



**PROVISIONAL MILITARY GOVERNMENT
OF SOCIALIST ETHIOPIA**

MINISTRY OF AGRICULTURE

**PRELIMINARY FORECAST
OF AREA, PRODUCTION AND YIELD OF MAJOR CROPS
FOR THE WHOLE COUNTRY AND BY REGION
IN 1979/80 (1972 E. C.) AND 1980/81 (1973 E. C.)**

I

CONTENTS

	<u>Page</u>
Preface -----	1
1. Description of statistical data -----	4
2. Methodology of preliminary forecasts -----	4
2.1 Introduction -----	4
2.2 Definition of the model -----	4
2.3 Criteria for choice of the most proper function -----	5
2.4 Considering of the regional differences---	9
3. Descriptive analysis of forecasted area under crops, crop production and yield in 1979/80 (1972E.C.) and 1980/81 (1973E.C.)-----	16
3.1 Introductory remarks on the choice of fore- casts for presentation -----	16
3.2 Statistical interpretation of forecasts result -----	19
3.3 Forecasts of area under crops-----	20
3.4 Forecast of yield -----	21
3.5 Forecasts of crop production -----	27
4. Concluding remarks-----	32
References -----	34
Annex- Estimated value for 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81 (1973E.C.) by crops and regions-----	36

የአስተባባሪ ጽ/ቤት
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II

LIST OF TABLES

	<u>Page</u>
Tab.1. Area under major crops in Ethiopia in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81 (1973E.C.)--	22
Tab.2. Standard errors and relative standard errors for two versions of forecasts of area under crops in 1979/80 (1972E.C.)-----	23
Tab.3. Average yields of major crops in Ethiopia in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and for 1980/81 (1973E.C.)	25
Tab.4. Standard errors and relative standard errors for two versions of forecasted yields of crops in 1979/80 (1972E.C.) -----	26
Tab.5. Comparison of forecasted changes of production from 1971 to 1972 E.C. -----	28
Tab.6. Production of major crops in Ethiopia in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and for 1980/81 (1973E.C.)---	30
Tab.7. Standard errors and relative standard errors for two versions of forecasted crop production in 1979/80 (1972E.C.)-----	31

III

CONTENTS OF THE ANNEX

Page

Tab. 1.1. Area under teff in 1978/79(1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81(1973E.C.) -----	37
Tab. 1.2. Area under Barley in 1978/79(1971E.C.) and forecasts for 1979/80(1972E.C.) and 1980/81 (1973E.C.) -----	38
Tab. 1.3. Area under wheat in 1978/79 (1971E.C.) and forecasts for 1979/80(1972E.C.) and 1980/81 (1973E.C.)-----	39
Tab. 1.4. Area under ~~maize~~ in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81(1973E.C.) -----	40
Tab. 1.5. Area under sorghum in 1978/79(1971E.C.) and 1980/81(1973E.C.) -----	41
Tab. 1.6. Area under millet in 1978/79(1971E.C.)and forecasts for 1979/80(1972E.C.) and 1980/81 (1973E.C.)-----	42
Tab. 1.7. Area under horse beans in 1978/79(1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81 (1973E.C.)	
Tab. 1.8. Area under Chick peas in 1978/79(1971E.C) and forecasts for 1979/80(1972E.C.) and 1980/81 (1973E.C.) -----	44
Tab. 1.9. Area under haricot beans in 1978/79(1971E.C) and forecasts for 1979/80 (1972E.C.) and 1980/81 (1973E.C.) -----	45

IV

Page

Tab. 1.10	Area under field peas in 1978/79(1971E.C) and forecasts for 1979/80(1972E.C.) and 1980/81(1973E.C.)-----	46
Tab. 1.11	Area under lentils in 1978/79(1971E.C.) and forecasts for 1979/80(1972E.C.)and 1980/81 (1973E.C.) -----	47
Tab. 1.12	Area under neug in 1978/79 (1971E.C.) and forecasts for 1979/80(1972E.C.) and 1980/81 (1973E.C.)-----	48
Tab. 1.13	Area under flax in 1978/79(1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81 (1973E.C.) -----	49
Tab. 1.14	Area under vetch in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81 (1973E.C.) -----	50
Tab. 2.1	Yield of teff in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81 (1973E.C.) -----	51
Tab. 2.2	Yield of barley in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81 (1973E.C.)-----	52
Tab. 2.3	Yield of wheat in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81 (1973E.C.) -----	53
Tab. 2.4	Yield of maize in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81 (1973E.C.) -----	54
Tab. 2.5	Yield of sorghum in 1978/79 (1971E.C.)	

	and forecasts for 1979/80 (1972E.C.)	
	and 1980/81 (1973E.C.) -----	55
Tab.2.6.	Yield of millet in 1978/79 (1971E.C.) and forecasts for 1979/80(1972E.C.) and 1980/81 (1973E.C.) -----	56
Tab.2.7.	Yield of horse bean in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81 (1973E.C.)-----	57
Tab.2.8.	Yield of chick peas in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81 (1973E.C.) -----	58
Tab.2.9.	Yield of Haricot beans in 1978/79(1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81 (1973E.C.) -----	59
Tab.2.10	Yield of field peas in 1978/79(1971E.C.) and forecasts for 1979/80(1972E.C.) and 1980/81(1973E.C.)-----	60
Tab.2.11	Yield of lentils in 1978/79(1971E.C.) and forecasts for 1979/80(1972E.C.) and 1980/81 (1973E.C.) -----	61
Tab.2.12	Yield of neug in 1978/79(1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81 (1973 E.C.) -----	62
Tab.2.13	Yield of flax in 1978/79 (1971E.C.) and forecasts for 1979/80(1972E.C.) and 1980/81 (1973E.C.) -----	63
Tab.2.14	Yield of vetch in 1978/79(1971E.C.) and forecasts for 1979/80 (1972E.C.) and1980/81 (1973E.C.) -----	64

VI

	<u>Page</u>
Tab.3.1. Production of teff in 1978/79(1971E.C) and forecasts for 1979/80(1972E.C.) and 1980/81(1973 E.C.).....	65
Tab.3.2. Production of barley in 1978/79(1971E.C) and forecasts for 1979/80(1972E.C.) and 1980/81(1973E.C.).....	66
Tab.3.3. Production of wheat in 1978/79(1971E.C) and forecasts for 1979/80(1972E.C.) and 1980/81(1973 E.C.).....	67
Tab.3.4. Production of maize in 1978/79(1971E.C) and forecasts for 1979/80(1972 E.C.) and 1980/81(1973 E.C.).....	68
Tab.3.5. Production of sorghum in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81(1973 E.C.)	69
Tab.3.6. Production of millet in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81(1973E.C.).....	70
Tab.3.7. Production of horse beans in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81(1973E.C.).....	71
Tab.3.8. Production of chick peas in 1978/79((1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81(1973E.C.)....	72
Tab.3.9. Production of haricot beans in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.)and 1980/81(1973E.C.).....	73

VII

	<u>Page</u>
Tab.3.10. Production of field peas in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81(1973 E.C.)...	74
Tab.3.11. Production of lentils in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81(1973E.C.)....	75
Tab.3.12. Production of neug in 1978/79(1971E.C) and forecasts for 1979/80(1972E.C.) and 1980/81(1973 E.C.).....	76
Tab.3.13. Production of flax in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972E.C.) and 1980/81(1973E.C.).....	77
Tab.3.14. Production of vetch in 1978/79 (1971E.C.) and forecasts for 1979/80 (1972 E.C.) and 1980/81 (1973 E.C.)	78

VIII

PREFACE

This report presents preliminary statistical forecasts of area under crops, crop production and yields for 1979/80(1972 E.C.) and 1980/81(1973 E.C.) in the private peasant holdings for the country and regional levels.

Statistical data applied for forecasting are cross-section (regional) - time series (1967-1971 E.C.). The method applied for forecasting consists in extrapolation on forecasted years relations between observations from consecutive years estimated on the base of statistical data, considering estimation of regional differentiation.

Attention should be paid on the interpretation of forecasts. At the country level forecasted values jointly with their standard errors define some limits in which future realizations should be found. At the regional level forecasted values show only possible tendency of changes in forecasted years.

It is the third attempt of forecasting undertaken by Planning and Programming Department Ministry of Agriculture. In previous years preliminary forecasts were made on the base of interview method and time series trend extrapolation (see references [1] [3])

This publication consists of description of data and applied methods and statistical description of result at country level. The Annex contains tables with forecasts of area, yields and crop production by regions.

1. DESCRIPTION OF STATISTICAL DATA

Preliminary forecasts of area under crops, crop production and yield of crops in private peasant's holdings are based on the analysis of statistical data on the area, production and yield of crops in regions in five years period from 1974/75 (1967E.C.) to 1978/79(1971 E.C.). For each considered crop and for each region we have got 5 years time series.

Regional data for years from 1974/75 to 1977/78 were collected from sample surveys. Data for 1978/79(1971 E.C.) were estimated. Estimation procedure as well as full description of data are presented in the forthcoming publication "Area, Production and Yield of Major Crops for the Whole Country and by Region in 1974/75-1978/79".

Therefore we confine ourselves only to general description of the behaviour of the forecasted phenomena in years 1974/75 to 1977/78. We want to assess if examined processes represent in this five years period uniform direction of development or not. Results of this assessment should be taken into consideration when model of forecasting is chosen.

We confine ourselves here to analysing of data for area under crops, crop production and yield only at the country level.

Area under crops showed in 1975/78(1968E.C.) big increase or decrease for nearly all crops. It

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increased for Teff, Sorghum, Millet, Chick peas, and Neug, decreased for Barley, Wheat, Horse beans, Maize.

For the first group area increased totally by 581.8 thousand hectares (by 24.4%) while for the second group it decreased by 539.4 thousand hectares (by 26.3%).

Looking at the changes of area under crops in the last three years it is evident that all crops whose area was disturbed in 1975/76 year tend to return to the original state in 1974/75 (1967 E.C.). For Barley, Millet and Chick this return is rather sharp. For Teff, Sorghum and Horse beans it is rather slow and gradual change. For Wheat and Haricot beans decreasing trend is evident while for Field peas and Vetch increasing tendency is observed.

Data for yield were calculated as ratios of production of crop to the area under crop. Characteristic feature of data on yields is that for almost all crops one year occurred with much higher yield than in all remaining years. For Barley, Wheat, Horse beans it is 1976/77(1969 E.C.), for Maize, Sorghum, Millet, Haricot beans it is 1975/76 (1968E.C.), for Flax and Vetch it is 1977/78(1970 E.C.) year.

The second characteristic feature of data on yield is low yield in the last two years for Barley, Wheat and Maize and increasing yields of Teff. Changes of production in 1974/75 to 1978/79 indicate similar features like yield and area, such like one year with much higher production than in all remaining years and decreasing/increasing trend in last two years. For Maize, Sorghum, Millet, Neug and Flax it is 1975/76(1968 E.C.) year, for Wheat it is 1974/75(1967E.C.) and for Barley 1976/77(1969 E.C.). For Teff an increase of production is observed in all considered period when for wheat quite opposite trend is evident. An increasing trend is apparent for Field peas and Vetch and decreasing trend appears for Haricot beans.

General conclusion which we can draw from analysis of data is that for area, yield and production of almost all crops investigated the five years period is nonhomogenous. There are particular years in which area, yield and production differ strongly from area, yield and production in the remaining years. Moreover the last two or three years seem to represent different direction of development than the direction in the first three or two years. These characteristic features of development of investigated phenomena were taken into consideration when forecasting models were constructed.

2. METHODOLOGY OF PRELIMINARY FORECASTS

2.1. Introduction

For preparing of preliminary forecasts of area under crops, yield and crop production in 1979/80(1972 E.C.) and 1980/81(1973 E.C.) simple but efficient statistical method has been applied. This method consists of estimation of parameters defining statistical dependence between observations from two consecutive years; and in application of estimated parameters to calculation of forecasted values. This method gives good results for data correlated in time such as area under crops and crop production for which observations in each year t are highly correlated with observations in year $t-1$. Also yield for almost all crops is correlated with yield in the previous year although this correlation is not very high.

2.2. Definition of the model

Dependence between observation from year t and observation one year delayed can be established on the base of so called autoregressive model.

For our time series-cross-section data the general idea of autoregressive model is as follows:

$$y_{tR} = \psi(y_{t-1,R}, e_{tR}) \quad (1)$$

where

y_{tR} - stands for area under crop (production or yield) in the year t , and region R ,

$y_{t-1,R}$ - area under crop (production or yield) in the year $t-1$, region R ,

ψ - function (to be estimated) defining relation between y_t and y_{t-1} ,

e_{tR} - error of model.

For correctly adjusted model error term of model should be realization of random variable with expected value equal zero and following variance-covariance function:

$$E(e_k, e_l) = \begin{cases} \sigma^2 & \text{for } k = l \\ 0 & \text{for } k \neq l \end{cases}$$

where k and l are possible combinations of t, R subscripts. In practice procedure of adjusting function to data is based on the criterion of minimalization of error term.

2.3. Criteria for choice of the most proper function

In the process of adjusting function to data two problems should be solved:

1. Selection of the most proper mathematical function.
2. Estimation of parameters of this function by means of proper estimating procedure such as least squares for example.

In practice shown above two steps very often are implemented simultaneously. For example for choosing from functions such as:

linear

$$y_{tR} = \alpha_0 + \alpha_1 y_{t-1,R} + e_{tR} \quad (3)$$

power

$$y_{tR} = \alpha_0 \alpha_1^{y_{t-1,R}} e_{tR} \quad (4)$$

or exponential

$$y_{tR} = \alpha_0 e^{\alpha_1 y_{t-1,R}} e_{tR} \quad (5)$$

one should adjust each type of function to data using proper estimation procedure. For such simple functions the most effective procedure of estimation is least square method.

It consists in selection of such parameters α and λ which minimalize error term of model. Strictly, least square method minimalizes sum of squares of residuals, that is differences between empirical observations and values calculated on the base of adjusted function.

$$D = \sum (y_{tR} - y_{tR}^*)^2 = \text{minimum} \quad (6)$$

Residuals are interpreted as estimation of the error term e_{tR} .

Proportion of residual (S_e^2) and dependent variable (S_y^2) variances shows us what part of the variability of dependent variable is not explained by model. It can be used as measure of goodness of fit of model.

More often used by econometricians measure of goodness of fit is so called determination coefficient

$$R^2 = 1 - \frac{S_e^2}{S_y^2} \quad 0 < R^2 \leq 1 \quad (7)$$

Determination coefficient shows what part of the dependent variable variability is explained by adjusted model. Square root of R^2 i.e. R is called multiple regression coefficient and is interpreted as a measure of interdependence between y variable and a set of explaining (independent) variables.

Another measure of goodness of fit the standard error of residuals S_e , shows the average dispersion of data around the function adjusted to the set of statistical data.

$$S_e = \sqrt{S_e^2} = \sqrt{\frac{1}{n-k-1} \sum (y_{tR} - y_{tR}^*)^2} \quad (8)$$

where

k - number of parameters estimated in the model

y_{tR}^* - value of dependent variable calculated on the base of adjusted function.

Value S_e^2 appeared in the formula (7).

Standard error is very useful for estimation of the error which we can commit taking note for forecasted values. If all classical assumptions of the regression analysis (see [4]) are fulfilled, that is if error term of model is normally distributed, expected value equals zero and variance-covariance matrix given by (2), we can construct limits in which with high probability true value of forecasted phenomena should be situated. If forecasted value is Y^* then true value Y should be situated in the partition:

$$y^* - 1.96S_e \leq y \leq y^* + 1.96S_e \quad (9)$$

with probability 0.95 (95%).

In the present work only S_e measure will be presented for assessment of goodness of fit and possible error of forecasting.

Other criteria for choosing a forecasting model consists in the checking of its forecasting power based on few testing forecasts prepared for the last few years for which data are available. For example having the data for N years we should prepare forecasts for years $N-1$ and N applying sets of data for $N-2$ and $N-1$ years. Forecasts based on the different models are compared with empirical data. This model which gives forecast the nearest to the true data should be taken for forecasting for $N+1$ year.

One should notice that this approach can be applied only when the period for which data are available is not short. At present for our forecasts it is rather useless.

The third approach for choosing function is based on a priori information, experience, economical or statistical knowledge etc. Experience of econometricians shows that as function for factors of industrial production development the best results gives power function:

$$P = \alpha_0 X_1^{\alpha_1} X_2^{\alpha_2} \dots X_m^{\alpha_m} e \quad (10)$$

where $X_1, X_2, \dots, X_m$ are factors influencing production.

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Similar function is very often applied in demand analysis. It was proved that such function gives good approximation and is very convenient because its interpretation is very simple. Change of dependent variable is proportional to the change of each independent variable. Parameter α_i shows the amount of change of dependent variable due to the change of independent variable by one unit, under assumption that all other independent variables will be constant.

elasticity

Experience shows that, also for data from agriculture, power function is very convenient and gives good results (see [1]). Therefore, for forecasting models of area, yield and production, power function (4) will be applied. Choice among different versions of forecasts will be based on statistical criterions R^2 and S_e .

2.4. Considering of the regional differencies

Function (4) estimates relations between y_t and y_{t-1} variables only generally as average relations for all country. This relations are defined by α_0 and α_1 parameters. They can give good approximation for all country but they can not explain regional differenciation for relations between y and y_{t-1} . Regional discrepancy from this country level relation are included into error term of model or into residuals after estimation of the models:

$$d_{tR} = y_{tR} - y_{tR}^* \quad (11)$$

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This estimation can be made using approach based on the following optimization procedure.

We want to minimize sum of squares

$$D = \sum_{t=2}^N (y_{tR} - d_R y_{tR}^*)^2 \quad (12)$$

It means that we want to adjust such correcting coefficient for region (d_R) which will give minimal sum of squares of differences between observations of original dependent variable and appropriate calculated values of this variable for the region.

According to the rule for finding of minimal value of function we receive.

$$\frac{\partial D}{\partial d_R} = -2 \sum_t (y_{tR} - d_R y_{tR}^*) y_{tR}^* = 0 \quad (13)$$

Solving equation

$$\sum_t y_{tR} y_{tR}^* - d_R \sum_t (y_{tR}^*)^2 = 0 \quad (14)$$

we receive

$$d_R = \frac{\sum y_{tR} y_{tR}^*}{\sum y_{tR}^{*2}} \quad (15)$$

Therefore forecast corrected for regional differences can be calculated as forecast on the base of equation (4) adjusted to the data for all regions jointly.

$$y_{72}^* = \hat{\alpha}_0 \hat{\alpha}_1 y_{71R} \quad (16)$$

corrected with d_R correction factor, that is

$$\hat{y}_{72}^* = d_R y_{72}^* \quad (17)$$

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where $\hat{\alpha}_0$ and $\hat{\alpha}_1$ estimated parameters of the function (4) adjusted to the data on the crop.

Forecasts for 1973 (E.C.) are calculated using the same parameters $\hat{\alpha}_0$ and $\hat{\alpha}_1$ and corrected forecast for 1972 year, that is

$$\hat{y}_{73} = d_R (\hat{\alpha}_0 y_{72}^* \hat{\alpha}_1) \quad (18)$$

Regional correction factor (15) can be presented as weighted average of the error term ratios:

$$\hat{e}_{tR} = y_{tR} / y_{tR}^* \quad (19)$$

According to the formula (4) each empirical observation can be presented as product of theoretical (calculated) value y_{tR}^* and error term $\hat{e}_{tR}$ which is estimation of the error e_{tR} in the (4) equation:

$$y_{tR} = y_{tR}^* \hat{e}_{tR} \quad (20)$$

Therefore (15) can be presented as

$$d_R = \frac{\sum \hat{e}_{tR} y_{tR}^{*2}}{\sum y_{tR}^{*2}} \quad (21)$$

Now it is evident that d_R is calculated as weighted mean of estimated error term of model. The weights are defined as the shares of squared theoretical values for each year in the total (regional) sum of these squares. Such system of weights strongly distinguishes error ratios $\hat{e}_{tR}$ corresponding to the biggest theoretical values y_{tR}^* .

For regions with increasing trend error ratios for the last years will receive the biggest weights. Opposite situation is for the regions with decreasing trend. Correcting factor d_R works good in the case when this regional decreasing or increasing trend is not according to general tendency for all country. If, for example, the general rule for nearly all regions is that from year to year observations are smaller but for few regions an opposite rule is true, theoretical values for them should be understimated, but owing to the nature of model this decreasing trend will be preserved. Only error ratios should be rather bigger than one (>1); Therefore d_R factor should be bigger than one and should move forecasted value up. It means that forecast should be corrected properly.

Available data can be arranged in two orders:

1. As sets of data on different crops in region, that is one set of data for one region.
2. As sets of data for the crop in regions, that is one set of data for one crop.

Each of this sets of data contains slightly different information. First set of data stresses information about regional tendencies. Second set of data stresses information about tendencies for crop at the country level.

Utilization of the second set of data for forecasting purpose is presented above. After estimation function for crop at the country level regional diff-

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erencies are included into error term of model. Therefore as estimator for regional differencies weighted average of estimated error term

$$(\hat{e}_{tR} = y_{tR}/y_{tR}^*) \text{ is applied}$$

The same procedure could be applied for forecasting on the base of regional data sets. At first step general function for region can be applied such as, for example, function (4).

Next correcting factors for crop can be estimated as follows:

$$d_c = \frac{\sum y_{tc} \cdot y_{tc}^*}{\sum y_{tc}^{*2}} \quad (22)$$

where

y_{tc} - observations of the regional data sets
(year t , crop c)

y_{tc}^* - theoretical values calculated on the base of function adjusted to the regional sets of data.

Forecasted values for 1972 and 1973 (E.C) can be calculated as the products

$$\hat{y}_{72c}^* = d_c y_{72c}^* \quad (23)$$

$$\hat{y}_{73c}^* = d_c y_{73c}^* \quad (24)$$

where

y_{72c}^* - forecasted value for 1972 (E.C) calculated on the base of function adjusted to the regional data set

$$y_{73}^* = \alpha_0 \hat{y}_{72c}^* - \text{forecasted value for 1973 (E.C.)}$$

From the theoretical point of view corrected forecasts estimated on the base of sets of data for crops and sets of data for regions should be similar.

Method with application correcting factors d_R or d_c can be applied to the cross-section-time series data covering some reasonable long period of time, no shorter than three or four years.

For data covering two years only (1970, 1971 E.C.) calculation of correcting factors d_c or d_R is unjustified. For such data another approach is recommended with utilization of information from regional and crop arrangements of data. This approach looks like follows:

1. For each arrangement of data autoregressive model should be adjusted separately and two forecasted values (y_{72R}^* and y_{72c}^*) should be calculated.

2. Because forecast on the ground of regional data sets off information about tendencies common for region and forecast ground on data for crops enhances tendencies specific for crops, then by averaging this pairs of forecasts we should receive forecasts taking into consideration this two tendencies. If power (4) or exponential (5) function is applied for adjusting two sets of data, geometric mean should be used for calculation of average forecast.

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The forecasted values for 1972 E.C. and 1973 E.C. are calculated as geometric means

$$y_{72}^* = \sqrt{y_{72c}^* \cdot y_{72R}^*} \quad (25)$$

$$y_{73}^* = \sqrt{y_{73c}^* \cdot y_{73R}^*} \quad (26)$$

where

y_{72R}^* , y_{73R}^* and y_{72c}^* , y_{73c}^* are forecasts estimated on the base, respectively, regional and crop sets of data.

3. Theoretical values y_{71}^* can be calculated as geometric means

$$y_{71}^* = \sqrt{y_{71c}^* \cdot y_{71R}^*} \quad (27)$$

where

y_{71c}^* and y_{71R}^* are theoretical values calculated on the base of estimated models.

4. Standard error and determination coefficient are calculated as follows:

$$s_e = \sqrt{\frac{\sum (y_{71} - y_{71}^*)^2}{n-k-1}} \quad (28)$$

$$R^2 = 1 - \frac{s_e^2}{s_{y_{71}}^2} \quad (29)$$

where

$k=4$, because to each set of data function with two parameters is adjusted.

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3. DESCRIPTIVE ANALYSIS OF FORECASTED AREA UNDER CROPS, CROP PRODUCTION AND YIELD IN 1979/80 (1972 E.C.) AND 1980/81(1973E.C.)

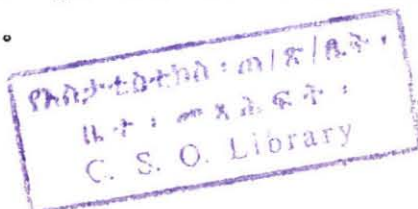
3.1. Introductory remarks on the choice of forecasts for presentation

Statistical analysis of data prove that problem of proper choice of period for forecasting is very important. From the analysis of data follows that, for example, for area under crops forecast should be based on data for last three or two years, because ~~the~~ first two and for some crops even ~~the~~ first three years indicate quite different tendency than a last few years.

Similarly nonhomogenous tendency is for yield. But yield shows considerable decrease in last two years for almost all crops. It seems that this low level of yield should be interpreted rather as temporary, produced by unfavourable weather conditions, than permanent trend. Therefore it seems to be justified to base forecasts on all the data from the total five years period.

For area, production and yield following three forecasts were estimated.

1. Geometric average of two forecasts received on the base of autoregressive model adjusted to the data from the last two years arranged in two ways: by regions and by crops. Model for this forecast is presented as combined autoregressive model.



2. Forecast from autoregressive model adjusted to data from the last three years arranged by regions with correction for regional effects
3. Forecast from the same model like in point 2 but adjusted to data from the entire all five years period (with correction of regional effects).

We are going to present two versions of forecast. The first of them will be called a preferred version and second a supplementary version. The preferred one is, according to our statistical analysis, version with higher probability of realization. The supplementary version is one with lower probability of realization than the preferred version. The priority of versions and their credibility results not only from statistical measures of goodness of fit as described above with determination coefficient R^2 and standard error S_e . Because each of the three estimated forecasts is based on the different periods of time (2,3 and 5 years) we need additional information or some assumptions for assessment which period of time represents trends which should be the most probable to continuation in the forecasted years.

For example for yield we decided to give priority for model adjusted to five years data, because, as it was stated above data from the last two years represent only temporary situation (low yields) which couldn't be expected to persist in the future.

It was stated that for area the first two or three

years should be excluded from analysis because structure of area under crops was disturbed and it is supposed that in the last three or two years tendency for stabilization of this structure is observed. Then our forecast of area should be rather based on the data from the last two or three years..

Therefore as result of analysis of data, taking into consideration assumptions about the future and statistical measures of goodness of fit we decided to present as preferred versions forecasts estimated with the following methods:

1. For area under crops presented above geometric average of two forecasts obtained by adjusting of autoregressive models to sets of data arranged by regions and crops. This forecast is based on data from the last two years.
2. For yield of crops autoregressive model adjusted to five years data arranged by regions, with correction for regional differences.
3. For production of product of preferred forecasts of area, point 1 above; and yield, point 2 above.

As supplementary versions the following forecasts were chosen:

1. For area autoregressive model adjusted to data from the last three years arranged by regions with correction for regional differences.

2. For production mentioned above geometric average of two forecasts estimated on the base of data from last two years.
3. For yield supplementary forecast of production (point 2 above) divided by preferred forecast of area. This forecast is based on data from last two years.

3.2. Statistical interpretation of forecast results

Forecasted values should be interpreted as possible future realization of statistical process which past component is represented by data applied as the base of forecasting procedure.

As every parameter estimated on the ground of statistical data forecasted value is subject to random error. This error results from the nature of statistical data and from approximated character of forecasting procedure.

As it was explained in the description of methodology standard deviation of error of forecasted value can be approximated by standard deviation of error term of the model adjusted to data. This last standard deviation is called standard error, S_e .

Then standard error can be applied as measure of possible mistake which may be committed when forecasted value is accepted as true. More strictly, standard error can be used to construct limits, in which true forecasted value should be found with high probability. For example, if

error term of model is approximately normally distributed, probability of mistake smaller than one standard error ($1S_e$) is 0.68 (68%), probability of mistake smaller than $1.96S_e$ is 0.95 (95%).

However one should be aware that as every estimation based on statistical information from previous years, forecast extrapolates only tendencies observed in the past. Therefore every event outside statistical information considered by forecasting model may cause that realization to fall far outside the limits of standard error.

Forecasts for 1973 year should be treated as very rough approximation because they were calculated as extrapolation of estimated function with forecasted value for 1972 year as explaining variable. Since level of uncertainty connected with them is very high, they will not be commented in the description of forecasts.

3.3. Forecasts of area under crops

Area under crops forecasted for 1972 and 1973 E.C. for all country is presented in the Table 1. Forecasts for regions are presented in the Annex in Tables 1.1 to 1.14. Total area under crops prognosed for Ethiopia for 1972 E.C. is 3.8% higher and for 1973 year 8.6% higher than in 1971.

Area forecasted (I version) for 1972 E.C. is bigger than in 1971 for all crops except Haricot beans. Very small increase of area (from 0.1% to 1.1%) is prognosed for Sorghum, Millet Lentils and Neug. For Sorghum, Millet and Lentils increase (0.5, 2.7 and 0.1 thousand hectares respectively)

is less than their standard errors S_e (7.8, 2.8 and 0.3 respectively).

The group of crops with high forecasted increase of area are Teff (4.3% of increase), Barley (5.6%), Maize (5.3%), Chick peas (5.8%), Field peas (6.1%).

For all cereals area forecasted for 1972 year is bigger than in 1971 by 3.8%, for pulses forecasted increase is 3.9%, for others 2.9%.

Supplementary (second) version of forecast foresee in 1972 E.C. slightly greater increase of total area than first version. For cereals increase is prognosed by 5.1%, for pulses is prognosed small decrease (-0.4%), for other forecasted decrease is 2.4%.

Standard errors and relative standard errors for area are presented in the Table 2. Relative standard errors are calculated as percentage of ratios;

$$\frac{\text{standard error}}{\text{forecast for 1972 E.C.}}$$

3.4. Forecasts of yield

Average yields forecasted for 1972 and 1973 E.C. for all country are presented in the Table 3. Forecasts at regional level are presented in the annex in Tables 2.1 to 2.14.

Forecasted average yields for country (Table 3) were calculated as weighted means of regional yields

Table 1

AREA UNDER MAJOR CROPS IN ETHIOPIA
IN 1978/79(1971E.C.) AND FORECASTS
FOR 1979/80(1972 E.C.) AND
1980/81(1973 E.C.)

Crop	Area in 1978/79 (1971E.C.)	Area forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
	thousand hectares				
Teff	1365.2	1423.6	1502.5	1397.0	1437.1
Barley	833.9	880.8	945.5	895.0	977.2
Wheat	503.2	521.8	541.5	493.5	487.6
Maize	888.7	936.0	981.3	1018.6	1178.3
Sorghum	719.3	719.8	714.2	717.6	724.0
Millet	236.6	239.3	252.0	255.6	277.8
Horse beans	295.7	304.8	317.2	311.2	332.1
Chick peas	140.5	148.7	157.5	134.4	130.4
Haricot beans	19.7	19.5	19.1	13.4	10.3
Field peas	126.0	133.7	142.1	120.8	117.9
Lentils	58.4	58.5	59.8	58.0	58.1
Neug	113.9	115.2	121.7	111.3	110.0
Flax	37.9	39.8	42.5	32.6	28.8
Vetch	57.5	60.0	63.2	60.4	63.3
TOTAL	5396.5	5601.5	5860.1	5619.4	5932.9

Table 4

STANDARD ERRORS AND RELATIVE STANDARD
ERRORS FOR TWO VERSIONS OF FORECASTED
YIELDS OF CROPS IN 1979/80(1972 E.C.)

Crop	version I		version II	
	Standard error (quintal per hec.)	Relative Standard error(%)	Standard error quintal per hec.)	Relative Standard error(%)
Teff	2.4	30.8	0.7	10.5
Barley	2.6	33.8	0.8	11.4
Wheat	2.6	30.2	1.8	22.2
Maize	6.6	64.7	3.1	29.8
Sorghum	3.5	36.5	1.0	11.2
Millet	3.9	45.3	1.2	16.7
Horse beans	5.2	55.3	0.6	7.2
Chick peas	3.2	56.1	3.2	71.1
Haricot beans	2.9	43.9	1.9	27.9
Field peas	3.1	43.7	1.1	17.2
Lentils	2.9	55.8	3.1	75.6
Neug	1.7	58.6	1.0	41.7
Flax	1.9	52.8	0.7	21.9
Vetch	1.4	25.9	1.4	31.1

Relative standard errors were calculated as ratios:

$$\frac{\text{Standard error} \times 100}{\text{forecasted average yield for Ethiopia}}$$

For some regions very high or very low yield, when compared with realization in 1971 year is recorded by version II. For example: in Tables 2.8 (yield of Chick peas) and 2.10 (yield of Field peas) for Hararge and in Table 2.11 (yield of Lentils) for Gamo Goffa region. In this regions the considered crops are cultivated on a very small scale and data about production and yields are rather unreliable.

3.5. Forecasts of Crop Production

Two versions of crop production forecasts for 1972 and 1973 E.C. at the country level are presented in the Table 6. Forecasts at regional level are presented in the Annex in Tables 3.1 to 3.14.

It should be noted that Version I of forecasted production was calculated as product of preferred versions of forecasts of area and yields.

According to this version, total production of crops in Ethiopia should increase in 1972 E.C. by 7.6% comparing with 1971 E.C. According to the second version total increase should be much lower (about 1%). It should be remainted that second version of forecasted production extrapolates low production from last two years.

First Version forecasts increase of production for all crops except of Haricot beans (about 1% decrease). According to the Second Version there should be reported increase for some crops while for the others decrease of production. Comparison of changes forecasted by two versions is presented in the table 5.

Table 5

Comparison of forecasted changes of production
from 1971 to 1972 E.C.

Crop	Change in % forecasted by	
	Version 1	Version 2
Teff	4.6	2.6
Barley	9.9	0.1
Wheat	7.2	1.7
Maize	10.0	7.4
Sorghum	5.1	-2.3
Millet	9.7	-7.8
Horse Beans	9.7	-4.0
Chick peas	12.2	-9.5
Haricot Beans	1.0	2.2
Field peas	10.5	0.4
Lentils	14.9	-11.2
Neug	1.1	-5.3
Flax	6.6	-4.9
Vetch	8.9	-8.2
TOTAL	7.6	1.0

Big differences between the two versions result from different assumptions under which these two forecasts were estimated. First Version was prepared under assumption that in 1972 year yields of crops will attain the level followed from trend for the five years period. Second Version assumes that in 1972 year trend of low yields from 1970-1971 years will last.

According to Version I forecasted increase of production of Teff, Neug and Flax will be caused by increase of area under these crops. Increase of production of Millet and Lentils should be caused by increase of yields mainly. Increase for other crops will be caused by increase of yields and areas.

Standard errors for crop production are presented in Table 7. They are higher for Version I, because it was estimated on the base of strongly discrepanted data.

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Table 6

PRODUCTION OF MAJOR CROPS IN ETHIOPIA
IN 1978/79(1971E.C) AND FORECASTS FOR
1979/80(1972E.C.) AND FOR 1980/81
(1973E.C.)

Crop	Production in 1978/79 (1971E.C)	Production forecasted			
		I version		II version	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand quintals			
Teff	10600.7	11090.7	11792.1	10879.0	11073.2
Barley	6130.5	6738.2	7504.7	6135.4	6087.7
Wheat	4183.1	4483.3	4766.9	4254.4	4372.7
Maize	8641.2	9507.1	9947.5	9277.6	10180.0
Sorghum	6659.7	7001.2	7114.3	6504.2	6363.7
Millet	1879.6	2061.2	2245.5	1733.2	1577.5
Horse beans	2619.1	2873.9	3076.6	2512.8	2391.8
Chick peas	753.8	846.3	927.4	682.5	670.0
Haricot beans	128.5	127.5	124.6	131.3	135.2
Field peas	862.6	953.0	1038.4	859.1	859.6
Lentils	266.9	306.6	332.7	236.9	209.7
Neug	331.2	334.9	353.4	313.6	286.3
Flax	135.4	144.4	154.9	128.8	122.9
Vetch	299.5	326.1	349.6	275.0	254.3
TOTAL	43491.8	46794.4	49728.6	43923.8	44584.6

Table 7

STANDARD ERRORS AND RELATIVE STANDARD
ERRORS FOR TWO VERSIONS OF FORECASTED
CROP PRODUCTION IN 1979/80(1972 E.C.)

Crop	Version I		Version II	
	Standard error th. quintals	Relative Standard error(%)	Standard error th. quintals	Relative Standard error(%)
Teff	136.8	1.2	12 .0	1.1
Barley	124.1	1.8	68.3	1.1
Wheat	161.5	3.6	60.8	1.4
Maize	157.1	1.7	22.6	0.2
Sorghum	109.3	1.6	98.9	1.5
Millet	46.6	2.3	3.3	0.2
Horse beans	88.7	3.1	21.1	0.9
Chick peas	13.5	1.6	38.3	5.6
Haricot beans	2.0	1.6	3.7	2.8
Field peas	22.8	2.4	5.3	0.6
Lentils	28.6	9.3	8.3	3.5
Neug	11.7	3.5	6.8	2.2
Flax	2.7	1.9	2.1	1.6
Vetch	6.6	2.0	6.7	2.4

Relative standard errors were calculated as ratio:

$$\frac{\text{standard error}}{\text{forecasted total production of crop}} \cdot 100$$

4. CONCLUDING REMARKS

Because the nature of economic and social phenomena can not be predicted precisely their future values. As result of human activity and influence of nature they are partly deterministic partly random and can be predicted within random error limits only.

Concept of standard error of estimation and its application to construction limits in which true forecasted value should be found with satisfactory high probability is presented in the description of methodology above.

The second reason which can cause that forecasted value may differ considerably from realization is that forecasts are made only on the base of statistical data as extrapolation into the future relations which occurred in the past. The models applied for forecasting consider relation between values of examined variable and the values of the same variable from the previous year. This relation is estimated as average for examined period of time. In other words we should interpret relation between y_t and y_{t-1} variables defined by estimated parameters α_0 and α_1 as true for average conditions in years from which statistical data was applied to

model. If in the year of forecast these conditions differ strongly from these average conditions, realization can differ considerably not only from this forecasted value but can fall outside limits of standard error.

For forecasting purpose three versions of the same approach were applied. This approach, autoregressive model with one year delayed explained variable used as explaining variable, seems to be effective for forecasting of area under crops and crop production. For yield of crops it give considerably worse statistical measures of goodness of fit.

In the future another statistical methods and models of forecasting should be examined, specially for forecasting of yields. A very important task is the systematic investigation of accuracy and efficiency of applied forecasting methods. Every year forecasted values should be compared with realization, and analysis on the base a posteriori results should be done as well as comparison of statistical measures of accuracy such as standard errors with measures calculated on the base a posteriori comparisons of forecasted values with realizations.

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ANNEX

ESTIMATED VALUES FOR 1978/79(1971 E.C.)
AND FORECASTS FOR 1979/80(1972 E.C.)
AND 1980/81(1973 E.C.)

BY CROPS AND REGIONS

1. Area under crops
2. Yield of crops
3. Crop production

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Table 1.1

AREA UNDER TEFF IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973E.C.)

Region	Area in 1978/79 (1971E.C)	Area forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
	thousand hectares				
Arssi	29.0	31.32	33.89	31.94	35.20
Bale	8.2	9.60	11.29	8.28	8.37
Eritrea	28.9	30.23	31.89	29.85	30.83
Gamo Goffa	14.6	15.87	17.47	16.27	18.14
Gojam	243.3	242.90	247.48	240.29	237.30
Gondar	205.9	214.90	224.22	200.26	194.75
Hararge	2.6	2.60	2.60	2.37	2.15
Illibabor	47.4	51.59	56.20	43.88	40.61
Kefa	116.9	129.02	142.74	134.28	154.34
Shoa	345.7	359.27	380.23	362.84	380.93
Sidamo	13.3	14.80	16.45	8.44	5.34
Tigrai	67.1	67.75	68.64	67.81	68.53
Wellega	177.6	187.88	201.65	174.92	172.27
Wollo	64.7	65.81	67.70	75.58	88.35
TOTAL	1365.2	1423.55	1502.45	1397.00	1437.11

Table 1.2

AREA UNDER BARLEY IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972 E.C.)
AND 1980/81(1973 E.C.)

Region	Area in 1978/79 (1971E.C)	Area forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand hectares			
Arssi	164.2	171.07	180.10	180.12	198.53
Bale	78.0	94.92	117.28	82.88	88.23
Eritrea	25.8	25.91	26.35	25.01	24.22
Gamo Goffa	32.4	33.77	35.93	38.69	46.55
Gojam	86.2	86.50	88.56	82.33	78.49
Gondar	120.9	126.07	132.08	138.74	160.15
Hararge	1.6	1.43	1.27	1.55	1.50
Illibabor	3.5	3.57	3.65	3.00	2.55
Kefa	23.2	24.47	25.95	25.79	28.81
Shoa	199.9	210.00	225.45	226.63	258.32
Sidamo	54.5	59.13	64.43	65.02	78.16
Tigrai	25.6	25.84	26.25	23.63	21.73
Wellega	14.4	14.47	14.70	8.99	5.50
Wollo	3.7	3.60	3.54	3.20	2.74
TOTAL	833.9	880.77	945.54	895.03	977.16

Table 1.3

AREA UNDER WHEAT IN 1978/79(1971E.C)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973 E.C.)

Region	Area in 1978/79 (1971E.C)	Area forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand hectares			
Arssi	163.3	169.35	174.69	174.68	187.00
Bale	34.0	39.69	46.33	31.81	29.73
Eritrea	16.1	16.21	16.34	15.53	14.97
Gamo Goffa	1.5	1.48	1.46	1.55	1.60
Gojam	27.8	27.71	27.73	30.69	33.91
Gondar	26.3	26.81	27.14	22.98	20.05
Hararge	5.8	5.42	5.03	4.93	4.19
Illibabor	1.8	1.83	1.86	0.90	0.45
Kefa	7.6	7.82	8.02	5.85	4.48
Shoa	160.3	167.04	174.92	149.98	140.21
Sidamo	0.5	0.49	0.48	0.38	0.01
Tigrai	36.0	36.05	35.92	34.54	33.12
Wellega	2.3	2.23	2.16	0.97	0.40
Wollo	19.9	19.65	19.44	18.66	17.48
TOTAL	503.2	521.79	541.52	493.45	487.60

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Table 1.4

YIELD UNDER MAIZE IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973E.C.)

Region	Yield in 1978/79 (1971E.C)	Yield forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand hectares			
Arssi	43.9	45.74	47.28	44.24	44.58
Bale	1.2	1.24	1.29	1.31	1.44
Eritrea	18.1	18.46	18.81	17.78	17.46
Gamo Goffa	29.3	30.75	32.46	34.16	39.84
Gojam	48.0	48.15	48.41	55.04	63.15
Gondar	27.6	28.43	29.00	34.23	42.48
Hararge	39.6	39.61	39.18	39.43	39.26
Illlibabor	63.5	67.37	70.73	73.41	84.90
Kefa	171.3	187.13	202.11	218.33	278.47
Shoa	195.6	202.57	210.06	204.18	213.15
Sidamo	94.5	103.41	111.57	123.09	160.46
Tigrai	5.8	6.22	6.62	5.39	5.02
Wellega	143.5	150.05	156.87	161.47	181.76
Wollo	6.8	6.84	6.88	6.57	6.34
TOTAL	888.7	935.96	981.27	1018.63	1178.31

Table 1.5

AREA UNDER SORGHUM IN 1978/79(1971 E.C)
AND FORECASTS FOR 1979/80(1972 E.C.)
AND 1980/81 (1973 E.C.)

Region	Area in 1978/79 (1971E.C)	Area forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand hectares			
Arssi	24.9	25.23	25.34	28.07	31.30
Bale	1/1	1.08	1.06	1.15	1.19
Eritrea	82.9	80.53	77.95	83.42	83.90
Gamo Goffa	6.5	6.46	6.44	7.46	8.46
Gojam	9.0	8.78	8.55	3.94	1.85
Gondar	57.1	57.32	56.69	52.13	47.99
Hararge	162.1	163.75	162.44	153.91	146.82
Illlibabor	17.5	17.88	18.10	21.35	25.58
Kefa	31.4	32.58	33.43	31.95	32.46
Shoa	137.2	138.70	139.82	144.52	151.52
Sidamo	2.4	2.38	2.36	0.58	0.16
Tigrai	44.5	43.28	41.68	44.91	45.28
Wellega	79.7	80.75	81.49	89.21	98.86
Wollo	63.0	61.00	58.83	55.03	48.65
TOTAL	719.3	719.75	714.20	717.62	724.02

Table 1.6

AREA UNDER MILLET IN 1978/79(1971E.C)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973E.C)

Region	Area in 1978/79 (1971E.C)	Area forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand hectares			
Arssi	=	=	=	=	=
Bale	0.8	0.80	0.84	0.93	0.96
Eritrea	34.8	34.86	40.57	37.72	40.36
Gamo Goffa	2.4	2.42	2.50	2.73	3.17
Gojam	41.9	41.74	44.14	45.27	42.85
Gondar	53.1	54.43	54.70	57.13	58.90
Hararge	0.8	0.72	0.72	0.93	0.68
Ilibabor	6.2	6.46	6.10	6.93	8.70
Kefa	7.5	7.79	8.10	8.35	9.80
Shoa	3.2	3.20	3.27	3.62	3.47
Sidamo	=	=	=	=	=
Tigrai	42.7	42.51	43.69	46.12	54.46
Wellega	42.9	44.00	47.03	46.33	53.13
Wollo	0.3	0.30	0.35	0.35	0.15
TOTAL	236.6	239.25	252.01	256.41	276.63

Table 1.7

AREA UNDER HORSE BEANS IN 1978/79(1971E.C)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973 E.C.)

Region	Area in 1978/79 (1971E.C)	Area forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand hectares			
Arssi	41.0	42.78	44.87	49.90	60.31
Bale	2.5	2.66	2.84	2.33	2.18
Eritrea	3.1	3.23	3.38	3.43	3.78
Gamo Goffa	1.5	1.52	1.55	1.64	1.79
Gojam	29.2	29.38	29.97	26.33	23.83
Gondar	57.2	59.15	61.27	67.37	78.89
Hararge	2.4	2.24	2.09	2.17	1.98
Illibabor	1.9	1.99	2.09	2.21	2.55
Kefa	7.8	8.18	8.61	4.18	2.29
Shoa	106.1	109.97	115.83	108.46	110.79
Sidamo	3.4	3.54	3.70	3.87	4.39
Tigrai	9.2	9.68	10.21	9.25	9.29
Wellega	5.5	5.55	5.63	4.12	3.12
Wollo	24.9	24.87	25.12	25.89	26.89
TOTAL'	295.7	304.76	317.16	311.17	332.08

Table 1.8

AREA UNDER CHICK PEAS IN 1978/79(1971E.C)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973 E.C.)

Region	Area in 1978/79 (1971E.C)	Area forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand hectares			
Arssi	1.1	1.14	1.18	1.40	1.77
Bale	0.1	0.09	0.08	0.10	0.10
Eritrea	6.8	7.03	7.29	6.39	6.02
Gamo Goffa	2.5	2.51	2.54	3.11	3.85
Gojam	6.0	6.07	6.17	4.37	3.22
Gondar	52.8	56.68	60.51	53.61	54.41
Hararge	0.1	0.08	0.06	0.06	0.04
Illibabor	2.0	2.06	2.12	2.45	2.97
Kefa	0.3	0.28	0.27	0.25	0.22
Shoa	45.7	48.80	52.43	41.34	37.52
Sidamo	3.5	3.62	3.74	2.30	1.54
Tigrai	15.4	16.22	17.04	14.87	14.37
Wellega	0.5	0.46	0.43	0.15	0.04
Wollo	3.7	3.68	3.68	4.01	4.34
TOTAL	140.5	148.73	157.54	134.42	130.41

Table 1.9

AREA UNDER HARICOT BEANS IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973 E.C.)

Region	area in 1978/79 (1971E.C)	Area forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand hectares			
Arssi	1.3	1.39	1.49	0.26	0.07
Bale	=	=	=	=	=
Eritrea	=	=	=	=	=
Gamo Goffa	0.9	0.92	0.96	0.79	0.71
Gojam	=	=	=	=	=
Gondar	0.5	0.52	0.58	0.46	0.43
Hararge	0.3	0.28	0.30	0.23	0.19
Illibabor	0.4	0.43	0.46	0.51	0.61
Kefa	=	=	=	=	=
Shoa	11.3	10.79	10.35	7.28	5.14
Sidamo	2.3	2.35	2.16	1.48	1.04
Tigrai	0.3	0.37	0.40	0.16	0.10
Wellega	2.3	2.26	2.30	2.09	1.95
Wollo	0.1	0.11	0.12	0.10	0.10
TOTAL	19.7	19.45	19.12	13.36	10.34

Table 1.10

AREA UNDER FIELD PEAS IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1971E.C.)
AND 1980/81(1973 E.C.)

Region	Area in 1978/79 (1971E.C)	Area forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand hectares			
Arssi	16.9	18.21	19.55	16.56	16.26
Bale	13.3	15.37	17.82	13.05	12.84
Eritrea	5.0	5.10	5.21	4.90	4.82
Gamo Goffa	2.4	2.36	2.33	1.98	1.67
Gojam	15.5	16.02	16.59	16.67	17.76
Gondar	16.4	17.29	18.11	11.84	8.90
Hararge	0.2	0.15	0.12	0.18	0.16
Illibabor	4.8	4.97	5.13	3.74	3.01
Kefa	9.2	9.74	10.28	8.72	8.32
Shoa	29.5	31.73	34.20	29.74	29.96
Sidamo	1.4	1.36	1.32	1.76	2.16
Tigrai	2.7	2.85	3.01	2.53	2.38
Wellega	3.3	3.21	3.13	3.23	3.17
Wollo	5.4	5.35	5.31	5.93	6.44
TOTAL	126.0	133.72	142.11	120.83	117.85

= 47 =

Table 1.11

AREA UNDER LENTILS IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973E.C.)

Region	Area in 1978/79 (1971E.C)	Area forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
	thousand hectares				
Arssi	5.4	5.54	5.68	4.11	3.12
Bale	0.6	0.58	0.56	0.44	0.32
Eritrea	2.6	2.62	2.65	2.68	2.76
Gamo Goffa	0.1	0.09	0.08	0.10	0.10
Gojam	1.0	0.98	0.96	1.00	1.00
Gondar	10.1	10.07	10.04	10.08	10.02
Hararge	0.3	0.25	0.21	0.26	0.23
Illibabor	=	=	=	=	=
Kefa	=	=	=	=	=
Shoa	29.7	29.86	30.98	29.36	29.02
Sidamo	0.1	0.09	0.08	0.10	0.10
Tigrai	2.2	2.33	2.28	2.20	2.15
Wellega	2.3	2.21	2.21	2.62	2.98
Wollo	4.0	3.88	4.07	5.02	6.89
TOTAL	58.4	58.51	59.80	57.97	58.09

Table 1.12

AREA UNDER NEUG IN 1978/79(1971 E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973 E.C.)

Region	Area in 1978/79 (1971E.C)	Area forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
	thousand hectares				
Arssi	0.3	0.35	0.41	0.17	0.10
Bale	=	=	=	=	=
Eritrea	=	=	=	=	=
Gamo Goffa	=	=	=	=	=
Gojam	38.4	37.85	43.50	37.77	37.16
Gondar	39.9	40.34	39.86	38.59	37.36
Hararge	=	=	=	=	=
Illibabor	1.3	1.43	1.54	1.44	1.59
Kefa	1.2	1.29	1.39	1.06	0.94
Shoa	3.6	3.77	3.96	1.77	0.88
Sidamo	=	=	=	=	=
Tigrai	5.3	5.81	5.67	6.26	7.36
Wellega	23.6	24.02	25.00	23.89	24.18
Wollo	0.3	0.33	0.36	0.35	0.40
TOTAL	113.9	115.18	121.66	111.29	109.97

Table 1.13

AREA UNDER FLAX IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973E.C.)

Region	Area in 1978/79 (1971E.C)	Area forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand hectares			
Arssi	3.4	3.68	3.98	3.14	2.91
Bale	2.8	3.05	3.33	1.80	1.16
Eritrea	9.7	10.17	10.73	9.64	9.58
Gamo Goffa	=	=	=	=	=
Gojam	10.1	10.41	11.16	8.66	7.43
Gondar	2.1	2.18	2.27	2.15	2.20
Hararge	=	=	=	=	=
Illibabor	0.1	0.10	0.10	0.03	0.01
Kefa	0.1	0.10	0.09	0.10	0.10
Shoa	5.9	6.12	6.58	3.86	2.54
Sidamo	≠	=	=	=	=
Tigray	2.5	2.80	2.96	2.22	1.98
Wellega	0.3	0.30	0.30	0.06	0.01
Wollo	0.9	0.92	0.96	0.89	0.89
TOTAL	37.9	39.83	42.46	32.56	28.81

= 50 =

Table 1.14

AREA UNDER VETCH IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C)
AND 1980/81(1973E.C.)

Region	Area in 1978/79 (1971E.C)	Area forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand hectares			
Arssi	1.0	1.06	1.13	1.07	1.13
Bale	=	=	=	=	=
Eritrea	8.2	8.55	9.60	8.74	9.14
Gamo Goffa	=	=	=	=	=
Gojam	5.5	5.63	5.88	6.79	7.90
Gondar	18.3	19.18	20.55	17.05	16.21
Hararge	a	=	=	=	=
Illibabor	=	=	=	=	=
Kefa	=	=	=	=	=
Shoa	13.0	13.51	13.89	15.43	17.45
Sidamo	=	=	=	=	=
Tigrai	7.6	8.15	8.41	8.46	9.14
Wellega	=	=	=	=	=
Wollo	3.9	3.94	3.74	2.89	2.33
TOTAL	57.5	60.03	63.20	60.43	63.30

Table 2.1

YIELD OF TEFF IN 1978/79 (1971 E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973 E.C.)

Region	Yield in 1978/79 (1971E.C)	Yield forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		quintals per hectares			
Arssi	11.39	11.90	12.40	10.83	10.39
Bale	6.5	6.30	6.20	6.56	6.59
Eritrea	7.4	7.40	7.40	7.22	6.92
Gamo Goffa	4.3	4.00	3.70	4.12	3.89
Gojam	7.4	7.50	7.60	7.20	6.67
Gondar	10.0	10.80	11.70	9.03	7.92
Hararge	7.0	7.90	9.10	7.94	8.92
Illibabor	6.9	7.10	7.30	7.54	8.19
Kefa	7.8	7.50	7.20	8.60	9.29
Shoa	7.8	7.70	7.60	7.79	7.58
Sidamo	9.5	9.60	9.80	9.29	9.01
Tigrai	7.5	7.10	6.80	7.56	7.65
Wellega	4.7	4.30	3.90	4.54	4.37
Wollo	10.4	10.60	10.80	10.40	10.14
AVERAGE	7.8	7.80	7.85	7.37	7.64

Table 2.2

YIELD OF BARLEY IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973E.C.)

Region	Yield in 1978/79 (1971E.C)	Yield forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		quintals per heddtares			
Arssi	10.9	11.50	12.00	10.37	9.82
Bale	13.5	13.90	14.20	12.27	10.77
Eritrea	5.5	5.60	5.70	5.31	5.06
Gamo Goffa	2.3	2.30	2.30	2.06	1.84
Gojam	4.3	4.30	4.30	3.39	3.53
Gondar	7.5	7.60	7.70	6.67	5.72
Hararge	5.3	5.60	5.80	5.99	6.81
Illibabor	3.7	3.40	3.20	3.41	3.12
Kefa	7.9	8.00	8.00	7.90	7.75
Shoa	5.6	5.70	5.80	5.38	4.96
Sidamo	3.3	3.30	3.40	3.06	2.81
Tigrai	7.5	7.50	7.40	7.27	6.98
Wellega	5.1	5.20	5.30	4.89	4.66
Wollo	5.9	6.10	6.20	5.60	5.19
TOTAL	7.4	7.65	7.94	6.97	6.44

Table 2.3

YIELD OF WHEAT IN 1978/79(1971 E.C.)
AND FORECASTES FOR 1979/80(1972E.C.)
AND 1980/81(1973 E.C.)

Region	Yield in 1978/79 (1971E.C)	Yield forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		quintals per hectare			
Arssi	12.5	12.50	12.56	12.32	12.50
Bale	12.0	12.99	13.68	11.46	10.87
Eritrea	4.7	5.0	5.20	4.54	4.36
Gamo Goffa	2.6	2.87	3.07	2.39	2.19
Gojam	7.2	7.24	7.27	6.63	6.03
Gondar	4.2	4.25	4.29	3.82	3.44
Hararge	6.0	6.01	6.02	6.32	6.70
Illibabor	2.1	2.12	2.13	1.72	1.41
Kefa	11.3	10.44	9.91	11.02	10.66
Shoa	5.1	5.48	5.68	5.01	4.87
Sidamo	13.0	14.29	15.20	12.40	11.66
Tigrai	5.6	5.88	6.07	5.42	5.38
Wellega	5.1	5.24	5.34	4.80	4.50
Wollo	9.3	9.51	9.64	8.97	8.65
TOTAL	8.3	8.59	8.80	8.07	8.15

Table 2.4

YIELD OF MAIZE IN 1978/79(1971 E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81 (1973E.C.)

Region	Yield in 1978/79 (1971E.C)	Yield forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		quintals per hectare			
Arssi	14.8	15.08	15.20	14.37	14.40
Bale	39.3	43.25	46.14	42.58	45.57
Eritrea	6.9	7.19	7.40	6.79	6.72
Gamo Goffa	7.1	7.46	7.64	6.71	6.33
Gojam	6.8	5.48	4.79	6.39	6.05
Gondar	6.7	5.53	4.86	6.25	5.83
Hararge	7.7	7.59	7.58	7.81	8.08
Illibabor	8.5	8.52	8.53	9.55	10.98
Kefa	8.5	8.79	8.99	9.57	11.08
Shoa	15.4	16.19	16.75	15.65	16.13
Sidamo	9.5	10.38	11.01	9.09	8.94
Tigrai	16.1	15.50	15.11	15.10	14.54
Wellega	5.1	6.27	7.21	4.91	4.90
Wollo	10.0	10.46	10.78	9.66	9.36
TOTAL	9.7	10.16	10.14	10.37	9.91

Table 2.5

YIELD OF SORGHUM IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973 E.C.)

Region	Yield in 1978/79 (1971E.C)	Yield forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
	quintals per hectare				
Arssi	15.1	16.34	16.87	14.37	13.99
Bale	8.6	9.07	9.27	8.68	9.00
Eritrea	8.8	8.82	8.83	8.40	8.0
Gamo Goffa	5.6	6.33	6.65	5.12	4.73
Gojam	6.5	7.17	7.46	5.81	5.14
Gondar	10.5	9.35	8.93	9.6	8.80
Hararge	7.6	8.01	8.23	7.39	7.27
Illibabor	9.6	10.03	10.21	10.03	10.55
Kefa	6.5	7.90	8.54	6.47	6.53
Shoa	11.4	12.92	13.59	11.46	11.58
Sidamo	7.6	9.93	11.07	7.22	6.86
Tigrai	10.7	10.55	10.49	10.57	10.70
Wellega	6.1	6.80	7.10	5.81	5.70
Wollo	11.2	10.81	10.65	11.25	11.28
TOTAL	9.3	9.55	9.78	8.88	8.75

Table 2.6

YIELD OF MILLET IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973E.C.)

Region	Yield in 1978/79 (1971E.C)	Yield forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		quintals per hectare			
Arssi	=	=	=	=	=
Bale	6.3	6.62	6.75	6.73	6.85
Eritrea	6.7	7.83	8.30	6.24	4.95
Gamo Goffa	5.5	6.07	6.29	5.21	4.82
Gojam	10.5	9.68	9.39	9.48	7.90
Gondar	11.2	10.48	10.19	9.81	8.51
Hararge	10.1	10.88	11.18	11.56	11.79
Illibabor	10.1	11.36	11.86	9.94	10.66
Kefa	4.6	8.03	9.88	4.19	3.75
Shoa	5.2	7.34	8.35	4.68	4.08
Sidamo	=	=	=	=	=
Tigrai	5.6	7.57	8.47	5.32	4.93
Wellega	5.3	6.83	7.50	4.96	4.44
Wollo	13.3	13.90	14.13	12.10	9.37
TOTAL	7.9	8.61	8.91	7.24	6.26

Table 2.7

YIELD OF HORSE BEANS IN 1978/79(1971 E.C.)
AND FORECASTS FOR 1979/80(1972 E.C)
AND 1980/81(1973E.C.)

Region	Yield in 1978/79 (1971E.C)	Yield forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		quintals per hectare			
Arssi	10.6	11.15	11.40	9.81	9.05
Bale	12.6	13.32	13.64	12.69	12.63
Eritrea	5.5	5.51	5.51	5.33	5.14
Gamo Goffa	2.5	4.00	4.89	2.33	2.19
Gojam	8.1	8.20	8.24	7.32	6.39
Gondar	5.4	5.95	6.15	4.79	4.13
Hararge	5.3	4.97	4.84	5.76	6.23
Illibabor	1.0	2.44	3.58	0.83	0.68
Kefa	6.6	8.52	9.50	6.14	5.58
Shoa	10.3	10.86	11.11	9.69	8.93
Sidamo	5.4	7.62	8.83	5.12	4.85
Tigrai	10.8	11.09	11.22	9.92	9.10
Wellega	4.3	5.09	5.47	4.04	3.82
Wollo	11.6	12.15	12.40	10.97	10.16
TOTAL	8.9	9.43	9.70	8.25	7.54

Table 2.8

YIELD OF CHICK PEAS IN 1978/79(1971 E.C)
AND FORECASTS FOR 1979/80(1972E.C)
AND 1980/81(1973E.C.)

Region	Yield in 1978/79 1971E.C	Yield forecasted			
		version I		version II	
		1979/80 1972E.C	1980/81 1973E.C	1979/80 1972E.C	1980/81 1973E.C
		quintals per hectare			
Arssi	5.3	6.71	6.47	6.26	5.46
Bale	8.0	14.79	14.69	8.89	10.00
Eritrea	3.9	4.02	4.08	3.63	3.35
Gamo Goffa	2.2	2.89	3.32	2.04	1.83
Gojam	3.0	3.53	3.84	2.50	2.06
Gondar	7.2	7.71	7.99	5.98	4.84
Hararge	14.0	11.74	10.73	15.16	16.43
Illibabor	5.0	5.41	5.63	4.33	3.73
Kefa	=	=	=	=	=
Shoa	4.5	4.84	5.02	3.91	3.30
Sidamo	7.2	7.71	7.99	6.66	6.11
Tigrai	4.0	3.64	3.47	3.57	3.17
Wellega	1.8	2.06	2.21	1.74	1.65
Wollo	1.8	1.95	2.04	1.58	1.35
AVERAGE	5.4	5.69	5.89	4.49	3.77

Table 2.9

YIELD OF HARICOT BEANS IN 1978/79(1971E.C)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973E.C.)

Region	Yield in 1978/79 (1971E.C)	Yield forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		quintals per hectare			
Arssi	4.1	3.61	3.34	3.53	3.06
Bale	=	=	=	=	=
Eritrea	=	=	=	=	=
Gamo Goffa	3.7	3.96	4.01	3.28	2.89
Gojam	=	=	=	=	=
Gondar	2.6	2.54	2.51	2.15	1.66
Hararge	18.7	17.96	17.52	20.18	19.03
Illibabor	6.5	5.24	4.59	5.05	3.87
Kefa	=	=	=	=	=
Shoa	6.3	6.25	6.21	6.85	7.49
Sidamo	11.1	11.92	12.45	11.47	13.31
Tigrai	4.0	4.21	4.34	2.92	2.40
Wellega	5.5	5.86	6.09	5.49	5.32
Wollo	=	=	=	=	=
TOTAL	6.5	6.56	6.49	6.75	7.07

Table 2.10

YIELD OF FIELD PEAS IN 1978/79(1971E.C)
AND FORECASTS FOR 1979/80(1972E.C)
AND 1980/81(1973E.C)

Region	Yield in 1978/79 (1971E.C)	Yield forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		quintals per hectare			
Arssi	4.2	5.00	4.82	4.82	4.52
Bale	7.5	7.91	8.18	7.22	6.97
Eritrea	7.2	7.44	7.60	7.13	7.10
Gamo Goffa	1.8	2.69	3.45	1.67	1.60
Gojam	4.5	4.27	4.13	4.05	3.61
Gondar	13.1	13.96	14.46	11.97	10.91
Hararge	15.5	14.72	14.26	20.87	26.33
Illibabor	1.5	1.72	1.87	1.31	1.16
Kefa	11.0	11.93	12.54	10.85	10.77
Shoa	5.3	5.50	5.63	4.87	4.47
Sidamo	10.7	11.26	11.62	11.01	11.36
Tigrai	8.6	8.76	8.85	8.02	7.55
Wellega	4.6	4.97	5.21	4.56	4.53
Wollo	5.2	5.35	5.52	4.86	4.58
TOTAL	6.9	7.13	7.31	6.42	6.05

Table 2.11

YIELD OF LENTILS IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C)
AND 1980/81(1973E.C.)

Region	Yield in 1978/79 (1971E.C)	Yield forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		quintals per hectare			
Arssi	3.1	3.55	3.78	2.70	2.38
Bale	16.5	15.95	15.70	17.50	18.41
Eritrea	9.4	8.97	8.78	8.83	8.85
Gamo Goffa	4.0	4.33	4.50	1.11	1.25
Gojam	7.1	7.40	7.54	6.13	5.39
Gondar	4.9	5.68	6.09	4.20	3.58
Hararge	13.3	12.39	11.98	16.00	18.95
Illibabor	=	=	=	=	=
Kefa	=	=	=	=	=
Shoa	3.2	4.29	4.85	2.78	2.29
Sidamo	=	=	=	=	=
Tigrai	8.0	7.74	7.62	6.96	6.78
Wellega	5.4	4.89	4.66	5.10	4.65
Wollo	7.5	7.41	7.37	6.68	5.48
TOTAL	4.6	5.24	5.56	4.05	3.51

Table 2.12

YIELD OF NEUG IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C)
AND 1980/81(1973 E.C.)

Region	Yield in 1978/79 (1971E.C)	Yield forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		quintals per hectare			
Arssi	3.0	2.99	2.99	2.49	2.05
Bale	=	=	=	=	=
Eritrea	=	=	=	=	=
Gamo Goffa	=	=	=	=	=
Gojam	2.4	2.40	2.41	2.14	1.62
Gondar	2.9	2.76	2.73	2.50	2.24
Hararge	=	=	=	=	=
Illibabor	3.5	3.71	3.84	2.94	2.49
Kefa	5.1	5.66	6.01	4.07	3.23
Shoa	3.2	3.60	3.86	2.72	2.31
Sidamo	=	=	=	=	=
Tigrai	1.8	1.98	2.09	1.63	1.66
Wellega	3.9	3.89	3.88	3.55	3.24
Wollo	1.7	1.61	1.56	1.36	1.14
TOTAL	2.9	2.91	2.90	2.72	2.36

Table 2.13

YIELD OF FLAX IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973E.C.)

Region	Yield in 1978/79 (1971E.C)	Yield forecasted			
		version II		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		quintals per hectare			
Arssi	8.0	7.20	6.85	7.09	6.32
Bale	5.4	5.28	5.18	5.30	5.17
Eritrea	3.8	3.76	3.74	3.68	3.56
Gamo Goffa	=	=	=	=	=
Gojam	2.5	2.45	2.42	2.16	1.78
Gondar	3.4	3.54	3.60	2.79	2.27
Hararge	=	=	=	=	=
Illibabor	=	=	=	=	=
Kefa	=	=	=	=	=
Shoa	2.1	2.75	3.12	1.70	1.33
Sidamo	=	=	=	=	=
Tigrai	2.9	3.21	3.36	2.32	1.97
Wellega	3.7	3.86	3.94	2.80	2.10
Wollo	3.9	3.62	3.49	3.00	2.22
TOTAL	3.6	3.63	3.64	3.23	2.89

Table 2.14

YIELD OF VETCH IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973E.C.)

Region	Yield in 1978/79 (1971E.C)	Yield forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		quintals per hectare			
Arssi	4.0	4.16	4.22	3.54	3.13
Bale	=	=	=	=	=
Eritrea	5.3	5.56	5.66	4.92	4.31
Gamo Goffa	=	=	=	=	=
Gojam	5.1	5.21	5.26	4.36	3.68
Gondar	6.1	5.93	5.87	5.25	4.42
Hararge	=	=	=	=	=
Illibabor	=	=	=	=	=
Kefa	=	=	=	=	=
Shoa	4.6	4.87	4.98	4.02	3.58
Sidamo	=	=	=	=	=
Tigrai	4.9	5.51	5.75	4.38	4.13
Wellega	=	=	=	=	=
Wollo	3.9	5.16	5.72	3.52	3.36
TOTAL	5.2	5.43	5.53	4.50	4.02

Table 3.1

PRODUCTION OF TEFF IN 1978/79(1971E.C)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973 E.C.)

Region	Production	Production forecasted			
	in	version I		version II	
	1978/79	1979/80	1980/81	1979/80	1980/81
	(1971E.C)	(1972E.C)	(1973E.C)	(1972E.C)	(1973E.C)
		thousand quintals			
Arssi	328.4	372.5	420.24	339.21	352.07
Bale	53.3	60.5	70.00	63.32	74.09
Eritrea	212.6	223.5	235.99	218.25	220.62
Gamo Goff	62.7	63.6	64.64	65.42	68.03
Gojam	1809.6	1797.5	1880.85	1750.00	1651.14
Gondar	2059.0	2320.9	2623.37	1939.51	1775.79
Hararge	18.2	22.9	23.66	20.65	23.17
Illibabor	325.4	366.4	410.26	388.89	460.21
Kefa	914.1	967.5	1027.73	1108.88	1325.94
Shoa	2687.1	2766.6	2889.75	2798.22	2881.06
Sidamo	126.6	142.1	161.21	137.48	148.17
Tigrai	500.7	481.4	466.75	512.38	524.79
Wellega	830.1	808.0	786.44	852.23	881.34
Wollo	672.9	697.5	731.16	684.58	686.80
TOTAL	10600.7	11090.7	11792.05	10879.03	11073.22

Table 3.2

PRODUCTION OF BARLEY IN 1978/79(1971E.C)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973E.C.)

Region	Production in 1978/79 (1971E.C)	Production forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
	thousand quintals				
Arssi	1788.4	1967.31	2161.20	1774.60	1767.76
Bale	1049.5	1319.39	1665.38	1165.11	1262.66
Eritrea	141.6	145.10	150.20	137.52	131.59
Gamo Goffa	72.8	77.67	82.64	69.52	66.04
Gojam	372.4	371.95	380.81	344.79	312.23
Gondar	909.7	958.13	1017.02	841.22	756.04
Hararge	8.4	8.01	7.37	8.56	8.65
Illibabor	12.8	12.14	11.68	12.18	11.47
Kefa	182.7	195.76	207.60	193.28	201.17
Shoa	1125.5	1197.00	1307.61	1128.94	1118.90
Sidamo	179.3	195.13	219.06	181.05	181.15
Tigrai	192.4	193.80	194.25	187.80	183.08
Wellega	73.1	75.24	77.91	70.69	68.57
Wollo	21.9	21.60	21.95	20.17	18.37
TOTAL	6130.5	6738.23	7504.68	6135.43	6087.68

Table 3.3

PRODUCTION OF WHEAT IN 1978/79(1971E.C)
AND FORECASTS FOR 1979/80(1972E.C)
AND 1980/81(1973E.C.)

Region	Production in 1978/79 (1971E.C)	Production forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand quintals			
Arssi	2033.0	2116.88	2194.11	2086.53	2183.96
Bale	408.2	515.57	633.79	454.91	503.13
Eritrea	75.4	81.05	84.97	73.48	71.26
Gamo Goffa	3.9	4.25	4.48	3.53	3.20
Gojam	199.6	200.62	201.60	183.62	167.13
Gondar	111.2	113.94	116.43	102.50	93.35
Hararge	34.7	32.57	30.28	34.27	33.68
Illibabor	3.7	3.88	3.96	3.14	2.63
Kefa	86.2	81.64	79.48	86.21	85.49
Shoa	823.9	915.38	993.55	836.67	851.65
Sidamo	6.5	7.00	7.30	6.16	5.83
Tigrai	200.2	211.97	218.03	195.83	193.29
wellega	11.7	11.69	11.53	10.74	9.91
Wollo	184.9	186.87	187.40	176.76	168.17
TOTAL	4183.1	4483.31	4766.91	4254.35	4372.68

Table 3.4

PRODUCTION OF MAIZE IN 1978/79(1971E.C)
AND FORECASTS FOR 1979/80(1972E.C)
AND 1980/81(1973 E.C)

Region	Production in 1978/79 (1971E.C)	Production forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand quintals			
Arssi	651.4	689.76	718.66	657.10	681.01
Bale	47.1	53.63	59.52	52.83	59.24
Eritrea	124.7	132.73	139.19	125.39	126.37
Gamo Goffa	209.2	229.40	247.99	206.15	205.78
Gojam	323.8	263.06	231.88	307.84	292.60
Gondar	186.1	157.22	140.94	177.73	169.16
Hararge	302.8	300.64	296.98	309.29	316.79
Illibabor	539.9	573.99	603.33	643.52	776.80
Kefa	1452.1	1644.87	1816.88	1790.81	2238.52
Shoa	3016.0	3279.61	3518.51	3169.70	3387.37
Sidamo	899.8	1073.40	1228.39	940.48	996.98
Tigrai	93.1	96.41	100.03	93.94	96.23
Wellega	727.2	940.81	1131.03	736.78	768.75
Wollo	68.0	71.55	74.17	66.07	64.38
TOTAL	8641.2	9507.08	9947.50	9277.64	10179.98

Table 3.5

PRODUCTION OF SORGHUM IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973E.C.)

Region	Production	Production forecasted			
	in	version I		version II	
	1978/79	1979/80	1980/81	1979/80	1980/81
	(1971E.C)	(1972E.C)	(1973E.C)	(1972E.C)	(1973E.C)
		thousand quintals			
Arssi	376.2	412.26	427.49	362.52	354.45
Bale	9.5	9.80	9.83	9.55	9.54
Eritrea	727.1	710.27	688.39	676.54	626.20
Gamo					
Goffa	36.5	40.89	42.83	33.31	30.45
Gojam	58.8	62.95	63.78	51.08	43.94
Gondar	601.9	535.94	506.24	551.94	498.86
Hararge	1230.7	1311.64	1336.88	1209.39	1180.83
Illibabor	168.7	179.34	184.80	179.55	190.95
Kefa	202.7	257.38	285.49	211.00	218.39
Shoa	1564.9	1792.00	1900.15	1588.89	1619.38
Sidamo	18.2	23.63	26.13	17.18	16.18
Tigrai	474.2	456.60	437.22	457.30	446.14
Wellega	482.7	549.10	578.58	469.48	464.59
Wollo	707.6	659.41	626.54	686.45	663.84
TOTAL	6659.7	7001.21	7114.26	6504.19	6363.74

Table 3.6

PRODUCTION OF MILLET IN 1978/79(1971E.C)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973E.C.)

Region	Production	Production forecasted			
	in	version I		version II	
	1978/79 (1971E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand quintals			
Arssi	=	=	=	=	=
Bale	5.0	5.30	5.67	5.38	5.75
Eritrea	232.1	272.95	336.73	217.48	200.95
Gamo Goffa	13.2	14.69	15.73	12.61	12.04
Gojam	440.0	404.04	414.47	395.85	348.53
Gondar	596.9	570.43	557.39	533.81	465.48
Hararge	8.1	7.83	8.05	8.32	8.49
Illibabor	62.8	73.39	72.35	64.24	65.03
Kefa	34.5	62.55	80.03	32.65	30.41
Shoa	16.7	23.49	27.30	14.96	13.35
Sidamo	=	=	=	=	=
Tigrai	237.5	321.80	370.05	226.07	215.19
Wellega	228.8	300.52	352.73	218.15	209.01
Wollo	4.0	4.17	4.95	3.63	3.28
TOTAL	1879.6	2061.16	2245.45	1733.16	1577.51

Table 3.7

PRODUCTION OF HORSE BEANS IN 1978/79(1971 E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81 (1973 E.C.)

Region	Production in 1978/79 (1971E.C)	Production forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand quintals			
Arssi	436.2	477.00	511.52	419.80	406.13
Bale	31.4	35.43	38.74	33.76	35.87
Eritrea	16.9	17.80	18.62	17.20	17.36
Gamo Goff	3.7	6.08	7.58	3.54	3.39
Gojam	237.0	240.92	246.95	214.99	191.56
Gondar	310.9	351.94	377.43	283.35	252.78
Hararge	12.7	11.13	10.12	12.91	13.02
Illibabor	1.9	4.86	7.48	1.66	1.43
Kefa	51.7	69.69	81.80	50.20	47.99
Shoa	1087.8	1194.27	1286.87	1066.10	1034.75
Sidamo	18.2	26.97	32.67	18.11	17.93
Tigrai	99.3	107.35	114.56	96.00	92.90
Wellega	23.5	28.25	30.80	22.44	21.51
Wollo	287.9	302.17	311.49	272.77	255.14
TOTAL	2619.1	2873.86	3076.63	2512.82	2391.77

Table 3.8

PRODUCTION OF CHICK PEAS IN 1978/79(1971 E.C)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973 E.C.)

Region	Production	Production forecasted			
	in	version I		version II	
	1978/79 (1971E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand quintals			
Arssi	7.9	7.65	7.63	7.14	6.44
Bale	0.8	1.33	1.18	0.80	0.80
Eritrea	26.4	28.26	29.74	25.52	24.39
Gamo Goffa	5.6	7.25	8.43	5.11	4.65
Gojam	18.00	21.43	23.69	15.15	12.73
Gondar	381.7	437.00	483.47	339.04	293.06
Hararge	1.4	0.94	0.64	1.39	1.37
Illibabor	9.9	11.14	11.94	8.91	7.91
Kefa	=	=	=	=	=
Shoa	207.3	236.19	263.20	190.64	173.03
Sidamo	25.2	27.91	29.88	24.11	22.86
Tigrai	61.9	59.04	59.13	57.96	54.10
Wellega	0.9	0.95	0.95	0.80	0.71
Wollo	6.7	7.18	7.51	5.80	4.97
TOTAL	753.8	846.27	927.39	682.48	607.02

Table 3.9

PRODUCTION OF HARICOT BEANS IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973 E.C.)

Region	Production in 1978/79 (1971E.C)	Production forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
	thousand quintals				
Arssi	5.3	5.02	4.98	4.91	4.56
Bale	=	=	=	=	=
Eritrea	=	=	=	=	=
Gamo Goffa	3.3	3.64	3.85	3.02	2.77
Gojam	=	=	=	=	=
Gondar	1.3	1.32	1.46	1.12	0.96
Hararge	5.6	5.03	5.26	5.65	5.71
Illibabor	2.6	2.26	2.11	2.17	1.78
Kefa	=	=	=	=	=
Shoa	71.4	67.44	64.27	73.93	77.48
Sidamo	25.5	28.01	26.89	26.96	28.76
Tigrai	1.2	1.56	1.74	1.08	0.96
Wellega	12.7	13.24	14.01	12.40	12.24
Wollo	=	=	=	=	=
TOTAL	128.5	127.52	124.57	131.25	135.22

Table 3.10

PRODUCTION OF FIELD PEAS IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972 E.C.)
AND 1980/81(1973 E.C.)

Region	Production in	Production forecasted			
		version I		version II	
	1978/79 (1971E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand quintals			
Arssi	88.6	91.05	94.23	87.74	88.31
Bale	99.2	121.58	145.77	111.02	124.25
Eritrea	35.8	37.94	39.60	36.37	36.97
Gamo Goffa	4.2	6.35	8.04	3.94	3.72
Gojam	70.0	68.41	68.52	64.81	59.82
Gondar	215.3	241.37	261.87	206.91	197.51
Hararge	3.1	2.21	1.71	3.13	3.16
Illibabor	7.1	8.55	9.59	6.51	5.95
Kefa	100.9	116.20	128.91	105.68	110.76
Shoa	157.1	174.52	192.55	154.47	152.96
Sidamo	15.0	15.31	15.34	14.97	15.00
Tigrai	23.2	24.97	26.64	22.86	22.74
Wellega	15.3	15.95	16.31	14.64	14.17
Wollo	27.8	28.62	29.31	26.00	24.31
TOTAL	862.6	953.03	1038.39	859.65	859.63

Table 3.11

PRODUCTION OF LENTILS IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C.)
AND 1980/81(1973 E.C.)

Region	Production	Production forecasted			
	in	version I		version II	
	1978/79 (1971E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand quintals			
Arssi	16.6	19.67	21.47	14.97	13.54
Bale	9.9	9.25	8.79	10.15	10.31
Eritrea	24.3	23.50	23.27	23.13	21.85
Gamo Goffa	0.1	0.39	0.36	0.10	0.10
Gojam	7.1	7.25	7.24	6.01	5.07
Gondar	49.0	57.20	61.14	42.26	35.96
Hararge	4.0	3.10	2.52	4.00	3.98
Illibabor	=	=	=	=	=
Kefa	=	=	=	=	=
Shoa	06.2	128.10	150.25	82.87	70.80
Sidamo	=	=	=	=	=
Tigrai	17.5	18.03	17.37	16.21	15.45
Wellega	12.4	11.39	10.30	11.27	10.28
Wollo	29.8	28.75	30.00	25.90	22.31
TOTAL	266.9	306.63	332.71	236.91	209.69

Table 3.12

PRODUCTION OF NEUG IN 1978/79(1971E.C.)
AND FORECASTS FOR 1979/80(1972E.C)
AND 1980/81(1973E.C.)

Region	Production in 1978/79 (1971E.C)	Production forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand quintals			
Arssi	0.9	1.05	1.25	0.87	0.84
Bale	=	=	=	=	=
Eritrea	=	=	=	=	=
Gamo Goffa	=	=	=	=	=
Gojam	92.6	90.84	104.84	80.81	70.62
Gondar	113.6	111.34	108.82	100.80	89.35
Hararge	=	=	=	=	=
Illibabor	4.6	5.31	5.91	4.20	3.84
Kefa	6.1	7.30	8.35	5.25	4.49
Shoa	11.6	13.57	15.29	10.26	9.13
Sidamo	=	=	=	=	=
Tigrai	9.7	11.50	11.79	9.48	9.34
Wellega	91.6	93.44	97.00	85.29	81.09
Wollo	0.5	0.53	0.13	0.45	0.41
TOTAL	331.2	334.88	353.36	313.6	286.33

Table 3.13

PRODUCTION OF FLAX IN 1978/79(1971E.C)
AND FORECASTS FOR 1979/80(1972E.C)
AND 1980/81(1973 E.C)

Region	Production in	Production forecasted			
		version I		version II	
	1978/79 (1971E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
	thousand quintals				
Arssi	27.3	26.50	27.30	26.08	25.14
Bale	15.2	16.10	17.25	16.18	17.22
Eritrea	36.7	38.24	40.13	37.43	38.23
Gamo Goffa	=	=	=	=	=
Gojam	25.3	25.50	27.01	22.49	19.81
Gondar	7.1	7.72	8.17	6.09	5.15
Hararge	=	=	=	=	=
Illibabor	=	=	=	=	=
Kefa	=	=	=	=	=
Shoa	12.3	16.83	20.53	10.42	8.73
Sidamo	=	=	=	=	=
Tigrai	7.2	8.99	9.95	6.49	5.83
Wellega	1.1	1.16	1.18	0.84	0.63
Wollo	3.5	3.33	3.35	2.76	2.13
TOTAL	135.4	144.37	154.87	128.78	122.87

Table 3.14

PRODUCTION OF VETCH IN 1978/79(1971 E.C.)
AND FORECASTS FOR 1979/80(1972E.C)
AND 1980/81(1973 E.C.)

Region	Production in 1978/79 (1971E.C)	Production forecasted			
		version I		version II	
		1979/80 (1972E.C)	1980/81 (1973E.C)	1979/80 (1972E.C)	1980/81 (1973E.C)
		thousand quintals			
Arssi	4.0	4.41	4.77	3.75	3.54
Bale	=	=	=	=	=
Eritrea	43.1	47.54	54.34	42.10	41.36
Gamo Goffa	=	=	=	=	=
Gojam	27.9	29.33	30.93	24.52	21.61
Gondar	111.9	113.74	120.63	100.75	90.81
Hararge	=	=	=	=	=
Illibabor	=	=	=	=	=
Kefa	=	=	=	=	=
Shoa	60.0	65.79	69.17	54.33	49.68
Sidamo	=	=	=	=	=
Tigrai	37.3	44.91	48.36	35.72	34.74
Wellega	=	=	=	=	=
Wollo	15.3	20.33	21.39	13.85	12.57
TOTAL	299.5	326.05	349.59	275.02	254.31