by selecting QUIT. It generally takes about 3 minutes to transfer all of the variables for a single commodity.

Figure 26--Structure of the TRANSFER/COMMODITY_BLOCK(S) program menus

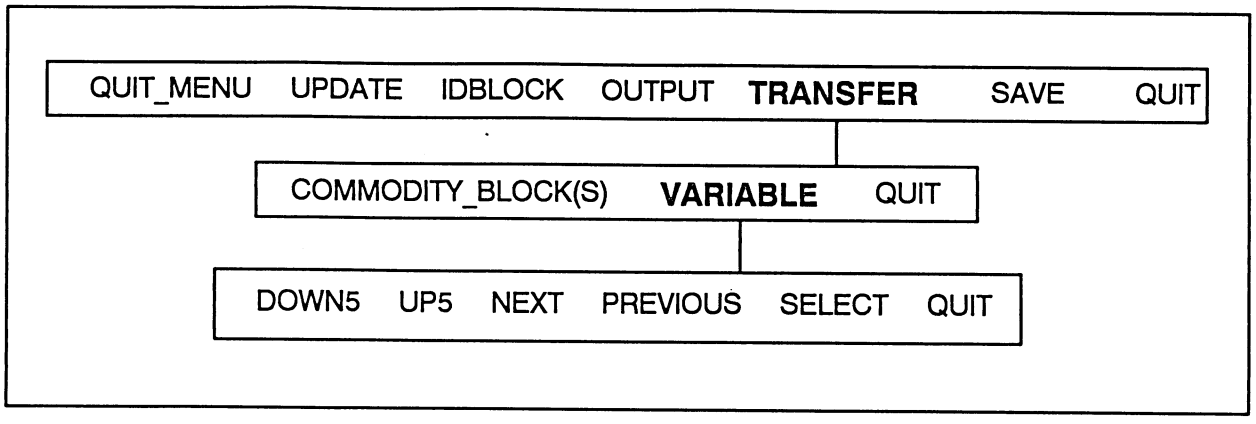


Selecting VARIABLE. If VARIABLE is chosen on the TRANSFER submenu, the user is presented with the commodity selection menu and asked to select the commodity for which projections of a single variable will be transferred (see fig. 27). Once a commodity is SELECTed, the user is taken to the commodity projection block, the cursor is positioned in the variable range name column (C), and the variable selection menu:

DOWN5 UP5 NEXT PREVIOUS SELECT QUIT

is presented at the bottom of the screen. Using the first four options, the cursor is moved up and down the list of variables to the desired variable, and then SELECT is keyed. The projections for that variable are copied to the history spreadsheet. Note that in this and the COMMODITY_BLOCK(S) option, only those variables which are present in the history spreadsheet can be transferred (that is, those variables for which the base value is derived from the history spreadsheet with a formula of the form HIST!*rangename*).

Figure 27--Structure of the TRANSFER/VARIABLE program menus



Selecting QUIT. If QUIT is chosen on the TRANSFER submenu, the user is returned to the main menu.

Selecting SAVE

The SAVE routine on the main menu saves the ***memory resident*** spreadsheets. It should be used frequently to save progress being made in specifying a country model. The forecast spreadsheet is saved first. The user is given the option of changing the forecast spreadsheet name with the prompt IS THE FILENAME...*filename*...OK (Y/N)? If the default is valid, entering Y will continue the save routine. If the default is not valid, the user should key N and then type a new filename in response to the prompt ENTER NEW FILENAME. If a new filename is entered at this stage, it will be also be entered in IDBLOCK. The forecast spreadsheet is ***unlinked*** from the CPPA and history spreadsheets before saving. After it is saved, it is relinked. The CPPA program file is also unlinked, saved, and relinked. If the history spreadsheet is resident, it, too, is saved. Default and new filename options are also available for the history spreadsheet. The process can take up to 5 minutes, depending on the size of the spreadsheets and how long it takes to unlink and relink the spreadsheets.

Selecting EXIT

The exit routine takes the user out of SC5.

> CAUTION: Be sure the spreadsheet has been saved before executing this command.

CHAPTER 3

PROGRAMMING IN THE HISTORY SPREADSHEET

Unlike the programmed options in the forecast spreadsheet, the history spreadsheet is self-contained, in the sense that all the programming which assists the user is present in the spreadsheet. Since all the programming is already contained in the history spreadsheet, this spreadsheet is used independently of the CPPA and forecast spreadsheets. As noted above, the history spreadsheet can be loaded through CPPA in conjunction with the forecast spreadsheet. In that case, the user may move among the spreadsheets with the use of CTRL - and CTRL +, which cycle through all memory-resident sheets. When the history spreadsheet is being used alone, the following procedure should be followed to load the history spreadsheet:

Action	Screen Display
Exit Shell, DesqView, and so forth	C:>
Select D drive	C:>d: (enter)
Select subdirectory	D:>cd\sc5\cppa (enter)
Load SC5 and history	D:\SC5\CPPA>sc5 c90hxxxn (enter),

where *c90hxxxn* is the generic representation of the history spreadsheet name.

The history spreadsheet takes about 7 minutes to load. When it is loaded, the user may call the main menu by holding down the ALT key and pressing M (ALT M). The first time the main menu is called, the computation of base year trend values from a 5-year linear and a 15-year semi-log regression will be activated.[19] On a computer with an 80286 processor, it takes about 10 minutes to compute the trend values for all variables in one commodity block; an 80386 processor requires about 5 minutes per block. Because of this time requirement, it is essential that the history spreadsheet be ***customized*** before the main menu is called for the first time (see p. 70 for a discussion of this process). Note that if projections are being made for 10 commodities, the total computation time can exceed 1-1/2 hours. If many commodities are being projected, it is best to activate the main menu for the first time at the end of the day to allow computation of the trends overnight. When the automatic trend computations are made, the user is presented with the main menu.

AUTOMATED ROUTINES IN THE HISTORY SPREADSHEET

The history spreadsheet contains programming that assists the user in the following operations:

- Computing a semi-log base year trend value from a user-specified sample period.
- Printing specified parts of the spreadsheet.
- Generating an ASCII file of spreadsheet contents.
- Graphing a single variable.
- Saving the spreadsheet.

Operations that are needed in the history spreadsheet that are not controlled by programming include:

- Calculation/recalculation of the spreadsheet.
- Entry of base values for the forecast variables.

---

[19] If the 5- and 15-year automatic trend computations are not needed, they may be bypassed by entering a value of 9 in the range REGCODE. However, this will create an error in generating expected returns in the forecast spreadsheet, since these returns depend on the 15-year semi-log growth rates in yields.

These activities are described briefly below and in more detail in the forthcoming *An Introductory Guide to Using the CPPA System*.

Selecting Automated Routines

The main menu contains the following options:

REGRESSION OUTPUT SAVE PRNFILE GRAPH QUIT EXIT

where
- REGRESSION computes a semi-logarithmic trend value for the base year from a user-specified sample period.
- OUTPUT prints a single commodity block.
- SAVE saves the history spreadsheet.
- PRNFILE generates an ASCII file that can be used in TS[20] or other software.
- GRAPH displays a graph of a single variable time series.
- QUIT exits from the menu and turns control over to the user for ***immediate mode*** input.
- EXIT leaves SC5.

As in the forecast spreadsheet, all menu options can be chosen either by keying the first letter in the option name or by using the arrow keys to position the cursor on the option and then pressing the Enter key.

Selecting REGRESSION

The REGRESSION routine computes a semi-log trend base year value for one variable in one commodity block. The variable is identified by proceeding through three menus. The first menu is used to identify the commodity group:

GRAINS SEEDS VEGOILS OILMEALS CT/SU ANIMALS MEAT LAND QUIT.

On this menu, the GRAINS option includes all grains. The SEEDS option provides access to all oilseeds. VEGOILS includes oilseed and tropical oils. OILMEALS includes oilseed and fish meals. CT/SU includes cotton and sugar. ANIMALS includes the cattle, hogs, and sheep inventories. MEAT includes beef and veal, pork, lamb and mutton, milk, poultry meat, and eggs. LAND includes the FAO land data.

When the commodity group is selected, the user is presented with the commodity selection menu (see fig. 28A, 28B, and 28C). The commodity selection menu is group-specific. For example, if GRAINS are chosen as the commodity group, the subsequent commodity menu is:

WHEAT RICE TOTAL_CO_GR CORN SORGHUM BARLEY OTHER_CO_GR QUIT.

Once a commodity is selected, the variable remains the only piece of information the user must supply. The variable selection menu is the same within a commodity group but may differ across commodity groups. For example, for the GRAINS, SEEDS, VEGOILS, OILMEALS, and CT/SU commodity groups, the variable menu is:

AREA/CRUSH YIELD PRODN IMPS EXPS TOTAL_DMD STOCKS(END) MORE QUIT

where selection of MORE will activate the second level variable menu:

FEED HUMAN/FOOD CRUSH OTHER_USE BLANK STKS/CONS PC_DEMAND QUIT.

---

[20] TS or Time Series is a graphics-based data-viewing software developed by ERS; see Appendix B for information on using the history spreadsheet data in TS.

Figure 28A--Structure of the REGRESSION and GRAPH program menus: Crops

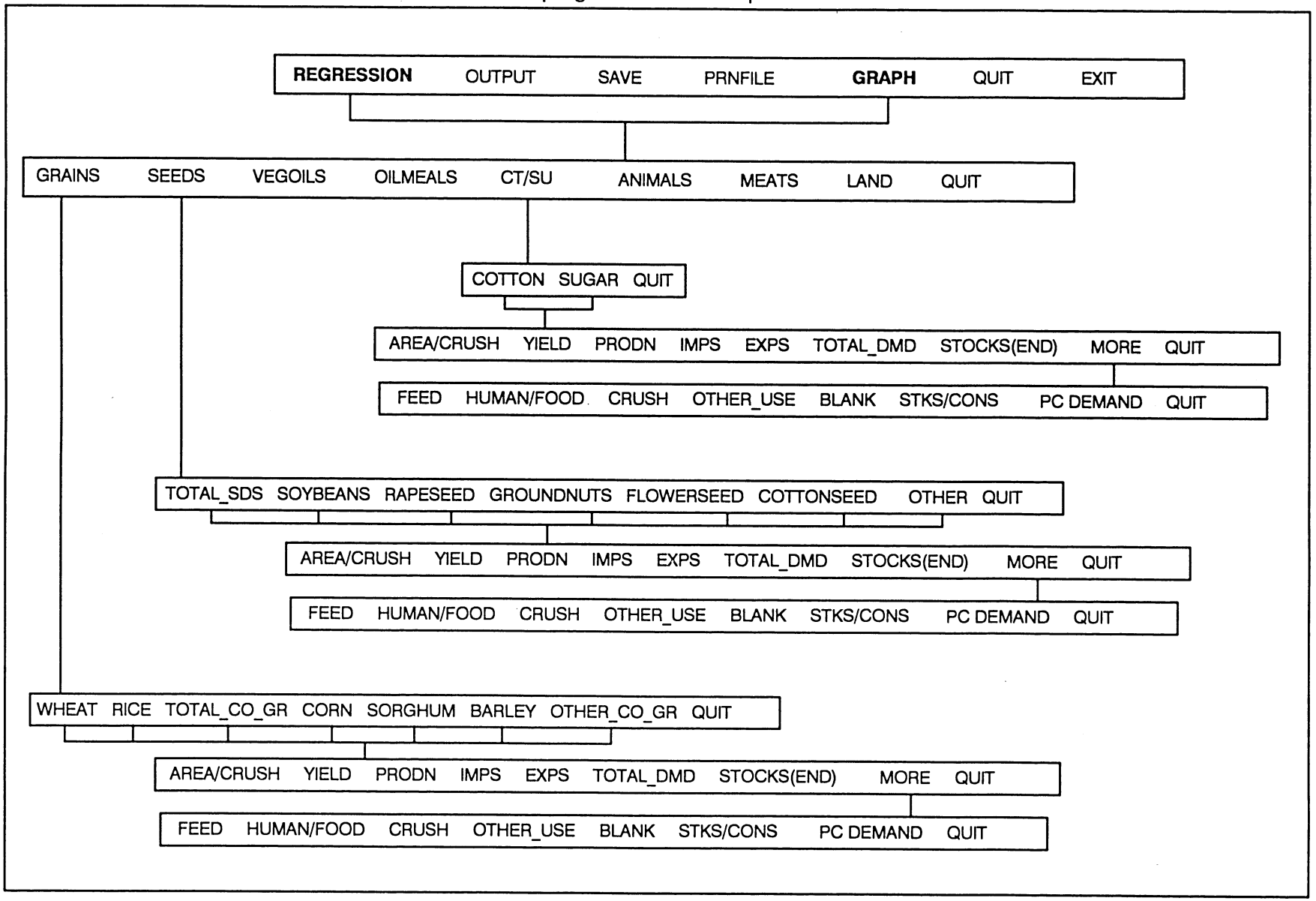


Figure 28B--Structure of the REGRESSION and GRAPH program menus: Oilseed products

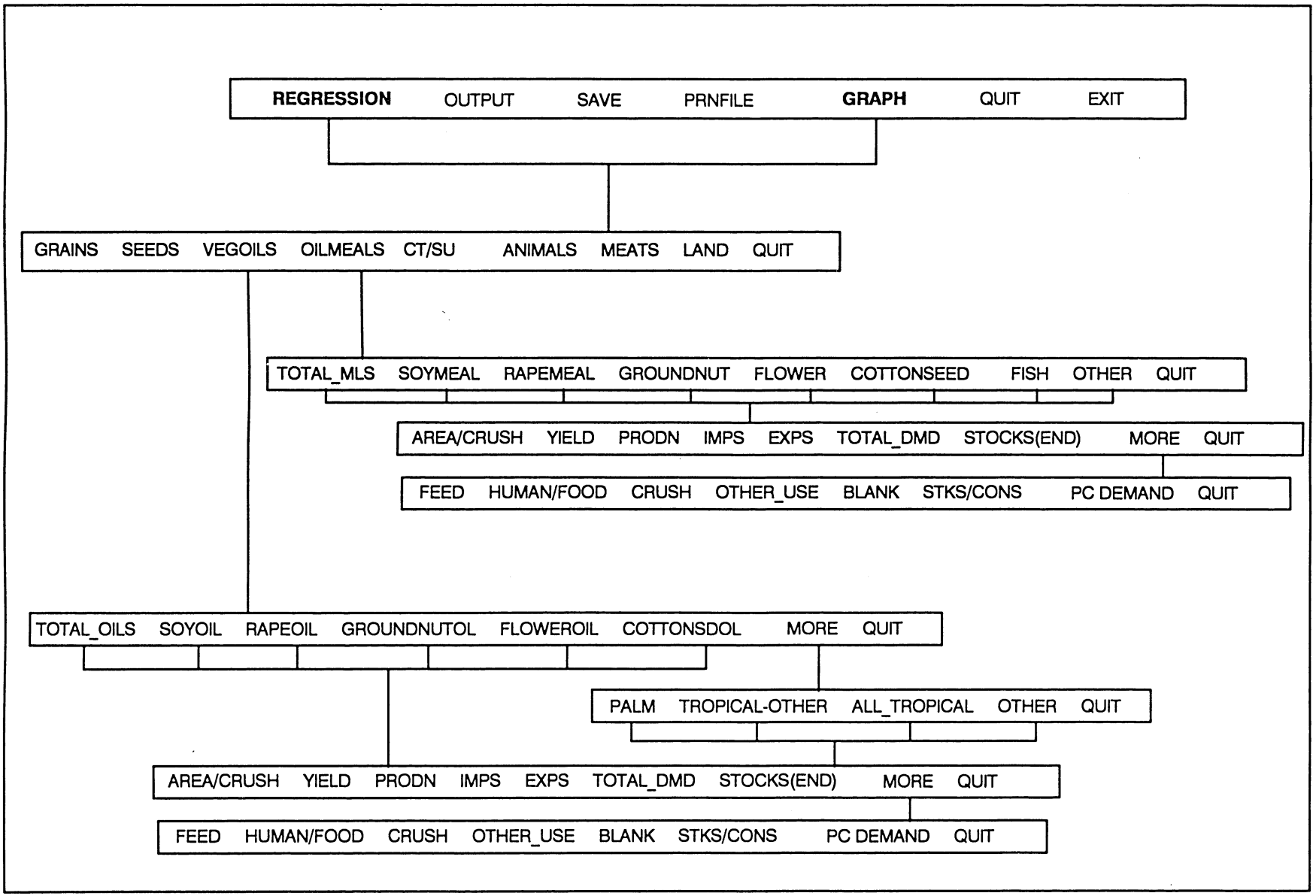
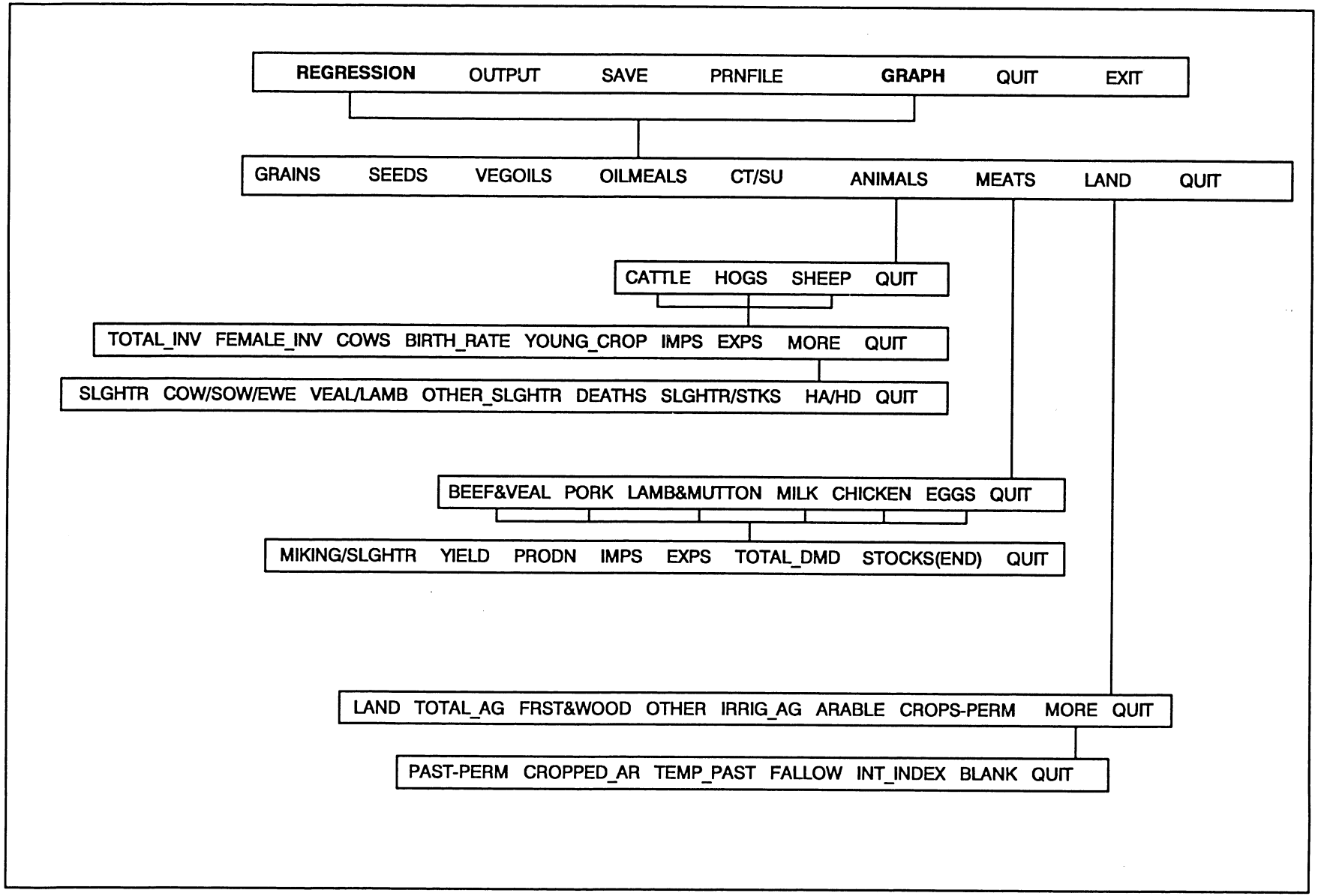


Figure 28C--Structure of the REGRESSION and GRAPH program menus: Animals, meats, and land



Note that the options on these menus correspond to the column headings in the commodity blocks (see table 19).

When the variable has been selected, the user is prompted to give the first and last years in the sample. The entry to these prompts should be in the form 19*yy*, where *yy* is between 60 and the last historical year. The trend base year value is computed and entered in the Varying trend row. The compound annual growth rate associated with the trend is also recorded in the Varying annual growth row. The user is then prompted with DO YOU WANT TO SUSPEND THE MACRO (Y/N)? Keying Y to this prompt temporarily stops execution of the macro (see below). Pressing N in response to this prompt returns the user to the variable selection menu, allowing the user to select another variable for the same commodity for trend computation. The user can return to the main menu by keying QUIT on all subsequent menus.

Suspending the Macro

Temporary suspension of the macro turns control of the spreadsheet over to the user. When suspended from the macro, the user can move around in the spreadsheet to view historical data, enter a base value, check the sample, view the statistical properties of the last regression computed, or view a graph of the historical data relative to the trend just computed. To view the statistical properties of the last trend, GOTO OUT. The (limited) statistical results are displayed on the screen. To view the graph, press F10. To exit from the graph display, press ESC. To return to the macro, press F8.

> CAUTION: Do not forget to return to the macro by pressing F8 if it has been suspended. Calling the main menu while being suspended from the programming will result in the display of a message reminding the user that a macro cannot be called while another is suspended.

Selecting OUTPUT

The OUTPUT routine on the main menu prints a complete commodity block. When OUTPUT is keyed, the user is reminded that an SC5 printer driver must be selected before using the routine (see Appendix A for instructions). The commodity to be printed is selected by proceeding through the first two submenus in the REGRESSION routine (see fig. 29).

Selecting SAVE

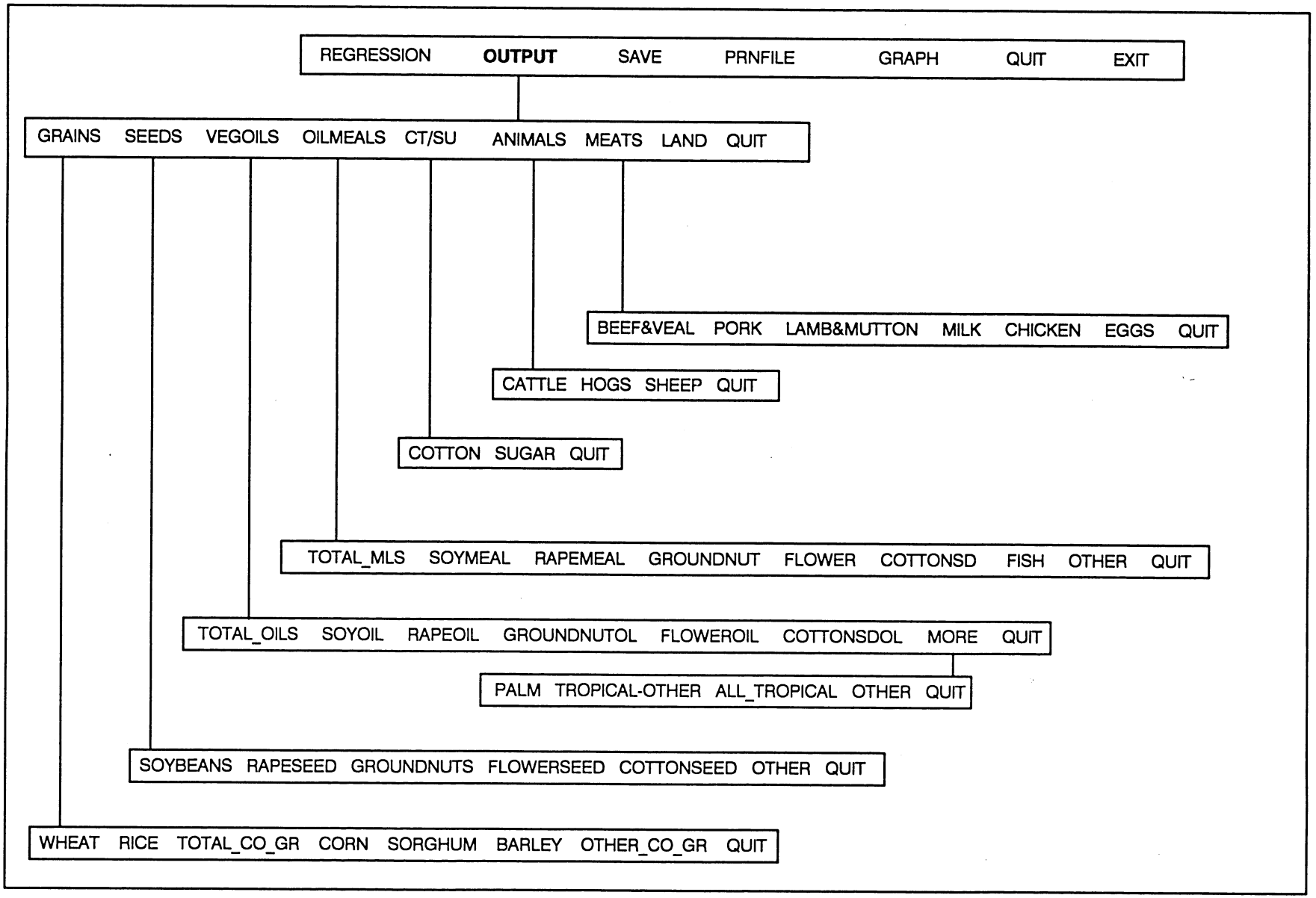
The SAVE routine saves the history spreadsheet. This routine should be performed after the automatic computation of the 5- and 15-year trends. It should also be used generously as you select and record base values to avoid the loss of your work.

> CAUTION: SC5 does not have an automatic backup procedure. Therefore, saving the spreadsheet is your responsibility.

Selecting PRNFILE

The PRNFILE routine creates an ASCII (or .PRN) file from the history spreadsheet. This file can, in turn, be used by ERS's Time Series (TS) software to create a TS viewer file. A TS viewer file enables access to all the graphical features provided by the software (see "Interfacing with TS" in Appendix B). This routine is typically activated after the TRANSFER routine, when the user wants to see graphically how the projections fit with the historical values.

Figure 29--Structure of the history OUTPUT program menus



When the PRNFILE option is selected, a message appears, warning the user that if the ASCII file will be used to create a TS viewer file, certain conditions must be met. These conditions are crucial to successful interaction with TS. The TS software that converts an ASCII file to a TS viewer file will not read NA's, ERROR's, or blank cells as data observations. Instead, it will skip them until it encounters the next valid numeric entry. One missed observation will skew the entire data set. To counter this problem, zeros must be entered in blank cells, and all NA's and ERROR's must be removed before generating a .PRN file to use with TS. Recall that all projection ranges (*cc*P) are preloaded with zeros, but the historical ranges (*cc*H) are not. If historical data have either been erased or not entered in some blocks, empty cells will exist in the spreadsheet. The programming will check the sum of the historical ranges in the wheat through milk blocks. If the range sum is zero, zeros will be copied to each cell in the history range, replacing empty cells in those cases. However, there is no programmed check for partially blank historical ranges nor for NA's or ERROR's. These must be altered manually. Therefore, before using the PRNFILE routine to generate a TS-readable .PRN file, the content of the blocks should be scanned. When the routine is successfully completed, the user is returned to the main menu.

Selecting GRAPH

The GRAPH routine displays a time series plot of a single variable. The variable is chosen by proceeding through the series of three menus (commodity group, commodity, and variable) used in the REGRESSION routine (see figs. 28A, 28B, and 28C).

Selecting QUIT

Choosing QUIT on the main menu takes the user out of the automated routines and into immediate mode, where the user may enter base values, recalculate the spreadsheet, and so forth.

Selecting EXIT

The EXIT option on the main menu takes the user out of SC5.

> CAUTION: Be sure the spreadsheet has been saved before executing this command.

The above sections cover all the automated routines available to assist the user in version 1.3 of the history spreadsheet. However, the primary function of the history spreadsheet, which is to provide base values, must be initiated by the user in immediate mode. This task is described below.

RECORDING BASE VALUES

Base values are entered by the user in ***immediate mode*** (that is, without the assistance of any automated routine). Base values must be entered in each empty cell on the BASE VALUE row for each forecast commodity. The only exception to this rule is that a base value need not be entered in the BLANK column unless a country-specific variable has been added to the history spreadsheet.

While input of base values is the responsibility of the user, an organized approach to this process is helpful. It is recommended that all base values be chosen for one commodity at a time, beginning at the top of the spreadsheet and working down. To enable ease of reading column headings, it is recommended that ***titles*** be set for each major commodity group (such as grains, oilseeds). Titles are set by placing the cursor in the cell corresponding to the intersection of the column(s) and row(s) to be fixed, and then pressing /TB. Titles can be cleared by pressing /TC.

In the base year, beginning stocks or beginning inventories are automatically set equal to ending stocks/inventories in the last historical year. Ending stocks/inventories are preprogrammed as the market-clearing residual in the base year. To see the value of these and other preprogrammed variables, press F9 to calculate the spreadsheet. To quickly recalculate preprogrammed variables in one block, press ALT K and enter the two-character commodity code for the block to be calculated. The ALT K recalculation operates only on one block; it will not recalculate preprogrammed formulas in any other block. This means that a change in the base value for soybean crush will not be entered in the soybean meal and soybean oil blocks until those blocks are recalculated. Therefore, the entire spreadsheet should be recalculated (that is, F9 should be pressed) after entering base values for oilseeds and animal inventories, since those blocks provide base values to other blocks.

If the implied value of ending stocks/inventories is negative or very different from beginning stocks/inventories, the user should reassess the base values. Either of these conditions suggest a basic imbalance within the base year supply-demand variables that could result in undesirable effects in the forecast period. Therefore, it is important to check the implied balance in the base year for each commodity being forecast before proceeding to the forecast spreadsheet.

In some cases, it may be necessary to supply a base value for a variable specific to a nonforecast commodity. For example, the base value for slaughter in the meat blocks, which is multiplied by yield to derive meat production, is preprogrammed as the base value of animal slaughter in the livestock blocks. This means that if beef and veal is being forecast but cattle is not, the user will need to select a base value for slaughter in the cattle inventory block, not in the beef and veal block.

Special cases of this nature can be identified when the spreadsheet is calculated after all base values have been entered. If any preprogrammed base values are 0 after recalculation, a base may need to be entered elsewhere on the spreadsheet. The address of the missing base value can be found by looking at the formula in the preprogrammed cell(s).

APPENDIX A

INSTALLING SC5 AND THE CPPA SYSTEM

To use the CPPA system, SC5 must be installed on the computer's hard disk drive. The programming in CPPA requires the use of version C or D of SC5; some programming may fail if earlier versions are used. Version D of SC5 requires about 3 million bytes of hard disk space. The CPPA templates require about 1.5 million bytes of hard disk space. An average country model will require about 2.5 million bytes of hard disk space, half of which is used to maintain backups of the country spreadsheets. Therefore, SC5 and the CPPA files should be installed on a hard drive with at least 7 million bytes of disk space.

To install SC5 in preparation for using the CPPA system, follow these steps:

1. Select a default drive for SC5, and create a directory called SC5. Copy the contents of the SC5 software diskettes to the SC5 directory. For example, if the D drive will contain SC5 and the SC5 floppies are in drive A:

Action	Screen Display
Exit Library, DesqView, and so forth	C:>
Change default drive to D	C:>d: (enter)
Create the SC5 directory	D:>md\sc5 (enter)
Select the SC5 subdirectory	D:>cd\sc5 (enter)
Install SC5 from the floppies	D:\SC5>copy a:*.* (enter)

2. Put the CPPA floppy in drive A. Install the SC5 configuration file for the CPPA system and a CPPA specific correction to an SC5 file contained on the CPPA floppy:[21]

Action	Screen Display
Copy the SC5 config file from the CPPA floppy	D:\SC5>copy a:sc5.cfg (enter)
Make a backup of the original SCV.OVL file	D:\SC5>copy sc5.ovl scv.bak (enter)
Copy the corrected SCV.OVL file from the CPPA floppy:	
- if you are using rev C of SC5[22]	D:\SC5>copy a:scvovlc.fix scv.ovl (enter)
or	
- if you are using rev D of SC5	D:\SC5>copy a:scvovld.fix scv.ovl (enter)

3. Create a CPPA subdirectory for the spreadsheet files and copy them to it:

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[21] This action is necessary to correct a problem associated with the linking and unlinking of the CPPA spreadsheets in revisions C and D of SC5.

[22] The revision version is identified on the initial SC5 screen. If you are unsure which version you have, load SC5 and look for the version letter on the initial screen.

Action	Screen Display
Create the CPPA subdirectory	D:\SC5>md\sc5\cppa (enter)
Select the SC5\CPPA subdirectory	D:\SC5>cd\sc5\cppa (enter)
Copy the spreadsheet files from the CPPA floppy	D:\SC5\CPPA>copy a:*.cal (enter)

4. If desired, copy the sample TS menu file (see Appendix B) to the CPPA subdirectory:

Action	Screen Display
Copy TSCPPA.MNU to CPPA subdirectory	D:\SC5\CPPA>copy a:*.mnu (enter)

5. Using EDLIN, Program Editor, or a word processing package, add SC5 to the PATH command in the AUTOEXEC.BAT file and execute AUTOEXEC.BAT (see DOS manual for instructions).[23]

6. Initialize SC5 for your system by loading the program and selecting a printer and graphics interface:

Action	Screen Display
Select SC5 directory	D:\SC5\CPPA>cd\sc5 (enter)
Load SC5	D:\SC5>sc5 (enter)
Select printer	1>/gsdb (follow instructions, then q)
Save the printer selection	1>/gky

[23] If you do not want to add SC5 to the PATH command, you will have to specify which directory SC5 is on if you access CPPA from the SC5\CPPA subdirectory. Alternatively, you will have to specify the location of the CPPA file and/or the history file each time you access them from the SC5 directory.

APPENDIX B

INTERFACING WITH TS

Time Series (TS) is a software package developed at ERS that is designed to enable quick graphical viewing and computation of trends underlying a data set.[24] This software can store any data set composed of 1 or more organizational blocks with up to 100 columns of data. Each TS data file is restricted to a single set of column labels; therefore, the column content of each of the organizational blocks is usually the same. Data units are assumed to be in 1,000 tons, except crop yields, which are assumed to be in tons/hectare.

The history spreadsheet commodity blocks, beginning with wheat and ending with milk, generally satisfy these conditions for columns A-R. The exceptions are: (1) the first data column contains either area (grains, oilseeds, cotton, sugar), crush (meals and oils), or slaughter (meats and animal products); (2) the units of the stocks/consumption ratio and per capita (food) demand are not 1,000 tons but are percentages and kilograms (kg) per person, respectively; and (3) the meat yields are in kg/head rather than tons/hectare. With these exceptions in mind and by selectively ignoring the units notation in TS, the system can be used to review the historical and projected data.

The first step in using Time Series is to create a .PRN or ASCII file of the desired portion of the history spreadsheet. This is preprogrammed as the PRNFILE option on the main menu in the history spreadsheet. Therefore, the user must load the history file, select PRNFILE on the main menu (see p. 97 for a description of this routine), and then exit from the history spreadsheet when the routine is complete.

The .PRN file is one of two files needed to create a TS file. A configuration file, which tells the TS software what data are contained in the PRN file, how large the blocks are, and the column headings for the blocks, is also needed. A sample configuration file for the CPPA system is contained in the file TSCPPA.MNU provided on the CPPA floppy.[25] You will need to customize this file for your country by changing the country name on line 1. Therefore, using EDLIN, Program Editor, or a word processing package that reads and saves ASCII files, edit TSCPPA.MNU. Once the country name has been changed, save the file with the same name as the data PRN file but with the suffix .MNU and then exit from EDLIN, Program Editor, or the word processing package. Note that if you have used a word processing package, you must save the file in ASCII format, not the word processing format.

The final step in loading the history and projection data into TS is to create the viewer file, using the PRN2TS utility provided with the TS software. The conversion is made simply by typing PRN2TS, pressing the space bar, and then entering the name of the .PRN file (without the extension) that you want converted. Both the .PRN file and the .MNU file must have the same name and they must be in the same drive. The PRN2TS conversion program will also need to be in the same drive if the TS software directory has not been added to the PATH command in the AUTOEXEC.BAT file. When the message "Done, press a key..." appears, you can load TS and view the new data file. When viewing the new data file, make sure that the data are properly aligned and consistent. If they are not, an error has occurred either in generating the .PRN file or in specifying the .PRN file contents in the .MNU file. See the TS instructions for assistance in correcting a .MNU file.

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[24] The TS software and instructions for its use can be obtained from Alan Webb (Developed Market Economies, Agriculture and Trade Analysis Division, ERS) or Karl Gudmunds (Data Services Center, ERS).

[25] The TSCPPA.MNU file requires that no structural changes, such as addition of new rows or columns, to the history spreadsheet have occurred. If the spacing in the history spreadsheet has been changed, a new menu file will have to be generated. Instructions for doing so are provided with the TS software.

APPENDIX C

CALORIC-RELATED DATA USED IN THE FOOD AID ANALYSIS BLOCK

The food aid analysis block in the forecast spreadsheet requires three variables not commonly available from other sources. The following table lists these data by country; see the sources for additional information on the variables and their sources and derivation. Note that the conversion coefficients needed in the food aid analysts block need to be specified in calories per kilogram, not the thousand calories per kilogram listed below.

Country	Conversion coefficient[1] (CRCEFA)	Minimum caloric requirement (CRNCFA)	Share of cereals in the diet (CRSGFA)
		Calories	Percent
Afghanistan	2.8197	2,039	79.39
Angola	3.1219	2,090	35.00
Bangladesh	3.1093	2,039	83.86
Benin	2.9667	2,100	37.00
Bolivia	3.0632	2,133	46.21
Burkina Faso	2.9978	2,100	73.00
Burundi	3.1179	2,078	34.00
Cape Verde	3.0830	2,100	57.00
Central African Republic	3.0785	2,078	21.00
Chad	2.8864	2,100	52.00
Costa Rica	2.9546	2,024	37.34
Dominican Republic	2.9248	2,024	32.34
Egypt	3.1022	2,196	61.54
El Salvador	3.2774	2,024	50.48
Ethiopia	3.1638	2,078	69.00
Gambia	2.9130	2,100	63.00
Ghana	3.0231	2,100	27.00
Guatemala	3.3086	2,024	57.17
Guinea	3.0193	2,100	52.00
Guinea-Bissau	3.0840	2,100	64.00
Haiti	3.1074	2,025	40.00
Honduras	3.2780	2,024	53.15
India	3.1071	2,039	59.37
Indonesia	3.2648	1,989	66.41
Jamaica	2.9319	2,025	36.39
Kenya	3.0955	2,078	56.00
Lesotho	3.1154	2,090	75.00
Liberia	2.8391	2,100	48.00
Madagascar	3.1466	2,090	60.00
Malawi	3.1649	2,090	70.00

See notes at end of table.

Continued--

Country	Conversion coefficient[1] (CRCEFA)	Minimum caloric requirement (CRNCFA)	Share of cereals in the diet (CRSGFA)
Mali	3.0058	2,100	75.00
Mauritania	2.9687	2,100	54.00
Morocco	2.7935	2,196	65.24
Mozambique	3.0429	2,090	33.00
Nepal	3.1025	2,039	81.52
Nicaragua	3.1139	2,024	43.02
Niger	2.5352	2,100	70.00
Pakistan	3.1483	2,039	59.35
Peru	3.0967	2,133	46.67
Philippines	2.9605	1,989	62.22
Rwanda	3.0935	2,078	25.00
Senegal	2.7646	2,100	61.00
Sierra Leone	2.8111	2,100	57.00
Somalia	3.2637	2,078	45.00
Sri Lanka	3.0076	2,039	58.33
Sudan	3.1861	2,078	51.00
Swaziland	3.1928	2,090	55.00
Tanzania	3.1860	2,078	60.00
Togo	2.9471	2,100	40.00
Tunisia	2.9005	2,196	57.28
Uganda	2.8636	2,078	35.00
Vietnam	3.1572	1,989	71.47
Zaire	3.0718	2,078	15.00
Zambia	2.9390	2,090	70.00
Zimbabwe	2.8557	2,090	66.00

[1] Thousand calories per kilogram of raw cereal equivalent of consumption of raw and processed cereal products; assumes average cereal and cereal product mix consumed in 1984/85-1986/87.

Source: Developing Economies Branch, Agricultural Trade Analysis Division, ERS, and *Global Food Assessment*, GFA-1, U.S. Dept. Agr., Econ. Res. Serv., Nov., 1990.

APPENDIX D

WHAT'S NEW IN VERSION 1.3?

The CPPA system has evolved over several years. The first version (1.1) was tested and used in the summer of 1989. The second version, 1.2, was released in early 1990. It was used by ERS analysts during 1990. The current version (1.3) became available in early 1991. The latest version differs from version 1.2 in four ways:

- There are minor improvements and changes in programming that increase the efficiency of some operations.
- Capability to define and write functions for macroeconomic variables has been added.
- The transfer utility now operates out of the forecast spreadsheet rather than the history spreadsheet.
- Duplication of two-character codes used in the range-naming convention has been eliminated.

The minor programming changes will, in general, not be noticeable to version 1.2 users. To define and write macroeconomic functions, see p. 15 and pp. 79-85. Moving the transfer utility to the forecast spreadsheet streamlines the transfer process. To transfer completed projections in version 1.2, the user had to save and exit from the forecast spreadsheet, load the history spreadsheet, and activate the transfer utility, which then reloaded the forecast spreadsheet. The revised utility bypasses the need to exit from the forecast spreadsheet. It also speeds up the operation of the routine. The last change is in the range-naming convention. In earlier versions, some two-character codes had more than one meaning. For example, TO in positions 5 and 6 meant total oils, TO in positions 7 and 8 meant total, and in positions 3 and 4, TO represented the takeoff (slaughter) rate in the animal blocks. The new range-naming convention reduces confusion by limiting the dual use of two-character codes. A table detailing the changes follows. Users of version 1.2 forecast spreadsheets must change the range names to version 1.3 equivalents in order to use the transfer utility. Programming which converts the range names is available from the authors.

Appendix table 1--Range name changes in version 1.3

Block	Item	Version 1.2 code (old)	Version 1.3 code (new)	Commodity codes (cc)
Margin to reference point	All	PRMUcc	PRMAcc	All forecast
Price policy variables	Unit import tax	PRTMccUT	PRMXccUT	All forecast
	Ad valorem import tax	PRTMccAV	PRMXccAV	
	Unit export tax	PRTXccUT	PRXXccUT	
	Ad valorem export tax	PRTXccAV	PRXXccAV	
	Producer-consumer marketing margin	PRMMccPC	PRMMccPM	
Aggregate land use	Agricultural land	LUAGLATO	LUTLLAAG	
	Forestry and woodland	LUFWLATO	LUTLLAFW	
	Other land	LUOLLATO	LUTLLAOT	
	Arable land	LUAGALLA	LUAGLAAL	
	Permanent crops	LUAGPCLA	LUAGLANC	
	Permanent pasture	LUAGPPLA	LUAGLANP	
	Irrigated agricultural land	LUAGIRLA	LUAGLAIR	
	Cropped arable	LUAGALCA	LUALLAAC	
	Temporary pasture	LUAGALTP	LUALLATP	
	Fallow and other cropped arable	LUAGALOT	LUALLAOT	
	Grazing land	LUAGGLTO	LUAGLAGZ	
	Crop intensity index	LUAHCIIN	LUAHLACI	
Cropland use	Gross cropped area	LUAHALGC	LUAHLAGA	
Cattle, hogs, and sheep extended models	Beginning inventory, breeding	LSBIccBR	LSBIccBD	CA, HG, SH
	Birth rate, breeding	LSBRccBR	LSBRccBD	
	Kept for breeding/milking	LSBRcc_F	LSBRcc_B	
	Births, for breeding	LSBTccBR	LSBTccBD	
	Deaths, breeding	LSDEccBR	LSDEccBD	
	Imports, breeding	LSIMccBR	LSIMccBD	
	Exports, breeding	LSEXccBR	LSEXccBD	
	Slaughter, breeding	LSSLccBR	LSSLccBD	
	Ending inventory, breeding	LSEIccBR	LSEIccBD	
	Take-off rate (slaughter/inventory)	LSTOccTO	LSSIccTO	
Cattle, hogs, and sheep abbreviated models	Take-off rate (slaughter/inventory)	LSTOccTO	LSSIccTO	CA, HG, SH

Continued--

Appendix table 1--Range name changes in version 1.3--Continued

Block	Item	Version 1.2 code (old)	Version 1.3 code (new)	Commodity codes (cc)
Beef and veal, lamb and mutton extended models	Slaughter, breeding	MTSLccBR	MTSLccBD	BV, LM
	Yield, breeding	MTYLccBR	MTYLccBD	
Feed demand	Grain requirement per ton animal product, all products except lamb	FEGRccTO	FEGQccTO	BV, BF, VL, MK, PK, PL, EG
	Grain requirement per ton animal product, lamb	FEGRLMLB	FEGQLMLB	
	Protein requirement per ton animal product, all products except lamb	FEPTccTO	FERQccTO	BV, BF, VL, MK, PK, PL, EG
	Protein requirement per ton animal, product, lamb	FEPTLMLB	FERQLMLB	
	Protein feeding requirement, all animal products	FEDMccPR	FEDMccPT	MT, BV, BF, VL, MK, PK, LB, PL, EG
Wheat, rice, coarse grains, corn, sorghum, barley, other coarse grains	Beginning stocks, government	CRBSccGO	CRBSccGV	WH, RI, CG, CO, SR, BA, OC
	Consumption demand, food demand	CRDMccFO	CRDMccFD	
	Ending stocks, government	CRESccGO	CRBSccGV	
	Per capita food consumption	CRPCccFO	CRPCccFD	
Food aid needs analysis	Minimum caloric requirement 3-year	CRCRFA	CRNCFA	
	Cereal conversion coefficient status quo	CRCCFA	CRCEFA	
	Food consumption target, 3-year status quo	CRTAFASQ03	CRFTFASQ03	
	Food consumption target, 10-year status quo	CRTAFASQ10	CRFTFASQ10	
	Food consumption target, 3-year nutrition based	CRTAFANR03	CRFTFANR03	
	Food consumption target, 10-year nutrition based	CRTAFANR10	CRFTFANR03	
	Food consumption target, market demand	CRTAFAMD	CRFTFAMD	
Sugar	Beginning stocks, government	CRBSSUGO	CRBSSUGV	
	Ending stocks, government	CRESSUGO	CRBSSUGV	
Total oilseeds, soybeans, groundnuts, sunflowerseed, rapeseed, cottonseed, other oilseeds	Consumption, crush demand	CRDMccCR	CRDMccCS	TS, SB, GN, FS, RA, NS, OS
	Per capita crush	CRPCccCR	CRPCccCS	
Total oils, soybean oil, groundnut oil, sunflowerseed oil, rapeseed oil, cottonseed oil, palm oil, other tropical oil, total tropical oil, other oil	Beginning stocks, government	CRBSccGO	CRBSccGV	TO, SO, GO, FO, RO, NO, PO, OI, IO, OO
	Consumption demand, food demand	CRDMccFO	CRDMccFD	
	Ending stocks, government	CRESccGO	CRESccGV	
	Per capita food	CRPCccFO	CRPCccGV	

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