CHANGES IN THE GRAIN AND LIVESTOCK ECONOMIES OF ITALY WITH PROJECTIONS TO 1970 AND 1975

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ABSTRACT

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by Fred Allen Mangum, Jr.

The six nations of the European Economic Community purchase almost one-third of U.S. agricultural exports for dollars. The effects of the Common Agricultural Policy on European Agriculture and the Communities' success in meeting its needs for increased meat and feed grains is of primary importance to U.S. agriculture. This study focused on changes in Italian agriculture as part of an overall study of agriculture in the EEC.

The specific objectives of the study were to describe the present state of Italian agriculture, make supply projections of wheat, feed grains and livestock products for 1970 and 1975 and given demand projections estimate the supply-demand balance of each commodity. Special attention was devoted to the effect of price changes expected under the CAP and to social-legal-political factors that condition adjustment to price change. Where possible the supply estimates were quantified by fitting linear regression equations to production data. But under Italian conditions the nonprice effects were often found to be more important than price change in determining production.

The major conclusions were concerned with probable commodity supply and import needs. Surface in wheat will continue to decline but production will remain little changed as yields increase. Wheat was found to be the only grain responsive to price change and supply elasticity estimates of 0.56, 0.39 and 0.45 were obtained for the north, central and southern regions of the country. If the higher of two price projections is realized, 1975 output will exceed Italian consumption by 689 thousand tons but at the 1975 lower price and in 1970 only slight surpluses are expected.

A large deficit is projected for feed grains even though higher prices are expected under the CAP. Feed grain production however, showed almost no response to price change. Corn represents 92 percent of domestic feed grain production and output has been increasing even though surface has declined. At expected prices and yields of this grain, hybrid corn will replace wheat where irrigation is possible in the north. The expected feed grain deficit in 1970 is projected to be near seven million tons and by 1975 will be between 8.5 and 9.5 million tons of grain.

Generating this strong increase in feed grain requirements is an expanding livestock and poultry industry. Regression results indicate a 0.30 percent change in cattle numbers is associated with a one percent change in cattle prices in regions outside the north and slightly less in the dairy region of northern Italy. At the considerable price increase expected for beef in 1975 this should call for a substantial increase in beef production but farm structure on cattle producing farms does not permit rapid or large shifts. A deficit of approximately one million tons of beef and veal is expected by 1975 when the country's self-sufficiency rate will be less than 40 percent. The increase that is expected in cattle numbers and increased milk production per cow will mean rising supplies of milk even though Italian milk prices will be lower under EEC policy. Increased consumption will likely absorb the greater output at all levels except the high price assumption for beef in 1975. But the milk industry is expected to be under increased pressure because of French exports of fresh milk and milk products.

Production of pork and poultry will more nearly equal consumption needs. Poultry in particular has experienced rapid expansion and will continue even though prices are expected to move lower. Poultry meat production is expected to increase from 340 thousand tons in 1964-65 to 429 in 1970 and 565 in 1975.

In 1970 the country would still be expected to import 91 thousand tons of poultry meat and in 1975 between 70 and 95 thousand tons. By contrast, almost all pork consumption is projected to come from domestic production.

The conclusion is reached that Italy will be a growing market in world trade of feed grains and beef. Part of its grain needs will be supplied by its EEC partners and some imports of meat and grains will be tied to export sales of manufactured products. But U.S. farmers will be able to sell increasing quantities of feed grains on the Italian market.

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WEIGHTS, MEASURES AND CONVERSION TABLE

1 Acre	=	.4047 Hectares
1 Dollar	=	624 Lire
1 Gallon	=	3.785 Liters
1 Hectare	=	2.471 Acres
1 Hectoliter	=	100 Liters
1 Hundredweight	=	.508 Quintals
1 Kilogram	=	1,000 Grams
1 Kilogram	=	2.2046 Lbs.
100 Kilograms	=	1 Quintal
1000 Kilograms	=	1 Metric Ton
1 Kilometer	=	1,000 Meters
1 Kilometer	=	.6214 Mile
1 Kilometer, Square	=	100 Hectares
1 Liter	=	1.057 Quarts (liquid)
1 Lb.	=	.4536 Kilogram
1 Lb.	=	453.6 Grams
1 Meter	=	1.094 Yards = 3.281 Feet
1 Metric Ton	=	2,204 Lbs.
1 Mile	=	1.609 Kilometers
1 Quintal	=	100 Kilograms
1 Quintal	=	1.97 CWT
10 Quintals	=	1 Metric Ton

CHAPTER I

INTRODUCTION

The Problem and Its Importance

The six nations of the European Economic Community annually purchase almost one-third of U.S. agricultural exports for dollars. In 1965 the value of farm products sold to the Community amounted to 1.6 billion dollars, almost half in grain and animal products. Exports to the EEC of feed grains alone increased 134 percent from 1960-1965 with Italy ranking second in importance among the six. Its total U.S. farm imports of $290 million ranked it third in the EEC. Obviously, any changes affecting a market of this size has major import to American farmers and exporters and indirectly affects the urban population through changes in specialization and productive efficiency.

The Common Agricultural Policy with provisions for harmonized prices in the six countries at levels generally above world prices, combined with restrictive import provisions and subsidies aimed at improving technology and farm and market structure represent such a change. The expansionist effects of these provisions are easily visualized in the U.S. farm setting. Questions are immediately raised as to their impact on European agriculture, the patterns of trade within the member countries and the implications for exports of U.S. farm commodities.

This research was undertaken to answer these questions for the cereal-livestock sector. The complete research plan included four subprojects: two related to changes in supply of these products, one on prices and marketing and a fourth on regional adjustments in the EEC including demand projections and expected trade patterns. This project focuses specifically on the present and projected supply of grain-livestock commodities in Italy in response to changing prices, shifts in structure and improved technology. By providing answers to the questions raised above, information is offered which may prove useful to decision making at farm, business and governmental levels in both Italy and the United States.

Objectives

The uncertainty created by the Common Agricultural Policy regarding future Italian farm output and import needs leads directly to the objectives of the research. Specifically, these are: (1) to describe the present state of Italian agriculture, isolating the key variables that condition the rates of change in output, (2) given expected equilibrium prices from Subproject III make projections of 1970 and 1975 hectarage, yield and production of wheat and feed grains and number of animals and poultry and yield of meat, milk and eggs and (3) given demand projections for the same years estimate supply-demand balances for each group of commodities and the net deficit or surplus position of Italian agriculture. In meeting these objectives supply response coefficients and information on the future cereal-livestock economy will be presented in sufficiently flexible form that adjustments to projections can be made as dictated by new conditions.

The Data and Its Limitations

The basic data source was government statistics published by the Istituto Centrale di Statistica. These statistics, published as annual averages for each of 19 geographic regions (except for poultry), were aggregated into four major areas: north, central, south and islands to describe historical changes and make projections.

The Istituto obtains price data from local chambers of commerce which report a weekly commodity price unweighted by quantity or quality sold, payment terms or local market conditions. Production data is obtained from a stratified sample of farms in 92 provinces.[1] Each province is divided into regions and each of these into fractions, a total of 552 sampling fractions. Stratification is both geographic

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[1]The sampling procedure is detailed in: Istituto Centrale di Statistica, "Rilevazioni Campionarie delle Produzioni Agrarie," Metodi e Norme della Istituto Centrale di Statistica (Roma: December, 1960), pp. 11-26.

and by classes of productivity for each crop determined from a preliminary analysis. Size of sample is determined by the number of agricultural fractions, the proportion of land occupied by the crop considered, production per unit and the variability of production. Generally, 10 per- cent of the agricultural fractions in each region are sampled but the proportion for livestock is probably less. Offi- cial statistics were supplemented with translations of pub- lished scientific papers, data from chambers of commerce in various cities and interviews with university and government officials and farmers and industry personnel.

Estimates of variance or errors in the data are not available. Many Italians do have a tendency to discredit the reliability of statistics and without doubt there are many inaccuracies in reporting and compiling farm data. Very likely these errors are biased so that production is underestimated given Italian farmers' hesitancy to report production data. Underestimation is particularly evident in poultry and livestock although some checks are available from slaughter plants. With expected improvements in methods of gathering and compiling statistics, future production data will become more reliable and will probably show increases at rates greater than in the past as the underestimation prob- lem is overcome. Data in its present form makes it difficult to draw exact conclusions regarding farmers response to price changes.

Assumptions and Methodology

Agricultural adjustments in Italy are highly interdependent with development in the general economy and with public policy emphasis. The level of economic activity strongly influences demand for farm products on the one hand and preconditions the rate of structural and technological change governing supply on the other. Thus, projections in this study proceed within a framework of assumptions regarding the Italian, the Common Market and the world economies. These assumptions are:

(1) The EEC will remain a viable organization capable and willing to administer the Common Agricultural Policy according to agreed on conditions that become effective July 1, 1967 or shortly thereafter.

(2) Italian and EEC population and gross national product will continue to grow at approximately the same rates as in the past decade.

(3) The present trends in popular consumption habits including rising effective demand for meats will be continued.

(4) No major political realignments or decisions will occur that change Italian appropriations for agriculture from the amount presently budgeted up to 1972 or prevent its continuation to 1975 at rates substantially different from the present Green Plan.

(5) The general price level is expected to rise approximately three percent per year.

Within this setting the present agricultural situation is described in Chapter II, keynoting the dimensions of producing units, the changes that have been occurring and their implications for production and the institutional and nonprice variables for which quantification is difficult if not impossible. With this as background, two major sets of projections are made, one for grains and one for livestock. These appear in Chapters III and IV respectively and emphasize the role of price in producer decisions. Crop and livestock projections are then integrated in Chapter V to estimate meat and feed grain balances and external requirements to meet expected 1970 and 1975 consumption. Finally, after considering the likely effects of EEC prices on Italian production, the implications of the country's grain-livestock needs are discussed in terms of U.S. trade.

To develop these projections a research procedure was needed that would indicate farmer's response to price changes as well as the social, political and institutional rigidities preventing optimal adjustments to price. Perhaps the most desirable approach would be to construct individual farm supply functions allowing for alternative techniques of production, variable quantities of resources and different levels of product prices. Assuming aggregation is possible macro-level supply functions would be the horizontal summation of each firm's supply. But this approach is not feasible for this study because of the difficulty of delineating homogeneous production regions in Italy and the time and expense of obtaining adequate input-output coefficients.

An alternative approach is the estimation of economic relationships by fitting a linear equation to time series data. This procedure permits the estimation of supply response to own price changes while at the same time the effects of changes in factor prices and prices of competing commodities that shift the supply function can be estimated. To make the model dynamic a time variable can serve as an estimate of the effect of structural change on output. This procedure would answer the questions raised earlier, namely, the effect of changed commodity prices under EEC policy, increased feed grain prices on livestock production and substitutions between grains at different price ratios. Unfortunately, the use of regression has several disadvantages in estimating supply functions. Three are especially noteworthy: (1) Technological change, developments in institutions and structure and changes in government program emphasis limit the usefulness of coefficients based on historical time series, (2) multicollinearity among price series often limits the number of price variables that may be considered and (3) data, especially in Italy, is often unavailable or questionable.

The procedure followed was to rely on regression results to explain past changes in grain surface and livestock numbers. Regressions were run for each of four geographic regions for each commodity of interest. The response to price was emphasized and estimates of supply elasticities were derived in each case. The equations were also of value in quantifying the effect of other variables such as wheat price on planted surface of feed grains and feed grain prices in the production of poultry and livestock products.

Recognizing that past statistical relationships may not correctly interpret future changes, the analysis relies heavily on judgments of specialists in many phases of Italian agriculture. Over 100 interviews in the course of a one year residence in Italy provided a consensus of opinion from researchers, extension and industry personnel and farmers as to the likely course of development of the grain-livestock economy in each of the four geographic areas. This background of information was relied upon in adjusting the regression coefficients before making projections.

Macro-level supply estimates at this level of aggregation have a propensity for error if projections are made with no consideration given to changes in net income at the firm level. To overcome this shortcoming input-output data were obtained to budget expected income at present price and yield relationships and under conditions expected in 1970 and 1975. If producer level income estimates were consistent with projections of grain surface or livestock numbers it was considered supporting evidence and conversely, if net income declined when quantitative estimates indicated an output expansion, the projection was either adjusted downward or the failure to agree was justified.

The remaining steps in making crop projections were to estimate yields per hectare and combine these with the regional estimates of hectares planted. Yields were assumed to change smoothly through time as average utilization of improved seed, chemical fertilizers and irrigation increased. Therefore, annual average yields in each region were regressed against time and extrapolated to 1970 and 1975. Again, if crop production specialists had indicated that rates of change in the sample period were not expected to be comparable to future changes, adjustments in the trend coefficients were made. Multiplication of projected surface and yield provided the desired production estimates for each region and these in turn were summed for the national total.

Livestock production estimates followed the same general procedure. While qualified regression equations provided estimates of livestock numbers the expected yield per animal or bird was primarily on the basis of past trends and judgment of future prospects. Published research of feeding trials and carcass yields weighed heavily in making yield estimates. In the case of pork and beef, annual estimates of number slaughtered from the total number of animals on farms was necessary. These figures were based on past slaughter rates at appropriate points on the production cycle.

The procedure employed has the limitations common to most projection studies. In particular the effect of changing farm and market structure and the imprecise data on Italian agriculture are cause for concern. By rejecting numerical estimates when personal judgment and advice of Italian assistants indicated doing so, it is hoped that these problems are largely overcome. Unfortunately, results from such analysis are not always quantitative or subject to statements regarding standard errors or confidence limits. Yet, even approximations as to direction and magnitude of change should provide useful information for long-range planning of U.S. farm production and export potential.

CHAPTER II

THE ITALIAN ECONOMY AND AGRICULTURAL DEVELOPMENT

The possibility for improvement of any nation's agriculture is closely related to the economic development of the country. The interrelated growth of both the farm and nonfarm sectors is of greater importance in Italy than in many countries because of the prominent role of agriculture. The present chapter describes the national economy and the structure of agriculture to provide a better understanding of the economic environment within which agricultural growth must occur.

The General Economy

Geography and Climate

The national territorial surface is equal to 301.2 thousand square kilometers. Of this surface, 39 percent is classed as mountainous, 40 percent as hills and 21 percent in plains. This distribution and the location of the distinguishing topographical features are shown in Figure II-1. The principal mountain chains are the Alps across the northern border and the Apennines which run the length of the country.

FIGURE II-1. ITALY WITH TOPOGRAPHICAL FEATURES AND LOCATION OF PRINCIPAL POPULATION CENTERS

The figure also illustrates the political subdivision of the country into 19 regions and its major urban centers. At the end of 1963, of the 8,046 Italian communes, four had more than one million resident inhabitants (Rome 2,378,978; Milan 1,657,640; Naples 1,204,041 and Turin 1,114,300).

The protective Alps along the northern border and the proximity to the Mediterranean Sea provide the typically mild, semi-arid climate of the Mediterranean region. In the Po Valley Plain, the principal agricultural region, the average annual temperature is about 55^{o}F. with annual temperature fluctuations of about 64^{o}. In Sicily, the average is about 64^{o}. The combination of length, location and topography contribute to a sharp diversity within the country in respect to growing conditions and type of agriculture.

Wide regional differences occur in quantity and distribution of rainfall. The general average in the north is about 50 inches although rainfall in parts of the Alps exceeds 80 inches. Parts of Sicily and Sardinia receive less than 20 inches annually. Most of the precipitation in the south occurs in winter with very dry summers. In the Alps rainfall is concentrated in summer with considerable snow in winter.

National Income

Italian national income, while low relative to other western countries, grew at a compound rate of 6.6 percent from 1949 to 1963 and only in the latter year did evidence appear of a slowing trend. The progress of GNP in current prices and in real terms is shown in Table II-1. From 1957 to 1965 national income at current prices has risen an average (geometrical average) 8.92 percent per year. The accompanying degree of inflation may be noted by observing that national income in real terms (1963 prices) has risen by 5.02 percent per year (geometrical average). Even so, the increase in real terms exceeds the average for most market economies.

Four basic factors are of paramount importance in explaining the growth of the post-war Italian economy.[1] (1) Its previously low level of technology experienced a jump in productivity when barriers to assimilation were removed (the advantage of being a late-comer). (2) Plentiful supplies of unutilized or underutilized manpower became better employed through the addition of technology, investment and shifts of labor from less to more productive uses. (3) An outburst of entrepreneurship that was associated to a large degree with the use of American aid and business experience and the establishment of the European Common Market. (4) The integration of Italy into the world market and the

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[1]G. Fua, Research on Italian Economic Development, 1861-1964, S.S.R.C. team, Faculty of Economics (Ancona: June, 1965), unpub. manuscript, p. 1.

TABLE II-1. GROSS NATIONAL INCOME AT CURRENT PRICES AND 1963 PRICES, 1951-1965.

Year	GNP at Current Prices and Factor Costs (millions)	Percent Change From the Preceding Year	GNP at 1963 Prices and Factor Costs (millions)	Percent Change From the Preceding Year
1951	10,499	-	15,370	-
1952	11,289	7.5	16,046	4.3
1953	12,486	10.6	17,266	7.6
1954	13,324	6.7	17,940	3.9
1955	14,641	9.8	19,104	6.4
1956	15,908	8.6	19,969	4.5
1957	17,081	7.3	21,045	5.3
1958	18,340	7.3	22,080	4.9
1959	19,437	5.9	23,512	6.4
1960	21,071	8.4	24,993	6.2
1961	23,363	10.8	26,945	7.8
1962	26,330	12.6	28,618	6.2
1963	30,193	14.6	30,193	5.5
1964	33,112	9.6	31,015	2.7
1965	35,460	7.0	32,084	3.4

Source: Istituto Centrale di Statistica, "I Conti Nazionali Dell'Italia" Nuova Serie-Anni 1951-1965, Supplemento al Bullettino Mensile di Statistica. No. 3 (Roma: Marzo, 1966).

exceptional expansion of world trade after the war. In assessing the potential for future growth the expected behavior of these factors and others must be considered. One that is of critical importance to its competitive position in the world and to internal price stability is the labor situation. The plentiful supply of labor no longer exists. Skilled labor has always been in short supply but in the late fifties increased employment combined with emigration has made unskilled labor scarce in some industrial centers.

Labor presents an especially difficult problem for the economy because of the scala mobile clause. This sliding scale for automatic wage increases is tied to the cost of living index, and a very minor rise in the index during a three-month period means an increase in labor costs out of proportion to the living index boost. Unless the cost of living index remains absolutely stable or decreases, salaries increase a one point minimum every three months. Each time the scale goes up a point, $54.4 million is pumped into the economy through higher wages and salaries, and total cost to employers rises $64 million with additional fringe benefits.

The record shows that since February, 1962, the sliding scale has moved up a total of 35 points.[2] The result is

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[2] Rome Daily American, May 15, 1966.

a rise of $2.24 billion in increased labor costs during the past four years. The effect of wage growth exceeding the growth of productivity leading to inflation and a deficit in the balance of payments is attributed by one study as the cause of the 1963-64 recession.[3]

The important point for Italy's future growth is not the fact of wages rising faster than productivity (although this surely determines in large measure the rate of inflation and affects the income distribution among various groups) but the relative rate of price increase compared to its trading partners, especially in the EEC. The index of wholesale prices (1958 = 100) stands in 1964 at 110 exceeded only by France in the EEC at 119 and the consumer price index of 124 is the highest in the EEC.[4] (Since 1964, there has been a greater relative price rise in the Netherlands so that the December, 1965 wholesale index of 113 equaled that of the Netherlands but still remained second in the EEC to France at 123.)

In looking to the future, official policy expectations are for an increase in national income from 29,050 million lire in 1964 to 37,100 in 1969, a rate of increase of five

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[3]Augusto Graziani, "Konjunktur - und Entwicklungspolitik in Italien," Zeitschrift Für Die Gesonte Staatswissensehaft, Vol. 121, No. 4 (October, 1965).

[4]Istituto Centrale di Statistica, Annuario Statistico Italiano (Roma: 1965), p. 457.

percent per year.[5] Industrial development, expected to increase at the rate of seven percent per year, is projected to provide over half of the increased national income.

Population and Labor Force

Italian population has increased steadily during this century except for dips connected with the two world wars. Total population for the two most recent census years has increased an annual average of 0.576 percent per year. In more recent years (1961-1964) the rate of increase has been higher because of two recent developments. First, both birth rates and death rates have been declining as the country develops. But the death rate has been declining at a faster pace (the 1950-51 average excess of births over deaths was 403,853 compared with a 1964-65 average of 502,436).[6] The result is a net addition each year to population. The second stimulus to population growth is the reduction in out-migration as new job opportunities are provided within the country by economic growth.

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[5]Ministro del Bilancio, Progetto di Programma di Suiluppo Economico per il Quinquennio 1965-69. (Roma: Presented to Consiglio dei Ministri January 21, 1965). Because its passage was delayed in parliament, the plan will actually cover the period 1966-1971. The first development plan was extended to cover the 1965 period.

[6]The rate per 1000 inhabitants in 1964 was: birth, 19.5 and death, 9.4. European Community Statistical Office, General Statistical Bulletin, No. 2 (1966).

The trend in population increase has not been constant among the four geographic regions. The industrialized north grew at a faster rate than the national average between census years and even faster in the 1961-64 period. The south lags considerably and continues to experience out-migration. In the last three years some improvement is noted as development efforts begin to be fruitful (the higher growth rates may also reflect inconsistencies in data). Looking to the future, one may expect a continued increase in population. This growth will continue to favor the north in absolute numbers but in percentage terms the south will likely continue its pace of the last three years. A continued declining growth rate may be expected in the center associated with the depopulation of hills and mountains.

Its relatively large population has in the past provided an abundant labor supply and in fact, unemployment and underemployment remain a major preoccupation with policy makers. As late as 1964, 67.7 percent of the population was in the working age brackets of 14-65. However, only 20,130 thousand or 39 percent are classed as regularly occupied. Employment by sector in 1964 was: agriculture 24.4 percent, industry 39.4 percent, services 31.5 percent, and unemployed 2.7 percent. Some special features of the labor market include the periodical oscillations between agricultural and nonagricultural activities, the high proportion of young, school-age children in the labor force and the large fringe of marginally employed workers who are taken on and dismissed in response to short-run cyclical fluctuations and the improvements in quality noted in recent years.

The labor force has not grown at the same rate as population. The growth rate was little more than half the rate of population growth between the two census years and essentially static in the more recent period. The labor force in the south and islands grew at a faster rate in the 1951-61 period than did the national average. In the recession period of 1961-64, these two regions experienced actual decreases in the numbers of people employed.

In coming years several factors are expected to influence the size of the labor force.[7] These include: (1) a longer period of formal education before entering the labor force, (2) the increase in number of women working, (3) the earlier retirement age that usually accompanies economic progress and (4) emigration. One may on balance expect a future labor force enlarged in both absolute numbers and as a percent of total population. (Perhaps more important will be qualitative improvements expected from more years of schooling and experience in technologically-related jobs.) This assumption reflects the anticipated growth in the economy that will provide job opportunities and the expected

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[7] Istituto Nazionale di Economia Agraria, Annuario dell' Agricoltura Italiano, Vol. XV (Roma: 1961), p. 37.

positive net effect of demographic factors.[8]

Agricultural Employment

Of special interest to this study is the past and future trend of employment in agriculture and the accompanying changes in agricultural structure. In the intercensal years of 1951-1961 there was an absolute decrease of 2,521 thousand persons in agriculture or an average decrease of 3.08 percent per year. From 1961-64 the rate of out-migration increased to just over four percent per year. Still the agricultural labor force remains at 24.7 percent of the total work force.

The out-migration has occurred at differing rates in the four geographic regions of Italy. In the earlier period the faster rate occurred in the north and center while in more recent years the exodus in the south was greater. This may reflect the recent emphasis on nonfarm job opportunities

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[8] It should be emphasized that the proportion of women in the nonfarm labor force is lower than in other developed countries. With rising wages and changes in customs that may be expected with economic growth, a higher proportion of women may be expected to work leading to a growth in the labor force. A negative factor associated with rising income levels will be the tendency for children to obtain more schooling and enter the labor force later. From 1951-1961 there was an absolute decrease of the active population employed less than 14 years of 244,000 persons. A similar tendency was noted between the two census years for persons over 65, the actual decrease being 293,000 persons.

in the southern region as well as the earlier reduction of salaried workers and share tenants, the two principal departing groups in the north. In this connection it is worthy of note that the number of family farmers actually increased by 4.3 percent from 1959-1963.[9] This is in response to government policy to promote family farming through its land reform program and favorable credit arrangements.

Even with these rates of decrease there remains a large surplus farm population. In projecting 1970 and 1975 farm employment several studies have relevant results. A SVIMEZ study predicts an out-migration of 100,000 persons from 1959-1975 (an average decrease of 1.8 percent per year).[10] This results in an expected 1975 estimate of 4,650,000. Since the 1966 figure has already decreased to 4,622,000 from a 1961 total of 5,657,446, we may conclude that the SVIMEZ estimate is too conservative.

A more recent study attempts to predict for 1970, 1975 and 1985 the number of surviving farmer families on the sole basis of demographic factors.[11] The study is based on 1,634,365

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[9]INEA, Annuario dell'Agricoltura Italiana, (Roma, issues of 1960 and 1964). This data is for individuals covered by social insurance.

[10]SVIMEZ (Associazione per la Sviluppo del'Industria nel Mezzogiorno) Trained Manpower Requirements for the Economic Development of Italy, Targets for 1975 (Roma: 1961), p. 13.

[11]Federazione Nazionale delle Casse Mutue Malattia per I Coltivatori Diretti, Famiglie senza Giovani, Ipotepi Demografiche in Ordine alla Diminuzione delle Imprese Coltivatrici nel 1970-75, 1985, No. 4, (Aprile, 1966).

families covered by the Unified Agricultural Contributary Service. Its results show that 58.5 percent of the farms are owned by families with no member less than 49 years of age. Farms operated by Mezzadria families have only 28.1 percent with no members less than 49. This lower figure is explained by a major exodus in previous years of entire sharecropper families. The results show an expected decrease of farm families due to aging alone of 9.74 percent (1.62 percent per year) to 1970 and 12.04 percent (1.09 percent per year) to 1975.

Further evidence of surplus Italian agricultural workers is found in an OECD report.[12] This estimates agricultural underemployment to be 34 percent of the 1960 available supply of farm labor. Given the 1960 level and pattern of output, this puts the surplus agricultural labor force at just over one million people with slightly less than half being farm families and the remainder hired laborers.

The 1965-69 economic development plan anticipates an absolute reduction of 730,000 farm workers in the five-year period, an average annual exodus of 3.05 percent. Over half of this number is expected to come from the south. These estimates are based on a growth of national income of five percent per year and of nonfarm employment of 2.05 percent per year.

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[12] OECD, Low Incomes in Agriculture, Problems and Policies, Agricultural Policy Report (Paris, 1964), p. 270.

For purposes of this study farm employment projection must give consideration to several critical variables: (1) the expected growth rate of the economy and the rate at which nonfarm jobs will be available, (2) the past trend of out-migration associated with different levels of economic growth, (3) the present age structure of the farm population, (4) government policy designed to maintain the family farm, (5) the law of 1964 that prohibits new Mezzadria contracts, (6) the rate of farm mechanization which is both a cause and effect of the exodus, and (7) farm versus nonfarm income differentials and social attitudes.

All of these factors with the exception of the policy to increase the number of family farms point to an even higher rate of out-migration. Over the period 1959-1965, when GNP grew at a rate of 6.6 percent per year at constant prices, a one percent growth in national income was associated with a 0.54 percent reduction in the farm labor force. Given the development plan projections of five percent per year in GNP this would indicate a decrease of 2.7 percent per year in the farm labor force. In actuality, the development plan predicts a decrease of 3.05 percent per year. This figure may not be over-ambitious in view of accompanying changes in the other variables listed. Therefore, for this study the development estimate of a 3.05 percent decrease per year is accepted.

Accepting these rates means a reduction of the farm work force from a 1964 level of 4,967 thousand (24.7 percent of the total work force) to a 1970 level of 4,058 thousand (19.1 percent) and a 1975 level of 3,300.6 thousand (14.9 percent). These are probably conservative estimates since the 1961-64 rate of exodus has been 4.06 percent per year. If, as we expect, the rate of exodus in the center equals the 1961-64 rate, the 1970 farm labor force would be slightly above four million persons and the 1975 estimate would be about 3 and 1/4 million.

The Agricultural Sector

Within the setting of the overall economy some special facets of the agricultural sector are of importance in conditioning its further development. Some of these stem from the physical environment, many are related to the customs of the country and others to government policies. Those which have been most important in determining the present state of agriculture or which may be expected to have considerable weight in determining its future course are discussed.

Land Use Patterns[13]

The diversity of growing conditions in Italy has already been stated. Differences in cropping patterns are derived principally from the climatic variation associated with the length of the country, the differences in altitude and the type of farm ownership and management.

Several attempts at classification have been made with perhaps the system used by Medici being most useful (see Figure II-2). By combining geographic, topographic, type of farm ownership and size of farm characteristics, he is able to delineate nine regions of agricultural homogeneity.

1. Alpine mountains: The extreme northern part of the country is formed by the Italian Alps. The area includes 4.5 million hectares that is of little agricultural importance. Land use is approximately 36 percent woodland, 28 percent native pasture and 11 percent fields and improved pasture. Only 3.9 percent is actually seeded land. Subsistence family farms account for most of the productive farm surface. Almost half of the Alpine territory belongs

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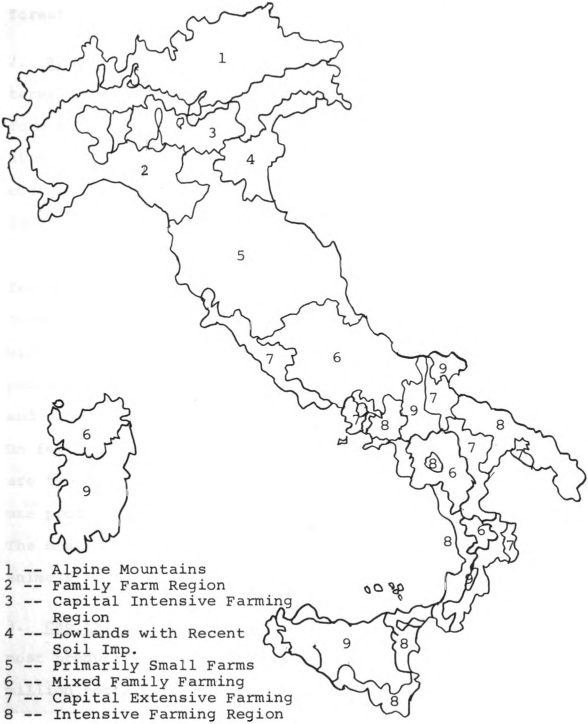
[13]The primary sources for material in this section are: Giuseppe Medici, Carta dei Tipi d'Impresa nel 'Agricoltura Italiana, Istituto Nazionale di Economia Agraria (Roma: 1958), p. 50.

and

Alessandro Antonietti and Carlo Vanzetti, Carta della Utilizzazione del Suolo d'Italia, Istituto Nazionale di Economia Agraria (Milano: 1961), p. 41.

FIGURE II-2. TYPE OF FARMING REGIONS IN ITALY



1 -- Alpine Mountains
2 -- Family Farm Region
3 -- Capital Intensive Farming Region
4 -- Lowlands with Recent Soil Imp.
5 -- Primarily Small Farms
6 -- Mixed Family Farming
7 -- Capital Extensive Farming
8 -- Intensive Farming Region
9 -- Large Estate Region

Source: Giuseppe Medici, <u>Carta dei Tipi d'Impresa nel 'Agricoltura Italiana</u>, Istituto Nazionale di Economia Agraria (Roma: 1958).

to public organizations or large private groups who control forest and pasture lands little used for cultivation.

2. Family farm region of the hills: The 4.3 million hectares comprising the pre-Alps, the Apennines and highlands form an arc across the north of Italy. The difficulty of hillside agriculture makes for small, fragmented, subsistence family enterprises spread over 90 percent of the productive farm surface.

Land use is extremely varied with wide differences manifested within small communities. Temporary forage crops cover 29 percent of the workable surface, followed by wheat with 23 percent and corn with 14 percent. The region, especially in and around the Piedmont, is famous for its wine and vineyards occupy a large proportion of land surface. On family farms, wheat and forage in a two-year rotation are typically interspersed with vines. Cattle in the hills are produced for meat and also provide the major power source. The small amount of milk produced is used as food for young animals or to produce cheese.

3. Capital intensive farming region of the plains: The most productive agriculture in Italy is found on about 1.5 million hectares of the Po River Basin. Deep, alluvial soils, well irrigated and relatively large mechanized farms make this one of Europe's best agricultural regions.

Rotations are important in establishing the pattern of land use. Forage covers over 50 percent of cropland surface and is cultivated throughout the region as part of the rotation or in permanent meadow. In Lombardia a unique water meadow is important that is flooded in winter for protection from the cold and drained in the growing season. In most areas, however, alfalfa is the dominant forage crop. Wheat, 27 percent of cropland; corn, 14 percent; and sugar beets, 2.5 percent are other generally grown crops. In Lombardia, two provinces, Vercelli and Novara, specialize in rice production, and tomatoes are important in the provinces of Parma and Piacenza. While such differences do occur the region is primarily a cereal-livestock area.

Cattle production is widespread. In the plains of the Piedmont meat production is of greatest importance. In Lombardia and Veneto milk production for the fresh market predominates, while in Emilia dairy cattle are kept to produce the Parmesan cheese for which the region is famous. This region also represents Italy's largest concentration of swine.

4. Low lands with recent soil improvements: The one million hectares of the Po Delta and its surrounding areas have in recent years experienced major soil reclamation and improvement efforts. With this program the traditional cereal culture has become more diversified. Wheat still occupies almost one-third of the cropland surface and corn more than 10 percent. But today sugar beets are planted on almost

18 percent of the surface, the highest concentration in the country. Forage has grown in importance and now temporary forage is produced on 33 percent of the crop surface. The Ferrara-Bologna area is the country's largest producer area of deciduous fruits and continues to expand this production.

5. Central Italy: This region in Figure II-2 is described as primarily small farm and mixed family farming. It is an area unfavored by topography and soil fertility. In Central Italy 37 percent of the area is mountainous, 54 percent is hills and only 9 percent plains. Farms are small, unmechanized and operated by sharecroppers and family farmers. Large-scale out-migration is rapidly forcing changes in the region's agriculture.

Wheat is the dominant crop. Even with low yields it provides a higher and more certain income than do alternative land uses. In recent years sugar beets have become more important as has land devoted to forage production. In the valleys tobacco and corn attain some importance. As in the hills of the north, cereals are often interspersed with grape vines and in this area olive trees also. This traditional cultural system is being reduced as larger units operated by full-time salaried workers increase at the expense of sharecropper systems.

6-8. Southern Italy: Three regions dominate the varied agriculture of the south. First, is a mixed farming area occupying 3.3 thousand hectares, mostly mountainous, with family farms operating almost two-thirds of the cropland. Wheat is cultivated on one-third of the surface and like other crops is usually mingled with grapes and olives. Vegetable plots and other subsistence crops are common.

A second classification is the region formerly composed of primarily large estates in the southwest part of the country. Forty percent of the workable land is planted to wheat, mostly of hard varieties. Much of the surface is the dry, arid land of the Mezzogiorno.

The third region is the 2.4 million hectares of an intensive farming area occupying the heel of the Italian boot and parts of the western coastline. The economy is based on trees and vines. Vineyards occupy more than a third of the surface and olives over two-fifths. Only in Puglia does wheat cover a large proportion of the surface. This is a region of large rolling fields almost completely mechanized and reminiscent of the wheat lands of the U.S. west.

9. The Islands: Sicily has about 2.6 million hectares of land divided almost equally into: (1) an intensive type of agriculture along the coasts largely devoted to tree fruits, nuts, citrus and grapes, and (2) the interior of the island which is a zone of large estates operated by renters and day laborers. In this zone hard wheat occupies over 40 percent of the planted surface.

Sardinia extends over 2.4 million hectares of unproductive, hilly land. It is chiefly a pastoral and cereal economy that has exhibited little change in cropping patterns.

Farm Size and Tenure

Italian supply response to EEC policies may well be more dependent on the rapidity with which structural and institutional changes can be made than on the relative changes in prices. Of the impediments to change, farm size, tenure and fragmentation are three of the most serious.

Data on the first two of these are presented in appendix tables one and two for the four major geographic regions of Italy. Type of tenure is shown in four categories: family farms, salary farms, *colonia parziaria* and other. Family farms can be owned or rented but the family supplies all labor except small amounts needed in peak labor periods. Salary farms may be owned or rented and are operated by hired labor on a fixed wage. *Colonia parziaria* are sharecroppers who may or may not have permanent rights in the land.

It is evident from appendix table 1 that Italy is a nation of family farms. For the country 81.2 percent of all farms are in this classification. In terms of surface cultivated almost 50 percent fall into this grouping (appendix table 2). The proportion of family farms in the total is fairly constant throughout Italy except in the center where the sharecropping arrangement is most prevalent.

The size distribution shows that all farms, especially family farms, are quite small. In 1961, 82 percent of the family farms were less than five hectares in size and only 17 thousand family farms of a total number of almost three and one-half million exceeded 50 hectares in size. The average size family farm was 3.8 hectares contrasted to a national average of 6.21 hectares.

Ranking second in number of farms and farm surface are the units operated by workers on fixed salaries. Almost eight percent of all Italian farms are operated in this manner and they account for over 34 percent of cultivated surface. The average size of salaried farms is 28 hectares and is quite large relative to other management types. In fact, 70 percent of Italian farms over 100 hectares in size are of this type and in total account for 6.7 million hectares of land.

The third type of tenure system is of most importance in Central Italy. Here 24.4 percent of the farms and 31 percent of the farm surface is cultivated by <u>colonia parziaria</u> or <u>mezzadria</u> as the system is known by in this area. Nationally, 7.4 percent of the farms and 11.8 percent of farm surface is in this tenure system. Average farm size is almost ten hectares or three times the average size of family farms.

The <u>mezzadria</u> is a centuries-old sharecropper system. The <u>mezzadro</u> provides his family's labor for cultivating the _podere_ or stabilized farm unit. It is somewhat unique in that the family has more-or-less lifetime rights to cultivate the land unless it voluntarily leaves the farm or in some cases when the land owner can show that through death or family members departing, sufficient labor to care for the soil is not available. Originally, landowner and _mezzadria_ shared equally in farm income. This was later changed to a 53 percent share for the owner and 47 percent for the _mezzadro_. In 1964 the law was again changed to provide the tenant 58 percent of the income and the landowner 42 percent.

In parts of Italy outside the center this share system may be called by different names and can exist without the rights to the land such as described for the _mezzadria_. It is usually of minor importance in these areas.

The last tenure type is listed in the official statistics as other. This mixed category is important only in the south and islands and includes several forms of renting cultivators as well as some _colonia parziaria_ without holdings. The number of these contracts have been decreasing because of their instability. The farmer renting the land has no guarantee from one year to the next of his holdings. Consequently, this type of cultivator has been one of the first to seek other opportunities or to be forced out by mechanization.

Substantial changes have been occurring in type of tenure, in location of farming activities and to some degree in farm size. It seems certain that these have effects on commodities produced and on productivity. An attempt has been made to quantify these changes in Appendix Table 2 by geographic area and by mountains, hills and plains.[14] This latter classification was included even though its preciseness is open to question because of the remarkable changes that appear to be associated with different height zones.

Appendix Table 2 shows a decrease in farm surface of slightly over one million hectares or 3.8 percent from 1948 to 1961. While part of this decrease is due to the normal attrition that may be expected with growing population demands, a large part is probably due to the noncomparability of the data from one period to the other.

Of greater interest is the location of change and the type of tenure involved. All of the surface decrease occurred in the mountain zones as large scale abandonment took place in these areas. Government land reform and reclamation were

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[14] Italy has had only one agricultural census and data from it is not directly comparable with the surface reported by Medici. The discrepancy is more than one million hectares since the Census does not include forests, uncultivated land, farmsteads and garden plots while the earlier study does. Tassininari has attempted an adjustment by adding the difference to the surface reported by the Census. He concludes that a fairly good comparison can be obtained by type of tenure but not for mountains, hills and plains because commune boundaries were changed in 1958. Therefore, the comparison in Appendix Table 2 should be viewed in the context of a direction of movement rather than absolute numbers.

primarily responsible for a 1.8 percent increase in surface in the plains and a very slight increase in the hills. This is further substantiated by noting that most of this increase occurred on family farms in the south and center of the country where the land reform program placed major emphasis.

In the north farm surface decreased in all height zones by about the same percentage. In the center the decrease of 30.5 percent in the mountains as family farms and *mezzadria* abandoned their land was the dominant change.

By type of tenure, the sharecropper system decreased most in both absolute and percentage terms. Further, this decrease occurred in all four geographic regions and in all height zones ranging from 70.1 percent in the mountains to 37.6 percent in the plains.

The greatest gain by type of tenure was land cultivated by salaried workers. The incidence of the increase occurred in descending order from 68.9 percent in the mountains to 47.5 percent in the hills to 13.0 percent in the plains. In percentage terms the gain in this system is approximately equal to the loss by the *mezzadria* everywhere but in the plains. Here the gain by family farmers equaled the increase by the commercial farms.

This shift is also noted by Campus who states, "In highly productive lands where it is possible to use machines, with good management and adaptability to markets, the family farm possibly with some salaried help is most suitable. On the contrary, where land is not very productive and mostly on the hill areas, salaried management is the only possibility of utilizing the land abandoned by farmers."[15]

These are precisely the changes that have been occurring. Land surface cultivated by sharecroppers and family farmers (this despite policy objectives to promote family farms) has been decreasing and that cultivated by salaried workers has been increasing. But ownership of family farms is important. Rented family farms decreased 36.6 percent while farms owned by the family actually increased 6.7 percent in the 13 year period. Like mezzadria farms, family farms tended to decrease in mountains and hills and to increase in the plains.

The trend indicated by Campus is quite evident. The more productive farmland in the plains that is amenable to mechanization is becoming a region of family farms. In the mountains and to a lesser degree, the hills, extensive farming patterns are being developed that rely on salaried workers.

This change in type of tenure and size in the higher elevations has important implications for cropping patterns and for the development of the cattle sector. The general

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[15] F. Campus, "Dynamics of Land Structure and Utilization in Economically Depressed Areas," Rivista di Economia Agraria, (Roma: 1965), pp. 249-332.

movement is to decrease surface planted to wheat and by consolidating smaller units provide grazing and forage production for a cow-calf system. This consolidation is dependent on the out-migration of family farmers and mezzadria in those areas.

One study has been made on the process of farm abandonment and its effect on farm size, type of tenure and cropland use.[16] The research was based on a 1962 survey of 5,328 abandoned farms in central Italy. A main conclusion is that farm abandonment in the past has primarily concerned the mezzadria system. Of 85,068 abandoned hectares in the survey, 73,270 had been operated under this type of tenure and almost 62,000 hectares were located in the hills and mountains. Family farms were also largely abandoned in the mountains. The results for different time periods are revealing (Table II-2). There is a successive increase in farm abandonment over the period covered. Although not pointed out in the study, this is likely tied closely to the availability of job opportunities as the economy grew in this period.

The concentration of out-migration by height zones also exhibits an interesting pattern. In the earlier period

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[16] Enzo Di Cocco, La Dinamica della Utilizzazione dei Terreni, dei Tipi d'Impresa e delle Dimensioni Aziendali nei Poderi "Disabitate," Indaginisull-esodo Rurale in Emilia-Romagna, Accademic Nazionale di Agricultura, Vol. I (Bologna: 1964), p. 159.

TABLE II-2. SURFACE ABANDONED BY HEIGHT ZONES AND TIME INTERVAL

Region	Before 1950	1951-54	Percent	1955-58	Percent	1959-62	Percent
Mountains	3,605	3,600	60	11,070	49	17,466	37
Hills	3,039	1,594	27	8,659	38	21,202	44
Plains	3,066	781	13	2,933	13	9,042	19
TOTAL	9,710	5,975	100	22,662	100	47,714	100

Source: Enzo Di Cocco, La Dinamica della Utilizzazione dei Terreni, dei Tipi d'Impresa e delle Dimensioni Aziendali nei Poderi "Disabitate," Indaginisull-esodo Rurale in Emilia-Romagna, Accademic Nazionale di Agricultura, Vol. I (Bologna: 1964), p. 159.

60 percent of all farm abandonment occurred in the mountains. The relative percentage but not the number declined in subsequent periods. In the most recent period the maximum rate of out-movement has shifted to the hills. In the future as these two areas become depopulated, we may expect the rate and number to be greater in the plains. The same tendency over time may be expected by type of management. Earlier, abandonment was largely on mezzadria farms; now it is occurring on family farms in the hills and mountains and rented farms in the plains. One may foresee the time when factors creating pressures for enlargement and rising labor difficulties will shift the rate of abandonment more to the farms operated by salaried workers.[17]

DiCocco found too that as the process of abandonment occurs, farm size was increased as aggregation takes place. Of the total land abandoned, 70 percent in the mountains, 66 percent in the hills, and 82 percent in the plains was consolidated. Most of this process is between abandoned and non-abandoned farms but two or more abandoned units are sometimes combined into one larger farm. His survey showed 700 abandoned farms had been re-combined into 190 new farms. In the hills and mountains the new farms averaged 100 hectares in size, about five times the average for all of the

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[17]Strikes and rapidly rising wages have already caused some salaried farms in the north to curtail their livestock production.

region. In the plains the average size was 38 hectares or three times the average before abandonment.

More out-migration is necessary for continued increases in farm size and consequent changes in the structure of agriculture. This movement is encouraged by the considerable income differential between farm and nonfarm sectors. An additional impetus is given by the absence of public facilities in hills and mountains that contribute to a lower level of living.

An important policy measure that prohibits new *mezzadria* contracts was passed by the parliament in 1964 to increase farm tenure changes and consolidation.[18] This means the present sharecropper system with its rigidities will gradually cease as the present tenants disappear through death or migration. The complete disappearance of the system will release 3-1/4 million hectares to other types of management.

Fragmentation

Together with size and tenure problems, fragmentation represents a critical problem in Italian agriculture. In the literature fragmentation and pulverization often appear as either simultaneously or separately occurring phenomenon

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[18] *Gazzetta Ufficiale*, No. 233, Anno 105th, Act No. 756 of the Civil Code (September, 1964).

causing poor performance. Fragmentation is defined as the operation of a single farm unit on separate bodies of land. The degree of fragmentation is measured by the number of units into which the property is divided or is indicated by distance from the farm center. Pulverization is defined as small farm units which are unable to usefully employ all the working force of the farm family.

Some of the inefficiencies resulting from these two factors are: (1) increased labor needs for separated fields, (2) impossibility of using machinery, (3) boundary and entry disputes, (4) difficulty of improving and developing land by irrigation, construction of windbreaks, roads and etc., and (5) difficulty of adopting more profitable land use plans and livestock enterprises.

Pulverization and fragmentation occur to a great extent in the Alpine and pre-Alpine valleys, in central Italy and is most serious in the south. In the northern mountains it is often intentional due to the practice of having summer pastures on the mountains and more protected areas at lower elevations for the winter. In the south the cause is a large population on a small supply of available land. In extent pulverization and fragmentation cover an area of four million hectares that produce 16 percent of the national gross saleable production.[19] Approximately 43 percent of this surface

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[19] _Atti della Conferenza Nazionale del Monda Rurale e dell Agricultura_, "La Polverizzazione e la Fragmmentazione della Proprieta Fondiaria," VII Studie Monografie, Vol. III, pp. 21-44.

is in the mountains. Of the four million hectares, about one million is in critical need of recombination. The remaining area is in a period of transition that must await further migration before efforts can be successful.

Dating from Law Number 183 of 12th February, 1942, land reorganization and improvement work has been encouraged but to date little has been achieved. However, present and anticipated technical, demographic and economic conditions point to improvement. One source expects land reorganization on the needed one million hectares to take place in the next ten years.[20]

Such reorganization of land units in the past has always resulted in a substantial increase of gross saleable product, net product and net income.[21] Where the same cultivation system is maintained the increase in net income ranges from 10 to 30 percent. But the more important gains are associated with changes in farm organization and production techniques. Where this has occurred simultaneously with reorganization net incomes have increased from 50 to 300 percent.

As consolidation and enlargement take place, Italian agriculture is tending toward two types of management. First,

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[20]Giuseppe Medici, Ugo Sorbi and Antonia Castratano, Polverizzazione e Frammentazione della Proprieta Fondiaria in Italia, Istituto Nazionale di Economia Agraria (Roma: 1962), p. 200.

[21]Ibid.

is the farm belonging to the cultivator; the family farm promoted by official policy that calls for a unit of sufficient size to absorb the family's labor and adopt rational production techniques. The second type is the commercial farm operated by wage earners and with a relatively high degree of mechanization.

Land Values

The land market forms a major obstacle to farm modernization through improvements in farm size and recombination of fragmented units. The problems are twofold, high land prices relative to income earned on the one hand and the desire to retain ownership of land even when migrating out of agriculture as a hedge against inflation and for security reasons.

Average price for farm land in the country in 1965 was 487,000 lire per hectare up three percent from 1964.[22] In the northwest the highest average of 723,000 lire was recorded with an average of 602,000 in the northeast, 340,000 in the center and 414,000 lire per hectare in the south. Rental values average 30,782 lire per hectare in the northwest, 27,204 in the northeast, 15,524 in the center and 19,034 in the south. In the north there is a general tendency for

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[22] INEA, Annuario Dell'Agricultura Italiana, (Roma: 1965), p. 210.

farmers to expand the area under cultivation both by purchase and renting causing land prices to increase more rapidly than other parts of the country. In the center land values tend to remain about the same and to decrease at higher elevations. Sharecroppers are demanding more land in this area as government financing is more available. In the south there is considerable demand for land by family farmers but offerings are few with consequent price increases.

Land prices that reflect nonmonetary factors more than potential income characterize the Italian land market. Except in the mountains where supply exceeds demand the land market is limited. At present asking prices and prices expected for farm products it is difficult to see how profitable farm enlargement can occur. But until it does efficiency gains will be small.

Government Programs

Obviously, much of the country's success in modernizing its agriculture is dependent upon both its policies for economic growth and for agriculture. The first is important because the rate of economic growth largely determines structural changes within agriculture. Agricultural policies are important in aiding the generally small, undercapitalized farms to adopt modern technology (income and price stability functions have been largely shifted to the EEC).

Since 1961 Italian policy has been implemented through successive five-year plans. The objectives of the current plan, 1966-1971, are: (1) to increase national income five percent per year, (2) to increase total agricultural production 2.85 percent per year to meet national demand and provide for additional exports, (3) to increase nonfarm employment by 1.5 to 1.6 million units, (4) to place 40 to 45 percent of the newly created nonfarm jobs in the south to help equalize regional income differences and (5) to increase social investments to a level of 27 to 27.5 percent of available domestic resources.[23]

In view of the wage problems discussed above and the technological obsoleteness of much of its productive capacity it seems likely that some difficulty will be experienced in reaching the goal of a five percent growth rate to 1971 and even more in maintaining this rate to 1975. Achieving the other four objectives depends on the success in attaining the income goal. If national income fails to grow at the expected rate it will not be possible to increase employment as planned and will also make improvements in agriculture more difficult.

To help in reaching these objectives, the present five year plan calls for public investment of 75,200 billion lire. Of this amount, 16,050 will go to industry and services and 3,950 to agriculture. Increasing emphasis is placed on the

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[23]Ministro del Bilancio, *op. cit.*

development of the south. A measure of this emphasis is obtained by comparing the 1959-63 expenditure for fixed investment in the south of 6,952 million lire to the 1965-69 sum of 14,700 million. It is planned that the number of new, nonfarm jobs created in the region will increase by 670 thousand over the five-year period and 380,000 are to be in industrial activities.

Of more immediate interest is investment in agriculture. This sector in the past has received its funds from many sources and made disbursements to a variety of agencies. It is difficult, therefore, to specify the amount of public money available and even more so to determine its final use. Some shifts in direction of farm policy in the last two decades can be pointed to, however, that have implications for future agricultural output.

Total agricultural investments in the decade 1951-1960 amounted to 2,587.6 billion lire of which 1,822.4 were public funds. Geographically, 40.9 percent of the public money was expended in the north-center of Italy and 59.1 percent in the south and islands. Striking differences are found in the use of public funds by geographic area. In the ten-year period 422.8 billions were used for land and building improvements on existing farms and land reform with associated improvements. Seventy-three percent of this investment was directed to the south and islands. The south also received 76.8 percent of the total funds used for agricultural reform (irrigation, terracing and similar land improvements) and 68.1 percent of the funds allocated to structural improvements.

The north, on the other hand, received the larger share (74.4 percent) of money used for short term credit and agricultural production improvements (62.5 percent). This latter classification included improved seed, technical assistance and instruction and marketing and processing funds. The supply of money for short term credit was 171 billion of which 154 billion was used for mechanization and 17 billion for livestock improvement.

It is evident from the foregoing that policy in the south largely took the form of fixed investments in land reform, land improvements and building construction. This was consistent with social policy which called for the breakup of large estates and social improvements for the south. The results show that policy in the south did little to increase agricultural output because of the concentration on fixed investments, particularly rural housing, and the dispersion dictated by social and political considerations.

In the north these facilities were more likely to be available and policy concentrated more directly on increasing output and efficiency. Even so, in this period little attention was directed to livestock improvement and to modernizing an antiquated marketing and distribution system.

The year 1961 marks a year of transition from the previous policy to the beginning of the five-year development plans. Total agricultural investment in 1961 was 372.7 billion lire with the government supplying 241.9 billion. As in the previous decade land reform with 34.5 percent and land improvement with 29.8 percent of the public funds received major emphasis. The only change of significance was a strong impetus given to irrigation in the Mezzogiorno with the construction of basins, pipelines and distribution networks.

Beginning in 1962 agricultural policy was implemented through financing provided by successive five-year plans. The first of the Piano Verde or "Green Plans" covering the period 1962-1966 had as its objectives: (1) to promote the formation and consolidation of efficient and organized farms, particularly, family farms; (2) to improve living conditions in agriculture; (3) to increase agricultural productivity; (4) to adapt agricultural productivity to current needs of the national and foreign markets by means of crop conversions; and (5) to assure a greater stability of agricultural prices and incomes.

The financial resources appropriated by the government to carry out these aims is in Table II-3. Total public funds for major expenditures for the five-year period were 550 billion lire which were to be added to appropriations of laws already approved. The allocation of these funds by use category indicates a major shift in policy emphasis. For example, substantially larger quantities were made

TABLE *II-3.* AGRICULTURAL APPROPRIATIONS BY MAJOR USE, GREEN PLANS I AND II

Use	First Plan 1961-66	Percent of Total	Second Plan 1966-71	Percent of Total
		(Millions of Lire)		
Mechanization	24,250	4[a]	106,000	11[a]
Land Reform and Improvement	156,500	28	213,000	23
Insect and Disease Control	12,000	2	15,300	1
Livestock Improvement	35,750	6	77,000	8
Credit	20,000	3	29,000	3
Market Research	1,500	2	3,600	4
Research Experimentation and Technical Assistance	81,000	14	123,700	13
Reclamation and Irrigation	40,000	7	116,000	12
Mountain Reclamation and Forest Development	65,000	11	138,000	15
TOTAL	550,000		900,000	

[a]Table omits items of lesser importance and therefore does not sum to 100 percent.

Sources: 1) Istituto Nazionale di Economia Agraria, Annuario Dell Agricoltura Italiana, Vol. XIV (Roma: 1960), p. 320.

2) Macchine e Motori Agricoli, Anno XXIV, No. 2, (February, 1966).

available for research and technical assistance, operating loans, mechanization and livestock improvement. The first funds were made available for marketing information and research including the formation of farmer cooperatives.

The first plan has been attacked on several sides. First, the plan has been called a list of additive investments rather than a true development program. The plan has been criticized because help was not given to the problem of the large estates (the problem is that of rapidly rising wage costs or actual labor shortages that force mechanization or the break-up of the large estates. This is in agreement with government policy but the large landowners have a potent political voice in protecting their own interests.)

The second Piano Verde, initiated in 1966, is continuing the same policy emphasis. This plan provides 900,000 billion lire to the agricultural sector, a 63 percent increase over the previous five year period. This substantial increase is largely directed to increasing technical efficiency.

The funds available for mechanization have increased by more than four times the previous plan, livestock improvement funds have doubled and irrigation and research and technical assistance have almost tripled.[24] Of the appro-

[24]Additional funds are available for agricultural improvement. In the Second Green Plan itself considerable money is budgeted for forestry development that directly affects agricultural productivity, for example, 24 billion

priations for livestock 62,000 million lire are for general improvement including better breeding stock and 15,000 is for new buildings and stalls. In the much larger budget for mechanization, 13,000 million lire (article 12) is reserved only for family farmers. This group also has priority in the 29,000 million lire available for operating credit. A considerable increase is available in the second plan for reforestation and structural changes in the mountains. Additional funds for these purposes are available in emergency appropriations for the 1966 flood. Items receiving the same or reduced relative emphasis are the land reform and improvement program, credit and pest control efforts. Funds for land reform and improvement remain the largest expenditure category but the proportion is reduced in the second plan.

Accompanying the changes expected in technology and to a lesser degree in structure, product composition shifts are anticipated in response to EEC consumer demand. Table II-4 shows the 1964 composition with projection to 1973. The planners expect substantial increases in fruit, vegetable and meat production. In the south large, new plantations of fruits, mainly citrus and irrigated land for vegetables

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lire for reforestation and two billion for pasture land. In addition 125 billion for aid to agriculture is established in the flood relief program and considerable money is available from the Cassa per il Mezzogiorno.

TABLE II-4. PERCENTAGE COMPOSITION OF FARM PRODUCTION FOR SALE IN 1964, PROJECTION TO 1973 AND EXPECTED ANNUAL RATES OF INCREASE

Product Group	Percent in 1964	Expected Avg. Annual Increment	Percent in 1973
Cereals and Other	15.7	0.4	12.1
Vegetables	17.1	4.7	19.3
Industrial Crops	4.0	3.2	4.0
Fruits	14.6	4.7	16.5
Grapes and Olives	13.6	2.0	12.1
Meats	18.5	4.8	21.1
Milk-Cheese	10.1	2.5	9.4
Other Livestock	3.8	1.8	3.4
Forests	2.6	1.2	2.1
TOTAL	100.0	3.3	100.0

Source: Ministro del Balancio, Progetto di Programma di Sviluppo Economico per il Quinquennio, 1965-69, Presentato al Consiglio dei Ministro (Gennaio 21, 1965).

is designed to make this area the "vegetable garden of northern Europe." Livestock production is being encouraged but several factors tend to discourage greater output. Increased production of these three commodities means a smaller proportion of total production will come from traditional products. Any future growth in output of these will stem from yield increases more than offsetting decreases in surface planted.

It appears from the foregoing that Italian farm policy, at least through 1971, will focus on different objectives in the four geographic regions. In the north, agriculture is already relatively far-advanced and emphasis will be on greater efficiency and technological improvements. Livestock production will be of major importance. In the center the "crisis of the mezzadria" and the mountain zones are of greatest importance. In the south and islands vegetables, fruit and olives will receive most attention. The success of these enterprises will rest largely on irrigation and market improvement programs.

Besides understanding the direction of government programs indicated by budgetary means, four specific programs are especially enlightening.

1. Land Reform Program: The land reform program has had most impact on type of management. Prior to 1950 agricultural land in the Mezzogiorno was concentrated in the Latifondos. These large estates were operated with much labor, little capital investment and absentee owners with little knowledge or interest in agriculture. (Only four percent of the land owners whose property was expropriated farmed as their major activity.) The land reform program was instituted both to improve the rate of development of agriculture and as a solution to the problem of many under-

employed farm workers.

Results show definite changes in the pattern of agriculture and in productivity when the program is instituted. In the extreme southern regions in the irrigated plains a large amount of surface is being planted to citrus. In mountain areas and in some of the irrigated plains where vegetable by-products are available, dairy cattle are becoming more numerous. In poorer zones hard wheat remains together with high-yielding varieties of olives. One study on 46,590 farms reports the most consistent change was a reduction of pasture and permanent forage surface from 150 to 90 thousand hectares, a decrease in cereals from 406 to 353 thousand hectares and an increase from 55 to 90 thousand hectares of vineyards, olives, fruit and citrus fruit.[25]

Although farm size varies among the different land reform areas, the objective has been a size of 4.5 to 5.5 hectares in irrigated areas and six to ten hectares in arid areas. This has proven satisfactory where water is provided but low incomes in dry areas are reflected in out-migration. There has also been criticism because funds for improvements have been dispersed over all areas rather than concentrating on regions likely to develop into viable units.

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[25] Carlo Aiello, La Dinamica della Struttura Agricola nel Mezzogiorno, Cassa per Opere Straordinarie di Pubblico Interesse nell Italia Meridionale (Roma: 1964), p. 63.

The land reform program has now been ended insofar as encompassing new land is concerned. Presently, and in the foreseeable future, attention will be focused on improving productivity in the areas already designated and extending credit to farmers who wish to purchase land.

2. Agricultural Credit Program: Investment and operating funds are typically in short supply in Italian farming. Therefore, public programs for financing agriculture are important in determining how rapidly agriculture can develop. Such funds in the past have been made available through several fragmented pieces of legislation. Administration was made difficult by the many laws, each requiring separate appropriations from parliament, and many requiring farmers to follow different application procedures.

With the present Green Plan there is some consolidation of laws but many of the criticisms remain. The circuitous movement from law to farmer-user shows funds allocated from the Green Plan to the Ministry of Agriculture and Forestry. Loans of over 30 million lire can be made directly from this agency. At the next lowest level are 16 regional agricultural inspection departments authorized to make loans of 10-30 million lire.[26] Still lower are 792 provincial inspec-

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[26]Cesare Selleri, "Il Credito Agrario in Italia, Considerazioni e Proposte," Rivista di Politica Agraria, Anno XII della nuova serie, No. 3 (Bologna: September, 1965), pp. 25-34.

tion offices that make loans of less than 10 million. Money allocated to the province level is even further divided among the various credit institutions in a province.

The frequent result of this rigid compartmentalization is to have funds available in one province or region while money is unavailable in another. In the past the situation has usually been for loan funds to remain unused in the south while in the north all available money is quickly distributed. The same situation exists for different size loans within the distribution system. In a given geographic area loans of up to 10 million may be depleted while amounts of 10-30 million are still available.

From the point of view of optimal use of limited funds the credit program is hampered by stringent security requirements. It would be most desirable from the agricultural standpoint for loans to be made depending on the user's ability to repay through use of the funds. In practice loans are made depending on the amount and value of land owned that can be used for security. For short-term loans the money is secured by a chattel mortgage on the crop or livestock.

Some specific credit laws affecting the future development of agriculture include the law permitting the mezzadria to purchase farm land. This law extends credit for up to a 40 year period at one percent interest. This is essentially a subsidy to encourage the sharecropper to become a family farmer. He may also obtain credit for complementary factors at two to three percent interest. On these loans the state pays the difference between the cost to the farmer and the eight to nine percent interest commonly charged by banks.

Another form of extending capital to the farmer was contributo. If a farmer wished to purchase livestock he could obtain 25 percent of the cost from the state provided he bought from an approved source. Such funds were also available for irrigation, fertilizer and similar practices to improve technical efficiency. This form of credit has now been reduced but is still available for some family farmers in the hills and mountains.

3. Marketing and Distribution:[27] To the extent that the marketing and distribution system obstructs the efficient organization of agriculture or reduces the response to changing conditions, it becomes an important variable in predicting future farm output. The antiquated structure of wholesale and retail markets in Italy plays this role.

Orlando classifies food markets into three types: a primitive model, which is a direct confrontation of producer and consumer; the traditional model which separates market functions into producer, processor, wholesaler and retailer

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[27] Giuseppe Orlando, La Politica dei Marcati Agricoli (Torino: 1965), p. 231.

stages; and a modern model which is an integrated network. In Italy he estimates the market flows in each as 10 percent, 87 percent and 8 percent respectively.

The structure of wholesale markets has changed little in recent years. Four characteristics describe it and the problems that must be overcome in increasing efficiency in the system. First is the small size of individual firms. At the end of 1961 there were a total of 46,734 wholesalers of food products or an average of one for each 14 retailers. Only 15 percent of these employ more than five people and in 75 percent of the firms all work is performed by the owner with one family member.

The second characteristic is the fragmentary nature of the services performed. The stages in the process are broken down into an unnecessarily large number with many firms entering the wholesaling function and often performing the same service. The result is an unnecessarily high cost for services rendered.

A third feature of the wholesale market is the high degree of imperfect competition. Even though the number of individual firms is relatively large, the volume of goods in a particular geographic area is concentrated in the hands of a few firms which effectively set prices and policies.

Some examples are illustrative. In the Turin market there are 44 wholesale meat firms that handle 150,000 kilograms of dead weight per week. But seven firms import almost

50 percent of the total leaving the other 50 percent to be shared among the remaining 37 firms. Similarly in Florence, of 230 dealers in meat, 20 handle about 60 percent of the entire volume. In Rome, of 150 meat dealers, only eight regularly bring in a weekly supply equal to 42 percent of the city's sales.

Another example is the fruit market of Rome where only seven of 108 wholesalers are important and where one is so organized as to be able to control the cold storage and rail loading facilities. He also has a telephone communication system with the major Italian and German markets and every morning is able to decide the designation of fruit shipments. Thus, fruit prices are established in the Rome market for all Italy.

The situation in the grain market is similar except that the importer becomes the price maker. Some four to six operators cover the entire market.[28] One firm, Ferruzzi, does 40 percent of the grain importing. Further, in some towns you either purchase from a particular importer or supplies are unavailable.

The low efficiency of the wholesale sector is aided and abetted by Italian legislation, the fourth characteristic reducing the rate of change. Laws regulating sanitation

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[28]Conversation with Mr. Hakim, Continental Grain Company, Milan, May 8, 1966.

and licensing are vested in the commune.[29] The usual policy is to regulate the import of meats and milk into the commune so that production within it is given preference. The effect is to eliminate any possible scale economics of centralized plants and prohibit some of the gains that might be obtained from specialized producing regions. The magnitude of the problem can be seen from the fact that there are 634 public and 11,402 private slaughter houses in the 3,946 communes of northern Italy.

The meat industry in particular suffers from the small amount of refrigeration available. This absence results in a deterioration in food quality, places limits on consumer choices available in warm seasons (fresh pork is considered unsuitable for summer consumption) and contributes to market domination by the few firms that have refrigeration.

Food processing has been slow to develop. Consumers have traditionally placed a premium on fresh goods of all types. More than three-fourths of Italian homes prepare their meals from products in the raw state.

Two factors are at work to increase the amount of processing. First, government policy strongly supports farm cooperatives for processing and storage and has made 47 billion lire (article 9) available for this purpose in the second Green Plan. Now modern plants are being constructed

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[29]Roughly equivalent to a county.

at a fairly rapid rate financed by both public and private investors. Second, consumers are becoming more used to processed foods. Part of this change in attitude is related to rapidly rising costs for maid service.

Like wholesalers, retail firms are quite numerous, small and poorly equipped. In 1961 there were 637,349 licensed establishments for the retail trade of foodstuffs. This is an average of one license for each eleven consumer families. Most of these are shops that specialize in a particular good, i.e., meat, poultry, wine or general staples.

The retail segment also shows an absence of competition and rigid prices. Factors giving rise to imperfect market conditions are: (1) the lack of communication between markets and within a given market and the neighborhood character of shopping, (2) the credit arrangements extended to regular clientele, and (3) the possibility of product differentiation due to consumer ignorance and the absence of a public service responsible for defining types, varieties and quality of products.

Still, improvements in retailing are being made at a faster pace than in wholesaling. The impact of the supermarket is being felt. Table II-5 shows the growth by years of this form of retailing in three geographic areas. To date, supermarket distribution is mainly confined to northern Italy and, in fact, one-fourth of the 1964 number is found in the region of Lombardia and the city of Rome.

TABLE II-5. SUPERMARKET GROWTH BY REGIONS, 1961-1964

Region	Aug. 31, 1961	March 31, 1962	June 30, 1963	June 30, 1964	Absolute Increase 1961-1964
North Italy	91	120	196	246	155
Central Italy	39	48	60	84	45
South and Islands	19	38	53	74	55
TOTAL	149	206	309	404	255

Source: Carlo Fabrizi, "La Diffusione dei Supermarcati in Italia," Revista di Politica Economica, No. 10 (October, 1965), pp. 1469-1489.

Increasing the number of modern retailing establishments faces several obstacles. The law governing retail commerce is unfavorable. Authorization of a new retail firm comes from the local Chamber of Commerce which represents the interests of existing merchants. Decisions on applications are often negative or come only after long delays. Many of the present supermarkets are subsidiaries of large companies such as the Standa or Upim Department stores which open as "branch stores" rather than new firms.

Some other obstacles to modernization include: (2) existing merchants are very much against these new forms of commerce, (3) the food suppliers cannot provide a continuous supply of the quantity and quality of products needed (larger chains meet this problem by importing), (4) trained personnel, especially for meats, milk products, vegetables and fruits are not available, and (5) price policy is established for a chain for all the country and local units cannot cut prices to meet competition.[30]

Even in the face of these obstacles this form of retailing is increasing. As it does, changes will be made not only as other retail firms are forced to modernize but throughout the marketing structure as consumer demands are more clearly transmitted. In addition to reducing monopolistic elements in the marketing system, improvements may be expected in food storage and processing. Most of these effects will likely be in favor of the consumer. Still, producers may expect to benefit from increased demand for products such as meat now priced out of many consumer budgets (note effects of integrated arrangements on broilers) and extending the period of consumption of some perishable products. Improvements in distribution can also be expected to increase the rate of structural transformation and affect the product composition of agriculture.

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[30]Carlo Fabrizi, "La Diffusione dei Supermarcati in Italia," Revista di Politica Economica, No. 10, (October, 1965), pp. 1469-1489.

CHAPTER III

HISTORICAL TRENDS, GENERAL CHARACTERISTICS AND PROJECTIONS OF CROP PRODUCTION

Italian crop production may be viewed in terms of four groups of commodities: wheat, feed grains, forage and other including fruits, vegetables, olives and the industrial crops of sugar beets, tobacco and cotton. A major objective of this research was to project the domestic production of wheat and feed grains. An initial hypothesis was that wheat production would decrease in response to lower prices and feed grains would increase as their prices moved in the opposite direction. In this chapter commodity projections are obtained by examining adjustments to price over a base period, input-output relationships and adjustment limitations imposed by farm structure.

Crop Inputs

Italian agriculture is characterized by limited land resources, especially land with fertility and topography conducive to modern agriculture and until recently there has been abundant and relatively inexpensive labor and limited amounts of capital. These ratios influenced the rate of development, the choice of enterprise and the techniques of production.

The relative change in use of land, labor and capital (measured by quantity of fertilizer and mechanized horse power) are shown in Figure III-1 for the three major regions of the country. In all three regions the land input changed little, reclamation programs actually increasing the productive agricultural surface until 1959 relative to the 1952-53 base period. Since that time slight declines in surface have taken place with the central part of the country the most substantial loser.

The agricultural work force declined from a 1952-53 base of 100 to 59.8 in the north, 56.6 in the center and 74.7 in the south. As with land, the center was the largest loser because of the hilly and mountainous terrain comprising the majority of its surface. The indexes of labor force could be misleading in that the north shows a comparable rate of decline to the center, but labor is a much smaller proportion of the input mix in the north than in other regions.

The indexes of fertilizer elements used and total horsepower of all agricultural machines is both an indication of the total influx of capital into agriculture and the substitution among types of inputs. As a measure of capital it is evident that increases since 1952-53 have been considerable in all regions. As an indication of input substitution, capital replaced declining quantities of labor and slight decreases in land. Beginning from a lower base,

FIGURE III-1. INDEX OF AGRICULTURAL INPUTS AND INPUT PRICES BY MAJOR GEOGRAPHIC REGION

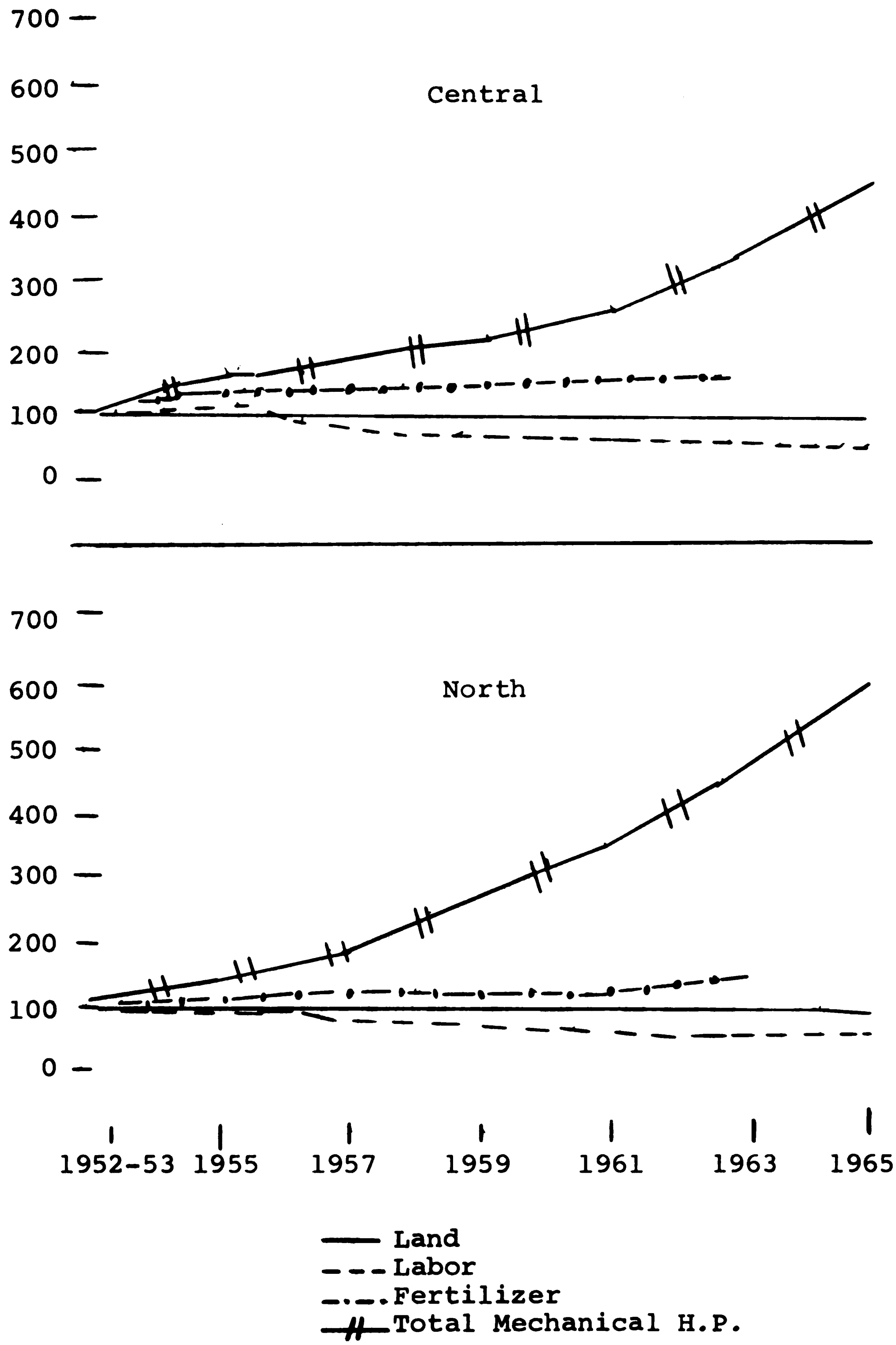

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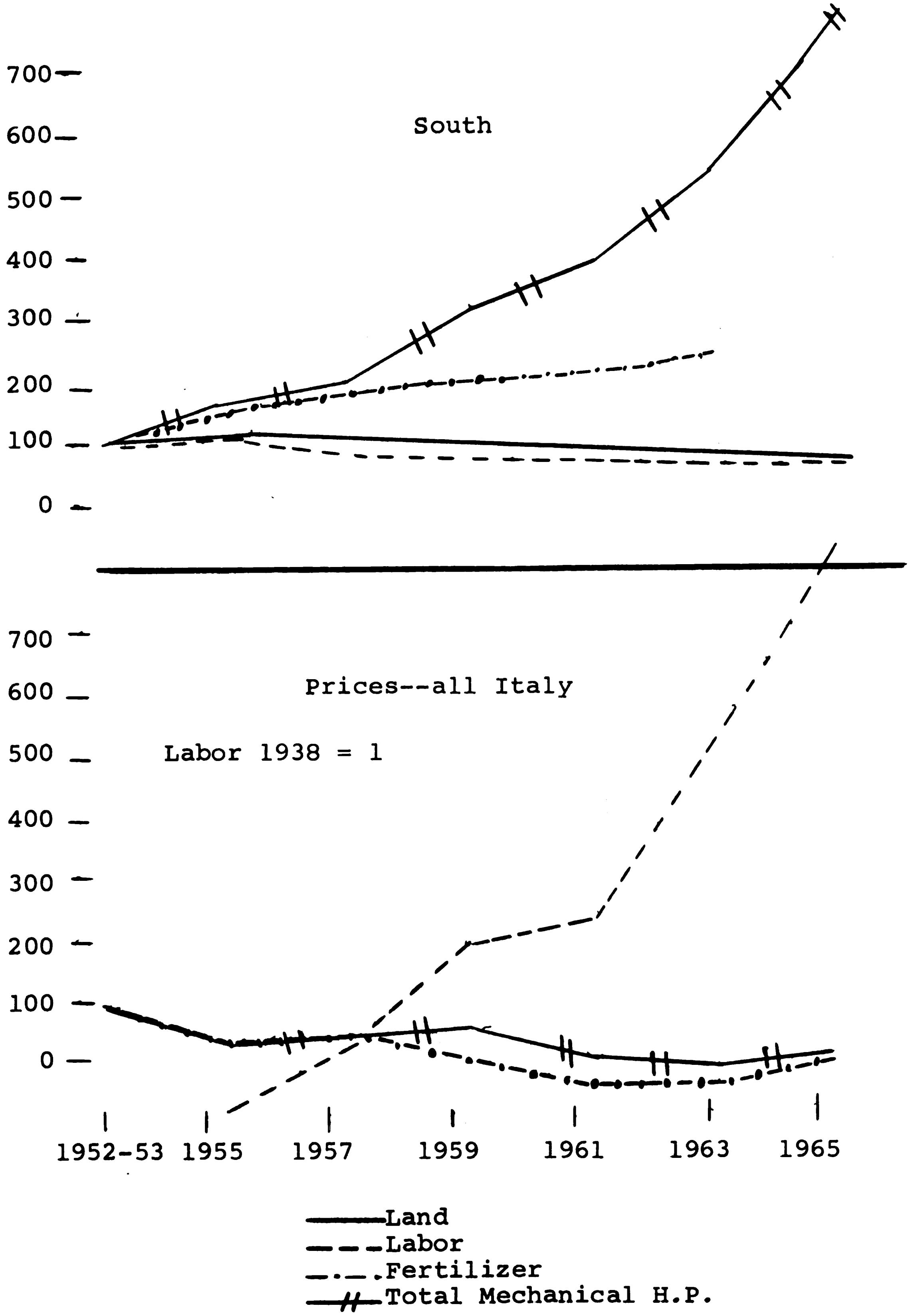
FIGURE III-1 (continued)



mechanization and fertilization increased at a faster rate in the south than in the other two regions and both have been retarded in the center by topography.

The economic incentive for input substitution is found in the price quadrant of Figure III-1. Both machinery and fertilizer price indexes have remained below 100, although the price index for all agricultural inputs purchased rose to 110.5 in 1965. The labor price index has increased rapidly, especially in recent years and land prices, although an index is not available, have been high in relation to farm income and have trended steadily upward. With these price changes farmers have found it profitable to mechanize farm operations and use more land intensive practices while reducing labor. Three of the input categories that are used in greater quantity are important in determining future production and will be discussed in more detail.

Mechanization

Agricultural mechanization is a major objective of Italian policy as a means of increasing labor efficiency but to date agriculture remains highly labor intensive. For example, the Ministry of Agriculture reports the total labor requirements per hectare in the plains with average wheat yields as 95-105 hours with little mechanization, 66-73 with an average level and 37-44 with a high level of mechanization. At the lowest level of use labor requirements are more than double U.S. rates.

Another study in central Italy emphasizes the different labor requirements by type of management as well as elevation. These results show a requirement for wheat of 69.3 hours per hectare in the plains (a range of 55.7 for salary farms to 95.8 for <u>mezzadria</u> farms), 117.6 hours in the hills (103.8 for salary farms and 159.2 for family farms), and 152.5 hours in the mountains (112.7 for salary farms to 185.0 for family farms).[1] From these results it appears that farm mechanization is much further advanced in the plains and on farms operated by hired labor. Hill and mountain farms have been difficult to mechanize and family farmers and sharecroppers with abundant family labor have had less incentive to purchase labor-saving equipment.

Appendix Table 3 shows the degree of mechanization measured by tractors and power units purchased in the different regions. For all Italy the number of machines has more than tripled over the ten-year period with the largest increases in the north and center. An index of mechanization (computed by dividing total horsepower by productive agricultural surface) shows an increase in the north from 0.45 in 1955 to 1.99 in 1965, from 0.21 to 0.87 in the center, from 0.10 to 0.49 in the south and 0.24 to 1.04 for the nation.

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[1]A. Benvenuti and A. Panattoni, "Research on Grain Production in Toscana," <u>L'Agricoltura Italiana</u> (Pisa: January-February, 1964).

In many ways an index of total horsepower overstates the actual progress. Farmers commonly purchase a tractor and continue to use former animal-drawn implements requiring one man on the tractor and one to operate the implement.

Mechanization of harvesting activities has proceeded even slower. In 1965 872,978 combines were reported in the country with 68.6 percent located in the north.[2] Total machines for harvest including many garden-tractor variety forage cutters was 3,227,271 with 74.6 percent in the north. Data is not available on livestock mechanization. Milking machines are found frequently, but feeding and clean-up are almost universally performed by hand. Inefficient barn arrangement and absence of mechanization form a major obstacle in competing with other livestock producing countries.

Mechanization in the future will no doubt proceed at a faster pace due to farmers' efforts in meeting rising labor costs and government aid to reduce labor use in agriculture. The second Green Plan has budgeted 106,000 million lire for mechanization for 1966-71 compared to 24,500 million in 1961-66 (13 million in the second plan is reserved for machinery purchase only by family farmers).[3] Assuming that investment funds available from the government reflect the

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[2]Utenti Motori Agricoli, La Meccanizzazione Agricola in Italia, Trattrici, Motori, Carboranti (Roma: 1965).

[3]Gazzetta Ufficiale (Roma: February, 1967).

pace of mechanization, this would mean an increase of 333 percent over the past five-year period, reduced by any inflationary effect on machinery costs.

Mechanization to date has largely been directed to grain with some forage operations mechanized in the north. One would expect new inputs to be directed to livestock and forage production, since these are the less efficient enterprises and the remaining unmechanized grain farms are in more difficult terrain. If so, the labor income from livestock would increase relative to grain.

Fertilizer Use

With farm output prices rising and fertilizer prices averaging below 1952-53 levels, farmers have responded by applying larger quantities of nutrients. Total consumption of the three principal elements has in fact almost doubled from 1952-53 to 1964. (Appendix Table 3). The rates of fertilizer use are good indicators of the different levels of development in the four geographic regions.

It is also of interest to know the rate of fertilization for different crops. An INEA study based on data from 1,754 farms shows wheat to be fertilized more than other grains (Table III-1).[4] Minor cereals receive little fertilizer especially in the south and islands where most

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[4]Istituto Nazionale di Economia Agraria, unpublished data (Roma: 1961).

TABLE III-1. FERTILIZER USE BY TYPE OF CROP, TYPE OF MANAGEMENT AND MAJOR GEOGRAPHIC REGION, 1961

Crop	North	Center	South	Islands
	(Kilograms of N, P. and K Per Hectare)			
All Cereals	136.7	91.2	67.2	49.4
Soft wheat	143.3	98.1	70.1	--
Hard wheat	--	--	63.4	54.6
Minor cereals	100.3	52.5	61.2	9.1
Corn	104.2	48.1	50.1	81.0
Sugar Beets	165.3	135.3	147.8	35.0
All Forage	77.3	34.1	61.6	57.3
Temporary Forage	78.0	37.1	66.9	57.4
Alfalfa	31.6	36.5	45.7	67.0
Farmer-Owner	98.9	66.7	60.9	66.0
Mezzadria	101.0	65.1	67.3	49.4
Salary-operated	130.0	64.0	93.3	123.3

Source: Instituto Nazionale di Economia Agraria, unpublished data (Roma: 1961).

production is found.

The study also reports the rate of fertilizer use by type of management and by elevation. Lower rates of fertilizer use are generally noted as one moves from north to south. Within each geographic area the salaried operated farms have higher rates of use than family and <u>mezzadria</u> farms except in the center. This is assumed to be associated both with a higher level of management ability including knowledge of fertilizer results and with less capital limitations for obtaining fertilizer. Fertilizer use also decreases with movement toward higher elevation. Fertilizer use on all cereals declines from 90.5 kilograms per hectare in the plains to 79.5 in the hills and 61.5 in the mountains. Similarly, use on forage is 77.3 kilograms in the plains, 44.7 in the hills and 47.6 in the mountains.

Without question greater fertilizer use in Italy will be profitable to farmers and will increase national farm output. Many family farmers and sharecroppers still rely on organic fertilizer and use little chemical material. Experiment station results show large yield increases for wheat associated with additional fertilizer and recommend doubling fertilizer use on corn. Conversely, forage does not respond well to higher rates of fertilizer use and little progress in yields is anticipated. A summary of such findings leads to the expectation of continued yield increases for grains associated with fertilizer use with a tendency to substitute grain for forage as yield relationships change.

Irrigation

Irrigation has more effect on the organization and output of Italian agriculture than any other single input. For example, hybrid corn is almost universally produced with supplementary water; where water is not available local varieties, lower yielding but more adapted to growing conditions, are planted. In the same manner forage, sugar beets, fruits, vegetables, rice and tobacco either require irrigation or else yield much better when it is provided. The effects of irrigation are most striking in the south where land use typically shifts from cereal production to higher value crops upon irrigation. Policy efforts in this region are directed toward increased irrigation and complementary inputs in land reform areas.

Appendix Table 3 illustrates the progress by regions. From 1955-1965 irrigated surface increased almost one million hectares, a 39 percent gain. The rate of change has been fastest in the center but in 1965 the north still contained 70 percent of the 1965 irrigated acreage. As late as 1962 the four Po Valley regions--Piemonte, Lombardia, Emilia-Romagna and Veneto--accounted for 70 percent of the nation's irrigated land.[5]

In order to make commodity projections that follow, an

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[5] A. Antonietti, A. D'Alanno and C. Vanzetti, Carta delle Irrigazioni d' Italia, INEA (Roma: 1965), p. 11.

estimate of 1970 and 1975 irrigated surface was needed. A first approximation is provided by an INEA study that sets the total additional irrigable surface in the long run (no mention of length of time) at 1,109,403 hectares distributed as follows: north 379,640; center 262,700; south 261,881; and islands 205,182 hectares.[6] For our purposes these may be viewed as maximum estimates for 1975.

Since this study is interested in the surface to be irrigated by 1975 and the above figures will not likely be attained by then, this estimate must be refined. Therefore, for each of the four regions a linear regression was computed with time (1952-1964) as the single independent variable and surface irrigated as the dependent variable. Extrapolation of this trend provides a 1970 estimate of 2,576,000 and for 1975, 2,763,000 irrigated hectares in the north (R^2 = .993). In the center the 1970 estimate is 426,900 hectares and 513,300 in 1975 (R^2 = .981); in the south, 570,700 and 694,300 (R^2 = .954) and in the islands 266,800 and 310,200 hectares (R^2 = .896).

An additional refinement for estimating surface is provided by the financial means available. The first Green Plan provided 40 million lire for irrigation and land improvements. In the second Green Plan (1966-1971) this was increased to 116 million lire. This money is to be distributed

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[6] Ibid.

at the rate of 22 million for each of the first two years and 24 million each of the last three years.

An average cost per hectare for irrigation for all Italy is 269,900 lire in 1963.[7] To arrive at the number of hectares that can be irrigated by the second Green Plan (1966-1971) it was assumed that costs would rise ten percent so that the cost per hectare would be 296,890 lire. Given the 116 million lire in available funds this means a maximum of 390,717 hectares could be irrigated. For 1975, the same reasoning was used to arrive at a maximum figure. For 1970-1975 it is assumed that the same rate of expenditure on irrigation as in the 1966-1971 period will be approved. This will mean available funds for this purpose of 149.6 million lire. Assuming also a price rise in cost of irrigation of 15 percent between 1970-1975 means this amount of funds will provide for irrigating 438,283 hectares. The total irrigated from 1967-1975 thus becomes 829,000 hectares.

For comparison the regression analysis provides an estimated additional surface irrigated from 1965-1970 of 387,500 hectares compared to the estimate of 390,717 hectares using Green Plan funds. For 1975 the regression estimate is an additional 440.4 thousand hectares compared to a budgeted estimate of 483,283.

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[7]Ministero Dell' Agricoltura e Delle Foreste, Piano Quinquennale di Sviluppo Dell Agricoltura, Relazione al Parlamento Sul Secondo Periodo di Attuazione (Roma: 1964), p. 87.

While these figures estimate the total addition to irrigated surface in Italy, it may be expected that changes will occur in the future geographic distribution. We may expect less emphasis in the north and more in the south for several reasons: (1) in the north most of the best land and that located in areas most easily irrigated has already been completed, (2) the north is chiefly a forage and cereal producing region and the economic results from irrigating these crops is not as favorable as can be obtained elsewhere, (3) most of the land that can be irrigated by flooding has already been completed and the remainder must be irrigated by sprinklers requiring considerable labor that in the industrialized north is both scarce and expensive, and (4) the government development plan places emphasis on the development of the south. For all of these reasons, the 1952-1964 trend is expected to be altered in the future.

To obtain regional estimates of irrigated surface in 1970 the assumption was made that surface in the north and Islands would follow the 1952-1964 trend, while the center would be three percent less than the indicated trend value with the south absorbing the remainder between the sum of these three regions and that made possible by funds from the second Green Plan. This procedure yields a 1970 estimate of 2,576,000 hectares in the north, 414,100 in the center, 586,800 in the south and 266,800 in the islands.

For 1975 it was assumed that the north would be less than the indicated trend value by one percent, the center by two percent and the islands would be above trend by two percent. The remainder was again assigned to the south. The results show for 1975 an irrigated surface of 2,735,400 hectares in the north, 503,000 hectares in the center, 727,200 hectares in the south and 316,400 hectares in the islands. The projected 1975 surface in all regions is less than the irrigable surface estimated by INEA.

The continued increase in irrigated land is expected to encourage the following shifts: (1) a decrease in wheat and small grain acreage, (2) an increase in high income crops such as fruits and vegetables, and (3) continued yield increases for forage and corn. In the south and islands especially, dramatic changes in farming occur as water is provided. In almost all cases it means a decrease in grain surface and more citrus, fruits and vegetables.

Soft Wheat

"Wheat is a basic commodity in the economy of Italy. It is the primary food of the people and is a staple crop throughout the country, in all regions and on every type of farm. Almost a fourth of the cultivated area is devoted to its production."[8] Thirty years later this statement still

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[8] Carl T. Schmidt, "The Italian Battle of Wheat," Journal of Farm Economics, Vol. XVIII (November, 1936), p. 645.

describes the importance of wheat, changing only in that wheat is now just over one-fifth of total farm surface.

Because of its importance most farm policy has focused on this crop. Schmidt, describing pre-war policy, tells how Mussolini appealed to the sentimental nature of Italians to make the country self-sufficient in wheat (equated to food) and at the same time increase farm income. The weapons of the "battle" were relatively high domestic price supports, heavy tariffs on imports and a variety of subsidy devices. The results were increasing wheat surface and erratic but higher yields. Self-sufficiency was essentially won but at the expense of livestock production. What were formerly steep, hillside pastures became wheat land that led to erosion, loss of fertility and many of the present problems of the mountain areas. Feed grain and forage production were neglected and imports of animal products rose.

Today, Italian farm policy has turned 180 degrees. The controversial Saraceno Report pointed to the necessity of reducing the surface in wheat and developing the livestock sector.[9] This plan advocated policies designed to contract wheat surface in the average and large size farms in the north and expand the cultivation of corn and fodders while in the southern irrigated plains fruits and vegetables would

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[9]Emilio Zanini, "1966-1970 Programma Quinquennale le Possibilita Tecniche di Sviluppo dei Settori--Chiave," Agricoltura, Anno XIV, No. 12 (Roma: Dicembre, 1965), pp. 23-36.

replace wheat. The second Green Plan essentially follows these recommendations.

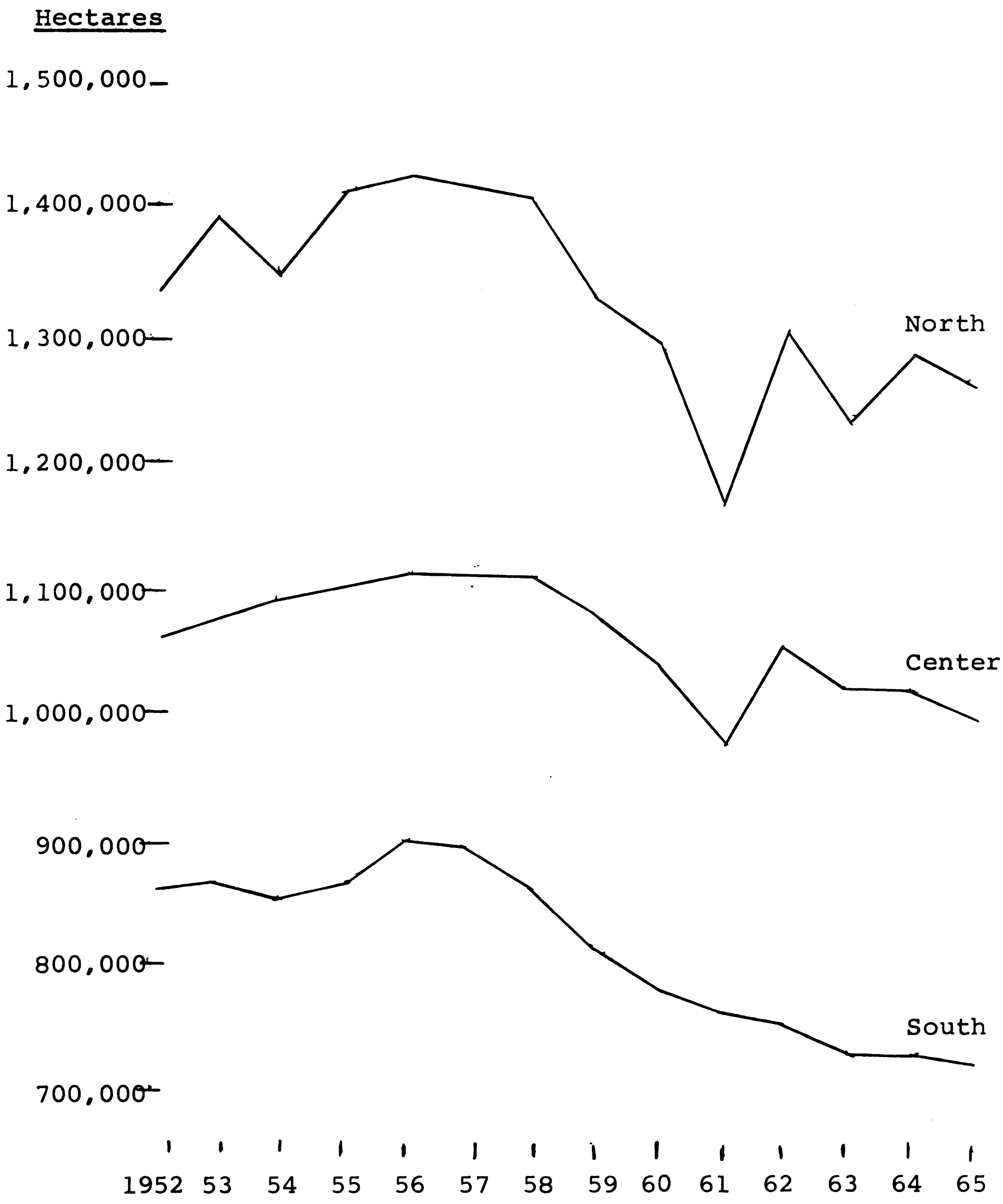
Soft Wheat Surface

Wheat surface continues to be responsive to policy direction. Figure III-2 illustrates the change in soft wheat surface for the three major producing regions from 1952-1965. In all three regions surface tended to increase through 1956 when mounting surpluses were a factor in reducing the domestic support price from 6800 to 6200 lire (8.8 percent) in the north and center and from 6950 to 6450 (7.2 percent) in the south. These changes, combined with a period of rapid economic growth encouraging off-farm migration, caused the sharp fall in wheat surface shown.

The prices of the Common Agricultural Policy continue this unfavorable pattern for wheat. Price projections used later show an expected decrease of 8.6 to 9.3 percent depending on the region from 1964-1970 and at the low price assumption for 1975. At the same time feed grain price projections call for an expected increase of almost 15 percent from 1964-1970 and 32 percent from 1964-1975. It is expected that price changes of this magnitude will lead to further reductions in wheat surface.

Besides unfavorable prices, other factors are important in farmer decisions to reduce wheat surface. In order to project 1970 and 1975 production, these must be considered

FIGURE III-2. SOFT WHEAT SURFACE BY MAJOR GEOGRAPHIC REGIONS, 1952-1965



and their collective impact weighed. Table III-2 lists the more important factors and further discussion of the effects of each follows.

Behind the changing price ratios is a change in grain requirements. In recent years the shift from the traditional forage ration for cattle to mixed feeds and the rapid expansion of the broiler industry has created additional feed grain demand. It may be anticipated that increasing quantities of these grains will be needed. Policy is being changed to encourage more feed grains and less wheat.

Much of the wheat land going out of production has been marginal land drawn into use by former policies. Wheat surface declined 11 percent in the mountains from 1959-1964, 7.4 percent in the hills and 2.4 percent in the plains. Although the rate of decline in the mountains is highest, the total decrease in number of hectares was only 61,000 compared to 95,000 in the plains and 107,100 in the hills. The process of farm abandonment at higher elevations is expected to continue in the poorer areas and in more favorable areas shift to pastures and woodlots. But the complete abandonment of the remaining 500 thousand hectares of wheat in the mountains would reduce national wheat production less than ten percent.

More important will be shifts occurring in the hills of Italy. It is in this area that out-migration at present is greatest in absolute and percentage terms.[10] In this

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[10]Di Cocco, op. cit., pp. 249-332.

TABLE III-2. FACTORS CONDITIONING ITALIAN WHEAT PRODUCTION[a]

Favoring a Decrease	Favoring Constant or Increase
Surface	
(1) Lower wheat prices under EEC policy	(1) A major source of farm income
(2) Higher prices for feed grains	(2) Large number of small family farms
(3) Need for increased amounts of grain and forage for livestock	(3) Traditional rotation
(4) Abandonment of land at higher elevations	(4) Most highly mechanized crop
(5) Decrease of _mezzadria_ farms (including _mezzadria_ law of 1964)	(5) Increase in number of salary-operated farms
(6) Increased irrigated surface	(6) Possibility of doublecropping with summer corn or forage
(7) Possibility of large surplus in France with exports to Italy	
(8) Lower per capita consumption	
Yield	
(1) Better land is irrigated and shifted to other crops	(1) Most genetic research has been on wheat
	(2) Relatively high rate of fertilizer use and increasing recognition of benefits
	(3) Tendency to specialize after _mezzadria_ and family farmer migrates
	(4) Decrease in sub-marginal land at higher elevations

[a]The dangers of generalizing must be noted for the factors underlying farmer decisions vary by regions. The list is not intended to be all inclusive but rather to focus on the more important of a wide variety of economic, social and political causes.

area and in the plains aggregation follows out-migration so that more viable farm units are created. Almost without exception when these units are operated in a salaried type of management, land formerly planted in an inter-mixed system of trees, vines and wheat becomes used for specialized wheat production. The consequences of out-migration are expected then to have different effects according to altitude; in the mountains continued decreases of wheat land can be foreseen with little effect on total wheat production; in the hills a more specialized and productive wheat culture on fewer hectares; and in the plains substitution of wheat by higher valued crops.

A part of the process of out-migration is the change in structure associated with the change in the tenure system. Farms operated by mezzadria are highly resistant to change. But as advancing age, off-farm job opportunities for younger family members and the 1964 law passed to prevent new contracts of this type gradually eliminate these sharecroppers, change can be more rapid. Where land shifts to a family farm arrangement farm organization changes little although more public financing is now available for modernization. Where the land shifts to a salary system more dynamic response as described above results.

Government policy promoting irrigation also negatively affects land planted to wheat. This is particularly true in the south and islands where most land feasible for irrigation is now planted in grains. Aiello describes the effect of irrigation on farm organization in 46,590 farms in the land reform program, "the most consistent changes were the reduction of pastures and dry grain crops--in the coastal lands there is a substantial increase in irrigated area counterbalanced by a reduction in dry grain crops--in the dry lands and internal hill lands dry grain crops retain their position of major importance."[11] With the major emphasis on irrigation in these areas indicated by the second Green Plan, a considerable reduction of all grains, particularly wheat, may be anticipated.

Of some concern to Italian policy makers is the effect of French wheat imports on wheat production and farm income. The price in that country will be higher under the Common Agricultural Policy and may be expected to encourage further wheat production. French soft wheat can now be purchased at less cost in some areas of Italy than it can be produced by traditional methods.[12] Dr. Amadei describes the policy dilemma, "The best of all situations would be for France to grow wheat and export to Italy with no tariffs. But in the center and south of Italy a large amount of land is suitable only for wheat; what would be the future for this part

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[11] Carlo Aiello, _op. cit._, p. 62.

[12] Conversation with Dr. Mariani, Director of Grain Importing, Agangeline Corporation, Ancona, June 6, 1966.

of the country--too many people presently employed in agriculture would have no jobs."[13] These apprehensions no doubt have foundation; nevertheless more French wheat will likely flow into Italy causing pressures to decrease domestic production.[14]

The factors discussed thus far indicate a reduction in wheat surface, but there are influences at work to resist these pulls. Because wheat is a major income source for farmers it is uppermost in the minds of policy-makers. Wheat income is especially important to two groups, the large land owner who has an influential voice with local and national politicians and the large number of family farmers for whom farm income cannot be allowed to fall at too fast a rate. Thus, aids designed to ease the effect of lower EEC wheat prices as much as possible may be expected.

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[13]Conversation with Dr. Georgio Amadei, Instituto di Economia e Politica Agraria, Universita de Bologna, Bologna, January 28, 1966.

[14]Italian wheat imports in 1965 totaled 930.7 thousand metric tons up from 540.8 in 1964 and 308.3 in 1963 but much less than the 2,451.5 thousand tons imported in 1961. France supplied essentially no wheat to Italy from 1955 to 1964 but in that year 202.3 and in 1965 375.8 thousand metric tons were imported from this country. Source: U.S.D.A., Economic Research Service, Preliminary Computer Printout, EEC Trade Study, Book No. 4.

Some Italian wheat is milled into flour and exported. In 1965 277.2 thousand metric tons of wheat flour was exported (equivalent to 360 thousand tons of wheat) and in 1964 113 thousand tons of flour was exported (equivalent to 147 thousand tons of wheat). Source: FAO, Monthly Bulletin of Agricultural Economics and Statistics, Vol. 15, No. 11 (Rome: November, 1966), p. 25.

A second factor is the large proportion of family farmers and sharecroppers in the country. Because wheat is the most dependable income source, production techniques are familiar, five to seven year rotations are common practice and small farms do not have capital for major transitions, wheat will remain the most important crop. Since adjustment on these farms comes slowly and in some cases not at all and government policy favors maintaining family farms, total wheat acreage in the future will not be drastically different than the past trend even with EEC price changes.

More operations in wheat production are mechanized than any other enterprise and rising labor costs have less dampening effect than in competing land uses. Where large elements of fixed costs are incurred with the purchase of specialized harvesting equipment there is incentive to maintain or even increase wheat output.[15]

In some areas of the country where irrigation is available wheat remains because it is possible to harvest in June and doublecrop summer corn or forage. Several cereal-livestock farmers in the Po Valley region indicated that even at proposed EEC prices this would be their most profitable combination. To the extent such cropping patterns persist,

[15]Combines with combination heads for two or more crops are available only in small numbers.

EEC prices will have less effect than envisioned.

The net effect of all the forces listed in Table III-2 will be a continued decline in national wheat surface. The rate of decline will differ according to elevation, type of management, input use and available alternatives, both farm and nonfarm. In the mountains low yields coupled with lower prices, inability to take advantage of modern technology and difficult living conditions will cause wheat surface to fall rapidly. In the hills wheat will remain the dominant crop. Where sharecroppers and family farms remain, wheat is a major income source and production will continue much as it has in the past; where land farmed by salaried workers increases, wheat offers the best alternative in the hills. Modernization of farming in the hills and mountains depends on out-migration and the willingness of land owners to sell land for consolidation. In the irrigated plains EEC policy will have more effect and higher valued crops including corn will be planted at the expense of wheat.

1. Statistical analysis of historical factors influencing wheat surface: Two original objectives were to quantify the effect of lower wheat prices under the CAP and to project wheat production under these prices. To accomplish the first and as a first estimator of the second, single equation regressions were fitted to data on surface planted to soft wheat in each of the four geographical regions. The

model for each region included the regional average nominal soft wheat price lagged one year and time as a dummy variable for the changes in structure discussed above but for which time series data were generally unavailable.[16] The dependent variable was soft wheat surface reported at the regional level and aggregated for the north, center, south and islands.

The results are in Table III-3. The two variables included explain 70 percent or more of the variation in wheat surface in each region, signs of all price coefficients are consistent with economic theory and signs of the time variables show the decreasing trend of wheat surface in each region. Price coefficients are statistically significant at the .05 level or better for all regions but the north and time coefficients are significant at the .01 level or better for all regions. The magnitude of the price coefficients support the expectation that farmers are less responsive to price in moving from north to south in the country.

Examination of the table of simple correlation coefficients shows time to be highly negatively correlated with wheat surface and positively with wheat price to a lesser degree. This indicates that the regression coefficients

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[16]Alternative formulations with estimates of out-migration, mechanization and prices of competing crops were run, but statistical difficulties and insignificant results indicated the research objective could best be accomplished with only two independent variables.

TABLE III-3. REGRESSIONS FOR EXPLAINING ITALIAN SOFT WHEAT SURFACE, 1955-1965 AND DERIVED ELASTICITIES

Region	Constant	Wheat Price	Time	$\bar{R}^2$	D.W. Statistic	Standard Error of Estimate
North	672,509.7323 (375,890.2893) (.12)	109.0014 (52.7418) (.08)	-15,673.1284 (5,054.9303) (.01)	.696	2.75	47,166.8618
Center	702,591.2149 (186,976.1029) (.01)	60.0104 (25.8222) (.05)	-9,864.5341 (2,559.8144) (.00)	.779	2.28	23,583.6660
South	536,242.7750 (152,484.7572) (.01)	52.3811 (20.9671) (.04)	-16,442.5939 (2,025.6730) (.00)	.928	1.55	18,011.6818
Islands	17,331.1294 (25,788.7902) (.53)	8.0612 (3.5460) (.05)	-3,124.5101 (342.5894) (.00)	.938	1.41	3,046.2027

Elasticities at Means	
North	0.563
Center	0.393
South	0.454
Islands	1.026

Figures in parentheses are in order, estimates of standard errors and significance levels of the regression coefficients.

and $\bar{R}^2$s may be slightly inflated. It should also be noted that the sample period for the wheat equations is 1955-1965 rather than 1952-1965 as with most other commodities. The reason is a desire to eliminate as much as possible the period before 1957 when conditions differ considerably from the present and those expected to 1975.

Estimates of the price elasticities of hectarage derived from the statistical supply functions also appear in Table III-3. These estimates indicate a one percent change in nominal wheat price is associated with a 0.56 percent change in the same direction for wheat surface in the north, 0.39 percent in the center, 0.45 percent in the south and 1.03 percent in the islands (the higher value in the islands was unexpected and probably is caused by statistical variability rather than indicating greater response to price in this region).[17] To the extent these estimates based on historical relationships hold for the future, they indicate the effect of EEC common prices on Italian acreage.

2. Projections to 1970 and 1975: To estimate 1970 and 1975 soft wheat surface, the equations of Table III-3 were used with projected prices. Since feed grain prices are omitted from the equation, farmers could conceivably decrease wheat

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[17] In another study for all Italy supply response for wheat surface to its price was estimated to be 0.33. Enno Friedrich Willms, Versuch einer Quantifizierung von Getreideangebotsfunktionen in der Europaischen Wirtschaflsgemeinschaft (Kiel: 1966), pp. 112-124.

surface at a faster rate than in the past. But the factors listed above describing farm structure and the unique position of wheat in the farm economy make more rapid adjustments to price changes extremely doubtful. Therefore, the choice of the sample period is assumed to be a reliable base for projection of wheat surface.

The projected surface and surface in three base periods are in Table III-4. For the country wheat surface has declined about five percent in each of the five year intervals shown. The rate of decrease was slowest in the north and more rapid the more southerly the location of the region. Using a price projection that assumes a producer price five percent above the intervention price set for July, 1967, a much more rapid decline in wheat surface is obtained. The projected surface in 1970 is 2.7 million hectares down 12.2 percent from 1964-65. The greatest absolute decline is in the north, a change from the past two periods but perhaps more realistic considering the alternatives open to growers in this region.

For 1975 two projections were made under alternative price assumptions. The low projection was based on the price assumption used for 1970. For the country wheat surface at this price is expected to be 2.4 million hectares, 8.3 percent less than the area projected for 1970. A high projection of 2.7 million hectares is obtained by assuming that real wheat price will be constant from 1964 to 1975. At this

TABLE III-4. SOFT WHEAT SURFACE, AVERAGE YIELD AND PRODUCTION BY MAJOR GEOGRAPHIC REGIONS FOR SELECTED YEARS AND PROJECTIONS TO 1970 AND 1975

Item	1954-1955[a]	1959-60[a]	1964-65[a]	1970	1975 Low	1975 High
Surface (Hectares)						
North	1,381,294	1,311,817	1,276,146	1,105,724	1,027,358	1,136,141
Center	1,092,805	1,061,113	1,009,396	927,805	878,482	939,393
South	856,634	798,096	727,454	612,643	530,430	584,382
Islands	65,939	56,579	38,771	32,081	20,365	28,668
Italy	3,396,672	3,227,605	3,051,767	2,678,253	2,456,635	2,688,584
Average Yield (Quintals Per Hectare)						
North	27.7	26.7	31.8	33.1	35.0	35.0
Center	17.9	17.7	22.3	24.4	27.9	27.9
South	11.7	11.3	15.9	17.2	18.6	18.6
Islands	8.4	9.0	10.6	11.0	11.6	11.6
Italy	--	--	--	--	--	--
Production (Metric Tons)						
North	3,826,184	3,502,551	4,058,144	3,659,946	3,595,753	3,976,493
Center	1,956,121	1,878,170	2,250,953	2,263,844	2,450,965	2,620,906
South	1,002,262	901,848	1,156,652	1,053,746	986,600	1,086,950
Islands	55,389	50,921	41,097	35,289	23,623	33,255
Italy	6,839,956	6,333,490	7,506,846	7,012,825	7,056,941	7,717,604

[a]Two year averages.

Source: Istituto Centrale di Statistica, Annuario di Statistica Agraria (Roma: various issues) and Bolletino Mensile di Statistica (Roma: December, 1964 and 1965).

price wheat surface would increase in the north and center from the 1970 projection and would almost equal 1964-65 plantings.

It appears quite unlikely that wheat prices could be administered at this rate without incurring a considerable wheat surplus in Europe. The only rationale would be a policy decision to maintain farm income at a high level. Therefore, the low price assumption is believed to provide the most probable projection and in fact, the possibility of even lower EEC wheat prices depending on the supply-demand balance in the future should not be overlooked.

These projections are expected trends at a highly aggregated level. It is important to know the farm level response as well since conceivably, net incomes could rise even at lower wheat prices if costs fell sufficiently or wheat could be the best alternative for farmers even at lower prices. In either event macro-level projections based on past data would incorrectly interpret the future trend.

Appendix Tables 4 and 5 show budgets for one hectare of dryland wheat with a low level of mechanization in the north of Italy and one hectare in the plains of the north with a high level of mechanization. The budgets are intended to be representative of family farms in the hills and family or salary farms in the plains of the most important producing area.

At 1964-65 prices net incomes are 44,790 lire per hectare in the hills and 188,765 lire in the plains. Using projected 1970 wheat price and assuming no change in costs, net income becomes 23,870 lire in the hills, a decrease of almost 47 percent and 145,665 in the plains, about 23 percent less than 1964-65. If costs are considered net income will probably fall more. Considering the pattern of input prices in Figure III-1 nonlabor costs will show only small increases, if any, while labor and land prices can be expected to rise substantially. This would place the hill farm with little mechanization at a further disadvantage. But most of these units are family farms using unpaid family workers and rising labor costs would not affect their market costs. It would make wheat farming less attractive than nonfarm alternatives and encourage migration.

These results support the regression analysis projection of less wheat surface. It is assumed that reduced profit on micro-level units will lead to a reduction in wheat surface--unless it remains the best alternative. To answer this question comparisons with other crops will follow as they are introduced.

Yields

Because wheat is the basic cash crop in Italy and because previous government policy was designed to make the country self-sufficient in wheat, it is the crop upon which almost all productivity efforts have been expended. Schmidt described these efforts, citing the government's vigorous program to raise domestic wheat output by "intensified cultivation but not increased acreage."[18]

Some success has been attained but today wheat yields are still largely dependent on natural conditions including the same factors Schmidt described, scarcity of moisture during the critical period of grain development, high temperatures and intense light. This dependence on Italian climatic conditions and the wide year-to-year fluctuations in yields was the biggest problem in predicting future yields.

While most genetic research has been concentrated on wheat, approximately three-fourths of all wheat seed planted is not purchased from commercial sources (and by implication would not be improved seed). Fertilizer use is also concentrated on wheat but still is considerably below an optimum level.

Bonciarelli, in a two year experiment in central Italy, applied ammonium nitrate in quantities of 0, 40, 80, 120 and 160 kilograms of N.[19] The resulting grain yields were 15.2, 18.2, 27.4, 33.3 and 41.6 quintals per hectare. Applying marginal analysis to this experiment (1963-64 prices) shows the added return from the fertilizer inputs exceeds

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[18] Schmidt, <u>op. cit.</u>, p. 645.

[19] Francesco Bonciarelli, "Dosi Crescenti di Azoto e Rendimento del Grano" <u>Progresso Agricolo</u>, Anno X, No. 1 (January, 1964).

the added cost by a wide margin at all levels of use. If we can infer from this that fertilizer will increase yields substantially (and net income also) higher rates of application in the future may be expected.

Another important factor for future wheat yields is the disappearance of wheat planted on sub-marginal lands. The average yield for the two year period 1963-64 in the mountains was 12.9 quintals; in the hills, 19.9 quintals and in the plains 28.8 quintals per hectare. With the continued reduction of wheat land on the higher elevations due to out-migration, average yields may be expected to increase.

It was also hypothesized that a positive relationship existed between wheat price and yield since producers might use more intensive practices if their expectations are for higher prices. To test this hypothesis the directional change in succeeding years for wheat yield was compared to the previous years directional change of wheat price. For the north the movements coincided for every year since 1959 and for the center and south the movements were in the same direction for all but one year since 1958. But the results for the years prior to those cited was the opposite. It seems very likely that farmers, at least in recent years, use the previous years price as one of the important guides in allocating inputs to the wheat crop. If this is correct, the changes in price ratios affected by EEC policy may result in reallocation of inputs among crops to favor yield of enterprises competing with wheat and at the expense of wheat yield increases.

We may conclude that considerable improvement is still possible. This improvement may be expected to come from: (1) greater use of improved seed, (2) more fertilization, (3) more mechanization, (4) a decrease in marginal land planted to wheat, (5) a shift in the management system to more salaried operations, and (6) EEC wheat prices that may reduce input use and consequently average yields.

For projecting 1970 and 1975 average yields a trend analysis was first computed over the period 1952-1965. The extrapolated trend for each region was then adjusted according to our judgment on how fast the above changes may occur. The low R^2's are an indication of the relatively wide fluctuations engendered by weather conditions.

The extrapolated trend for the north shows an annual average increase of 0.390 quintals (R^2 = .157). The 1970 yield estimate was 33.07 and the 1975 estimate was 35.02 quintals per hectare. For projection purposes it was assumed that 1970 and 1975 average yields would be five and ten percent respectively above the trend values. The final results were 34.72 quintals for 1970 and 38.52 quintals for 1975, Table III-4.

In the center average yields have increased from 16.3 quintals per hectare in 1952 to 22.7 in 1965. The average annual rate has been 0.336 (R^2 = .341). The extrapolated trend values show an estimate of 22.80 quintals per hectare in 1970 and 24.48 in 1975. Following the same procedure as in the north, the trend values were increased by seven percent to 1970 and 14 percent in 1975. These higher values were used because of the expected continued abandonment of wheat land at higher elevations. The results show an expected average yield of 24.40 quintals in 1970 and 27.91 in 1975.

In the south average wheat yields have been at a virtual standstill. Moreover, little improvement in the average can be expected because the various government programs will cause much of the best wheat land in the plains to be irrigated and converted to more intensive uses. Thus, despite the adoption of technology and some land abandonment, the average yield over the next ten years will likely approximate the past trend. The 1970 and 1975 projections are therefore 17.16 quintals and 18.63 quintals (trend value = 0.293 and R^2 = .395).

The situation in the islands is comparable to that in the south. The average annual increase over the 1952-1965 period was 0.113 quintals per year (R^2 = .013). Projecting this to 1970 and 1975 shows an expected yield of 11.03 and 11.60 quintals per hectare.

Production

With both yields and surface planted dependent on climatic conditions, considerable variation in production takes place from year to year. In the last eight years the change in output from the preceding year has ranged from 9.7 to 22.4 percent and averaged 16.5 percent. This variability, the trend to fewer hectares and generally rising yields are the considerations to note in projecting 1970 and 1975 production.

The estimates of 1970 and 1975 output are simple multiples of the previously projected surface and yield. Production in 1970 is estimated to be seven million metric tons, down 6.6 percent from 1964-65 levels.[20] Most of this decrease is expected in the north and south. Production in 1975 is estimated to be 220 thousand tons less than 1970 levels at the low price assumption and to about equal 1970 production at the higher price.

Durum Wheat

The Italian consumer of pasta frequently judges this diet staple by the proportion of durum wheat used in its preparation. As industries gradually supplanted home prepared

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[20] Allowance is not made for reduced yields and surface due to a buildup in soil salinity from the autumn 1966 floods. It was initially reported that soils in some areas would be uncultivatible for several years. Later assessment shows the damage to agriculture to be much less than first supposed. Letter from W. Glenn Tussey, Assistant Agricultural Attache, Rome, March 14, 1967.

paste there has been a tendency to reduce the proportion of durum used in making the noodles. Still, 95 percent of the durum wheat produced in the EEC is grown in Italy and used in these mixes.

Durum Wheat Surface

Durum wheat enjoys a market advantage over soft wheat, but yields are generally lower. Less breeding work has been done and the older varieties can only be planted in well-adapted soils, cannot be fertilized and yield only about 20 quintals per hectare. Now a new variety is available that is much more tolerant of growing conditions and yields 30-40 quintals in a normal year.[21] With prices established by the Common Agricultural Policy and increasing yields as the lag in adoption is overcome the net income per hectare from durum will likely rise relative to soft wheat. This will be important in estimating future supply. Other variables influencing the surface planted to durum include out-migration from the hills and the recommendations of the land reform agency as irrigation and reorganization take place.

Generally, as farms become irrigated wheat surface decreases and more land intensive uses follow. The transi-

[21] Conversation with Dr. Rotelli, Consortium of Land Improvement of Capitanata (Foggia: June 14, 1966).

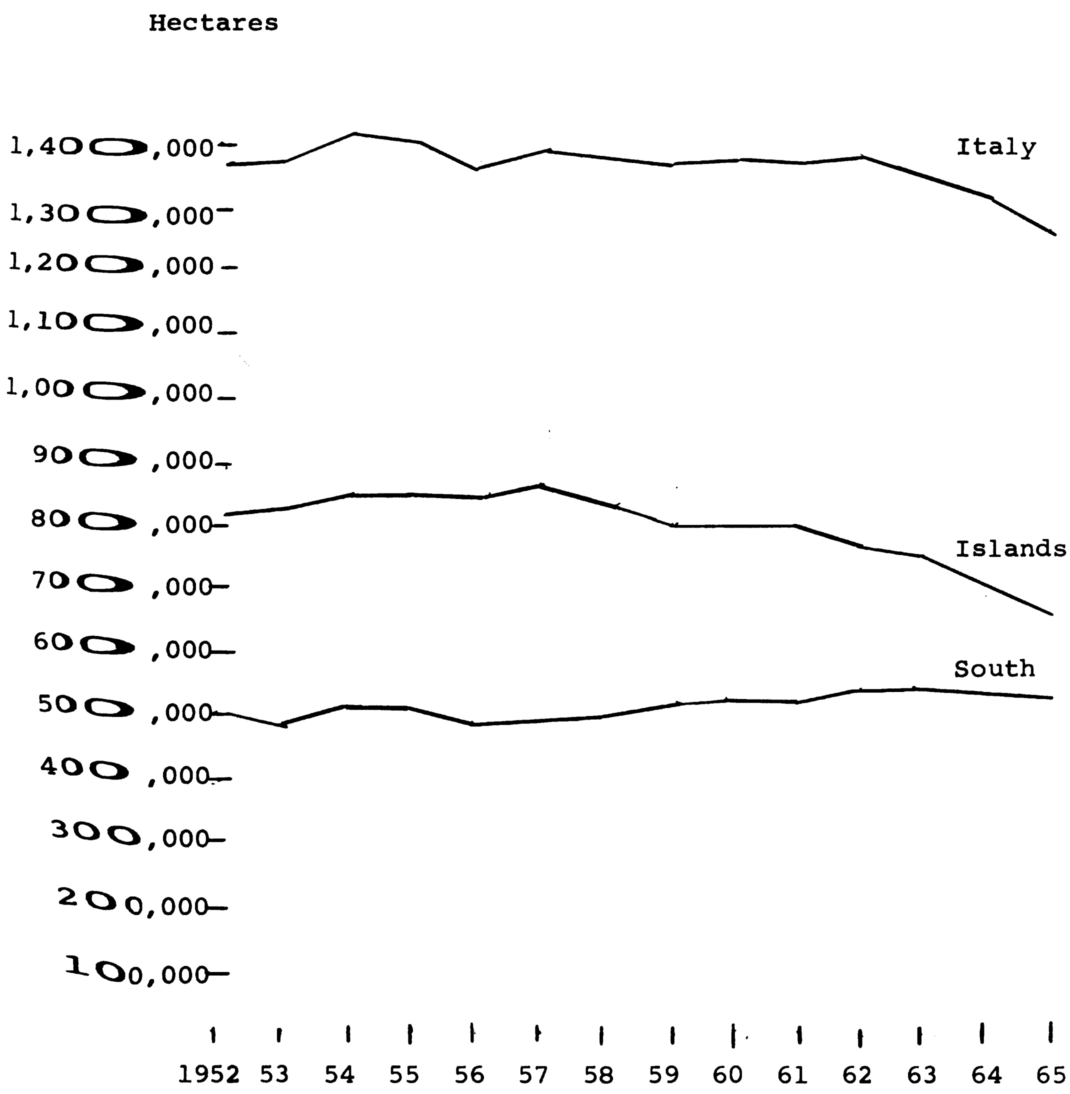
tion is rapid in large farms, but slower in smaller farms where capital is often unavailable. In areas along the coast land passed first from all cereal production to cereal-livestock as forage production was made possible. Now this land is being planted increasingly to fruits and grapes. Wheat in these areas remains only because of a lack of time and capital for the transition.

In areas further inland where water is less abundant the land reform agency plans to irrigate only half the farm surface. The irrigated portion will be planted to fruits, grapes and forage while the dry portion will remain in durum wheat. Soft wheat, even though it shows better response to fertilizer and yields better, will remain only where it is impossible to grow durum wheat. Wheats of both types but with an increasing proportion of durum as yields are improved will likely be planted in the hills where irrigation is not feasible.

Out-migration from the south will continue and cause decreases in surface as sub-marginal lands are abandoned. In higher elevations where growing conditions are more favorable forage will increase. In hotter, drier areas some farm consolidation will occur with durum wheat at least maintaining its proportion of planted surface while in other areas land will be abandoned.

Figure III-3 illustrates the past pattern for durum wheat surface. In 1964, 64 percent of the country's produc-

FIGURE III-3. HARD WHEAT SURFACE, 1952-1965



tion came from the region of Puglia in the southeast corner and the island of Sicily. In the largest producing region, the islands, surface planted has decreased since 1957 and at a more rapid rate since 1961. This decrease has been sufficient to cause total surface for all Italy to decrease by 6.1 percent from 1959-60 to 1964-65.

1. Statistical Analysis of Historical Factors Influencing Durum Wheat Surface: Single equation regressions were fitted to 1952-1965 data for each major producing region. Causal variables discussed above were durum wheat price, the percent of the total labor force in agriculture and time to represent the land reform program and other structural changes not easily quantified. The results, presented in Table III-5 explain 70 percent or more of the variation in the two regions.

For the south signs of all coefficients were as expected. Price over the sample period has had a small effect on farmers' decisions as indicated by the price elasticity of 0.154. Time is numerically the largest and statistically the most significant of the explanatory variables. For the islands the regression results were less satisfying in that "wrong signs" were obtained for both price and agricultural labor force. The explanation for both variables could lie in the imprecise estimation denoted by large standard errors and to the fact that surface is highly correlated with trend and to a lesser degree to the labor force variable.

TABLE III-5. REGRESSIONS FOR EXPLAINING ITALIAN DURUM WHEAT SURFACE, 1952-1965 AND DERIVED ELASTICITIES

Constant	Wheat Price	Percent of Labor Force in Agr.	Time	$\bar{R}^2$	D. W. Statistic	Standard Error of Estimate
South						
297,145.2034	9.9513	1972.2501	7131.3401	.697	1.31	11,793.3762
(121,686.1682)	(10.3552)	(1271.9551)	(1865.8305)			
(.04)	(.36)	(.15)	(.00)			
Islands						
1,107,138.6414	-4.0012	-3738.4577	-19,600.0260	.775	1.07	26,430.4950
(213,939.5929)	(7.4811)	(3996.4903)	(6,183.9451)			
(.00)	(.61)	(.38)	(.01)			

Elasticities at the Means:	
South	0.154
Islands	-0.038

Figures in parentheses are in order, estimates of standard errors and significance levels of the regression coefficients.

2. Projections: Since the reliability of the equation for the islands is open to question, an alternative method for projection was selected. The trend estimate does appear to indicate with accuracy the average decrease over time. This coefficient was used to project durum wheat surface in 1970. The rate of decline over the five year period was 13.9 percent compared to 13.3 percent in the previous five years.

For the 1970-1975 period the rate of decrease is expected to be less because: (1) many of the sub-marginal areas will have been depopulated previously and (2) adoption of new varieties now available will improve both net income from durum wheat and its competitive position vis-a-vis other crops. Therefore, the trend value per year from 1970-1975 was assumed to be only 80 percent of the regression estimate. This procedure provides a 1975 estimate 78,400 hectares less than 1970, a 13 percent decline for the five year period.

The regression equation for the south was presumed to be adequate for projection. Extrapolation shows increases in durum acreage for 1970 and 1975, Table III-6. This is consistent with the trend in the sample period, and more important, with observations of professional agricultural workers interviewed in this region.

Since such a small proportion of durum wheat is grown in the center, and this primarily in the southern part of Lazio, separate equations were not estimated for this region.

TABLE III-6. DURUM WHEAT SURFACE, AVERAGE YIELD AND PRODUCTION BY MAJOR GEOGRAPHIC REGIONS FOR SELECTED YEARS AND PROJECTIONS TO 1970 AND 1975

Item	1954-55[a]	1959-60[a]	1964-65[a]	1970	1975 Low	1975 High
Surface (Hectares)						
North	---	---	---	---	---	---
Center	51,597	46,997	56,958	55,300	70,000	70,000
South	515,667	526,918	541,216	557,387	572,688	582,381
Islands	846,866	807,754	700,215	602,615	524,215	524,215
Italy	1,414,130	1,381,669	1,297,440	1,215,302	1,166,907	1,176,596
Average Yield (Quintals per Hectare)						
North	---	---	---	---	---	---
Center	14.8	14.6	17.1	17.4	18.2	18.2
South	11.6	9.7	15.2	16.7	18.2	18.2
Islands	10.3	9.1	11.2	11.0	11.5	11.5
Italy	---	---	---	---	---	---
Production (Metric Tons)						
North	---	---	---	---	---	---
Center	76,363	68,616	97,398	96,222	127,400	127,400
South	598,174	511,110	822,648	930,836	1,042,292	1,059,933
Islands	872,272	735,056	784,241	662,876	602,847	602,847
Italy	1,546,809	1,314,782	1,704,287	1,689,934	1,772,539	1,790,180

[a]Two year average.

Source: Istituto Centrale di Statistica, Annuario di Statistica Agraria (Roma: various issues) and Bolletino Mensile di Statistica (Roma: December, 1964 and 1965).

Rather, 1970 surface was assumed to be approximately equal to 1964-65 and 1975 acreage was assumed to increase to 70,000 hectares due to a higher relative price and improved yields.

As a micro-level check on these projections a budget for durum wheat in the south was constructed, Appendix Table 6. At 1964 prices and yields, net income per hectare is estimated to be 34,828 lire under average conditions. Assuming no change in costs and yields net income with projected 1970 prices would be 35,196 lire, approximately the same as in 1964.

This would indicate that the projected surface would overstate what may actually occur. Further evidence is obtained by comparing income from durum wheat with income from soft wheat in conditions that approximate those in the south, Appendix Table 4. This comparison shows 1970 net income to be less for durum. Unless the new varieties are rapidly adopted so that yields will increase, it is not likely that 1970 surface will be as large as that projected in Table III-6.

Yields

Yields of hard wheat over the 1952-1965 period were almost completely determined by growing conditions. There has been some improvement from 1961-1965 for the south, but in the islands a regression of yield on time was zero indicating no improvement at all. New varieties available now offer opportunities for increased yields.

In order to estimate 1970 and 1975 yields it was assumed that price ratios more favorable to hard wheat than to soft wheat would cause average yields to at least equal the past trend of 0.307 quintals per year (R^2 = .262). Therefore, the south's 1970 and 1975 yields were estimated at 16.70 and 18.17 quintals per hectare.

In the islands neither the trend analysis nor data from more recent years indicate any improvement. The 1970 and 1975 projections for this region were made by assuming a four and eight percent increase over the average yield of 10.63 quintals for the period considered. This resulted in a 1970 estimate of 11.05 quintals and a 1975 estimate of 11.48 quintals per hectare, Table III-6.

Production

These yield projections were combined with surface projections to produce the estimates of production in Table III-6. Production in the two base periods followed the same pattern as soft wheat, decreasing from 1954-55 to 1959-60 and then increasing about 30 percent to 1964-65. The 1970 production is projected at 1.7 million metric tons down less than one percent from 1964-65. The low price assumption for 1975 provides an increase of four percent from 1970 to almost 1.8 million tons.

Comparison with production in the three base periods and the results of the budgeting lead to the expectation that this estimate will exceed the actual. Only if yields increase sufficiently to cause farmers to substitute durum for soft wheat and to attain the yield estimates in Table III-6 could production be this great. Based on observation and advice from Italian agriculturists in the south this will occur.

Feed Grains

The second category listed for Italian crops, feed grains, includes corn, barley, oats and very small amounts of rye and grain sorghum. Like wheat, surface planted to these grains has been declining but unlike wheat, demand has risen sharply. Feed grain requirements have in fact, increased an average 13 percent per year since 1955 (Table III-7).

It is evident from the table that requirements have been met with increasing quantities of imports. While total feed grain use was 2.3 times as great at the end of the decade, imports were 9.3 times as large. At the same time that demand and imports were increasing at these rates domestic production did not change. The country produced 84 percent of its 1955 needs, but was only 37 percent self-sufficient in 1965.

With static domestic production and rapidly increasing

TABLE III-7. **DOMESTIC PRODUCTION, IMPORTS AND TOTAL SUPPLIES OF FEED GRAINS, 1955-1965**

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
					(thousands of metric tons)						
CORN-Production	3,194	3,410	3,493	3,674	3,880	3,816	3,940	3,261	3,692	3,929	3,316
Imported	391	353	656	899	107	1,705	1,730	2,741	3,664	3,472	5,153
Total	3,584	3,763	4,149	4,573	4,951	5,520	5,670	6,002	7,356	7,531	8,468
% Produced	89.1	90.6	84.2	80.3	78.3	69.1	69.5	54.3	50.2	52.1	39.1
RYE-Production	125	107	92	105	105	93	98	93	77	86	-
Imported	111	43	69	63	66	219	134	26	4	4	-
Total	236	150	161	168	173	313	297	140	107	89	-
% Produced	52.9	71.0	57.2	62.5	60.9	29.8	32.9	66.5	71.7	95.6	-
BARLEY-Production	292	275	296	296	279	232	279	285	280	251	285
Imported	162	209	295	208	238	414	656	519	815	656	1,042[a]
Total	454	485	591	504	550	646	935	805	1,095	1,037	1,327
% Produced	64.3	56.8	50.0	58.7	50.7	35.9	29.8	35.4	25.6	24.2	21.4
TOTAL FEED GRAINS											
Production	3,610	3,793	3,881	4,126	4,264	4,141	4,317	3,640	4,049	4,266	3,600
Imported	664	606	1,019	1,170	1,378	2,338	2,520	3,286	4,483	4,132	6,195
Total	4,274	4,305	4,901	5,296	5,671	6,479	6,902	6,947	8,558	8,658	9,795
% Produced	84.4	86.2	79.2	78.6	92.8	63.9	62.5	52.4	52.0	49.2	36.7

[a]Includes rye, oats and barley.

Source: Istituto Centrale di Statistica, Annuario Statistica Italiano (Roma: Issues of 1956-1965).

requirements, the source of feed grain imports is of interest. Table III-8 provides this information for three exporting regions.[22] In recent years over 60 percent of feed grain imports were delivered from the rest of the world category, primarily corn from Argentina. The U.S. share increased from 7.3 percent in 1956-1960 to 20.4 percent of the market in the years 1960-1964. Italy's feed grain imports from its EEC partners is almost all barley imported from France.

As Table III-8 shows, Italy has not traditionally been a feed grain exporting country and exports are still small in relation to imports. But in 1963, the year following the initiation of the Common Agricultural Policy, exports increased ten times, doubled again the following year and probably tripled the next year. Where before 1962 less than half of its feed grain exports went to EEC countries, after this date all were directed to other EEC members, principally Germany.

The reason for the change in export movement is the special provision given to Italy by the EEC allowing corn to be imported at a lower price until 1972. One author shows how an Italian grain dealer can take advantage of the pro-

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[22] Total imports do not equal those of the previous table because the Italian source on which Table III-7 is based does not agree with U.S.D.A. statistics used for Table III-8.

TABLE III-8. ITALIAN TRADE IN FEED GRAINS, IMPORT SOURCE AND EXPORT PURCHASER, 1955-1965

Source	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
	(thousands of metric tons)										
	Imports										
Total	416.9	766.7	724.4	1034.0	1421.6	2423.5	2585.4	3304.9	4584.0	4246.9	N.A.
EEC	18.8	3.7	28.5	6.4	23.0	121.3	699.0	155.0	185.7	232.6	N.A.
U.S.	15.8	95.7	36.0	62.9	150.3	52.7	160.9	753.0	1343.2	995.7	N.A.
Rest of World	382.2	667.3	659.9	964.6	1248.2	2249.5	1725.6	2396.9	3055.0	3018.5	N.A.
	Exports										
Total	35.0	18.8	10.9	4.0	5.1	6.5	5.1	11.2	110.2	218.9	N.A.[a]
EEC	12.3	15.3	9.2	0.7	2.1	1.4	1.0	4.2	110.2	225.2	692.3
Germany	8.6	10.4	7.7	0.7	0.8	1.4	1.0	4.2	53.3	170.0	510.0

[a]FAO trade data shows corn exports alone were 676.1 thousand metric tons in 1965 up from 215.7 in the previous year. FAO, Monthly Bulletin of Agricultural Economics and Statistics, Vol. 15, No. 11 (Rome: November, 1966), p. 30.

Source: U.S.D.A., Economic Research Service, Preliminary Computer Printout, EEC Trade Study, Book No. 4.

vision.[23] The price of corn is established in Ravenna, a deficit zone, at 4,050 lire per quintal and may be imported for 4,300 inclusive of unloading and customs expenses. A certificate may be obtained declaring it national production and the "Italian grain" is shipped to Emmericch, Germany (the Ministry of Agriculture has ordered this practice halted but apparently it is circumvented). The Italian importer now has a total cost of 4,550 lire per quintal and can sell the grain on the German market at about 5,600 lire.

Such re-exports explain only a small part of the increased volume of grain imports.[24] With the ending of the special provision in 1972 this advantage will be eliminated. Until then the larger exports within the EEC will add to the rising demand for feed grains created by the increased numbers of grain consuming units and the shift from forage feeding to grain-based rations.

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[23]Francesco Grinzato, Convegno Nazionale della Mais-colltura, Dei Prezzi del Mais in Relation Alle Esiglnze delle Produzione Veneto Inserita in Campo Nazionale e Comunitario (Treviso: 1966), 7 pp.

[24]Evidence is appearing that the concession is resented by German grain merchants and policy makers who fear depressed producer prices in Bavaria. They claim the concession was made to aid in developing Italy's livestock industry and instead Italy has become a transit country for feed grain. As a result of the decree, the levy on Italian imports of feed grain from third countries can be reduced by 6,627 lire per metric ton counterbalanced only by a tax of 1,947 lire to EEC countries and zero to third countries. This has resulted in grain from third countries via Italy being sold cheaper on the Bavarian market than grain routed in the normal way from Rotterdam. Agra Europe, No. 211 (London: April 5, 1967), p. MI-4.

Corn

In Table III-7 corn is 92 percent of domestically produced feed grains and 87 percent of the total available for consumption. Any discussion of Italy's demand and supply of feed grains must of necessity focus on this crop. Fortunately, for projection purposes, production is geographically concentrated. In the two years 1964-65, 80 percent was produced in the north and 67 percent of the total was grown in three Po Valley regions: Piemonte, Lombardia and Veneto. Present tendencies are for even more concentration.

With the exception of the Po Valley region production methods and uses of corn have changed little. In the hills of the north, in the center and south corn is largely produced by family farmers and sharecroppers in small plots destined for home consumption. The exact amount entering the market is a matter of conjecture; one source estimates that 80 percent is used directly on farm with the remaining 20 percent and imported corn traded on the market.[25] A second source indicates that about 50 percent is retained for on-farm use in small hill farms.[26] In the major producing area of the Lombardy plains farm records from 40 family farms show 64 percent of corn production is sold and

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[25]Author unknown, "Il Mercato del Mais," p. 87.

[26]Atti della Conferenza Nazionale del Mondo Rurale e dell Agricultura, <u>Azienda-Viticola-Zootecnio-Cerealicola della Marca Trevigiana</u>, VI, Vol. 2, pp. 99-117.

a comparable amount on salary farms.[27] Generally, the proportion of home use is higher in the small farms but it also depends on the type of livestock produced. If beef is raised almost all corn produced will be consumed on the farm, but if dairy animals or milk-fed veal (Sanati) are grown, corn will be used only as a supplement and the largest proportion will enter the market.

When corn is sold price depends on the location (price is usually highest in the south) and on the type of corn. In general, the local corn, marano, vitreous and highly colored, is priced highest. Following are the cinquantini, the common nostrani, the Italian hybrids and lowest priced are foreign hybrids.[28]

Corn prior to the EEC policy was essentially a free trade item, although a customs tariff of four percent (and in periods of lowest international prices reaching 12 percent) provided some protection. Prior to 1962 licensing requirements for the dollar area were required to: (1) prevent excess supplies and low domestic prices, and (2) allow Italy to buy grains from Argentina and South Africa in return for purchases of Italian manufactured products. Removal of these requirements explains in part the increase in U.S. imports since 1962.

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[27]Computed from INEA farm records for 1963, Perugia.

[28]Author unknown, "Il Mercato del Mais," p. 89.

Since the CAP became effective, Italian prices have not been increased at the suggested monthly increments. The Ministry justifies the failure to adjust to EEC prices because: (1) production costs have recently been lowered by the introduction of new techniques, (2) an increase in the price of corn would mean rising costs for livestock production and in its present state would have negative effects for the country, (3) corn is produced mainly for on-farm consumption and EEC prices would not benefit corn producers but rather would be a disadvantage to livestock producers due to the large amount of higher priced corn imports, and (4) adjusting Italian prices to the EEC price would cause farmers to increase its surface at the expense of other crops important for Italian commercial balance such as sugar beets, wheat and tomatoes.[29]

From the foregoing, it is obvious that Italian corn production is greatly influenced by foreign trade. Corn imports have doubled about every three years since 1955 and in 1965 domestic production was less than 40 percent of total corn available. Total corn imports in the two years 1954-55, amounted to 252 thousand metric tons (5.6 percent supplied by the U.S. and 94.4 percent from the rest of the world), increased to 2,769 tons in 1959-60 (4.3 percent from the U.S. and 93.9 percent from the rest of the world), and

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[29]Francesco Grinzato, op. cit.

to 8,628 tons in 1964-65 (35.8 percent from the U.S. and 63.6 percent from the rest of the world). Two facts stand out, the rapid growth of corn imports and the small proportion supplied by the U.S. until recently, actually until 1965. The largest single supplier by far has been Argentina with 73.5 percent of the market in 1959-60.

The growth of corn imports is closely related to growth of the poultry and swine industries and therein lies the reason for the small proportion of U.S. corn. Italian consumers of poultry and eggs show a strong preference for yellow pigmentation. Argentina plata corn is high in xanthophyll that provides this coloring. Producers are also of the opinion that more efficient conversion to meat and eggs is obtained from plata. Whether real or fancied these opinions are sufficiently strong for producers to demand and pay higher prices to obtain Argentine corn.

There is basis for the claim. A chemical comparison of plata and U.S. yellow corn shows plata has 100 more calories per kilogram, one percent greater protein, 0.8 to one percent more fat and almost double the xanthophyll.[30] A conclusion is that yellow corn is preferred for swine and cattle because of the lower cost but plata is fed to poultry to obtain the desired coloration.

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[30] Conversation with Mr. Hakim, Manager, Continental Grain Company, Milano, May 8, 1966.

The Italian experience of another U.S. feed manufacturer, Ralston Purina, differs. While not disagreeing with the chemical differences, their procedure for computing least-cost rations places a lower feeding value on plata than its market value. Their solution is to mix some plata with U.S. yellow corn and provide the required pigmentation by carotene additions.[31] An Italian feed manufacturer's viewpoint is that a difference of one dollar must exist to make the feeds comparable. Argentine corn is said to possess better quality, lower moisture and permit a longer storage period.[32]

The U.S. Feed Grains Council has attempted to show that plata corn is not needed for poultry. Their results confirm that only in the last two weeks before lay does a hen require plata or a carotene substitute to produce yellow eggs. Nevertheless plata forms the basis for poultry rations and some producers insist on it for swine and cattle. It is firmly entrenched in the present market because: (1) to the producer it is a guarantee of quality, (2) consumers prefer yellow pigmented eggs and poultry, (3) advantages to grain importers, i.e., lower moisture, familiarity with exporters and less "red tape" and (4) Italian trade agree-

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[31] Conversation with Mr. Mundie, Manager, Globo-Purina, Milano, June, 1966.

[32] Conversation with Dr. Mariani, Director of Grain Importing, Agangeline Corporation, Ancona, June 6, 1966.

ments calling for payments of machinery with feed grains.[33]

In coming years more substitution of lower cost U.S. grain is expected. As evidence accumulates that the same coloration can be obtained by carotene additives feed manufacturers will be less insistent upon plata.[34] Important also in changing the need for plata is the growth of the mixed feed industry. As long as corn is fed alone or mixed on the farm, farmers easily identify and purchase plata but in mixed feed the proportion of lower cost yellow corn is usually increased.

Corn Surface

The rise in corn imports helps to explain why surface planted in corn has declined even though requirements have been rising rapidly. Figure III-4 illustrates the past trend in surface planted and the geographic concentration. The rate of decline has averaged 1.4 percent per year since 1952 in the north and somewhat less in the other areas. But this rate of decline masks important changes.

Although total corn surface in the north has been

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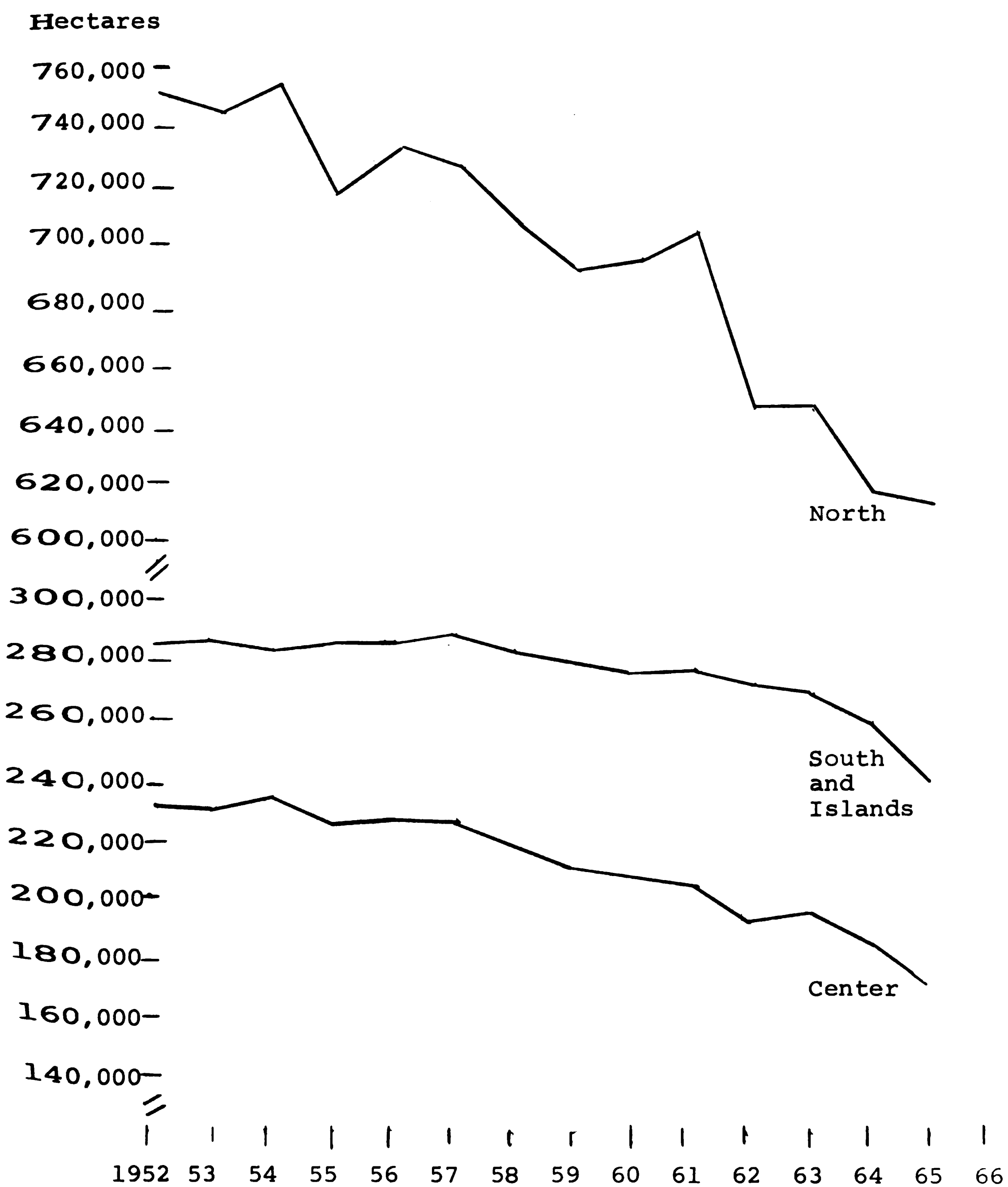
[33] Randall Stelly and James E. Kirby, Developing Markets for U.S. Agricultural Commodities in Italy--an Economic Evaluation, Texas Agricultural Experiment Station Bulletin MP-539 (College Station: September, 1961), p. 38.

[34] But Argentina policy of raising domestic corn prices while subsidizing exports may well bring the price of plata in Italy down to the level of competing corn.

FIGURE III-4. CORN SURFACE BY MAJOR GEOGRAPHIC REGIONS, 1952-1965



declining, hybrid corn plantings increased at the rate of 4.4 percent per year since 1957 and now account for 73 percent of all corn. The increase in the center has been 2.3 percent and represents 20 percent of all corn but in the south only 1.4 percent of corn planted is hybrid. Even though total corn surface in Figure III-4 shows a decrease, it is the relatively low yielding, open-pollinated varieties that have decreased faster than hybrid plantings have increased. The result has been a slight increase in production on less surface.

Three reasons explain the failure to adopt hybrid corn more readily. First, climatic conditions prevent the production of hybrids unless irrigation is available. Where supplementary water is not available, locally adapted varieties can provide more constant yields even though hybrids may produce more in an ideal growing season. Second, local varieties are similar to plata in their carotene content and hardness. As indicated earlier, market prices are higher for these varieties and many farmers continue to plant older varieties on the basis of price. Third, corn in the center and south is typically produced by family farmers and <u>mezzadria</u> in small plots for home use. Adoption of technology occurs under these conditions less rapidly than on larger, commercial farms in the north.

Besides the slow adoption of hybrids, the out-migration of many of the small farmers producing corn and the price disadvantage relative to wheat explain the decline in surface. Other reasons are offered: some farmers indicated that even if prices changed so that corn price was 5,000 lire per quintal and wheat 6,500, they would continue to plant wheat because income is more certain; others said they would continue to plant wheat because it was easier to mechanize.

Mechanization of corn cultivation, especially harvesting operations, has hindered expansion. One report shows labor used for this phase alone can be reduced from 80-100 hours per hectare to 3.5-5.5 hours by use of machines.[35]

Official policy promoting corn production has been increased in 1967 with price due to rise 800 lire per quintal and large areas of wheat land in the lower Po Valley left unsown because of the floods.[36] An accelerated educational effort is being made to bring results of a 1965 demonstration program on 11 farms to the attention of farmers. These results show that by increasing production expenses from a standard outlay of 165,765 lire per hectare to 221,962 lire, yields between 97 and 120 quintals per hectare are obtained. With corn prices at 4,500 lire, net income is increased by making this expenditure.

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[35] Enzo Manfred, "Mechanization Problems in Maise Production," L'Inforamtore Agrario, Anno XVII (Verona: Febbraio 24, 1966).

[36] Agra Europe, No. 211 (London: April 5, 1967), p. 5-2.

1. Statistical analysis of historical factors influencing corn surface: To assess the impact of the influences discussed above on planted surface, single equation regressions were fitted to corn surface in the major geographical regions for 1955 through 1965. Corn price and wheat price were assumed to be major determinants of corn surface and time was included to represent nonprice influences. The equations are presented in Table III-9.

The included variables explain 78 percent or more of the variation in corn surface over the sample period. Signs of all regression coefficients are as expected except corn price in the south and islands. The relatively large estimate of the standard error indicates this could easily be positive or negative. In fact, the large error terms for all price coefficients add a measure of doubt to their validity. Time appears to be a much more reliable indicator of surface planted.

Elasticities were computed from the equations to estimate the influence of price. Surprisingly, the elasticity of corn surface with respect to its own price was less than 0.1 in all three regions.[37] This might have been anticipated in the center and south but more price response was expected in the north. For example, farmers in the irrigated plains are now increasing corn surface in response

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[37]By comparison Willms computed an elasticity for all Italy of 0.18. Enno Friedrick Willms, op. cit., pp. 112-124.

TABLE III-9. REGRESSIONS FOR EXPLAINING ITALIAN CORN SURFACE, 1955-1965, AND DERIVED ELASTICITIES

Constant	Corn Price	Wheat Price	Time	$\bar{R}^2$	D. W. Statistic	Standard Error of Estimate
North						
984,578.1770 (122,224.9132) (.00)	7.6840 (15.9479) (.65)	-37.6445 (19.1641) (.09)	-13,225.6778 (1,666.0264) (.00)	.873	2.62	15,225.8079
Center						
285,876.2285 (36,946.7000) (.00)	4.1454 (5.4377) (.48)	-9.6648 (6.3983) (.17)	-5,225.9085 (509.2285) (.00)	.925	1.69	4,665.8349
South and Islands						
377,632.9999 (54,562.4617) (.00)	-3.6679 (7.9473) (.66)	-8.6967 (9.9419) (.41)	-4,232.6079 (713.1368) (.00)	.781	1.30	6,338.9819

Elasticities at Means:		
North	.0514	-.3772
Center	.0917	-.3245
South and Islands	-.0609	-.2195

Figures in parentheses are in order, estimates of standard errors and significance levels of the regression coefficients.

to higher prices in the last two years.

Since the regression coefficient measures the rate of change in corn surface associated with price change all else assumed constant, an estimate of the effect of projected prices is available. In the north the change in corn surface will equal b ($Price_{1970}$ - $Price_{1965}$). For 1970 the increase due to higher corn price alone is 7.6840 (5,602 - 4,878) or 5,563 hectares and from lower wheat price is -37.6445 (6,275 - 6,931) or 24,695 hectares. In 1975 the increase in corn surface over 1965 under the high corn price assumption is 7.6840 (6,492 - 4,878) or 12,402 hectares. Because 1975 wheat price is projected under the high alternative to be above the 1965 price, corn surface would be reduced from the wheat price effect. The amount would equal -37.6445 (7,273 - 6,931) or -12,874 hectares. These results show wheat prices to be much more important in determining corn surface than corn prices.

2. <u>Projections to 1970 and 1975</u>: The regression equations provide the basic technique for projecting surface. Because the 1955-1965 sample period is not expected to accurately reflect conditions in the coming decade, some changes were introduced in the coefficients. Specific changes expected in the north include a substitution of corn for forage as feeding systems change, greater mechanization prompted by increased government credit and since three-fourths of the

surface is now in hybrids, less reduction of old varieties of corn. These changes are expected to slow down the rate of past decrease in surface. In the center, however, the rate of decrease is expected to accelerate because of continued out-migration, the small proportion of hybrids planted and little irrigable surface to devote to hybrids. In the south the rate of decrease will probably be about the same or slightly faster. Some redistribution will occur as corn is reduced in the hills and mountains and increased in the irrigated plains. But even irrigated corn does not do well in this area because higher humidity prevents flower set and hybrids are much less resistant to piralids (insects) than local varieties.[38]

For estimates of corn surface in the north the trend coefficient was assumed to be 90 percent of the value in Table III-9 for 1970 and 75 percent for 1975. In the center the coefficient was increased by 25 percent to 1970 and 50 percent to 1975 to reflect the expected change in rate of decrease. Projections for the south used the estimated equation.

The projected corn surface in each region from applying these adjustments is in Table III-10. In the north the 1970 projection is 600,954 hectares down 2.6 percent from 1965 and about half the rate of decrease from 1959-60 to

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[38]Carlo Aiello, op. cit., p. 163.

TABLE III-10. CORN SURFACE, AVERAGE YIELD AND PRODUCTION BY MAJOR GEOGRAPHIC AREAS FOR SELECTED YEARS AND PROJECTIONS TO 1970 AND 1975

Item	1954-55[a]	1959-60[a]	1964-65[a]	1970	1975 Low	1975 High
Surface (Hectares)						
North	735,370	694,370	617,199	600,954	596,987	566,257
Center	228,095	209,834	180,566	157,261	124,599	118,479
South	284,397	278,538	251,648	233,000	211,837	199,615
Islands	8,570	7,832	4,439			
Italy	1,256,432	1,190,574	1,053,852	991,215	933,423	884,351
Average Yield (Quintals/Hectare)						
North	33.2	44.0	46.8	56.2	63.0	63.0
Center	15.1	19.8	20.2	26.7	30.4	30.4
South	10.1	13.6	14.4	18.3	20.8	20.8
Islands	11.6	13.1	14.2	18.3	20.8	20.8
Italy	--	--	--	--	--	--
Production (Metric Tons)						
North	2,441,428	3,055,228	2,888,491	3,377,361	3,761,018	3,567,419
Center	344,423	415,471	364,743	419,887	378,781	360,176
South	287,241	378,812	362,373	426,390	440,621	415,199
Islands	9,941	10,260	6,303			
Italy	3,083,033	3,859,771	3,621,910	4,223,638	4,580,420	4,342,794

[a]Two year averages.

Sources: Istituto Centrale di Statistica, Annuario di Statistica Agraria (Roma: 1956-1965) and Bollettino Mensile di Statistica (Roma: Novembre, 1964 and Febbraio, 1965).

1964-65. At the low price assumption corn surface in this region would be little changed from 1970 to 1975 but would decrease 5.2 percent at the high price level because land would be drawn into wheat production. As stated earlier, this wheat price would not be realistic in meeting the Italian government's objective of adjusting its agriculture to EEC market needs, but could maintain farm income.

Corn surface in areas outside the north will decrease faster. Total corn surface is projected at 991,215 hectares in 1970, six percent less than in 1965. The decline from 1970 to 1975 is expected to be almost six percent at the low price assumption and almost 11 percent at the higher price. Future production will shift more to areas of comparative advantage, the irrigated plains of the north.

To ascertain the effect of projected prices on farm level profits, budgets were prepared to represent corn production in the irrigated plains of the north and in dry plains of this region (Appendix Tables 7 and 8). Net income in dry areas is estimated to increase 10,071 lire per hectare at 1970 prices and in irrigated plains 50,120 lire. Net incomes would also depend on the outlay for productive inputs. It is assumed that these costs will not rise more than savings are affected through less use of labor and added income from yield increases.

Assuming that farmers react optimally, these results substantiate the trend toward increased plantings of hybrid corn. When compared to income from wheat, Appendix Tables 4 and 5, the income position in 1970 for corn is more favorable than at present. Again, this provides added evidence that corn surface will be substituted for wheat land in areas where hybrids can be produced.

Yields

To project yield estimates for 1970 and 1975 a simple linear regression was used to extrapolate from the 1952-1965 period. Time was the single independent variable and yield the dependent variable. In some cases the linear trend was judged not acceptable due to expected changes in the next ten years that differentiate this period from the base period. In these cases the regression estimate becomes solely a mechanism for quantifying past changes and the judgment of the researcher and advice of Italian technicians was relied on for the final estimate. In these cases the trend estimate and the final estimate are both noted as alternatives.

In the north corn is largely grown in irrigated areas, more highly fertilized and with almost three-fourths of the surface planted with hybrid seed. One would, therefore, expect more constant yields and higher yields relative to other regions of Italy. The regression analysis bears out this expectation. The average yield per hectare increased from 25.8 quintals in 1952 to 44.0 quintals in 1965, with an average yield over the entire time period of 39.37

quintals per hectare. There was an upward trend of 1.35 quintals per hectare per year (R^2 = .787). Extrapolating this trend gives a 1970 estimated yield of 56.24 quintals and a 1975 estimate of 62.99 quintals per hectare.

By way of comparison, the average yield per hectare reported by ISTAT for the two years 1964-1965 was 46.8 for all corn and 53.3 quintals per hectare for hybrid corn. Individual farmers interviewed in the irrigated plains of the north report yields of 85-100 quintals are easily attainable now. With these possibilities and with the expected increased adoption of technology, the trend estimates can be accepted.

In the center corn is less well adapted and occupies a smaller percent of the agricultural surface (8.6 percent in the north and 4.9 percent in the center). The average yield is approximately half that in the north increasing from 9.4 quintals in 1952 to 18.0 in 1965. Again, since the total includes irrigated plains as well as hills, the average yields in the best areas surpass these figures. In the center the average yield for hybrid corn was 31.0 quintals but only twenty percent of corn planted was of hybrid varieties. Average nitrogen use on corn, while less than the north, has doubled in the ten year period 1955-1965.

The regression analysis gives an annual increase of 0.62 quintals per hectare (R^2 = .596). This trend extrapolated to 1970 and 1975 provides an estimate of 25.0 quintals per hectare in 1970 and 28.1 in 1975. From the foregoing data on the present low status of techniques and the expected decrease in surface devoted to cropland in the hills and mountains of the center, it may be expected that the extrapolation of the 1952-1965 trend will understate actual future yields. Therefore, the trend estimate for 1970 and 1975 was viewed as a minimum estimate and a most probable yield estimate was computed.

The higher estimate was based on three assumptions: (1) the percent of hybrid corn planted doubled from 1960-1965 and this rate of adoption will be more indicative for the future than is the longer period, (2) nitrogen use on row crops as reported by the INEA study was 42.2 kilograms per hectare in the plains compared to 25.4 in the hills and 17.9 in the mountains and the corn surface in the more heavily fertilized areas will increase relative to the less fertilized areas, and (3) more favorable price ratios under EEC policy will encourage more intensive production.[39] On these assumptions the annual rate of change was increased from 0.62 quintals to 0.75 quintals per year. This results in an estimated yield of 26.67 in 1970 and 30.42 quintals per hectare in 1975.

Average corn yields decrease as one moves southward where more intense heat and reduced rainfall is encountered.

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[39] INEA, unpublished data, op. cit.

The percent of surface devoted to corn in the south is about the same as in the center and is negligible in the islands. Regarding technical practices, only 1.3 percent of corn planted in 1965 was hybrid in the south and less than one percent in the islands. The average quantity of nitrogen applied was 27.4 quintals in the south and 15.5 in the islands in 1964. Yields have been essentially static over the period 1952-1965 averaging only 11.6 quintals per hectare in the latter year. The average increase per hectare was 0.393 quintals (R^2 = .456).

Beginning from such a low level of technology and with substantial changes expected to be associated with agricultural development programs in this region, the yields in the next ten years are expected to increase at a more rapid rate. Assuming an annual rate of increase 25 percent greater than the trend value (0.393) gives an increase per year of 0.491 quintals per hectare. For 1970 this results in an estimate of 18.34 quintals and in 1975 20.79 quintals per hectare.

Production

Improvements in yields enabled Italian farmers to produce slightly more corn in 1965 than in 1955 on 16.3 percent fewer hectares. The estimates in Table III-10 indicate a continuation of these trends. Production in 1970, obtained as a multiple of the projected surface and yield, is 4.2

million metric tons, 16.6 percent greater than in 1964-65. The low corn price assumption provides an additional increase to 1975 of 8.4 percent. This would mean an increase of about 357 thousand metric tons over 1964-65 on 120,000 less hectares of land. Given Italian feed grain needs and present emphasis on making its agriculture more efficient, these estimates appear to be well within the range of expectation.

Grain Sorghum

The climatic conditions in many parts of Italy favor the production of grain sorghums rather than corn. Experiments are now beginning and farmers are being introduced to this grain. U.S. hybrids are sold by seed firms and the U.S. Feed Grains Council has promotional efforts to acquaint farmers with its feeding value.

Results to date show hybrids give superior results to corn in dry areas of the center and south.[40] Disadvantages that hinder widespread acceptance include: (1) too lengthy a life cycle, (2) difficulty of germination in clay soils that form much of the south, (3) slow early growth that makes the plant susceptible to insects, (4) loss of grain to birds and (5) low price compared to corn even though feeding value is equal (proposed threshold price at Ravenna is 4,165 lire

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[40] G. Mariani, "Sorghum as an Alternative to Maise," L'Informatore Agrario, Anno XXII (Verona: 1966).

per quintal compared to 4,450 for yellow corn).[41]

Less favorable results in dry cultivation are reported elsewhere.[42] It was found that sorghum yields were too close to those from wheat and with the price advantage that wheat enjoys and lower crop risk of winter cereals in general, little increase for sorghum was foreseen. Prospects for both corn and sorghum in irrigated land in the south was favorable.

In the north sorghum finds favor for silage or green feed but currently is not widely planted for grain. It seems to be increasing as a summer-crop green feed following wheat.

Italian statistics provide no information on sorghum production. Sufficient interest was encountered to indicate that it will grow in importance, particularly if it is accepted in poultry rations. Although quantitative projections were not attempted, grain sorghum will clearly become a more important feed grain for domestic producers and holds much promise as an import possibility.

Barley

Barley is a crop of increasing importance in Italy. Over time, production has been small compared to corn and

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[41] Agra Europe, No. 179 (London: August 17, 1966), p. MI-9.

[42] Carlo Aiello, op. cit.

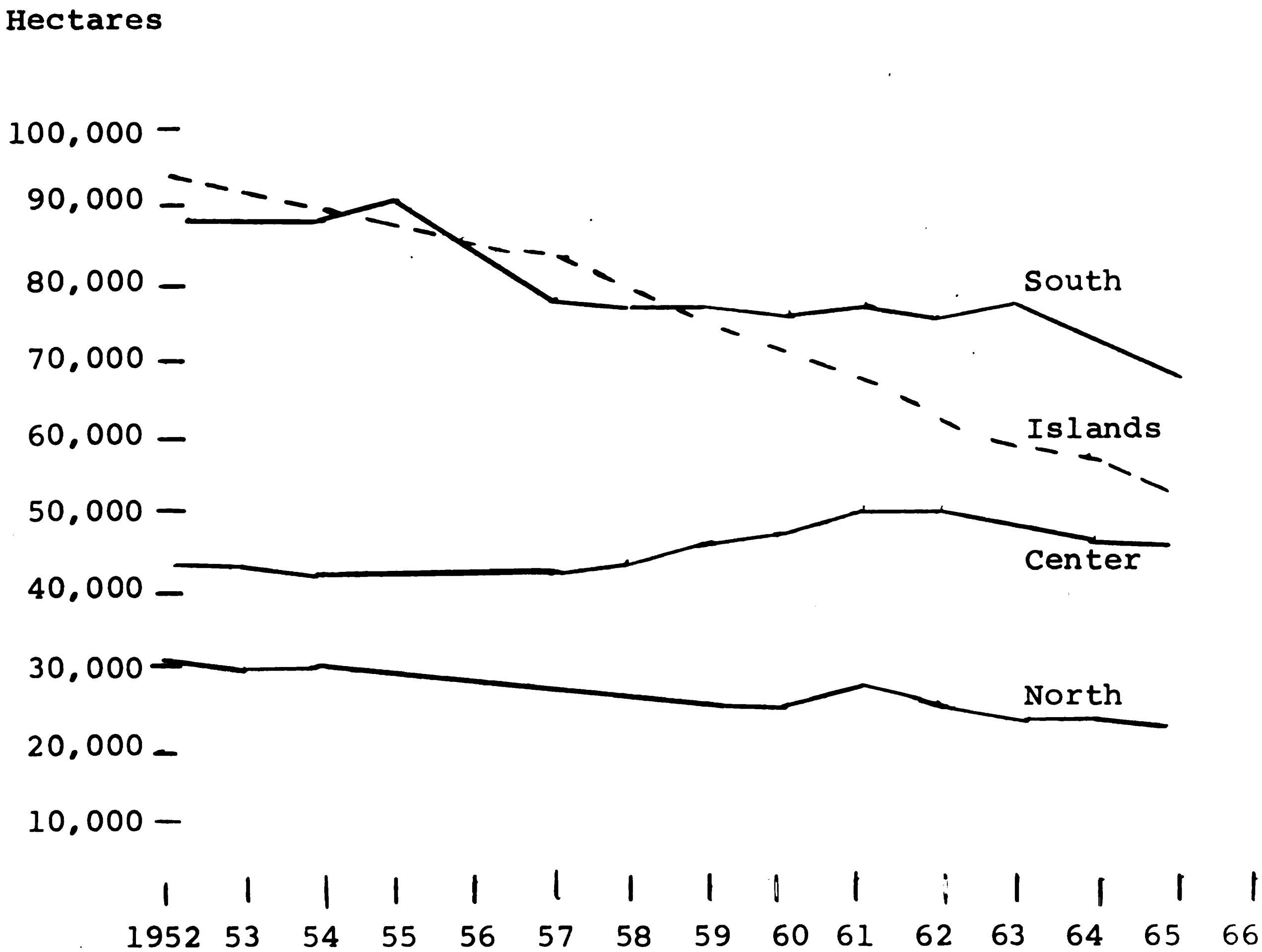
wheat and surface has declined continuously. But as surface dropped, imports followed a similar pattern to corn.

Barley Surface

The principal reason for the surface decline is a much lower net income than can be expected from wheat, its major competitor for land. Wheat is the principal income source for many farmers and was produced on the best land, with improved seed and fertilizer. By contrast, barley received no genetic work because of the early emphasis on self-sufficiency in wheat, could not be fertilized because old varieties developed lodging and was planted on land that remained after wheat was planted. The results are seen by comparing wheat yield to barley yield. In 1954-55 in the north the ratio was 1.56 and in the south 1.16. In 1964-65 the ratio was 1.33 in the north and 1.23 in the south. Price likewise favored wheat with a ratio for 1954-55 of 1.45 in the north and 1.66 in the south. By 1964-65 the ratio favored wheat less but still was 1.33 in the north and 1.23 in the south.

The historical pattern of barley surface may be seen in Figure III-5. Most of the country's barley is grown in the south and islands and these are the areas that have declined most in acreage. The decrease in the islands has in fact been 22.7 percent in the last decade, nearly double the national trend. Factors causing the decline in addition to its competition with wheat are out-migration from the

FIGURE III-5. BARLEY SURFACE BY MAJOR GEOGRAPHIC REGIONS, 1952-1965



hills where most barley is grown and irrigation of land in the plains.

Even with surface declining at greater than two percent per year, production has remained about the same for the past ten years. Imports, however, are three to four times the 1955 quantity. The country now produces only one-fourth of its barley requirements and this figure is rapidly diminishing.

The reasons for the large increase in requirements is the development of the Preston Method of feeding cattle or "barley beef." This is a feedlot system for feeding dairy breeds to a weight of about 400 kilograms exclusively on feed concentrates. The system is gaining in popularity for several reasons. Most important is the type of meat produced; by feeding barley the calf can be fed to a heavier weight yet retain the lean meat and rose-pink color characteristic of veal. If corn were fed the meat would develop marbling, would be red in color and would bring a lower price in the market. Other reasons are the general tendency to use more concentrates and less forage in producing cattle and the increase in swine and poultry numbers.

Increasing per capita consumption of beer is a second source of rising barley demand. Barley for all industrial uses, primarily brewing, increased from 95 thousand metric tons in 1961/62 to 98 in 1963/64 and 108 in 1964/65 (11.8 percent, 9.0 and 12.3 percent of total barley consumption in the three years).[43]

In addition to a favorable demand situation production of barley will benefit from breeding improvements. Varieties from several countries are being tried in hopes of selecting one that can be fertilized. Improved yields and more favorable prices under EEC policy should reduce the advantage wheat now enjoys.

1. Statistical analysis of historical relationships: To estimate 1970 and 1975 production and to appraise the effect of changing price ratios, single equation regressions were fitted to data of the 1952-1965 period. It was hypothesized that wheat prices or wheat income was an important variable in farmers' decisions to plant barley. First formulations of the model included wheat price and barley price as separate independent variables. The results were discouraging because the regression coefficients often had signs opposite to that posited by economic theory, with low levels of statistical significance and with considerable intercorrelation of the independent variables. To circumvent the latter problem and yet retain the same causal variables, a model was selected with the lagged ratio of nominal barley price to nominal wheat price and time as the independent variables and barley surface in each of the four regions as the dependent.

[43] Istituto Statistico delle Comunita' Europee, Agrarstatistik (Brussels: 1963, 1965, 1966).

The results are in Table III-11.

The sign of the price ratio was positive as expected in all regions but the south. Here effects excluded from the model apparently play an important role (regressions run with barley price as an independent variable also have negative signs for the price coefficient in this region). It should also be noted that large standard errors accompany the price ratios in the other three regions, reducing confidence in this coefficient.

Time is quite large numerically and highly significant statistically. This would indicate that out-migration, especially from the hills where most barley is produced, and other structural adjustments are much more important in determining barley surface planted than is price. Only in the central part of the country is the time coefficient positive. Examination of Figure III-5 shows that barley surface in this region did increase until 1962, but since then has followed the same trend as the other regions. Because of this change in trend the adjusted R^2's show a much smaller proportion of the variation explained by the included variables in this region.

Elasticities were derived from the regression equations. For the three regions with the correct signs all estimates were less than 0.1, indicating that a one percent change in the price ratio would be associated with a change in barley surface of less than one percent.[44] The price ratio of

[44] One study reports a price elasticity for all Italy of 0.2, Willms, op. cit., pp. 112-124.

TABLE III-11. REGRESSIONS FOR EXPLAINING ITALIAN BARLEY SURFACE, 1952-1965 AND DERIVED ELASTICITIES

Region	Constant	Ratio of Barley-Wheat Price, lagged	Time	$\bar{R}^2$	D. W. Statistic	Standard Error of Estimate
North	29,318.1129 (3,002.5569) (.00)	1,710.2750 (3,521.3385) (.64)	-642.0490 (71.8044) (.00)	.897	2.11	928.8678
Center	37,093.6955 (7,029.9858) (.00)	4,255.6999 (8,167.6708) (.62)	558.3752 (172.1797) (.01)	.465	.64	2114.6321
South	100,345.5141 (7,333.0382) (.00)	-13,851.4436 (9,893.4332) (.19)	-1,561.5426 (196.1553) (.00)	.828	.93	2825.0578
Islands	97,291.8850 (5,783.8491) (.00)	3,980.6463 (9,135.4437) (.67)	-3,282.6269 (139.3204) (.00)	.981	.50	1908.2294

Elasticities at Means:

North	0.0504
Center	0.0723
South	-0.1188
Islands	0.0305

Figures in parentheses are in order, estimates of standard errors and significance levels of regression coefficients.

barley price to wheat price is estimated to increase 27.7 percent from 1964 to 1970 and 8.4 percent from 1970 to 1975. A change of this magnitude combined with the estimated elasticity would increase barley surface to 1970 almost two percent or about 3,800 hectares due to price effects alone.

2. Projections to 1970 and 1975: Except for the islands the equations in Table III-11 were used to project 1970 and 1975 barley surface. For the islands it was believed that the time coefficient showing a relatively large annual decline would not continue from 1970 to 1975 because the structural change in the interior of Sicily will not match the change of 1952-1965. For this region the 1970-1975 decrease was assumed to be one-third the past rate or 10,942 hectares per year. The projection results are in Table III-12.

National barley surface decreased 11.7 percent from 1954-55 to 1959-60, an additional 12.5 percent from 1959-60 to 1964-65 and is expected to fall 13 percent to 1970 and 10 percent from 1970 to 1975. The 1975 projections are only slightly changed by the alternative price assumptions again pointing to the low response of barley surface to price. Surface in the center is projected to increase based on past experience but the change in trend since 1962 casts some doubt on this projection.

TABLE III-12. BARLEY SURFACE, AVERAGE YIELD AND PRODUCTION BY MAJOR GEOGRAPHIC REGIONS FOR SELECTED YEARS AND PROJECTIONS TO 1970 AND 1975

Item	1954-55[a]	1959-60[a]	1964-65[a]	1970	1975 Low	1975 High
Surface (Hectares)						
North	28,795	24,421	21,658	18,708	15,624	15,498
Center	41,709	45,910	45,273	51,588	54,691	54,380
South	88,626	75,912	69,919	58,681	49,876	50,873
Islands	88,521	72,491	54,588	37,485	29,759	29,106
Italy	247,651	218,734	191,438	166,462	149,950	149,857
Average Yield (Quintals per hectare)						
North	17.8	18.2	22.2	26.4	29.3	29.3
Center	13.1	13.7	15.5	17.0	18.3	18.3
South	10.1	10.3	12.5	15.0	16.5	16.5
Islands	10.1	9.6	11.4	12.8	14.1	14.1
Italy	--	--	--	--	--	--
Production (Metric tons)						
North	51,255	44,446	48,088	49,389	45,778	45,409
Center	54,639	63,085	70,173	87,700	100,084	99,515
South	89,512	87,420	87,399	88,021	82,295	83,940
Islands	89,406	69,591	62,222	47,981	41,960	41,039
Italy	284,812	264,542	267,882	273,091	270,117	269,903

[a]Two-year averages.

Source: Istituto Centrale di Statistica, Annuario di Statistica Agraria (Roma: 1956-1965), and Bollettino Mensile di Statistica (Roma: Novembre, 1964 and Febbraio, 1965).

Yields

In past years little effort has been given to increasing yields of minor cereals. There have been no breeding programs at all in Italy for oats and barley as all such effort has been concentrated on wheat. Without improved varieties and with little fertilization both because of the lodging problem and because farmers choose to allocate inputs to wheat there has been little yield improvement. This is presently changing and should be reflected in future yield increases.

In the north barley is of little relative importance occupying only 0.3 percent of the productive agricultural surface. The average yield increased from 17.1 quintals in 1952 to 23.1 in 1965, an annual average increase of 0.33 quintals per year (R^2 = .429). The increase appears to have come at a faster pace over the last six years. This may reflect the rising importance of barley as a livestock feed with the increased interest in the Preston Method of cattle feeding.

Because technical changes are expected to occur at a faster rate in the next ten years and also because of the greater need for livestock feed, the regression trend was not accepted. Rather, a second trend approximating the change over the last six years was selected as most probable. These results show an average yield per hectare of 26.39 quintals in 1970 (1952-65 trend projection = 23.32) and a 1975 yield of 29.26 quintals (1952-65 trend projection = 24.97).

The average yield and the rate of increase over time is less in the center than in the north. The regression on time over the period 1952-65 shows an annual increase of 0.19 quintals per hectare (R^2 = .402) rising from a 1952 average of 12.4 to 16.2 quintals in 1965. It may be expected that improved seed and more fertilizer will be adopted at a slower rate than in the north. Even so, these improvements coupled with the reduced cultivation in unfavorable conditions in the hills and mountains and the economic pressures of EEC prices may be expected to call forth some yield improvement. Therefore, for the projected 1970 and 1975 average yields a rate per year of 0.25 was assumed. This provides a 1970 estimate of 17.02 (extrapolated trend = 16.27) and a 1975 estimate of 18.27 (extrapolated trend = 17.03).

The south is Italy's most important barley producing region in terms of surface and production. Average yield here has increased from 8.4 quintals per hectare in 1952 to 14.2 in 1965, a rate of 0.25 quintals per year (R^2 = .410). For projecting 1970 and 1975 average yields an annual increase of 0.30 quintals per year was assumed. This results in a 1970 expected yield of 15.05 quintals (trend projection = 14.42) and a 1975 estimate of 16.55 quintals per hectare (trend projection = 15.67).

In the islands the regression on time was of little help in predicting future yields. Over the period 1952-1965 the average annual increase was 0.064 quintals per year (R^2 = .043). For projection purposes the base used was the average of the three years 1963-1964-1965 equal to 11.63. An increase of ten percent from 1965 to 1970 was assumed and a similar increase of ten percent from 1970-1975 (equal to two percent per year). The results show an expected yield of 12.79 quintals in 1970 (trend projection = 11.1) and 14.07 quintals in 1975 (trend projection = 11.4).

Production

Barley production fluctuates considerably as yields change. In the first five year interval in Table III-12 production decreased seven percent and then increased 1.3 percent from 1959-60 to 1964-65. In the ten year period shown there were shifts in the location of production. Where in 1954-55 the islands accounted for 31.4 percent of domestic output, this area contributed only 23.2 percent in 1964-65. The south on the other hand increased its proportion of the total from 31.4 to 32.6 percent in this time interval and the center increased from 19.2 to 26.2 percent. The tendency is for barley production to be concentrated more in the regions of Puglia, Abruzzi, Basilicata and lower Lazio.

Projection results for 1970 show an expected output of 273 thousand metric tons, a two percent increase over 1964-65. Production in 1975 will be little changed from the 1970 level at either the low or high price assumption. The tendency of past shifts in location of production is expected to continue with most of the barley being grown in the center and south of Italy and smaller amounts in the islands.

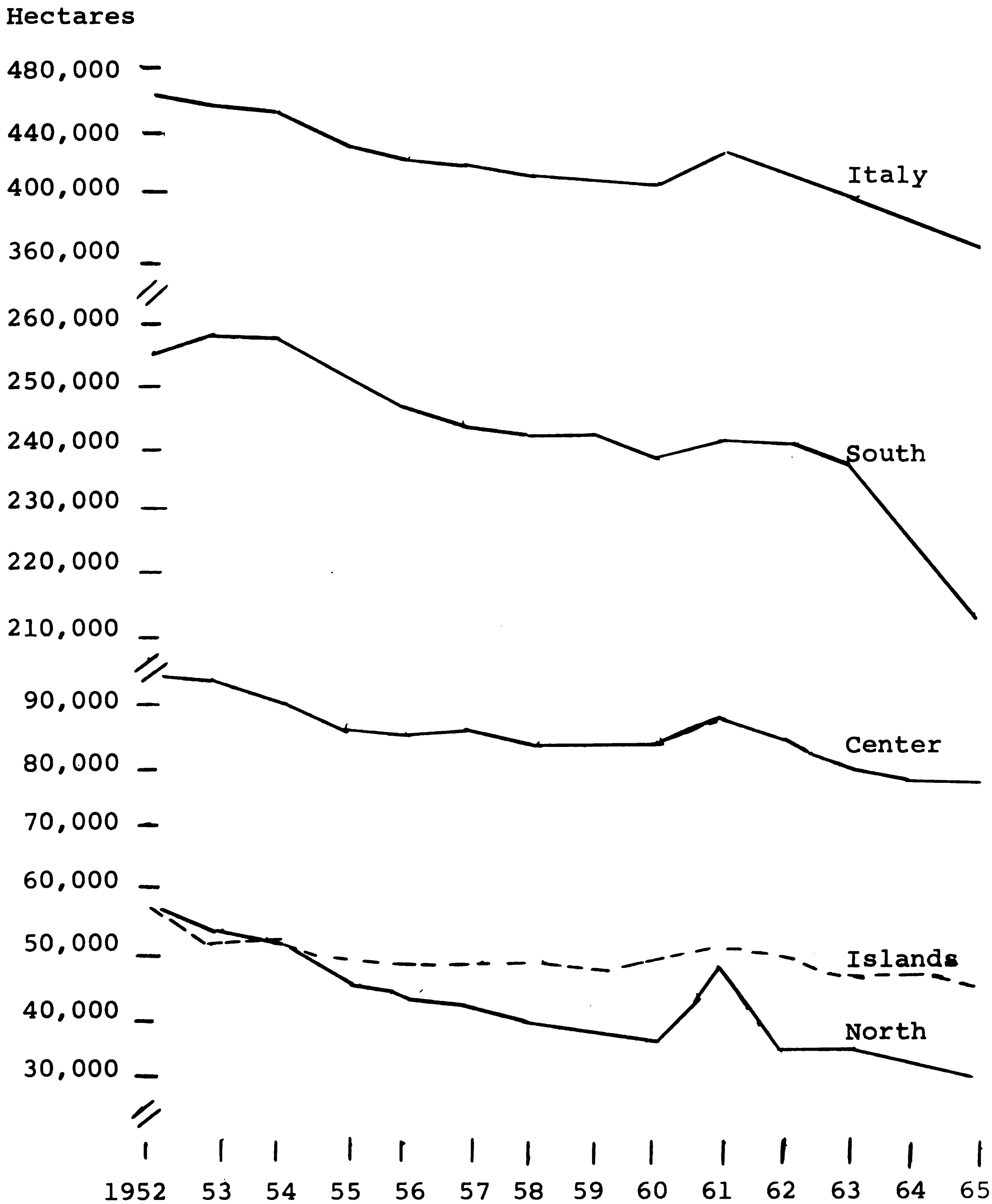
Oats

In contrast to some countries oats have remained a relatively important feed in Italy. In the largest producing region, the south, oats are used extensively as feed for donkeys that serve as draft animals. In northern regions cattle or tractors serve this purpose and oats are less favored. Oats also have advantages in the south because corn is not well adapted to the hot, dry climate of this area. In all regions of the country oats are used as cut, green feed for cattle or stored as hay for winter feeding.

Oat Surface

Oat surface has decreased steadily in Italy and at a faster rate since 1961. Even so, the amount planted is twice that of barley and one-third of total corn acreage. The rapid decrease in surface in the south since 1961 explains the greater rate of decline of national surface, Figure III-6. In other regions the change over time has followed the same trend but has been more gradual. The relationship between

FIGURE III-6. OAT SURFACE, 1952-1965



wheat and oat plantings stands out especially in 1961 in the figure. Bad weather reduced fall wheat plantings and land in the north and center was shifted to oats. Oat surface in both regions shows a large departure from trend in 1961.

This competition between wheat and oats might be expected to lead to increased oat surface in 1975 with the EEC policy price ratios. But other factors are more important. Feeding value of oats is less than other feed grains, income per hectare even with the changed prices is less than wheat, the replacement of draft animals by mechanical power, fewer number of sheep and off-farm migration all discourage oat production. Since these factors are expected to continue as in the past with perhaps a faster rate of mechanization in the south, oat surface will continue to lessen.

1. <u>Statistical analysis of past relationships</u>: Single equation regressions were fitted to 1952-1965 surface data in the four geographic regions. Independent variables were the lagged ratio of nominal oat price to wheat price and time. The signs of the price ratio coefficient for all regions but the islands was positive signifying that a rise in the price of oats relative to wheat would cause an increase in oat surface, Table III-13. However, standard errors for these coefficients were so large compared to the coefficient that little confidence is held in their validity. The

TABLE III-13. REGRESSIONS FOR EXPLAINING ITALIAN OAT SURFACE, 1952-1965 AND DERIVED ELASTICITIES

Region	Constant	Ratio of Oat Price to Wheat Price	Time	$\bar{R}^2$	D. W. Statistic	Standard Error of Estimate
North	47,219.5983 (11,042.9740) (.00)	12,029.5298 (15,714.9861) (.47)	-1,759.3171 (274.6233) (.00)	.755	1.76	4,139.3195
Center	88,013.8558 (5,496.4269) (.00)	7,841.2044 (7,953.4367) (.35)	-1,093.9835 (167.1284) (.00)	.762	.66	2,520.5861
South	257,554.7333 (11,779.8389) (.00)	6,338.1566 (16,531.5045) (.71)	-2,575.0948 (361.1365) (.00)	.791	.84	5,442.9935
Islands	55,071.2373 (5,536.8912) (.00)	-2,318.3320 (8,635.5015) (.78)	-531.1549 (157.0491) (.01)	.460	1.14	2,146.3295

Elasticities at Means:

North	.0194
Center	.0617
South	.0178
Islands	.0264

Figures in parentheses are in order, the estimate of the standard error and the significance level of the regression coefficients.

multiple correlation coefficient adjusted for sample size shows 75 percent or more of the variation explained in all but the islands.[45]

Supply elasticities computed from the equations support the hypothesis of a lack of price response.[46] The results indicate that changes in the price of oats relative to wheat affected by EEC policy will have little or no effect on surface planted. Since oats are usually planted for on-farm consumption and in many cases for draft animals, price is relatively unimportant in farmer decisions. Absence of price response and the little technical change in oat production makes change in structure the key variable for future oat surface.

2. Projections for 1970 and 1975: The regressions of Table III-13 were used as the basis for surface projections. In the north and islands the technique was a simple extrapolation using price projections of 1970 and 1975.[47] In the

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[45]Omitting the price ratio variable decreases the explanatory power of the equation less than two percent.

[46]Willms' results show a supply elasticity for oats of 0.03. Willms, op. cit.

[47]Prices for oats were not projected in sub-project III. To obtain estimates for 1970 and 1975 the relationship between oats and barley price was computed for 1956 through 1965. In the north the average ratio was .924 and in the south 1.004. Therefore, a one-to-one ratio was assumed for the two future years and an oat price equal to the projected barley price was used. If oat prices are lower in keeping with their feeding value, previous estimates show it would make little difference in oat surface.

major producing regions of the south and center it was believed that structural change would be faster than in the sample period. Under this assumption the downward trend would be greater than that estimated in Table III-13. For the center the time coefficient was increased 15 percent to -1,258 for 1965-70 and 30 percent to -1,422 for 1970-75. In the south the annual rate of decrease was assumed to be 65 percent greater for both years and results in a trend coefficient of -4,249.

The projections in Table III-14 show 1970 surface to be 322 thousand hectares, 14.3 percent less than in 1964-65. Oat surface at the 1975 low price assumption is nearly 281,000 hectares an additional decrease of 13 percent from 1970.

Yield

The same factors that account for the low yield of barley also explain oat yields. Generally, little breeding work has been done and most of the seed planted are open-pollinated varieties, there is little fertilization, the crop is relegated to the less favorable land and a large amount of the surface planted is harvested for forage.

In the north the 1965 average yield was 21.4 compared to a 1952 average of 18.2 quintals. This represents an annual increase of 0.288 quintals per year (R^2 = .581). Using the trend value to project gives a 1970 estimated

TABLE III-14. OAT SURFACE, AVERAGE YIELD AND PRODUCTION BY MAJOR GEOGRAPHIC REGIONS FOR SELECTED YEARS AND PROJECTIONS TO 1970 AND 1975

Item	1954-55[a]	1959-60[a]	1964-65[a]	1970	1975 Low	1975 High
Surface (hectares)						
North	49,156	37,020	32,096	24,956	17,062	16,171
Center	88,086	83,536	77,333	71,269	61,613	61,040
South	254,884	240,751	219,860	182,314	161,526	161,070
Islands	50,714	49,003	46,368	43,542	49,766	40,886
Italy	442,840	410,310	375,657	322,081	280,967	279,167
Average Yield (Quintals per hectare)						
North	18.1	19.3	21.5	23.1	24.5	24.5
Center	13.3	14.2	15.4	16.5	17.9	17.9
South	11.0	10.3	11.7	14.3	15.9	15.9
Islands	9.7	9.7	11.3	12.4	13.6	13.6
Italy	--	--	--	--	--	--
Production (Metric tons)						
North	88,972	71,449	69,006	57,648	41,802	39,619
Center	117,154	118,621	119,093	117,594	110,287	109,262
South	280,372	247,973	257,236	260,709	256,826	256,101
Islands	49,192	47,533	52,396	53,992	55,442	55,605
Italy	535,690	485,576	497,731	489,943	464,357	460,587

[a]Two-year average.

Sources: Istituto Centrale di Statistica, Annuario di Statistica Agraria (Roma: 1956-1965) and Bollettino Mensile di Statistica (Roma: Novembre, 1964 and Febbraio, 1965).

yield of 23.1 quintals and a 1975 estimate of 24.54 quintals per hectare.

In the center the average annual increase has been only 0.106 quintals per year (R^2 = .081). Extrapolating this trend provides a 1970 estimate of 15.72 and a 1975 estimate of 16.25. It was believed that improvement in the next ten years would occur at a faster pace in this region. Therefore, these estimates were increased by five percent for 1970 and ten percent for 1975. The final results used were 16.51 quintals per hectare in 1970 and 17.87 in 1975.

Almost 60 percent of the country's 1965 planted surface of oats was in the south and over 50 percent of the total production. Yields are low relative to other parts of the country; the average for the 1952-65 period is 11.6 quintals and the rate of increase has been 0.162 quintals per year (R^2 = .156). The trend was again increased by five percent to 1970 and 10 percent to 1975 to account for expected faster adoption of improved practices. The results show a 1970 estimate of 14.30 quintals (trend projection = 13.62) and 1975 estimate of 15.87 (trend projection = 14.43).

The average annual increase in the islands has been 0.107 quintals (R^2 = .164). The same procedure was followed as in the other two regions, that is, extrapolating this trend and then increasing the estimate by five and ten percent. The 1970 results are for 12.43 quintals (projected trend = 11.84) and a 1975 figure of 13.61 (projected trend = 12.37).

Production

These yield estimates and the surface projections provide the production estimates of Table III-14. Production of oats in 1970 is estimated to be slightly above the 1959-60 output but 1.6 percent less than 1964-65. In 1975 a larger reduction of 5.2 percent is expected. The decreased output will occur mostly in the north and center as yield increases in the south and islands offset the decline in surface in these two regions.

Summary

The historical evidence presented and the projections made underline the tendency in all four geographic areas of Italy to shift land out of grain production into competing uses. This movement has been especially pronounced since 1956 when substantially lower price supports for wheat were announced. Feed grain surface has declined in all four areas with barley in central Italy the only individual exception. In the coming decade the combination of lower wheat prices under EEC policy and economic growth providing migration opportunities is similar to the set of circumstances that prevailed in the 1956-65 period and is expected to have the same effect on grain surface.

Estimates of supply elasticities support the view of Italian researchers and farmers that wheat price is an important variable not only in decisions to plant wheat but strongly influences other grains as well. By contrast elasticities estimated for feed grains indicate surface planted responds only slightly to feed grain price changes.

Yield increases in wheat and especially in hybrid corn have offset the reduction in surface and increased total grain production over the past decade. Still, domestic grain production has not been sufficient to meet demand and imports of some grains have increased dramatically. In the coming ten years wheat production is expected to about equal consumption but external feed requirements will be even greater.

CHAPTER IV

HISTORICAL TRENDS, GENERAL CHARACTERISTICS AND PROJECTIONS OF LIVESTOCK PRODUCTION

Italian farm policy in recent years has been reoriented to equate production with shifts in market demand. Of first importance was establishing a goal for an annual increase of 4.8 percent in meat production and 2.5 percent for milk and cheese.[1] In this chapter attention is focused on the past trends in livestock production and the characteristics that condition expansion in the livestock sector. These characteristics and the prices resulting from the Common Agricultural Policy are employed to make projections for cattle, swine, sheep and goats, and poultry.

Cattle

Cattle and milk production are the most controversial aspects of Italian agriculture. Its problems, dimensions and future potential are viewed in different perspective by various sectors of the industry and by different individuals within each sector. To consumers beef and veal are highly preferred meats that have risen in price over 60

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[1]Table II-4, p. 53.

percent from 1958 to 1965, to processors and distributors cattle marketing is archaic with relatively high and inflexible margins and to producers it is a major income source and in some instances a source of farm power. Each sector will be examined describing some of the more important trends and possibilities for change.

Demand and Consumption

Beef and veal are the strongly preferred meats in Italian diets both because of acquired tastes and as a prestige item. Although the proportion varies according to availability, beef is normally about half of all meats consumed. Regional differences are so great that demand for beef, veal and milk is best thought of in regional terms rather than a national market. For example, the ratio of per capita income in Milano to income in the south is 4.5:1 and per capita meat consumption varies from 22 to 7 kilograms in the two regions. According to Visco, income, climate, food traditions and social conditions all contribute to differences in food consumption generally and meat consumption in particular.[2]

Regional differences cause changes in type of meat consumed as well as quantity. In the north and especially

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[2] Conversation with Dr. Visco, Director, Istituto per le Richerche e le Informazioni di Mercato, Roma, January 11, 1966.

the northeast veal consumption is a larger proportion of the total while consumers in the center and south eat beef from larger animals. In Piemonte, milk-fed veal slaughtered at a weight of 150 kilograms is the regional speciality and in Tuscany, Beefsteaka Florentina, from animals weighing 500-600 kilograms is preferred. Overall, vitelli (vealer calves) under one year of age comprise about 15 percent of total slaughtered.[3,4] This is a decrease from the 25 percent of 10 years ago and represents a slow but general trend to heavier weights. Vitelloni or what compares most closely with "baby beef" increased in the same period of time from 24 to almost 40 percent of beef consumption. The proportion of cull cows as a meat source has decreased slightly and work cattle considerably.

Veal has high utility because of a general preference for a meat without fat and with a pink color. This largely explains why U.S. beef exports that are grain fed, red and marbled with the highly prized "taste" to U.S. consumers do not find favor on the Italian market. The lighter weight, milk-fed veal meets their requirements as does heavier forage-

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[3] U.S. Feed Grains Council, La Carne Bovina, Produzione e Commercio (Roma: 1965), p. 56.

[4] Another source places the proportion of domestic production by category at: vitelli, 11 percent; vitelloni, 43 percent; manzi, 6 percent; buoi, 4 percent; tori, 12 percent and vacche, 24 percent. Georgio Amadei, "The Economic Consequences of an Increase in Price of Feed Grains," Revista di Politica Agraria, No. 4 (December, 1965), pp. 21-37.

fed animals. These preferences, combined with strongly rising demand and generally inadequate world supplies, place domestic producers in a most favorable position.

Milk consumption does not occupy the same position of prominence accorded beef and veal. Consumption per capita of liquid milk and cream in 1965 was 65.7 kilograms. Milk by-products are much more relished; per capita cheese consumption in the same year was 7.6 kilograms. Approximately 44 percent of the country's milk production is consumed fresh and the remainder is processed. It appears that increasing consumption of both fresh and processed milk products will favor cattle producers.

Production Characteristics

Three and possibly four regions in Italy may be defined with distinct differences in type of cattle produced and product use. Northern Italy is essentially a dairy region but with two sub-regions, the northeast that tends more toward the production of fresh milk and veal and the northwest where processed milk and heavier beef are the rule. Cattle in the center are used both as a source of farm power and meat production and in the south are relatively small in number and frequently triple-purpose.

In 1958, 47 percent of all cattle were primarily used for milk production, 28 percent for work and meat and 25 percent served all three functions.[5] More recently there has been a trend toward greater numbers of dairy-type animals and fewer work stock. The principal milk breeds are _Bruno Alpina_ (Brown Swiss), about 47 percent of cattle primarily for milk; _Frisona_ (Fresian), 21 percent and mixed breeds 30 percent. The number of _Frisona_ is increasing rapidly as a proportion of the total and _Bruno Alpina_ is declining.

There is no principal breed for the dual purpose, work-meat cattle. The more popular breeds are _Romagnola_ about 23 percent of this type, _Chianina_, 21 percent and _Marchigiana_, about 20 percent. In recent years the _Marchigiana_ seems to have gained in favor as a few cattle are placed on range. The triple purpose breeds are even more diverse: _Piemontese_ representing about 32 percent, _Grigia Alpina_ about 17 percent and _Simmenthal_ about 10 percent of this type of cattle. This last breed is currently sought for commercial feed lot operations. The number of breeds, lack of specialization and need to adapt to widely ranging circumstances is a major problem in modernizing cattle production.

The number of breeds lead to a variety of types of meat.[6] Veal may be classified as _vitelli lattanti_ or _vitelli_

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[5]Giulio Zucchi, _Problemi e Prospettive della produzione della carne in Italia_, Istituto di Economia e Politica Agraria (Bologna: 1963), p. 173.

[6]Federazione Italiana dei Consorzi Agrari, _Per Una Moderna Agricoltura_, Ramo Editoriale Agricoltori (Roma: 1965), p. 1037.

sanati. The former are calves from milk breeds slaughtered at weights of 90-100 kilograms and the latter are either milk breeds or Piemontese slaughtered at 150 kilograms. Next in order of weight are vitelli fed to a weight of 350-400 kilograms that come from double or triple purpose animals and last are the vitelloni fattened to weights of 450-600 kilograms.

In addition to the problems posed by a large variety of breeds, the small size of producing farms contributes to high cost production. Appendix Table 9 shows cow numbers by geographic region, type of management, and size of farm. Three aspects are immediately evident: cattle production is located in northern Italy, production is primarily a family farm enterprise and small farms produce most of the cattle. In 1961, 82 percent of the nation's cows were concentrated in the north and 51 percent were on family farms in this region of less than 10 hectares in size. Almost 70 percent of all cows are owned by family farmers in total. One writer concludes that farms producing livestock are usually small, family farms where labor costs are essentially zero and capital is limited, that the proportion of mezzadria farms with livestock is high because it is part of the contract and the most advanced farms operated by salaried workers do not have livestock because of low profits.[7]

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[7] Giulio Zucchi, op. cit.

The conclusions derived from the table and supported by Zucchi focus on the important issues for future cattle production. First, and most important, what changes are occurring that might influence family farmers to produce more or less cattle? Second, what will be the effects on cattle production of the disappearance of the mezzadria and third, are conditions favorable to encourage investment from outside traditional agriculture to develop cattle feed lots in a similar manner to the development of the poultry industry?

The first question must be answered in two parts; what will be the trend in numbers of family farms, especially the small ones and what will happen to cattle numbers on these farms? One estimate shows 492,408 family farms, 30 percent of the total number, without a working member less than 60 years of age.[8] Almost half of this number is in the north where livestock production is greatest.

By 1975 the combination of aging and out-migration of younger family members will substantially reduce the number of family farmers. But attrition does not affect all areas equally nor does it account for land remaining in agriculture after present operators leave. It was earlier shown that land in family farms declined almost nine percent from

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[8]Federazione Nazionale delle Casse Mutue Malattia per I Coltivatori Diretti, op. cit.

1948 to 1961 but with increases in the plains and hills of 13.6 and 5.3 percent.[9] In the north land in family farms increased 14.2 in the plains but declined elsewhere. Assuming a continuation of this trend, the net effect of aging, out-migration and recombination of farm units will be a reduction in the number of family farms. This trend in turn will tend to reduce cattle numbers. Moreover, meat animals will be most affected since family farmers in the hills produce this type of cattle while farmers in the plains tend to produce dairy cattle.

Producing more or less cattle on the remaining family farms involves first, net income from cattle and second, net income from alternative enterprises. Alternatives for the cattle producer are limited. Poultry has become a large-scale operation requiring amounts of capital in quantities that cannot be considered by family farmers.[10] Pork production has much better possibilities although it too in Italy is primarily an industrial operation. The remaining alternative is crops but on small farms income from grain crops alone would be quite low. Vegetables are an attractive alternative and will likely increase although only 16 percent

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[9] Table II-2.

[10] The exception is a trend toward contract production that enables the farmer to contribute only his labor and buildings. Birds run on open floors and are preferred by consumers to those in cages.

of 167 farmers interviewed in the Lombardia plains in 1963 had added this enterprise.[11] One must surmise that cattle production will remain at least equally as attractive relative to other farm opportunities as in the past few years for family farmers remaining.

If farmers are to continue the cattle enterprise, an auxiliary question is, are there incentives to expand output? The answer rests on potential net income which in turn depends primarily on the prices of meat, milk, labor, feed and the efficiency of feed conversion. These variables are summarized in budget form in Appendix Tables 10, 11, and 12 for a northern dairy farm, a veal operation and a fat cattle feedlot system.

Under 1963-64 price conditions, a 30-cow dairy shows a net income above variable expenses of about 13.5 million lire. (Fixed expenses were not considered because of the variability in buildings and equipment and because changes in variable cost items have most relevance for this analysis.) At projected 1970 prices net income is expected to be 13.3 million lire, a decrease of about two percent. Assuming the lower of two milk price projections and the higher of two meat prices, 1975 net income would be 12.5 million lire,

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[11] Luigi Frey, "La Pianura Lombardia Irrigua sta Divenendo Zona Depressa," Mondo Economico, Anno XVIII, No. 44 (November, 1963), pp. 9-20.

down 7.8 percent from 1963-64.[12] Input-output coefficients could improve to increase net income above these estimates. This is to be expected in the north as mechanization replaces labor and as milk yields per cow increase.[13] The outlook is for net incomes on dairy farms to be less in 1970 and 1975 than at present. Optimal response by farmers would indicate a reduction in dairy type animals.

Veal production as a proportion of the total has been decreasing but is still important in northeastern Italy. Estimated costs and returns from a 20 calf unit are presented in Appendix Table 11. At 1963-64 price relationships gross income is less than variable expenses. It should be pointed out that all labor is costed out but in reality this type of production would normally be on family farms where the cost would be a return to labor. In this case labor income above variable expenses would be 106,045 lire.[14] At the

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[12]An alternative estimate of the effect of increased feed grain prices is provided by Amadei. By estimating that mixed feed costs will increase 11.4 percent, he finds that costs of milk production will rise from one percent on family farms (producing 75 percent of cow milk) to 2.3 percent on the most modern farms using greater quantities of grain. He also estimates cost increases of 4.08 percent for veal production, 3.4 percent for baby beef and 2.72 percent for beef from culled animals. He concludes that increases in feed grain costs will be less damaging to cattle production than to swine and poultry. Georgio Amadei, op. cit., pp. 21-37.

[13]Milk production per cow in the north was the same in 1965 as 1959, less in the center and improved only in the south.

[14]It may well be also that the price of feeder calves is too high in relation to selling price of veal in which case net income would be greater.

1970 high price alternative a net loss would still be incurred from producing veal but the 1975 high price assumption for both veal and grain shows net income over variable expenses would increase considerably to 409 thousand lire. If all costs are considered by farmers, only at this set of prices would expansion be profitable.

The third system of cattle production considered was a feed lot for fattening calves from dairy cows. The 1963-64 estimated income above variable costs for feeding 50 cattle to a weight of 400 kilograms is 1,150,854 lire. At the high meat-price alternative in 1970 expected income would be slightly lower. In 1975 again employing the higher of the two prices for meat and grain, net income would rise to 1,809,327 lire, 57 percent greater than in 1963-64. These estimates point to an expansion of this form of cattle production.

To summarize the evidence thus far relating to the future of cattle production on family farms, we may expect: (1) fewer family farms with a negative impact on cattle production, (2) income pressure to shift from dairy to beef production and from veal to fat cattle and (3) a strong expansion of feed lot produced beef. Some qualifications must be noted. Incomes in dairying will be lower but only slightly and farmers with large fixed investment or an inclination for dairy farming may well resist the income pressure. Nor do the budget results apply to a large portion of the north where cheese price and not EEC milk price will determine gross income.

The second question raised by the data in Appendix Table 9 is the impact on cattle production by the exodus of the *mezzadria*. Many Italians believe this to be a major factor in the lack of growth in cattle numbers. The statistics do not support this argument. Only 16 percent of the cows reported in the 1961 census are produced by this type of management. In addition, cattle numbers have been increasing since 1964 while the numbers of *mezzadria* continue to decline. Very definitely the decrease in cattle numbers are associated with out-migration--but of small family farmers and not due to the "crisis of the *mezzadria*". It is true, however, that most share farmers are cattle producers and their dwindling numbers have a negative effect. The effect is modified by the degree to which these tenants accept government assistance to become family farmers.

The last question posed is the possibility of increased capital investment from outside agriculture for feedlot cattle production. The budget showing increased profits from feedlot operations would seem to favor this and observation confirms an increasing number of such units. But there seems a hesitancy to commit capital to cattle production. Most Italian investors who elect agriculture as an investment choose pork and poultry where the rate of turnover is faster. The rate of feedlot development is therefore difficult to predict. It is evident that if cattle production in Italy is to increase, it must come from two sources: feed-lot operations financed by nonfarm capital and feeding imported grains and the further development of cattle production on family farms using government capital. A more specific evaluation depends on improvement in the obstacles mentioned below.

Obstacles to Cattle Production

1. Antiquated facilities: The general inefficiency of farm structures, building arrangement and system of production is immediately visable to a non-Italian but is frequently overlooked by an Italian listing problems in cattle production. In the livestock region of the north most barns were constructed before 1900 and the method of producing cattle has changed little. This system requires cattle to be housed as protection against the elements and chained because excess movement reduces feeding efficiency. These gains are more than offset by labor used in feeding and cleanup chores for each cow, disease problems caused by housing conditions (it is estimated that T.B. infects 70 percent of the cows in Lombardia) and limits to cattle numbers imposed by building size.[15]

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[15] Labor cost, often pointed to as a major obstacle to increased cattle production, is really a part of this problem as is the labor law that restricts the number of cows per man.

A definite movement toward loose housing arrangements and feed mechanization is now underway. The trend will be intensified by competition with EEC countries and increased availability of public funds earmarked for this purpose. But the magnitude of the obstacle is too great for substantial improvement before 1975.

2. Feeder Cattle: A serious stumbling block to the development of feedlots is a dependable source of feeder calves at reasonable prices. As long as small family farmers remained the primary source of beef and veal, locally produced calves could be fed out or sold to other farmers in the vicinity for feeding. But the rapid growth of demand for beef has been translated into feeder cattle needs in excess of local supply.

Domestic supply can be estimated from cow numbers. Official statistics in 1962 reported 3,378 thousand dairy cows and 1,511 other types.[16] At a calfing rate of 85 percent for dairy cows and 70 percent for nondairy animals, total supply would be 3,929 thousand calves less mortality, for feeding and replacement.[17] The number of total cattle

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[16] Istituto Centrale di Statistica, Annuario di Statistiche Zootecniche, Vol. IV (Roma: 1964).

[17] Pier Giovanni Buiatti, "Economic and Technical Problems Connected to Meat Production," Atti del I Convegno Zootecnico Interregionale per la Toscana, Marche, Umbria (Foligno: December 19-20, 1964), pp. 151-171.

slaughtered the following year was 3,709 thousand and in addition a large number of herd replacements were added as the cattle cycle entered an expansionist phase.

Feeder cattle production holds little promise of substantial improvement. The prevailing opinion of Italians holds that it is unprofitable to maintain beef cows solely for calf production but instead milk must be produced to at least partially pay for the upkeep of the breeding herd. But expansion of the dairy herd to meet the need for feeders provides at the same time increased milk production and lower prices for a large segment of the industry.

One solution is to consolidate abandoned land in the hills and mountains into large tracts for a cow-calf system of production and move the calves to the plains for feeding. This program is being encouraged by government policy. The State Agency for Forests has stocked cattle on about 60,000 hectares of pasture at higher elevation and plans to increase the program under the new Green Plan.[18] In terms of land use planning this is an ideal arrangement but several factors limit the number of calves that can be produced: (1) in summer land at the higher elevations becomes quite dry and little vegetation is available for feed, (2) it is difficult to entice people to live in these areas and (3) until recently

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[18]Adriano Reina, "Zootecnia e Azienda di Stato per le Foreste Demaniali," Agricoltura, No. 9, (Roma: September, 1965).

land owners hesitated to sell land and would sell only at prices that prohibited extensive uses.

A second solution is to import feeders. This has been done in increasing numbers, Appendix Table 13. Since 1959 Eastern European countries have supplied an increasing proportion of imported calves due both to Italian feeders' satisfaction with results and to bilateral trade agreements between Italy and Eastern European governments. When available, French Simmenthal and Charolais are also favorably received by Italian cattle producers. Results of air shipments of dairy calves from the U.S. have not been as good. Hexem indicates the market potential is large but summarizes the problems that must be overcome before the U.S. can become a major supplier.[19]

Success in meeting the rising demand for feeders through imports or increasing domestic production will be a major factor determining the growth of feedlots. Local production is restricted by the threat of milk surplus and exporting countries in Europe also face rising demand for beef and feeders. This obstacle is likely to become larger as time passes.

3. Feed Supply: The demand for feed created by Italian

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[19] Roger W. Hexem, Factors Affecting Beef and Veal Production in Italy in the Near Future, Draft report, Internation Monetary Branch, ERS, USDA (Washington, D.C.: June 1, 1965), p. 17.

cattle production already exceeds domestic feed supply. Even with feed grain imports increasing each year cattle are fed less than an optimum ration (most imported grains are fed to poultry and swine). Before significant expansion of cattle production can occur domestic forage production must increase or producers must rely on greater use of feed grains.

Three developments have occurred to meet the feed problem. First, has been the rapid increase in feeding reconstituted milk to veal calves or in the first period of a feeding program for fat cattle. Information is not available on total consumption but use has increased very rapidly with France supplying a large quantity of milk meal.[20]

Second, is the relatively slow but steady increase in the use of mixed feeds for cattle. Forage remains the basic feedstuff especially for dairy animals and many farmers buy grain and protein mix and blend on the farm. But compound feeds for cattle have increased from 225 thousand metric tons in 1961-62 to 515 thousand tons in 1965-66, a 129 percent gain.

Third is the decision by the Ministry of Agriculture

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[20] One report indicates Italy is France's largest customer for skimmed milk powder and milk-meal. Exports in fact, have been so large as to create serious difficulties for the Italian feedingstuff industry and in 1965 the Italian Government temporarily banned these imports from France.

to make soft wheat available for feed.[21] Noting the growing imports of feed grains and the difficulty of exporting Italian wheat at the world price, a large allotment of soft wheat was distributed as livestock feed. To prevent speculation it comes denatured with an ingredient that does not harm animals but makes it impossible for milling. The sale price is fixed at 4,000 lire per quintal compared to an Italian policy price of 6,200 lire.

A fourth contributor to the feed supply is the use of vegetable and crop by-products. In the land reform area around Bari, 47 percent of the forage now comes from fruit and vegetable by-products, wheat, straw and sugar beet tops. One observer is of the opinion that cattle production in the south can only be profitable where such food is available. Sugar beet pulp and tops are an important feeding ingredient in northern Italy as well. With increased production expected from vegetables and fruits more feed will come from this source.

The availability of feed grains and forage are discussed earlier. Increased quantities of forage and slight increases in feed grain production will not be sufficient for an expansion in cattle production. Italy will continue to need larger quantities of feed grain imports to meet the demand for beef and veal.

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[21] "L'Impiego del Frumento nell Alimentazione del Bestiame," Federazione Italiana dei Consorzi Agrari, Per Una Moderna Agricoltura, Ramo Editoriale Agricoltori (Roma: 1965) pp. 641-649.

4. <u>Adapted Cattle Breeds</u>: The number of types of cattle and the diversity of breeds within each type are discussed earlier. Most cattle are at least dual purpose and many are former work stock and do not permit the advantages of specialized meat and milk breeds.

Breed improvements are receiving a strong impetus from Government programs. Article 13 of the second Green Plan is providing 62 billion lire for livestock development through 1971. Approved breeding farms increase the supply of specialized breeds and financing at two percent interest for five years is provided to aid farmers in obtaining better stock. The most popular breed in those programs is the Fresoni. Importation of Holstein-Fresians from the U.S. and Canada are very popular and Carnation is a highly prized bloodline. This program should have a noticeable impact on milk production per cow and add to the possibility of a milk surplus.

5. <u>Lower Milk Prices</u>: Italian milk prices have been maintained at the upper limit of the EEC milk guidance range and even at this price Italian producers have complained that costs of production were not covered. The low milk prices of 1960 and 1961 are listed by farmers in the Po Valley as a primary reason for the cattle sell-off. Complying with the EEC unified price will require some further downward adjustment of Italian prices. The average 1963-64 price for all milk in northern Italy was 6,506 lire per

quintal (7,110 for fresh milk only).[22] The common target price agreed on for 1968-69 is 6,427 lire and the projected 1970 price in subproject III is 5,959 lire per quintal. Adjustment to the target price will have little effect but if milk production in the EEC drives price down to the projected level many Italian producers will likely abandon production.

Lower milk prices will have different impacts by regions, however. In three of the four major milk producing regions the average proportion used for industrial purposes was 45 percent in the Piemonte, 71 percent in Lombardia and 73 percent in Emilia. The important price variable in these areas is the price of Parmigiano cheese and to a lesser extent butter and pork. In the cheese producing areas lower EEC milk prices will have little effect.

Nor will lower prices seriously affect cattle production in the south. Increased milk consumption in an area isolated from the northern dairy belt by transportation costs provide a favorable environment for cattle expansion. Farmers who have irrigation for forage and vegetable by-products are expanding cattle numbers to meet the rising demand.

Lower milk prices will be felt most keenly in areas of the north where milk is produced for the fresh market.

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[22] A weighted average of 10 cities in the north for fresh milk and four for industrial milk.

If price falls to the level projected in subproject III several shifts would be expected. When the ratio of meat to milk prices exceeds 6:1 there is a movement toward meat production and if the ratio exceeds 7:1 the movement is quite sharp.[23] An increase in beef production and less milk production in the fresh milk areas would therefore be expected. In the irrigated plains corn production could also be substituted for forage as dairy animals are reduced.

6. The Marketing and Distribution System: The small scale and disorganized processing and marketing of Italian meats results in higher consumer costs, quality loss and inflexible margins. One study reports the cost of beef distribution is 35 percent of the final selling price, second only to France in the EEC.[24] Two factors now at work to improve the system of marketing are the growth of supermarkets and increased public funds for market research and facilities. Still, the distribution system will hamper development of the cattle sector through 1975.

Marketing problems for dairy products are less severe. In northern Italy cooperatives for processing cheese are highly developed and modern. Fluid milk, probably because

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[23] Tito Manlio Bettini, Aspetti Technici dell 'Allevamento Animale e della Produzione Cornea," Parte Seconda, Strutture e Mercati dell 'Agricoltura Meridionale, No. 6, Carni, (1966) p. 282.

[24] U.S. Feed Grains Council, op. cit., p. 106.

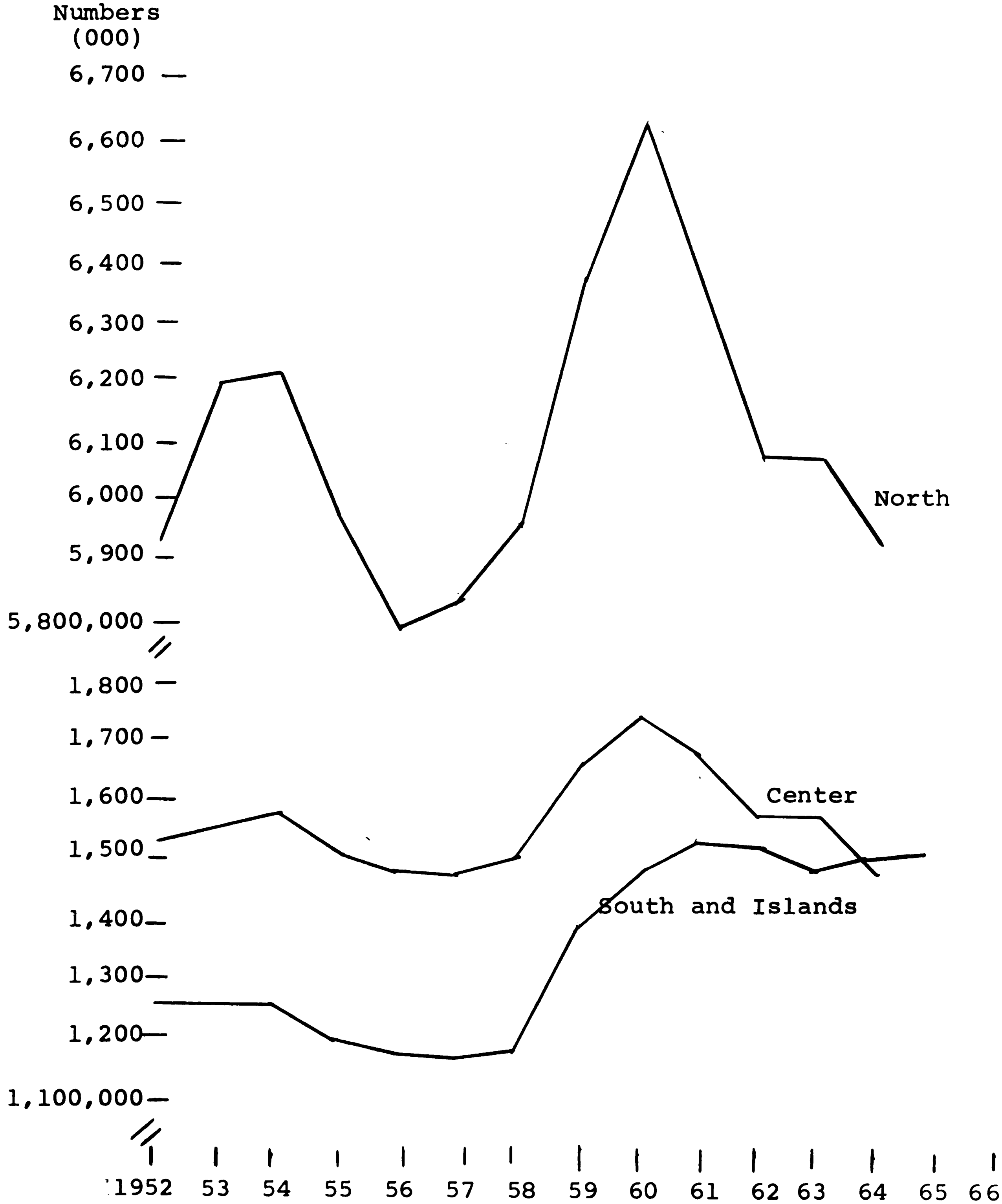
of the low rate of consumption, is still largely purchased at the neighborhood bar or delivered to the door by the farmer. Further development of fresh milk marketing would likely have a favorable effect on both consumption and production.

Cattle Numbers

The evolution of cattle numbers in the three geographic regions from 1952-1964 is shown in Figure IV-1. The concentration of cattle production in the north is evident as is the cyclical variation in cattle numbers. High points on the cycle were attained in 1953-54 and 1960 and troughs in 1957 and 1964 (prices, of course, oscilating in the opposite direction). Production in the south and islands did not decrease after 1960 as in the other two regions and exceeded cattle numbers in the center for the first time in 1964.

Farmers were assumed to make two principal decisions that jointly determine the production of meat and milk: the number of cattle to maintain on farms and the weight at which animals are slaughtered. Subsidiary decisions are the number of cows to breed, the number of total cattle to market and the breed of cattle (which largely determines milk production per cow). To arrive at the desired 1970 and 1975 estimates of meat and milk production, projections are first made for cattle number and slaughter weights.

FIGURE IV-1. CATTLE NUMBERS ON FARMS BY MAJOR GEOGRAPHIC REGIONS, 1952-1964



1. <u>Statistical Analysis of Historical Factors Influencing Cattle Numbers</u>: To quantify the effect of the variables assumed to be most important in farmer's decisions regarding cattle numbers on farms, single equation regressions were fitted to 1952-1964 data. Determining variables differ somewhat by regions but include: prices of beef, milk, feed grains, labor and competing products, capital availability, forage production, draft animal requirements and out-migration of family farmers and *mezzadria*. Alternative combinations of these variables were fitted to explain cattle numbers and the "best" equations are presented in Table IV-1.

Lagged prices of beef and milk were deflated by the index of consumer prices (1952-53 = 100). Alternative formulations with nominal prices resulted in slightly larger price coefficients and much smaller time coefficients. Labor is an increasingly expensive item on cattle farms and its effect in the form of average wage rates was included in all regions but the south. Results are presented in the center with and without an index of mechanization included to see the effect of replacement of work cattle by mechanical power. Time in all regions was included for structural and technological changes not otherwise measured.

In all cases the signs of the coefficients were those suggested by economic theory but all coefficients were not statistically significant. Some with large standard error

TABLE IV-1. REGRESSIONS FOR EXPLAINING ITALIAN CATTLE NUMBERS, 1952-1964 AND DERIVED ELASTICITIES

Region	Constant	Beef Price	Milk Price	Labor Cost	Index of Mechanization	Time	$\bar{R}^2$	D. W. Statistic	Standard Error of Estimate
North	4,332.7904 (726.3874) (.00)	0.0354 (.0156) (.05)	0.2443 (.2330) (.33)	-0.0023 (.0006) (.01)		82.6059 (28.3898) (.02)	.769	1.51	115.3133
Center w/o mechanization variable	1,271.6134 (394.1324) (.01)	0.0137 (.0066) (.07)		-0.3515 (.3493) (.34)		32.2662 (21.8678) (.17)	.288	1.62	70.7872
Center	1,237.2334 (463.1547) (.03)	0.0132 (.0076) (.12)		-0.2759 (.5764) (.65)	-146.3025 (855.2427) (.84)	34.5214 (26.6421) (.23)	.202	1.56	74.9442
South and Islands	-62.0420 (1,564.0278) (.92)	0.0120 (.0091) (.22)	0.1291 (.2483) (.62)			46.2108 (24.4219) (.10)	.612	.70	93.0345
Elasticities at Means									
North		0.223	0.183	-0.212					
Center		0.309		-0.266					
Center		0.297		-0.209	-0.033				
South and Islands		0.317	0.488						

estimates, for example, milk price, were nevertheless retained because of their logical importance in farmer decisions. As expected the magnitude of the coefficient for beef and milk price was larger in the north than in other regions but the negative impact of labor costs was less contrary to empirical observation. The index of mechanization in the center, although not significant statistically, has apparently been an important negative influence on cattle numbers in the sample period. The multiple correlation coefficient adjusted for small sample size shows an acceptable amount of variation in cattle numbers explained in the north and south but a very low proportion in the center. The low $\bar{R}^2$ in this region is likely due either to the omission of milk price, thought to be less important in this area, or to structural change inadequately represented by time. Examination of the table of simple correlation coefficients shows labor cost to be highly correlated with time. Milk price in the south shows the same tendency. The Durbin-Watson statistic points to the possible existence of serial correlation in the residuals especially in the south.

Estimates of supply elasticities for each region were derived from the equations and also appear in Table IV-1. These estimates show an increase of one percent in beef price in the north is associated with a 0.22 percent increase in cattle numbers three years later. An increase in milk price will have a slightly lower effect. It was expected that price response to both meat and milk would be highest in the north. Although the estimates for beef price are very similar in each region this expectation was not substantiated. Supply response of milk production to its price change was also greater in the south and appears to have more influence on cattle numbers in this region than beef price. Conversations with farmers and technical agriculturists and increases in milk breeds rather than meat breeds bear out the relative importance of the milk price estimate in this region. The lower response indicated in the north probably reflects the established pattern of animal husbandry and the large commitment to fixed facilities while cattle production in the south is a relatively new enterprise marking its real growth from the advent of the intensive period of the land reform program and the Cassa Mezzogiorno.

Wage rates also seem to have a substantial effect on cattle numbers. In the north a one percent rise in wage rates appears to be associated with a 0.21 percent change in the opposite direction in cattle numbers all other things assumed constant. Similar response was obtained in the other two regions. In the center a one percent increase in the index of mechanization (total horsepower of farm machines divided by agricultural surface) is associated with a 0.03 percent decline in cattle numbers.

Considering the many variables that enter into an

Italian farmer's decision to produce cattle, the regression results were satisfactory. Especially in the north where two-thirds of the cattle are produced, the equation explains a large proportion of the variation and the size of the standard errors relative to their coefficients lends confidence. Less confidence is expressed in the estimates for the other two regions where the variety of influences affecting cattle numbers is greater and less easily expressed in functional form.

2. Projections of Cattle Numbers to 1970 and 1975: The characteristics that have historically determined cattle production in Italy and the major obstacles that restrict continuing expansion have been described. An attempt has been made with multiple regression equations to quantify at the regional level the effect of price and collectively those other variables that move together through time. To the extent that the same conditions hold to 1975 these equations can be used to project cattle numbers. Where changes in structure or technology clearly differ from the base period, adjustments in the regression coefficients must be made before projecting.

Independent variables were first projected to 1970 and 1975. Future prices were based on the percentage change from 1964 prices in Subproject III. Actual prices projected in this study were for both veal and beef and could not be used because the regressions were computed using a simple average price in each region of _vitelli_ first and second quality and _vitelloni_ first and second quality weighted by the quantity slaughtered in each region. The percentage price change projected in Subproject III was applied to this 1964 estimate of all beef price. Milk price projections were computed in the same manner. Both beef and milk prices were deflated by the consumers price index that is assumed to increase three percent per year from 1964-65 to 1975. Labor costs were assumed to increase seven percent per year from 1964 to 1975 equivalent to wage increases for qualified livestock labor from 1955-1964.

Using these estimates the projection results show almost six million head of cattle on farms in the north in 1970, Table IV-2. This number is approximately the same as in 1964-65 but almost eight percent less than the peak reached in 1959-60.[25] The more likely higher beef price alternative in 1970 gives an estimate of 6.2 million head in the north. At the lower price assumption for beef in 1975 cattle numbers would be estimated at 6.7 million, 10.4 percent greater than in 1964-65 and if the higher prices prevail cattle numbers in the north would be around 7.1 million head or 17.6 percent over the 1964-65 number.

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[25] In making comparisons with earlier years and looking ahead, note must be taken of the cyclical variation in cattle numbers. Expansion has been occurring since the low of 1964 and numbers now exceed the 1970 projection. But the projections are made assuming another low point will be reached in 1971 and a high in 1975.

TABLE IV-2. CATTLE NUMBERS, AVERAGE SLAUGHTER WEIGHTS AND BEEF PRODUCTION BY MAJOR GEOGRAPHIC REGIONS FOR SELECTED YEARS AND PROJECTIONS TO 1970 AND 1975

Item	1954-55	1959-60	1964-65	1970 Low	1970 High	1975 Low	1975 High
Cattle Numbers on Farms							
North	6,084,000	6,493,700	6,036,900	5,994,329	6,178,272	6,666,430	7,102,201
Center	1,542,000	1,700,200	1,515,500	1,508,290	1,566,505	1,660,651	1,796,880
South	778,000	910,800	950,200	1,658,208	1,709,214	1,701,446	1,763,048
Islands	447,500	517,200	557,100				
Italy	8,851,500	9,621,900	9,059,700	9,160,827	9,453,991	10,028,527	10,662,129
Slaughter Weight (Kilograms)							
North	267	274	278[a]	284	288	288	300
Center	355	367	379	365	384	362	414
South	276	307	314	305	323	313	352
Islands	313	328	308				
Italy	---	---	---	---	---	---	---
Cattle Numbers Slaughtered							
North	1,609,578	1,828,336	1,782,006[a]	1,774,321	1,828,768	1,913,265	2,038,332
Center	595,848	621,482	631,916	622,924	646,966	645,993	698,986
South	330,842	406,539	470,418	809,205	834,096	745,233	772,215
Islands	171,719	222,971	227,544				
Italy	2,707,987	3,079,328	3,111,884	3,206,450	3,309,830	3,304,491	3,509,533
Dead Weight (Kilograms)							
North	152	156	159	162	164	164	171
Center	196	203	209	201	212	200	228
South	161	179	183	180	189	183	206
Islands	173	181	170	---	---	---	---
Italy	---	---	---	---	---	---	---

. . . continued

TABLE IV-2 (continued)

Item	1954-55	1959-60	1964-65	1970 Low	1970 High	1975 Low	1975 High
Beef Production (Metric Tons)							
North	244,656	285,220	283,339	287,440	299,918	313,775	348,555
Center	116,786	126,161	132,070	125,208	137,157	129,199	159,369
South	53,266	72,770	86,086	145,657	157,644	136,378	159,076
Islands	29,707	40,358	38,682				
Italy	444,415	524,451	540,177	558,305	594,719	579,352	667,000

[a] 1964 only.

Source: Istituto Centrale di Statistica, _Annuario di Statistica Agraria_ (Roma: 1956-1960) and _Annuario di Statistiche Zootechniche_ (Roma: 1960-1964).

Little change is foreseen in cattle numbers in the center of the country. This is in contrast to several Italian writers who place considerable emphasis on out-migration, especially of mezzadria families, and a decrease in cattle numbers. Yet 1952-1964 was a period of much exodus from the hills and mountains and cattle numbers in 1964 were approximately the same as in 1952. It seems more correct to say these factors have a negative effect on cattle numbers but other changes are occurring with positive impacts so that on balance cattle numbers are little changed.

Projections were made for central Italy from the regression equation assuming only that the negative effect of rising wages would be less important to 1975 than in the sample period. This was justified on the assumption that abundant labor would be available in this region and less labor would be used as extensive cattle operations develop in the hills and modernized feed lots in the plains. The labor variable was assumed to be 90 percent of its estimated value to 1970 and 70 percent to 1975. Results in the center show 1.5 million cattle at the low price assumption in 1970 and 1.57 at the higher price differing little in either case from 1964-65. A slight increase is envisioned in 1975 at the lower price to 1.6 million head and 1.8 million at the high price.

In the south and islands the regression fitted to the sample period data is presumed to be representative for

1970. But limits to forage production and the strong possibility that larger milk supplies from the region and imports from the north will lead to lower prices make this rate of expansion unlikely to 1975. To project cattle numbers in 1975 the time coefficient was reduced to 80 percent of its past value. The projected number for 1970 is 1.66 million head at the lower price and 1.71 at the upper price. In 1975 1.70 and 1.76 million cattle are expected at the two price assumptions. Although there are limitations to livestock production in the south farmers at present are anxious to acquire more capital and breeding stock and appear pleased at present profit prospects. In view of these tendencies the projected increase seems reasonable.

There is a definite cyclical effect in cattle numbers in all three geographic regions, Figure IV-1. In the sample period peaks in the cycle occurred in 1954 and 1960 and troughs in 1956 and 1964. An increase in cattle numbers would therefore be expected to continue from 1964 to a peak around 1967-68. Evidence confirms this movement. "Monthly slaughter returns from eight West European countries clearly show the rise in beef cattle production during 1966--an increase of at least five percent over 1966 is estimated in Italy (and 1966 production was nine percent greater than 1965)."[26]

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[26] Agra Europe, No. 208 (London: March 15, 1967), p. MI-1.

In coming years a recurrence of the cyclic low would be expected in 1971 and a peak about 1975. While the projections in this study are based primarily on the factors underlying cattle production in the country, the cyclical effect should not be ignored in the projections. Indications are that domestic production will be relatively low in 1970 (possibly lower than in 1967) and higher than normal in 1975. The regressions on which the projections are based include the cyclic effect and the tendency for each peak and trough to be a higher level than the previous one.

3. Number of Cattle Slaughtered: Projections were made for the total number of cattle on farms because farm level response to changed price ratios was desired and total cattle numbers were needed to estimate feed grain consumption. But it is necessary to know the number of cattle slaughtered to estimate meat consumption. Computing the ratio of cattle slaughtered to total number of cattle for each year from 1952 through 1964 reveals two trends. First, the proportion slaughtered has increased reflecting improvement in calfing rates, a speed-up in the rate of turnover of the cattle herd due to the increase in the proportion of young beef animals relative to the number of cows and an increase in the turnover of cows from 10 to 16 percent in Italy.[27]

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[27] L. Borsody, "Beef and Veal Production in Western Europe: Trends and Prospects," Monthly Bulletin of Agricultural Economics and Statistics, FAO, Vol. 15, No. 12 (Rome: December, 1966), p. 13.

Second, the number of cattle slaughtered as a proportion of the total cattle herd tends to be high in low price periods and low when prices are high and animals are retained for breeding. For the 1952-1964 period the proportion of number slaughtered to total number was 29.2 percent in the north (an annual range of 21.2 to 38.9 percent), 40.1 percent in the center (a range of 28.6 to 56.1 percent) and 45.7 percent in the south (a range of 27.1 to 59.6 percent). Slaughter is a much lower proportion of the total and has less variability from year-to-year in the north where dairy cows and replacements are more important.

This information was used to make projections of the number of cattle slaughtered. An average of the ratio of cattle slaughtered to total numbers was obtained for three consecutive years in the two most recent lows and similarly for the two most recent high periods of the cattle cycle. Since it was earlier shown that a low point on the cycle would be reached in 1971 and a peak in 1975 these average ratios can be used to estimate cattle slaughter in these two years. The results show 29.6 percent of the total number of cattle slaughtered in 1970 and 28.7 percent in 1975 in the north, 41.3 percent in 1970 and 38.9 percent in 1975 in the center and 48.8 percent in 1970 and 43.8 percent in 1975 in the south and islands. These percentages applied to the projected number of cattle provided an estimate of the number slaughtered, Table IV-2.

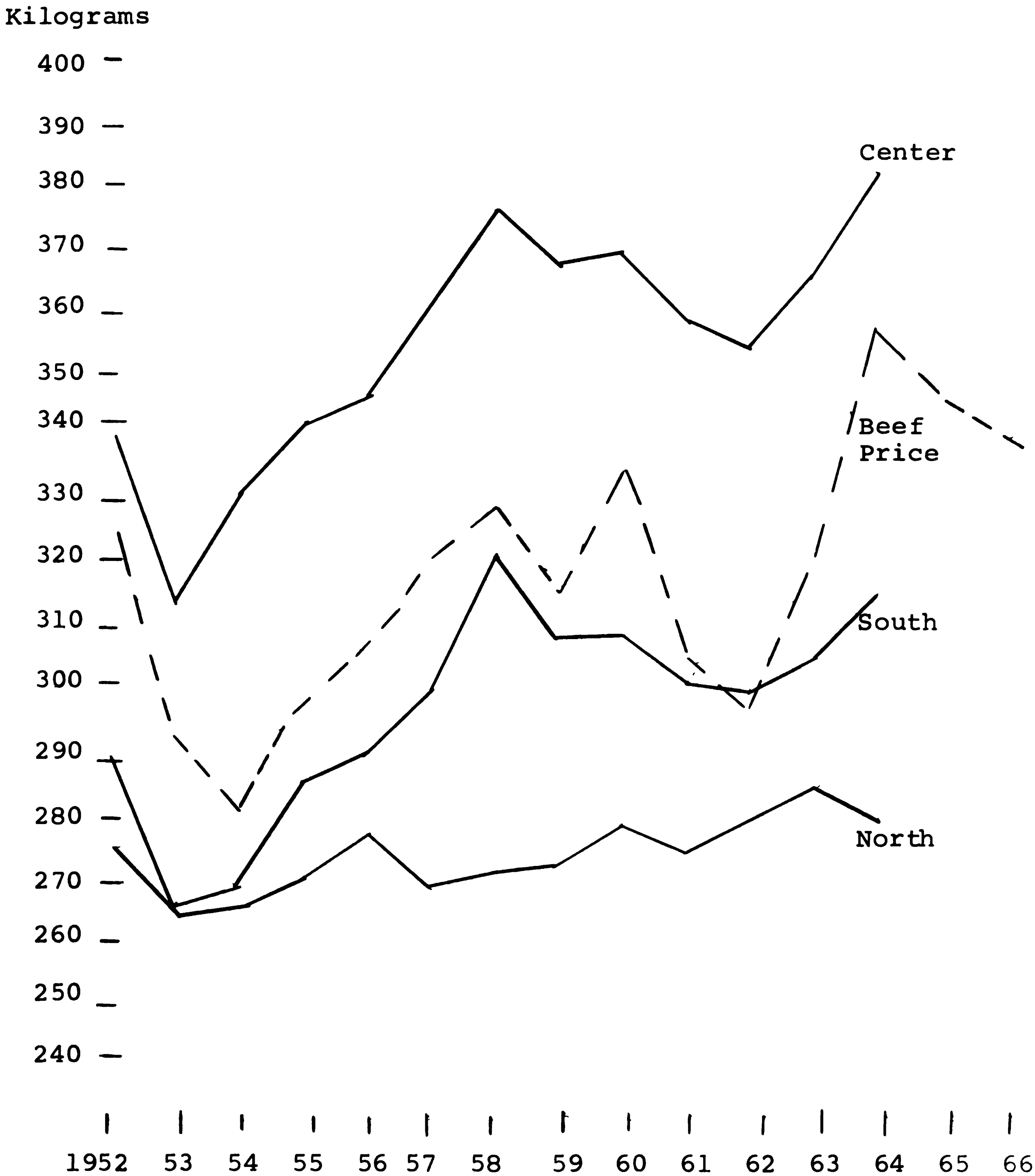
Slaughter Weight

The second major variable determining beef production is the weight at which animals are marketed. Since 1952 slaughter weights have increased from a 1952-53 average of 287 kilograms per animal to 325 in 1963, Figure IV-2. The change has been smallest in the north where average slaughter weights are the lowest in Italy and the greatest increase was in central Italy where the average moved from 326 to 364 kilograms. The gain in slaughter weight reflects the decrease in the proportion of calves slaughtered from 23.6 percent of cattle slaughter in 1952 to 14.1 percent in 1963 and the accompanying increase in *vitelloni* from 26.3 percent to 40.7 percent in the same two years.

Average slaughter weights show a definite relationship to cyclical price movements of beef in Figure IV-2. In the center and south cattle producers seek maximum income by holding cattle longer and feeding to heavier weights when prices are rising. Conversely, at low or falling prices marketing occurs at lower weights. In the north the importance of dairy animals imparts more stability to marketing weights in the course of a cycle and has resulted in less increase in weights over time.

1. *Statistical Analysis of Historical Factors Influencing Slaughter Weights*: Cattle slaughter weight seems to be influenced first, by a tendency to increase over time and

FIGURE IV-2. BEEF SLAUGHTER WEIGHTS BY MAJOR GEOGRAPHIC REGIONS, 1952-1965



second by net income during the life of the animal. Single equation regressions were fitted to average slaughter weights for each of the three regions for which cattle numbers had been projected. Independent variables were beef and corn price as measures of net income and time.

The equations presented in Table IV-3 essentially verify the graphical analysis of Figure IV-2. Prices have no effect on slaughter weights in the north as evidenced by the low $\bar{R}^2$ and the zero regression coefficients. The time variable measures the upward trend in slaughter weights from 1953 to 1964. In the center and south the price coefficients have the expected signs and are highly significant statistically. Over 80 percent of the variation in slaughter weight is explained in the south and islands and 90 percent in the center by the variables included in the equation.

Elasticities derived from these equations indicate that farmers will in the course of the animal's life increase the marketing weight about 0.3 percent for each one percent increase in beef prices (there are limitations, of course, imposed by loss of feeding efficiency at heavier weights). In like manner, a decrease in marketing weight of about 0.2 percent will be associated with each one percent increase in corn price (again qualification is necessary because of the importance of forage rather than grain in fattening cattle).

TABLE IV-3. REGRESSIONS FOR EXPLAINING CATTLE SLAUGHTER WEIGHTS, 1952-1964

Region	Constant	Beef Price	Corn Price	Time	$\bar{R}^2$	D.W. Statistic	Standard Error of Estimate
North	241.8354 (20.5452) (.00)	0.0005 (.0005) (.30)	0.0008 (.0034) (.81)	0.5309 (.8195) (.54)	.391	2.29	4.7533
Center	308.0872 (25.1761) (.00)	0.0028 (.005) (.00)	-0.0147 (.0041) (.01)	0.9384 (.6733) (.19)	.901	1.10	5.9326
South	246.3204 (29.3047) (.00)	0.0026 (.0006) (.00)	-0.0121 (.0047) (.03)	0.5747 (.7831) (.49)	.827	1.65	6.8952
Elasticities at Means							
North		0.084	0.016				
Center		0.307	-0.198				
South		0.347	-0.194				

2. Projection of Cattle Slaughter Weight to 1970 and 1975: These equations were employed to project live slaughter weight to 1970 and 1975. Beef prices were the same as those earlier used to project cattle numbers and corn prices were those projected in Subproject III. Projected slaughter weights closely follow the trend just described. In the north a slow increase in average weight is foreseen from 1964-65 to 1975. In the center and south there is more year-to-year variability, average weight increase is larger and price has a greater influence as seen by the weight at the low and high price alternatives.

The results in Table IV-2 show a 1970 slaughter weight in the north at the more likely high price assumption of 288 kilograms compared to 278 in 1964-65. The same weight could be expected in 1975 if price approximates the lower alternative or would be 300 kilograms per head if the higher price is reached. In the center and south the lower 1970 price would call forth a lower slaughter weight than in 1964-65 but at the higher price the marketing weight would be expected to average about 384 kilograms. The same tendency would prevail in 1975 with the 414 kilogram weight at the higher price a relatively large gain over 1964-65. The south parallels the center but with less variation and at a lower average weight.

3. Conversion to Carcass Weight: The equations provide an estimate of the weight at which live animals are slaughtered,

equivalent to the farm level supply of beef and veal. More important for meeting consumer needs and estimating future import requirements is the carcass weight of the animals.

The proportion dead weight is of live weight varies according to age and breed of the animal. Experimental results from feeding trials show Piemontese breeds of 400 and 500 kilograms dress out about 64 percent of a live weight.[28] Heavier animals are somewhat less: the carcass weight of 600 kilogram Frisoni is 57 percent of live weight and chianini of the same weight averages about 62.2 percent.[29]

The procedure followed here was to compute for the three geographic regions considered the percentage that total dead weight was of live weight in 1960, 1961 and 1962. The percentages were for the north, 57.1 percent; center, 55.2 percent; and south, 58.4 percent. These percentages applied to the average live slaughter weight projected in 1970 and 1975 provided the estimate in Table IV-2 of average weight per animal slaughtered.

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[28] Raimondo Raimondi, "Influenza del Peso di Macellazione sulla Produzione Economica di Vitelli Piemontesi all 'Ingrasso," Rivista di Zootecnia, Vol. XXXVIII (1965), p. 22.

[29] Angelo Meregalli, "Influenza del Piano di Alimentazione sull 'Accrescimento, la Capacita' di Utilizzazione degli Alimenti e le Caratteristiche di Macellazione nei Vitelloni Chianini e Pezzati Neri Frisoni," Estratto da Rivista di Zootecnia, No. 4-5, (Firenze: 1965), p. 44.

Beef and Veal Production

Domestic beef supply is a multiple of the number of cattle slaughtered and the average dead weight per animal.[30] Both of these have been projected and total cattle meat production can now be obtained.

Italian beef production in Table IV-2 is estimated to increase from 540 thousand metric tons in 1964-65 to 558 thousand at the low price projected in 1970 or 595 thousand tons at the more probable higher price. The first estimate would be 3.3 percent higher and the second 10.1 percent above 1964-65 output. By comparison, total production increased 18 percent in the five year period, 1954-55 to 1959-60 but only three percent from 1959-60 to 1964-65. A continued expansion is foreseen to 1975 with production at the lower price midway between the two 1970 estimates and increased to 667 thousand tons, a 23.5 percent increase at the higher 1975 price.

The projections are for total cattle meat and do not provide separate estimates for beef and veal. This division can be obtained by extrapolating the past trend in the proportion of each. In 1963, 14.12 percent of total cattle meat was from <u>vitelli</u> and 40.72 percent from <u>vitelloni</u> with the remainder of total cattle meat coming from cows, bulls

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[30]There would be a slight degree of double counting from animals imported live for slaughter.

and work animals.[31] In the decade, 1953-1963, the average annual decline in calves as a proportion of the total supply was 3.72 percent and the annual increase of fat cattle was 3.75 percent per year. Assuming the same rate of change to 1970, calves would comprise 10.44 percent of the total in Table IV-2 and 7.82 percent in 1975. Fat cattle would increase to 51.4 percent in 1970 and 59.04 percent in 1975. It is doubtful that the rate of change will continue at this pace and these proportions should be viewed as minimum for veal and maximum for fat cattle.

The budget results discussed earlier in Appendix Tables 11 and 12 indicate that farmers will make this shift in attempting to maximize income. Relative prices indicate that incomes will increase for feedlot operators and will exceed the return on veal production. If solutions to the obstacles discussed can be found, particularly a supply of feeder cattle and feed, expansion of beef production could well exceed our estimates.

Milk

Milk and beef production in Europe are joint products of the cattle herd. Meeting the rising demand for meat without incurring large surpluses of milk and milk products

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[31] U.S. Feed Grains Council, op. cit.

is one of the EEC's most perplexing policy problems. The situation in Italy differs from other European countries in that neither meat nor milk production are adequate to meet requirements even though milk consumption per capita is the lowest in the EEC.

Italian cow milk production in 1964-65 totaled 8,970,900 metric tons with 7,241,875 metric tons sold, Figure IV-3. The north accounts for 80 percent of the 1964-65 output and one region alone, Lombardia, produces almost one-third of the country's milk. The most rapid growth in milk production, however, has been in the south and islands. Cow numbers and production per cow have increased steadily in this area as public assistance for breeding stock, feed and processing plants has been made available.

Milk use is primarily directed to processed products. In 1965, 50 percent was used for cheese, butter and powdered milk; 20 percent for feeding calves, 25 percent for direct consumption and two percent sterilized and sold.[32] The cheese industries in 1965 used almost four million tons of cow milk to process 332,813 tons of cheese and 48,027 tons of butter.[33] About 2.4 million tons of milk are used for table cheese

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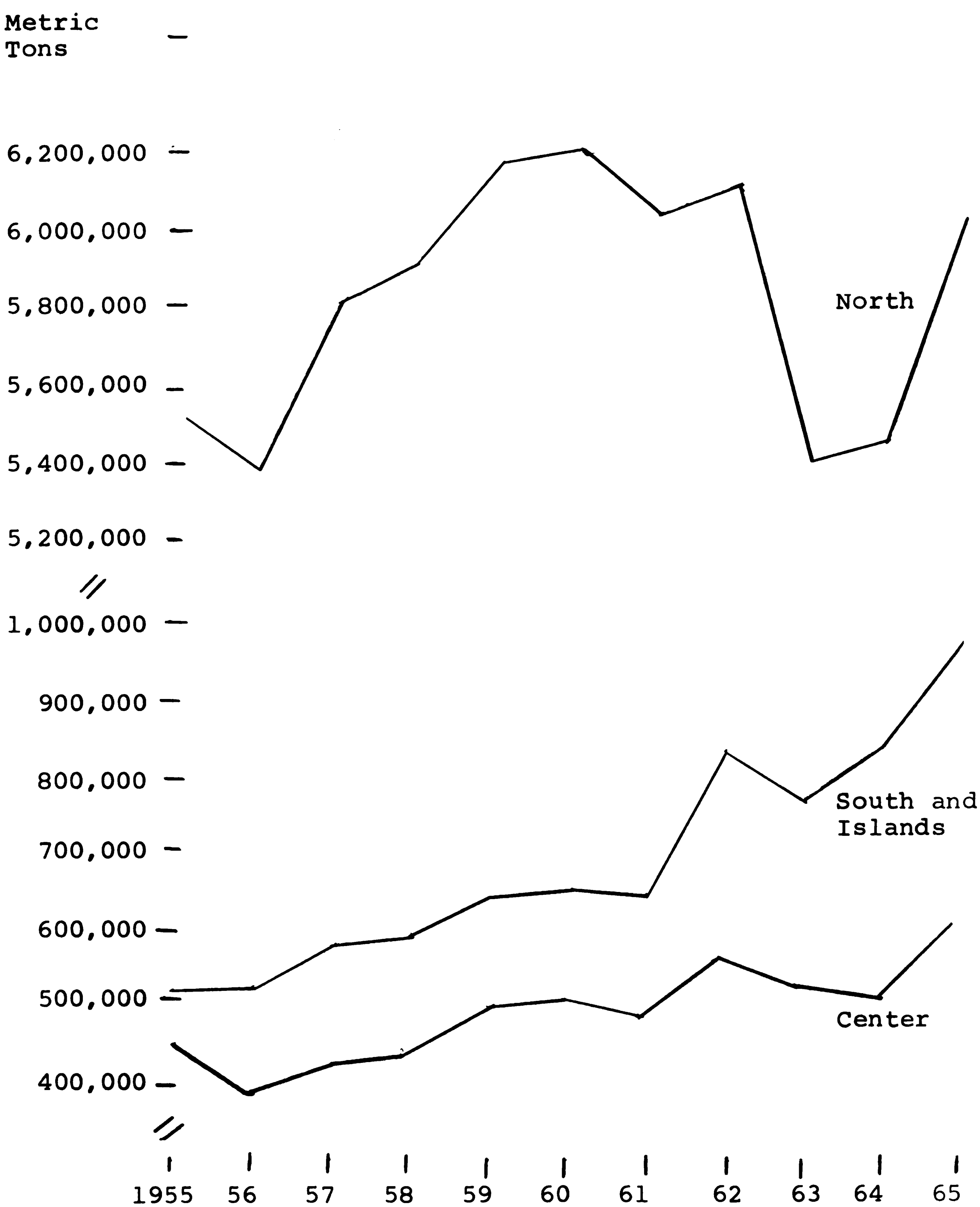
[32] Mondo Economico, Anno XXI, No. 36, (September 10, 1966).

[33] These statistics on milk production are reported by the Associazione Italiana Lattiero--Casearia and exceed government statistics slightly.

FIGURE IV-3. MILK SOLD FROM FARMS BY MAJOR GEOGRAPHIC REGIONS, 1955-1965



and condensed milk which competes with other EEC countries (imports increased from 387,000 quintals to 633,000 from 1960-1965, a gain of 63 percent). About 1.9 million tons of milk in 1965 were used to make the hard cheeses which do not meet international competition and which strongly influence milk prices in Italy.

1. Number of Cows: Cow numbers have increased with the overall growth of the cattle herd and are a relatively high proportion of cattle numbers in each region. The proportion is highest in the south and islands indicating the generally lower calfing rate and technical practices. The proportion of cow numbers in 1963 and 1964, a low period in the cattle cycle, was used to estimate cow numbers in 1970 when a similar situation is expected. The proportions were: 49.71 percent in the north, 53.58 percent in the center and 54.12 percent in the south. The average proportion in 1959, 1960 and 1961 was used to estimate cow numbers in 1975 when production should reach a peak. These proportions were: 50.62 percent in the north, 51.39 percent in the center and 53.37 percent in the south. Applying these percentages to projected cattle numbers provides an estimate of all cows in 1970 and 1975, Table IV-4. It is possible that this procedure could overestimate cow numbers if calfing rates improve and calves are fed for longer periods of time.

TABLE IV-4. COW NUMBERS, MILK PER COW AND MILK PRODUCTION BY MAJOR GEOGRAPHIC REGIONS FOR SELECTED YEARS AND PROJECTIONS TO 1970 AND 1975

Item	1954-55	1959-60	1964-65	1970 low	1970 high	1975 low	1975 high
Cow Numbers							
North	N.A.	3,245,100	2,966,450	2,979,781	3,071,219	3,374,547	3,595,134
Center	N.A.	842,100	688,000	808,142	839,333	853,408	923,417
South & Islands	N.A.	732,350	860,950	897,422	925,027	908,062	940,939
Italy	N.A.	4,819,550	4,515,500	4,685,345	4,894,546	5,136,017	5,459,490
Milk per Cow (Quintals)							
North	N.A.	25.06	24.06	25.26	25.26	26.02	26.02
Center	N.A.	7.90	10.29	11.63	11.63	12.79	12.79
South & Islands	N.A.	11.53	13.09	14.54	14.54	16.07	16.07
Italy	N.A.	20.00	19.87	20.84	20.84	22.06	22.06
Milk Production (Metric Tons)[a]							
North	N.A.	8,131,214	7,136,351	7,526,927	7,757,899	8,780,571	9,354,539
Center	N.A.	665,229	707,804	939,869	976,144	1,091,509	1,181,050
South & Islands	N.A.	844,557	1,126,745	1,304,851	1,344,989	1,459,256	1,512,089
Italy	N.A.	9,641,000	8,970,900	9,771,647	10,079,032	11,331,336	12,047,678

[a]Total milk production is allocated among the geographic regions in proportion to the quantity of milk marketed in each region.

Sources: Istituto Centrale di Statistica, Annuario di Statistica Italiano, (Roma: Various Issues).
, Compendio Statistico Italiano, (Roma: 1966).
, Annuario di Statistica Agraria, (Roma: Various Issues).

2. <u>Milk Production per Cow</u>: Milk production in Italy is a high cost enterprise relative to other EEC countries. The causes are low average production per cow, a result of a variety of nonspecialized breeds, and feeding practices. Milk yield per cow in the north in 1964-65 was 24.06 quintals, 10.29 in the center and 13.09 in the south, Table IV-4.

Breeds are being improved rapidly. The government subsidizes imported breeding stock purchased by approved farms and provides low interest capital and in some cases gives 25 percent of the animals' cost to disseminate them to other farmers. The effects are especially noticeable in the center and south where average production per cow increased from 11.53 quintals in 1959-60 to 13.09 in 1964-65 and in the center from 7.90 quintals in 1959-60 to 10.29 in 1964-65. In the north yields have been static, averaging 25.06 quintals in 1959-60 and 24.06 in 1964-65. Average figures in all regions may be deceiving however, since better farmers in the irrigated plains of all three areas report herd averages of 30 to 40 quintals per cow.

Feed is perhaps as great a problem but is not recognized as such. Most farmers use forage as the basic feed but quality of hay is quite low. Green feed is fed in season that produces well but contributes to sharp seasonal variation in milk production. Improvements in feeding, especially increased plantings of alfalfa and greater use of feed grains and concentrates should complement the reservoir of improved stock now being produced.

Production per cow is expected to increase to 1975 from three influences: the increase in proportion of specialized dairy cattle with improved blood lines, the exodus of farmers in the hills and mountains who tend to have lower yielding cows and the continued improvement in grain feeding. On these assumptions milk production in the north is expected to be 25.26 quintals per cow in 1970 and 26.02 in 1975, 11.63 quintals in 1970 and 12.79 in 1975 in the center and 14.54 in 1970 and 16.07 quintals per cow in the south in 1975. These estimates show only a slight increase in the established dairy region of the north but provide what probably are conservative average yields in the south.

3. Projection of milk Production to 1970 and 1975: Estimates of 1970 and 1975 milk output are multiples of projected cow numbers and production per cow. Table IV-4 shows an expected output of 9.8 million tons at the low price alternative of 1970 and 10.1 million at the higher price, increases of 8.9 and 12.3 percent over 1964-65. Continued expansion to 1975 is foreseen with 11.3 million and 12.0 million tons at the two price assumptions. Production at this rate would mean an increase of almost 26.3 and 34.3 percent over 1964-65 output.

Expected lower milk prices enter the projections in the estimate of total cattle numbers. But direct account is not taken of the possibility of price ratios that make beef production more profitable than milk production. Projected prices used in the cattle equations show expected price ratios of 7.25 and 8.41 in 1970 and 7.62 and 9.25 in 1975. Past experience shows that a ratio greater than 7:1 caused farmers to move sharply to meat production. These ratios indicate some of the dairy animals would be fattened for slaughter and milk production would consequently be less than projected. Budget results showing a relatively large net income from dairy production but decreasing in size with expected milk and feed prices while income from feedlot beef production increases support this conclusion. But milk production cannot be substantially reduced because of the dual purpose nature of cattle production.

Swine Production

Italian pork production has traditionally followed two different patterns. In the northern part of the country pigs are a joint product with cheese production to utilize milk by-products. In the remainder of the country pork is grown for home consumption, for sale as feeders in the north or for sale in small lots in nearby villages. Future output will be influenced by changes in the dairy sector, structural changes on farms in the center and south and consumer demand for red meat.

Demand and Consumption

Consumption patterns for pork are sufficiently different from those in other countries to warrant special attention. These unique features determine the form in which pork is consumed as well as limiting its consumption.

In per capita consumption Italy is not a large pork consumer when compared to northern European countries. The rate per person in 1965 was 8.2 kilograms up from 6.7 in 1963. This increase was in part due to the limited availability of beef in this period. Beef consumption was approximately double that of pork which is now in third place behind poultry. Pork represents about 20 percent of all meats consumed, a percentage which has been decreasing over the past decade as beef and especially poultry have been consumed in larger quantities.

The low rate of pork consumption is explained in part by a low caloric requirement caused by climatic factors. It is heightened by the generally held view in Italy that pork is unhealthy because it is hard to digest or because it contains a large amount of fat. This idea is furthered by a campaign against pork consumption by many doctors who attribute diseases of the heart and arteries to this food. These opinions are probably derived from earlier periods when refrigeration was unavailable and pork easily spoiled. But even today fresh pork is consumed only in the cold months when it is thought to be safe and a higher calorie diet is needed.

Processed pork constitutes about 50 percent of the total. This is usually in the form of prosciutto, salt-cured or raw ham, and various types of salami. To obtain the desired flavor in these cuts heavy slaughter hogs are necessary; the average weight is, in fact, the highest in the world. The average live weight in these industries is 170 kilograms but ranges in size from 120 to 220 kilograms.[34] The ideal animal demanded by the industry is a meaty hog, fat, low in water content and with large hams.

Besides the very heavy hogs required by industry, there is considerable demand for porchetta, little pigs, that weigh around 60 kilograms. These are roasted whole by families or retail shops that sell meat in slices. In this form fresh pork is consumed all year but again demand is greatest in the winter months.

The different forms in which pork is consumed make interpretation of an average slaughter weight almost meaningless. When combined the extremes result in an average weight that has increased over the past decade in contrast to almost all other countries.

In viewing the future of the pork industry in Italy,

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[34] Cassa per il Mezzogiorno, Strutture e Mercati dell' Agricoltura Meridionale - Carni, Vol. 6 (1966), p. 385.

the essential elements of demand must be considered. In particular, the low demand relative to other meats, the highly seasonal nature of consumption and the rather specific requirements of pork processors greatly influence the type of animal produced, how it is produced, and the amount of production.

Historic Production Patterns

Total numbers of swine in the country have been increasing since 1954, Figure IV-4. There is a cyclical effect of approximately four years duration that appears to have troughs in 1954, 1958, 1962 and expected again in 1966.[35] Numbers have increased so rapidly since 1958 that the 1962 trough became more of a leveling off than a down-turn.

The growth pattern differs in the three major geographic regions. Numbers produced in the north have increased very rapidly since 1955 with only slight pauses in 1958 and 1962-63. This area produces over 50 percent of the swine in the country and 40 percent are grown in the two regions of Emilia-Romana and Lombardia alone. Production in the center has

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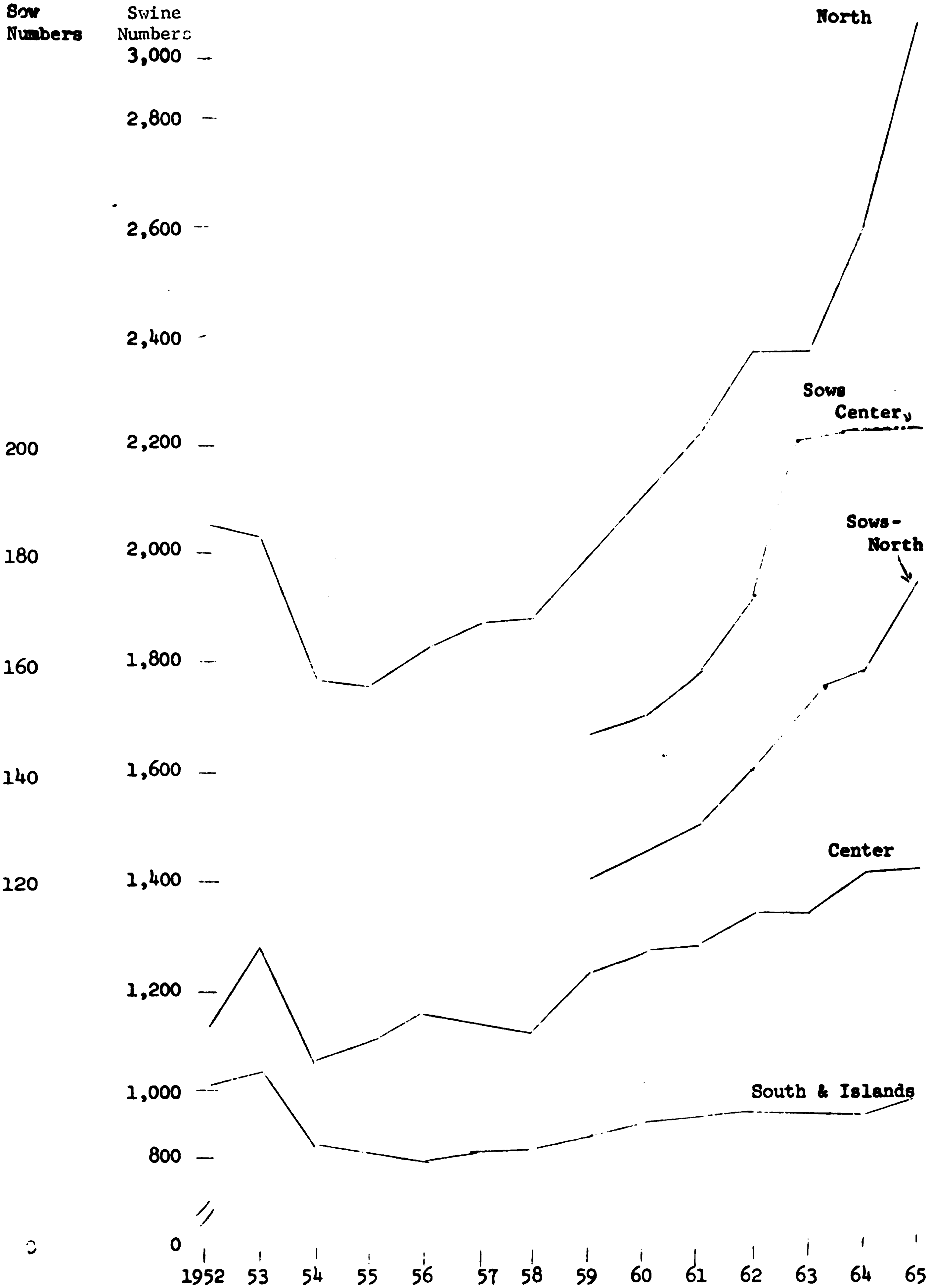
[35] In a recent study of the hog cycle in the region of Umbria, Cassano found the cycle covered an average duration of slightly more than 40 months. In each cycle the high phase of production lasted just over 19 months and the low phase slightly over 21 months. Cosimo Cassano, Le Previsoni Economiche per gli Allevamenti Suini, INEA, (Perugia: April, 1965), p. 83.

FIGURE IV-4. SWINE NUMBERS ON FARMS, 1952-1965



also increased since 1954 but at a slower pace. In the south and islands there has been little change with production in these areas largely for on-farm consumption.

There is also a definite difference in the type of swine produced in the various areas. Production in the north is largely a coordinated arrangement between dairies making cheese and the ham and salami processing industries. Hogs are fed to quite heavy weights for industrial needs. Northern Italy supplies 53 percent of all pigs slaughtered but due to the heavier live weight and higher yield, accounts for 58 percent of total weight. Central Italy slaughters pigs which weigh less and yield less and slaughter weight is a lower percentage of the total than numbers produced. This relationship is even more evident in the south and still more so in the islands.

The pork industries that grew up in the north as an adjunct to the milk-cheese industry are largely responsible for this region being an area of fattening and the central part of the country specializing in lattone or feeder pigs.[36]

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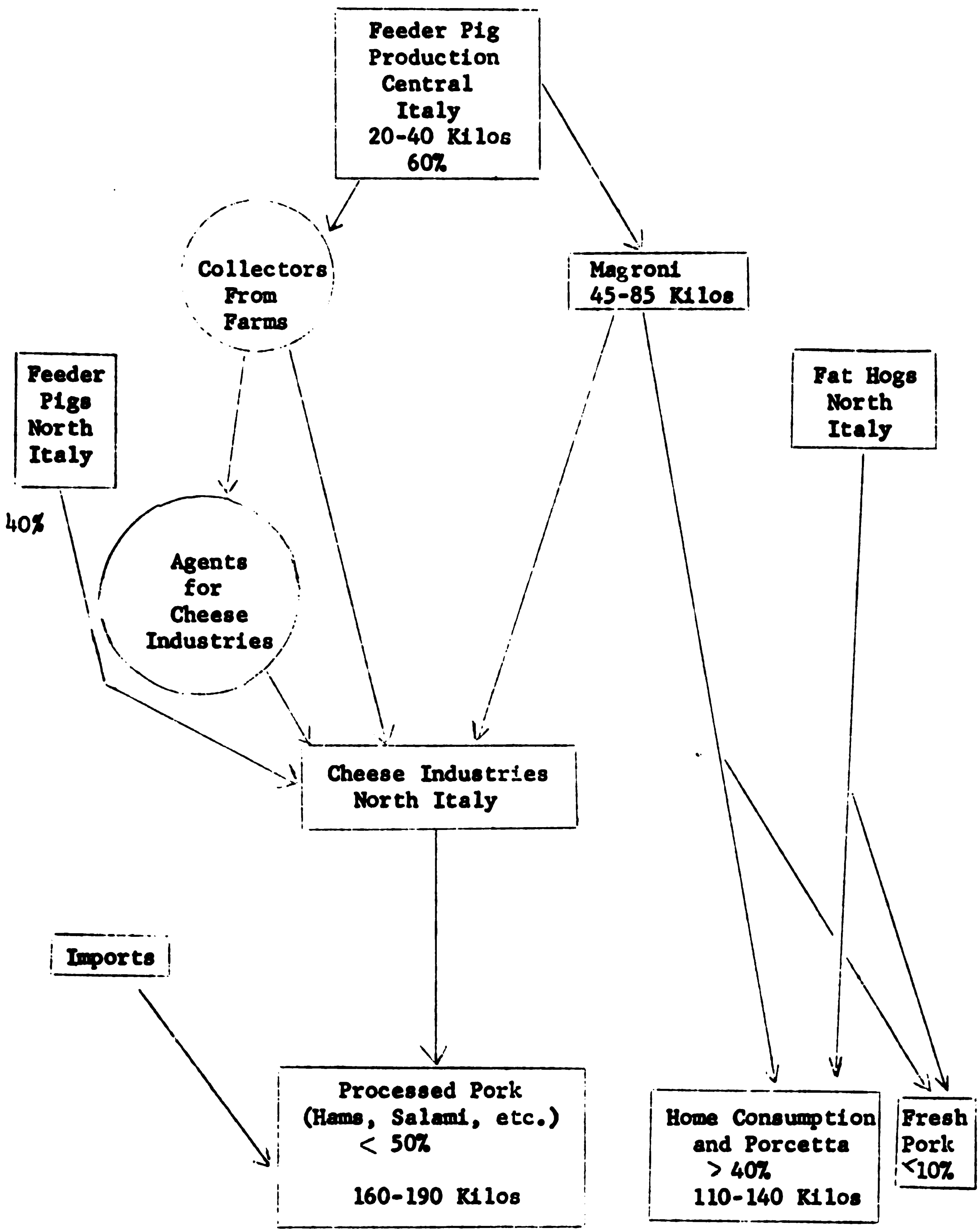
[36]Brunelli in describing the relationship between dairies and pig growing says in the beginning the dairy barn and pigsty constituted a single structural unit with the number of pigs equal to cow numbers. After the war pigs became an increasingly more substantial factor in the price of milk and the relationship between milk produced and pigs raised became continually closer. Today, cheese production has moved off-farm but pigs have moved with the milk processing. Now dairies produce in a continuous cycle rather than seasonally, production per cow has increased and the production of pigs has tripled. There is still a definite relationship between milk and pigs with the optimum ratio held to be one pig for every ten quintals of milk processed per year. Paolo Brunelli, "L'Allevamento Suinicolo nell'Impresa Cesearia," Rivista di Suinicoltura, Anno IV, No. 5 (May, 1963), p. 15.

Even though the north has almost twice the number of swine as the center, the number of sows in the center exceeds the number in the north by almost 200,000. The regions of Emilia, Tuscany, Marche and Umbria serve as a source of feeders for the northern dairy plants.

Figure IV-5 schematically illustrates the flow pattern. Most feeders are produced on small farms in the center by mezzadria or family farmers. These are collected by speculators who may sell directly to cheese factories or more likely operate on a contract basis for agents of these industries. Pigs are trucked from a central pick-up point to a dairy plant in the north.

Three factors are at work which may change this pattern. First, the dairies themselves appear to be dissatisfied with the number and quality of pigs obtained. They are encouraging farmers in the north to produce more feeder pigs and this enterprise appears to be expanding. Second, dairymen in the cheese producing regions have well established cooperative and trade associations for marketing and maintaining cheese quality. These cooperatives are pressuring for government financing of an integrated system up through meat processing and down to producing feeders. Third, is the rapid out-migration of farmers in the center who have been the traditional suppliers of feeder pigs. All three changes point to an increase in large, modern farrowing operations located in the north or by nonfarmer interests in the center.

FIGURE IV-5. FLOW DIAGRAM OF THE ITALIAN PORK SECTOR



Besides these two traditional forms of swine production, there is a third--the production of magroni or middle-size pigs. The proportion is small and appears to be declining. These pigs, weighing 45-85 kilograms, are an intermediate step between the feeder pig producers and the fat hog producers. Some are also slaughtered for fresh pork consumption. The general system is to buy feeders around 20 kilograms and 70-80 days of age and sell magroni at a usual weight of 45-50 kilograms.

1. Technical Improvements: Through the efforts of the Ministry of Agriculture and private producers, technology is improving. The Ministry provides educational programs, breeding stock and financing to improve facilities and herds. Private industries are contributing to growing hog numbers and are providing a demonstration impact with modern facilities.

The basic breed is the Large White (Berkshire) which together with its cross-breeds make-up 40 percent of the total production. The Landrace is fast gaining in popularity due to its high birth rates, fast weight gain and because it is able to meet the conformity and yield requirements of the meat industry at a live weight of 20-30 kilograms less than the Large White. A cross between the male Landrace and female Large White represents the ideal type for breeders, growers and the meat industry together. Foreign breeds in total account for 80 percent of the production in the north but only five percent in the south and one percent in the islands. Better breeding is reflected in improved feed conversion rates and increased yield of meat per hog.

With genetic improvements has come updating of facilities. In the northern dairies almost all fat swine are in clean, mechanized buildings where one man is able to care for 500-800 hogs. Feeding is accomplished through an automated conveyor system of mixing, cooking and serving. In the feeder pig producing areas the first modern farrowing houses are appearing. These are financed by integrators who produce for their own fattening pens or to contract out on farms.

Average feed conversion rates appear to be quite high compared to U.S. rates but in fact, are little different in commercial operations. Average rates are high because animals are fed to 200 kilogram weights. At these weights feed conversion rates are approximately 6:1 but in the smaller sizes the rate is less. Outside the commercial feed lots little can be said on feed conversion rates.

Some improvement in conversion rates has come from better quality feed. Mixed feed production for swine has increased almost 50 percent (300 to 590 metric tons) from 1962-63 to 1965-66.[37] Still most feeders continue to buy

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[37] Agra Europe, No. 199 (London: January 11, 1967), p. MI-6.

grains and mix their own rations with purchased protein mixes.

2. <u>Prices</u>: Prices of fat hogs at farm level generally trended downward from 1954 to 1960 but then increased sharply to a high in 1962. The major characteristic of hog prices is the four year cyclical pattern familiar in most countries. Orlando reports this price variation to average 30 percent of the price of fat hogs compared to 8-12 percent in the U.S., Denmark and similar producing countries and reaches 60-80 percent for feeder pig prices.[38] There is also a very pronounced pattern within the year with prices peaking in the October-February period when demand is highest and reaching an annual low point in July.

At retail pork prices have steadily increased since 1960 with little of the oscillation just described at the farm level. This is explained in part by the inefficiency in marketing and distribution of meats and partly by the absence of competition. It is reported that the price of swine in Italy is established by four large pork processors. Price can be driven down by a refusal of these plants to buy pigs for 15 days. They are also exerting pressure on the state to prevent the farm cooperatives from becoming pork processors.

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[38] Giuseppe Orlando, "Due Fondamentali Problemi del Mercato Suino," <u>Rivista di Suinicoltura</u>, Anno III, No. 9 (Septembre, 1962), p. 17.

It is evident that prices in this environment operate to the disadvantage of small farm units and farmers themselves point to price uncertainty as one of the major disadvantages of pork production. Fluctuating prices, farm level prices that are expected to move lower and the exodus of the traditional pork producer indicate a shift from farm level production to larger integrated units.

From 1951 to 1961 corn prices trended lower but since 1961 there has been an upward turn reflecting increased demand and probably some effects of EEC policy. But with the special concessions to Italy, corn price increases at least to 1972 will not be a serious obstacle to pork output.

Farm produced feeders and fresh pork are likely to be fed farmgrown corn. Most of the fat hog industry in the north is dependent on purchased corn, a good share being imported corn. Higher corn prices will have more impact here than in the rest of the country but these industries also have some market advantages as corn is purchased in large lots. Farmer cooperatives, for example, in 1966 paid 4300-4900 lire per quintal when average market price for all Italy was reported at 5,033 lire. In addition, these coops use Green Plan funds to purchase corn on credit at very low interest rates.

Production and price of hard cheese may be more important than corn price in determining future pork production.

Cheese price up to 1962 followed a cycle similar to cow numbers but price increased from 74,987 lire per quintal that year to 135,963 lire in 1965, a rise of 81 percent in three years (corresponding to a 79 percent decrease in milk processed in the two largest cheese producing regions from 1962-1964).

While it is easily verified that a relationship exists between milk produced, cheese manufactured and swine numbers, an exact specification is difficult. It is known that milk yields 80 percent whey after cheese and butter are processed. The ratio for feeding hogs is in a range of 8-10 quintals of whey per pig per year.[39] Thus specific swine numbers for a given plant can be cited but in the aggregate little can be said because not all dairy plants produce swine.[40]

It can be said that future prospects for hard cheese production and consequently whey for feeding pigs appears favorable. The cattle cycle is now in its expansionist phase and following past trends milk production should be at a peak in 1967 or 1968 and then decline through 1970. Milk

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[39] An optimum relationship is one pig for every 10 quintals of milk processed. Paolo Brunelli, op. cit., p. 15.

[40] For example, in the Parmesan producing region of Emilia there are 575 cooperatives and 67 private cheese factories that together process 92 percent of all the milk in the region. All the private firms produce swine but only 50 percent of the coops have this enterprise. Farmer-members in some coops buy whey for home feeding.

production has been projected to increase substantially to 1975. To the extent that pig numbers depend on milk production, this should mean an expansion in pork production.

Beef prices too have operated to the advantage of pork producers. Although beef is a strongly preferred food in the diet of Italian consumers rapid price increases since 1960 have increased the demand for competing meats. With the expected supply of beef continuing below desired levels, beef prices should provide added stimulus to pork production.

Obstacles for Future Pork Production

Both numbers of swine and quintals of meat produced increased substantially since 1958. With the exception of higher feed cost and expected lower prices of hard cheese the same factors underlying these changes are still influencing pork output. An additional factor, integration, is providing stimulus to supply. A larger proportion of Italy's pork will come from this source to circumvent the massive changes in farm and market structure needed to compete with more efficient pork producing partners of the EEC. Therefore, the future production of swine must be viewed with optimism.

Some problems exist that will dampen the potential expansion. Orlando cites two: the effect of price cycles, especially on farmers producing feeder pigs and the low and seasonal demand for fresh pork.[41] Several authors point to poor management on farms as a serious obstacle. For example, one study of 28 farms over a two-year period found an average of 14.3 pigs per sow weaned in the better farming areas where 16 pigs is considered desirable.[42]

Another obstacle that may restrict production is the possibility of large pork imports from northern Europe when free trade begins. Most of the country's imports of pork now come from the Netherlands and Scandinavia and Dutch imports have increased sharply since 1962 when EEC policies were initiated. Processed meat imports from the Netherlands increased from 3.4 percent of total imports in 1961 to 15.1 percent in 1962 and 17.1 percent in 1964. If large volume supplies are available from northern Europe, high cost Italian producers will have difficulty competing with more efficient northern pork producers.

Much depends on the expansion of demand. Persuading consumers to eat more fresh pork instead of beef will not be accomplished in a short time. A pig must be produced with less fat, refrigeration must be readily available and pork must win acceptance in the warmer months. Here too

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[41] Giuseppe Orlando, op. cit., p. 17.

[42] Pier Giovanni Bucatti and Marchello Martelli, "Problemi Tecnici ed Economici dell Allevamento Suino," Rassegna Suinicola Internazionale (Reggio Emilia: May 7-8, 1966).

there is optimism. The U.S. Feed Grains Council sponsored a promotional campaign for fresh, lean, grain-fed pork in Torino that led to dramatic sales increases. They expect fresh pork consumption to increase rapidly and swine numbers to double. Agangelini Corporation--an integrated grain importer and feed manufacturing producer of beef, poultry and swine--singled out swine as the type of livestock to increase in their plans. They foresee increased consumption of fresh pork and plan to slaughter hogs of 110 kilograms to meet this demand.

Thus, existing obstacles to greater swine production are not insurmountable. It may well be that production restraints can be removed as fast or faster than demand expands. Future production should be viewed with this as an hypothesis.

Swine Numbers

1. Statistical Analysis of Historical Factors Influencing Swine Numbers: In estimating future production, historical relationships were first considered by regressing numbers of pigs on farms in the north and in the remainder of Italy on the price factors discussed above and time as a dummy for nonprice influence. The results are in Table IV-5.

In all equations the signs of the pork and cheese price coefficients were positive as expected but corn price had

TABLE IV-5. REGRESSIONS FOR EXPLAINING NUMBER OF SWINE ON FARMS, 1952-1964 AND DERIVED ELASTICITIES

Region	Constant	Price of Pork	Price of Hard Cheese	Price of Corn	Time	$\bar{R}^2$	D.W. Statistic	Standard Error of Estimate
North	76.7265 (556.4566) (.86)	0.0059 (.0117) (.63)	0.0084 (.0029) (.02)	0.1268 (.0968) (.23)	81.5861 (19.1633) (.00)	.813	1.59	112.5809
North	6.2539 (749.4461) (.94)	0.0114 (.0156) (.49)		0.2002 (.1259) (.14)	99.5843 (24.4327) (.00)	.661	.88	151.7717
Remainder of Italy	1042.2305 (598.5743) (.13)	0.0116 (.0124) (.38)		0.0839 (.1005) (.43)	48.3018 (19.5141) (.04)	.343	1.20	121.2184

Elasticities at Means

North	.067	.290	.303
North	.130		.478
Remainder	.175		.190

Figures in parentheses are in order, estimates of standard errors and significance levels of the regression coefficients.

the "wrong" sign. The Durbin-Watson Statistic indicates the presence of some positive serial correlation but the test at the five percent level of probability is inconclusive. $\overline{R}^2$, the coefficient of multiple determination adjusted for small sample size, indicates 81 percent of the variation in the north is explained by the three included variables but only 34 percent in the remainder of the country.

Two reasons probably account for this large difference. In the north production tends to be more stable and more a function of prices while in the other parts of the country variables omitted from the analysis are relatively more important. Second, hard cheese price is included in the north and apparently is an important variable in explaining past changes. To test this and the response to pork prices a second regression was run omitting cheese price. In this form only 66 percent of the variation in swine numbers is explained. The $\overline{R}^2$'s are somewhat inflated due to the inter-correlation of time with corn price and swine numbers.

The elasticity of pig numbers with respect to real farm price of swine computed from these equations shows for producers outside the north a value of 0.175 computed at the means. Thus, under 1952-1964 conditions a price change of one percent in real farm price of swine results in a 0.17 percent change in the same direction in pig numbers. The price elasticity computed from the equation fitted to northern Italian data gave quite different results; the elasticity was essentially zero. This is in contrast to a supposition that farmers in this region are more price responsive than other parts of the country. The difference is likely a result of one of two effects. First, pork and cheese may indeed be true joint products such that pig numbers are determined by the amount of milk processed and little response is associated with pork price change. Since graphical analysis indicates these two do not always move together and some hogs are produced outside of dairies, this explanation is rejected. It is more likely that the cheese price variable included in the equation assumes much of the pork price influence. This view is supported by the value of the price coefficient and resulting elasticity in the alternate equation for the north. The estimated response to price change is almost equal to that calculated for other regions.

The remaining elasticity estimate of interest is that related to real corn price. As expected, the effect of a price change in the north has greater effect than in other parts of the country but because the sign is opposite to that expected and standard errors are large relative to the coefficient little confidence is held in this estimate.

2. <u>Projection of Swine Numbers and Pork Production to 1970 and 1975</u>: To estimate swine numbers and supply of pork the regression equations presented in table one were

employed. Initially several assumptions should be noted. First, the cyclical effect of pork production is assumed to continue into the future in much the same pattern as previously. This would mean a low point in the cycle in 1970 and a high in 1974. This factor alone would cause pig numbers to be below trend in 1970 and above for 1975.

The cyclical effect will also affect beef production, with cattle numbers at a low point in 1970-71 and around a maximum in 1975. It appears that meat will be in relatively short supply in 1970 and more plentiful in 1975. Combined with an expected decrease in the rate of poultry meat production, pork prices in 1970 may be higher than those projected in Subproject III and used in this analysis.

In projecting pork production cheese output will be important. Currently, the market is very favorable and expansion is occurring. For projection of swine numbers the EEC common threshold price of 127,296 lire per quintal was used.[43] It was assumed this same nominal price would prevail through 1975.

The out-migration of small family farmers and <u>mezzadria</u>, the principal growers of swine, will cause a decrease in pig numbers in regions outside the north. But it was assumed

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[43]This is a theoretical price calculated from the common target price of $4.67 per hundred weight of 3.7 percent milk and is to become effective April 1, 1968. <u>Agra Europe</u>, No. 206 (March 1, 1967), p. S-1.

that production in larger commercial units would at least compensate for their decline and the equation in Table IV-5 would be adequate for projection. In the north, however, more growth than indicated by the equation is expected. With supplies of meat less than needed to meet requirements additional capital is expected to flow into pork production. Expansion will also be indicated by the increased volume of milk and cheese projected in the north. The trend coefficient for this area was increased 10 percent on the basis of these expectations for projecting swine numbers.

Results of the projections are in Table IV-6. A 15.6 percent increase is projected for the north for the 1964-1970 period and a 26.7 and 29.6 percent increase for the low and high price estimates of 1975. In the remainder of the country a slightly lower increase is expected. For all Italy pig numbers in 1970 would be about 750 thousand more than in 1964-65. Under the high price estimate for 1975 pig numbers would be 6.2 million or almost 28 percent greater than in 1964-65. It is believed that the high estimate for 1975 would be the most realistic projection given the present continuing rate of increase in sow numbers, integrated firms and total demand for red meat.

The number of hogs slaughtered varies greatly due to phase in the cycle and to level of management. A higher percent is slaughtered when the cycle is at its high point and prices are lowest. While in high price periods more

TABLE IV-6. SWINE NUMBERS, AVERAGE SLAUGHTER WEIGHTS AND PORK PRODUCTION BY MAJOR GEOGRAPHIC REGIONS FOR SELECTED YEARS AND PROJECTIONS TO 1970 AND 1975

Item	1954-55	1959-60	1964-65	1970	1975 Low	1975 High
Swine Numbers on Farms						
North	1,763,350	2,045,600	2,618,100	3,031,328	3,318,473	3,392,498
Remainder of Country	1,988,050	2,195,900	2,219,900	2,559,704	2,725,761	2,790,059
Italy	3,751,400	4,241,500	4,838,000	5,591,032	6,044,234	6,182,557
Swine Numbers Slaughtered[b]						
North	1,421,248	2,020,519	2,169,195[a]	2,852,480	3,185,734	3,256,798
Remainder of Country	1,412,368	1,727,901	1,759,657[a]	1,942,815	2,316,897	2,371,550
Italy	2,833,616	3,748,420	3,928,852[a]	4,795,295	5,502,631	5,628,348
Average Live Slaughter Weight (Kilograms)						
North	121.4	138.6	136.6[a]	136.3	136.3	136.3
Remainder of Country	121.4	116.0	115.2[a]	116.0	114.0	114.0
Italy	---	---	---	---	---	---
Average Dead Slaughter Weight (Kilograms)[c]						
North	99.5	113.6	112.0	111.8	111.8	111.8
Remainder of Country	92.3	88.2	87.5	88.2	86.6	86.6
Italy	---	---	---	---	---	---
Pork Production (Metric Tons)						
North	172,539	229,531	242,950	318,907	356,165	364,110
Remainder of Country	130,361	152,401	153,970	171,356	200,643	205,376
Italy	302,900	381,932	396,920	490,263	556,808	569,486

[a]Data for 1964 only.

[b]The percent of swine on farms slaughtered is estimated to be 94.1 and 96.0 for 1970 and 1975 in the north and 75.9 and 85.0 in the remainder of the country.

[c]Dead slaughter weight is estimated to be 82 percent of live weight in the north and 76 percent in the remainder of the country.

Sources: Istituto Centrale di Statistica, Annuario di Statistica Agraria, (Roma: Issues of 1956-1965), and
, Annuario Statistico Italiano, (Roma: 1965).

pigs are saved for breeding. Better management in the north means more pigs weaned per sow and more litters per year compared to other regions. Both these factors were considered in assuming that 94.1 percent of pigs on farms in the north would be slaughtered in 1970 and 96.0 percent in 1975. A lower assumption of 75.9 percent in 1970 and 85 percent in 1975 for the remainder of the country was used.

A slaughter weight of 82 percent of live weight was employed to convert to carcass weight (one study reported a range of 80-82.7 percent and another 80-83.3 percent of live weight).[44] Under these assumptions the tabled values of pork supply were estimated for 1970 and 1975.

Farm level budgets. Macro-level supply response estimates have a propensity for error if forecasts are made with no consideration given to changes in net profit at the firm level. To test the effect of changed price relationships and technical conditions an enterprise budget was constructed for 1963-64 conditions and the anticipated 1970 and 1975 conditions. A net profit estimate of 17.3 million lire was obtained from a 1000 swine unit in 1963-64, Appendix Table 14. Under the price and input-output assumptions of 1970 this would increase slightly to 18.1 million. In 1975 there would be a decrease in net income of 9.5 percent under the

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[44]Pier Giovanni Buiatti and Marchello Martilli, op. cit., Cassa per il Mezzogiorno, op. cit., p. 391.

low price assumption and an increase of 22.8 percent at the higher rate. At the 1975 low, net income would be lower but would still provide a favorable return on investment.

Those estimates indicate that net income under conditions represented by these data would still be positive and actually increase in 1970 and the most probable 1975 assumption. It may be concluded that the budget data lends support to the projected increases in swine numbers in the north.

Sheep and Goat Production

Italian sheep and goat production has declined steadily but is still important in some areas. Numbers of both in 1964-65 were almost 18 percent less than ten years earlier but the rate of decrease for goats was approximately twice that of sheep. In 1965 there were 7.87 million sheep and 1.23 million goats remaining. The largest concentration is on the Island of Sardegna where 33.2 percent of the sheep and 24.6 percent of the goats are located.

Production has declined for three principal reasons: (1) the out-migration of shepherds from the hills, (2) the land reclamation and reform programs that have reduced the large tracts of pasture land in the estates and prevented seasonal migratory movements from plains to hills, and (3) the relatively low income from this enterprise.

About 65 percent of sheep income is from milk, 25 percent from meat and 10 percent from wool.[45] Milk is an important ingredient in cheese production used usually in 60:40 or 40:60 ratios with cow milk. Wool is of poor quality (70 percent is used for filler and ordinary textiles) and low production per head (even though Italy is a large textile producer, most wool is imported). Lamb is consumed in the center and south in cold months and is often reserved for special occasions.

To project 1970 and 1975 meat production from sheep and goats the average annual percentage decline in each geographical region in Table IV-6A was applied to 1964-65 numbers. The projection results indicate a reduction from nine million head in the base period to 8.3 million in 1970 and 7.5 million in 1975. The decline would be most rapid in the north and central part of the country where competing enterprises offer better returns and is least in the islands where little change is expected in agriculture. Total meat production would decline in proportion to animal numbers.

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[45]Casa per il Mezzogiorno, "L'Evoluzione dell 'Allevamento Ovino e Caprino in Italia e la Situazione Attuale," Strutture e Mercati dell 'Agricoltura Meridionale--Carni, No. 6 (Roma: 1966), p. 380.

TABLE IV-6A. SHEEP AND GOAT NUMBERS AND MEAT PRODUCTION BY MAJOR GEOGRAPHIC REGIONS FOR SELECTED YEARS AND PROJECTIONS TO 1970 AND 1975

Item	1954-55	1959-60	1964-65	1970	1975
Sheep and Goat Numbers (thousands)					
North and Center	3,364	2,496	1,987	1,627	1,208
South	3,847	3,525	3,377	3,090	2,803
Islands	3,747	3,716	3,645	3,574	3,503
Italy	10,958	9,737	9,009	8,291	7,514
Meat Production (metric tons)					
	44,600	39,400	33,340	33,164	30,056

Poultry Meat Production

Poultry production in recent years has been the most dynamic sector of Italian agriculture. Broiler production, representing by far the largest proportion of poultry meat, remained almost unchanged from 1900 to 1950. Small per capita increases in consumption were supplied by imports which reached a maximum in 1955 when import quotas were imposed. Beginning then in 1954 and especially since 1959, production has grown rapidly in number and improved in quality so that today Italy is the leading broiler producer in the EEC. Figure IV-6 illustrates this growth from 1953-1965.[46]

This vigorous output expansion is largely explained on the one hand by the nature of poultry production that permits rapid adjustment to a strong increase in consumer demand for meat and on the other by substantial injections of cost-reducing technology associated with integrated producing arrangements. Because of its importance and its distinctive requirements consumer demand will be discussed in some detail.

Demand and Consumption

Per capita consumption of poultry (including rabbits and game) increased from 2.2 kilograms in 1955 to 4.0 in 1959 and 8.3 in 1965.[47] This increase was associated with

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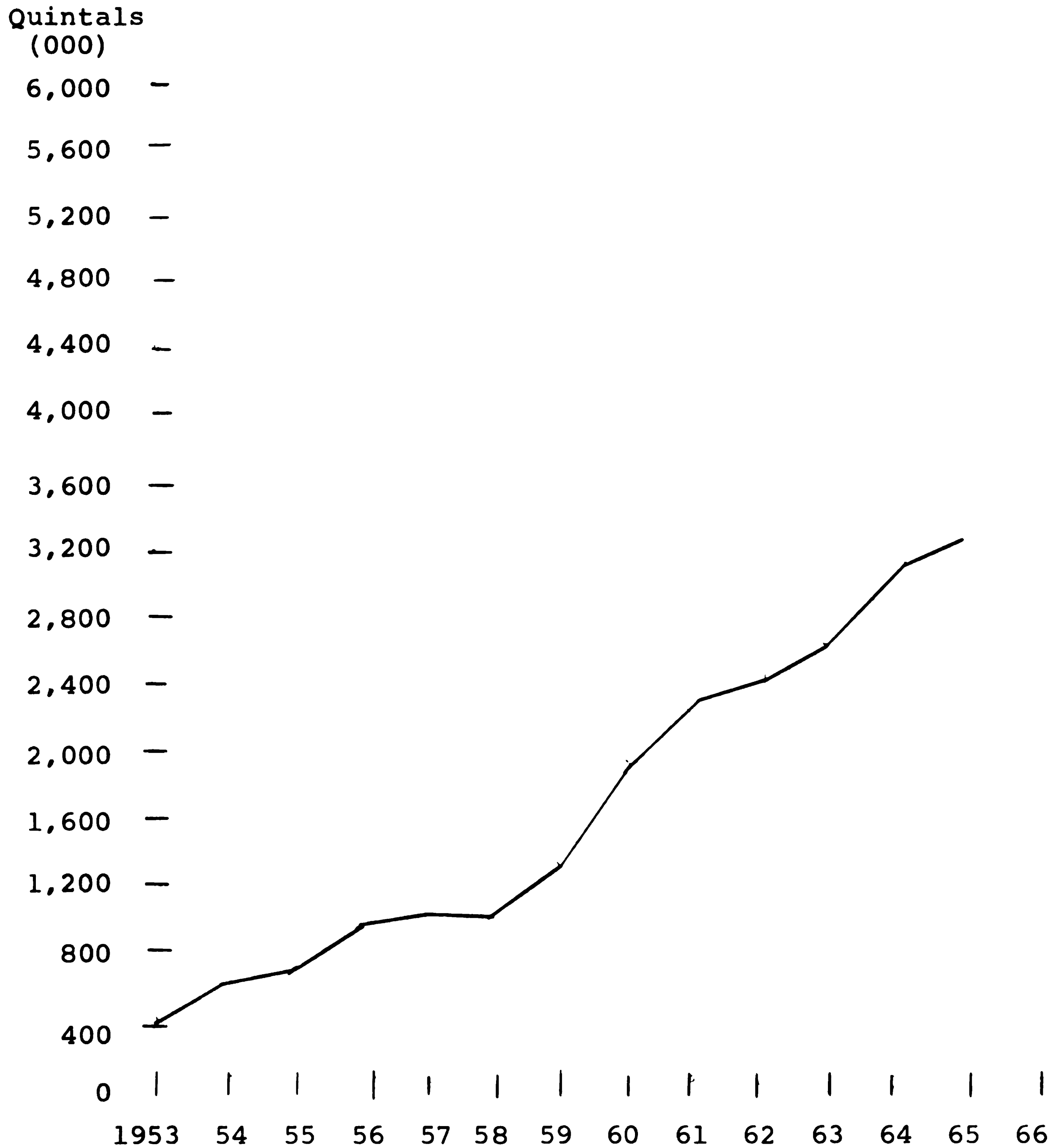
[46] It should be recognized at the outset that Italian statistics on poultry and egg production are probably less accurate than data in other areas. Three specific problems may be noted. (1) The official statistics have not kept pace with the rapid rise in output and according to some observers underestimate the actual by as much as 50 percent. (2) Data reported on poultry meat includes broilers, turkeys, ducks, geese, rabbits, and wild game. While broilers represent the majority of such meat, turkeys and rabbits are also increasing rapidly. (3) Prices reported for poultry meat are at the wholesale level and not farm level as with other commodities analyzed.

[47] Consumption of only broiler meat in 1964 is estimated by the National Union of Hatcheries at 9.5 kilos per person, almost 32 percent greater than official statistics. The estimate is based on the number of birds hatched times an average weight of 1.1 kilo/bird less a mortality rate.

FIGURE IV-6. ITALIAN POULTRY MEAT PRODUCTION, 1953-1965



rising consumer incomes and a low initial rate of consumption relative to other Western countries. Experience from these countries leads to an expectation for further per capita growth.[48]

In addition to expanding demand, strong consumer preferences for particular types of poultry meat are important. Three types of broilers are produced: (1) those allowed to spend all their life running free on the ground, (2) those raised in industrial (integrated) systems that remain caged throughout their life and (3) those in integrated operations that are confined for the first part of their life and then allowed to run free on the ground or in houses during a finishing period. This hybrid method allows some of the feeding efficiency of the caged method while at the same time producing the more desired meat. Italian consumers strongly prefer the farm raised bird because of its "gamier" taste and firmer flesh. Earlier battery produced birds were fed fish meal and the odor and taste of these first integrated chickens still conditions the mind of the consumer.

The degree of preference for the three categories is seen in typical market prices. Chickens produced in cages are sold in supermarkets for 450 lire per kilogram to

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[48]A dissenting view is held by some Italians who believe that on a per capita basis Italy will remain low in poultry meat consumption. The reasoning is that beef and veal are much preferred to poultry.

690-780 lire in the poultry shops. Chickens produced on the ground bring 890-1100 lire per kilogram and <u>nostrani</u>, or farm produced broilers, bring 1200 to 1800 lire.[49]

Another facet of consumer preference that is of particular importance to this research is a desire for poultry meat and eggs with considerable yellow pigmentation. Producers have historically fed <u>plata</u> corn from Argentina to obtain this coloration. This corn is more vitreous and has a higher percent of carotene than U.S. yellow corn. Although results from both Purina and U.S. Feed Grains Council experiments shows that the same coloration can be obtained by using U.S. yellow corn with carotene additions or alfalfa meal added, most producers still desire and feed rations based on South American corn.[50]

Historic Production Patterns

1. <u>Integrated Producing Arrangements</u>: Rising consumer demand for meat is more easily met by expanding poultry output

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[49]Ufficia Italiano del U.S. Feed Grains Council, <u>La Produzione Avicola in Italia</u> (Roma, undated), p. 108.

[50]The Purina experience is enlightening. They use little Plata corn in poultry rations because its feeding value is much less than its market price. They still add some Plata corn for color, however, because it is necessary to sell the feed. If Italy reduces the IGE tax at point of sale, a complete mixed feed could be sold instead of the present system of selling a blended concentrate which the farmer mixes with his own or purchased corn. As long as the feeder buys corn himself, he will buy Plata corn. If a complete feed mix is sold U.S. yellow corn with additives can be substituted.

than other types of livestock because of the shorter life cycle and adaptability to intensive production methods. These characteristic features have made poultry production ideally suited to integrated arrangements and it now dominates broiler output. As late as 1957 farm-type production provided 75-80 percent of the domestic supply, 15-20 percent was supplied by a mixed type and at most 10 percent came from industrial flocks.[51] By 1965 industrial production was estimated to be 90-95 percent of the total.

Integration brought four elements that radically changed techniques of production and lowered costs. This technology in turn has made possible the rapid expansion in numbers in response to consumer demand. The first change has been confinement growing in batteries that has increased labor efficiency and contributed to larger volume production. A second element has been the rapid adoption of mixed feed for poultry. About 80 percent of the firms producing livestock feed have been built since 1960. Compound poultry feed production has increased from 250 thousand metric tons in 1958 to 560 in 1962-63 and to 1,150 thousand in 1965-66, approximately doubling in each time period.[52] Substitution of these rations for feeds formerly used has helped increase feeding efficiency.

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[51] Ufficia Italiana del U.S. Feed Grains Council, op. cit.

[52] Agra Europe, No. 199 (London: January 11, 1967), p. MI-6.

At present four to four and one-half kilograms of mixed feed are required per kilogram of broiler meat produced in a battery system. Birds weighing 1.8 kilograms are produced in 60-65 days at a cost of 300 lire per kilo. By comparison broilers produced on the ground require 70-80 days. Some indication of the effects of changing technology on costs of production may be seen in an OECD report that shows a cost per kilo of 600 lire in 1954 and 350 lire in 1960.[53]

Another contribution of integration has been improved meat strains of poultry. Almost all battery produced birds are from strains originally produced in the United States. Popular varieties are Vantress, Peterson and Hubbard. These meat-type crosses also contribute to improved conversion rates. The effects of integration parallel those of the U.S. experience; larger but fewer producing units, increases in capital employed, labor saving technology, improved management levels and decreasing per unit costs.

2. Feed Costs: Falling corn prices have also encouraged poultry expansion. Corn prices fell sharply from 1953 to 1961 but since have been rising. Poultry prices also fell considerably from 1953 to 1958 and since have been increasing rapidly except for 1961. Even in the earlier

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[53]OECD, Survey on the Organization of Marketing Poultry Meat with Special Emphasis on Broilers, No. 58, (Paris: 1961 Series), p. 136.

period with declining poultry prices, cost reducing technology and falling feed prices were sufficient for steady growth in poultry output. Since 1958 when poultry prices trended upward, output expansion has been even greater.

3. Marketing and Distribution: The wide variety in which poultry is marketed is manifested in a diversity of marketing conditions and forms in which the birds reach the consumer. A rapidly decreasing proportion of birds are sold live, usually directly from farmer to consumer or from farmer to retailer to consumer. Slaughtered birds are in three forms: (1) drained of blood, plucked but with head, feet and intestines, (2) drained of blood, plucked, without crop and intestines but with vital organs still attached (approximately 80 percent is in this form) and (3) completely cleaned with organs attached to the body.[54]

Formerly, broilers passed through as many as six stages in the marketing chain. Increasingly the expansion of integrated organizations is shortening the market pattern. The integrator will usually collect birds from the farmer or from his own cages, process and sell directly to large retailers or sell to wholesalers who process and sell to a retailer. Not only does this structure reduce margins but also makes for better grading and quality control.

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[54] Ufficio Italiano del U.S. Feed Grains Council, *op. cit.*

Under present marketing conditions poultry prices are at best inaccurate and at worst dishonest. The variety of forms in which poultry is marketed, the absence of grading standards and the small number of buyers in a given market, particularly with refrigeration and freezing facilities, make for little competition. Published price quotations are of little use in establishing a market price based on quantity and quality sold and indeed provide little information to producers and consumers alike.[55]

Other Poultry Meats

Initially, it was noted that poultry meat statistics include several types of meat. Previous discussion focused on broiler production because it is the largest item and the most rapidly growing. Two other sources, turkeys and hens, have also increased substantially in recent years.

Turkeys have traditionally been produced in small farm flocks for Christmas and special occasions. Like broilers, production is rapidly shifting to larger, integrated operations. The effects are lower prices, increased consumption and increased output with the adoption of modern technology.

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[55] Published prices are collected by the Chamber of Commerce in the wholesale markets. With an increasing proportion of the birds sold bypassing this market, published figures are likely to deteriorate still farther in representing "true" prices.

Restaurants, especially the _tavola calda_ or short order places are increasing their sales of turkeys in sandwiches and roasts.

Though it is evident that turkey production is expanding, little information is available on the number or rate of increase. Two examples underscore the lag in reporting. Recently, a representative of the U.S. Agricultural Attache's office visited a one million turkey operation in the Piemonte. The output of this farm alone exceeded the total reported in that region. In Emilia the Communist Farmers Cooperatives are planning a multi-million bird output by 1968. These turkeys will be grown under contract with their farmer members and processed by the cooperative. While such isolated cases do not provide a clear view of turkey production, they do contribute to a consistent pattern of expanding output. With a meat product meeting ready consumer acceptance and technology available to reduce costs of production, continued expansion may be expected.

Cull hens from commercial laying flocks add to the poultry meat supply. As the following discussion will show, egg production and number of hens have been increasing significantly since 1955. In 1964, 69 million hens were slaughtered yielding an estimated 1.170 million quintals of meat.[56] Approximately 20 million hens came from industrial

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[56] Ufficio Italiano del U.S. Feed Grains Council, _op. cit._

units and 49 million from rural farms. Culled hens usually reach the market at about 15 months of age weighing about two kilograms. Poultry meat supply from this source in the future depends on the demand-supply relationship for eggs. For the past ten years there has been a fairly steady increase, but in the near future expansion will be slower.

Obstacles for Future Production

In order to estimate future production consideration must be given to several factors that will affect poultry output. In various degrees these hamper the further growth of the industry.

1. Price Cycles: From the producer viewpoint recurring price cycles are a serious problem. In recent years large injections of capital and technology through integration have caused short-run expansion above market needs. Results have been farm level prices as low as 250 lire per kilogram, less than the average 300 lire estimated cost of production (this may vary from 250-320 depending on scale of plant and level of technology). Usually when prices fall below 300 lire, production decreases sharply until prices rise.

While these price variations are to be expected in such a dynamic industry, the effect is to force out the less efficient and poorly capitalized operations. Price cycles may be expected to continue with the level of prices dependent on cost reducing technology on the one hand and rising demand on the other.

2. Distributing and Processing: Of greater concern is the bottleneck in this stage named by one study as being the most critical obstacle. "The main drawbacks to more rapid expansion have been high retail prices resulting from wide marketing margins and lack of processing, cold storage and marketing facilities."[57] By providing more acceptable physical facilities and eliminating some of the outmoded collection methods, an improved quality product at lower cost can stimulate demand.

3. Trade Policy: Bearing on both prices and the marketing system is the government's policy on imports. In the past imports have been permitted as payment for industrial products sold to countries with limited foreign exchange.[58] Oftentimes trade agreements are consumated without regard to the domestic market situation and the results were falling prices and considerable criticism from Italian producers.

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[57]Randall Stelly and James E. Kirby, op. cit., p. 16.

[58]Trade statistics clearly point to the rise in poultry meat imports from Eastern Europe. U.S. exporters, however, have met much difficulty in securing import licenses. Further, the Rome office of the Institute of American Poultry Industries described the rigid packaging and temperature requirements imposed on U.S. poultry while imports from Poland and Hungary are received in cotton bags with minimal health inspection.

On the opposite side of the trade flow Italian exports have been hampered by domestic taxes and competitor's export subsidies. Cost of production in several European countries has been reported as: Germany, 350 lire; France, 320 lire; Italy, 310 lire; Belgium, 295 lire, and Holland, 270 lire.[59] Yet French chicken sells at 160 lire per kilogram less on the German market than does Italian chicken.[60] This difference is largely due to an export subsidy of 120 lire paid by the French government and taxes paid on purchased inputs by Italian producers. Both of these policies will likely change when the Common Agricultural Policy becomes effective and Italian exports will be more competitive on the Western European market.

4. Taxes: The General Taxation on Entry (IGE) referred to above increases the cost of production and has an adverse effect on domestic consumption. The U.S. Feed Grains Council has estimated that the cumulative IGE tax per slaughtered chicken including feed, baby chicks and other inputs as well as the broiler itself comes to 67.25 lire or about 11.2 percent in the most favorable circumstances. For small

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[59] Filippo Sassetti, "Attualita e Provisioni sul Mercato dei Prodotti Avicoli nel MEC," Giornate Avicole Varesine, Vol. III, (Giugno 18-22, 1964), p. 40.

[60] Giulio Zucchi, "Le Ricorrenti Crisi Avicole in Rapporto alla Dinamica del Mercato e della Produzione," Giornate Avicole Varesine, Vol. III, (Giugno 18-22, 1964), p. 40.

farmers where inputs and birds go through more turnover points and are taxed at each the rate can be 12.6 percent. In addition, a consumption tax (imposto di consumo) of seven percent (in some cities, Rome and Naples, it is 10.5 percent) and a commune tax of 3.5 percent is added. This means an additional tax of 75 lire per bird or more. If present pressures to have these taxes eliminated are successful, poultry meat consumption should increase. (Since comparable reductions would occur in prices of other meats there would be no substitution effect.)

5. Feed Grain Prices: Feed grain prices will increase in Italy under the Common Agricultural Policy.[61] Since practically all industrial poultry is fed with imported grain, the industry will be quite vulnerable to grain price increases. Sassetti estimates the increase in feed grain prices will increase the cost of poultry rations 15-16 percent leading to a five percent increase in the cost of producing broilers.[62] This estimate equal to 14 lire per kilogram is in agreement with another of 21 lire for industrial flocks and 10 for farm flocks under the assumption that feed is 70-80 percent

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[61] It should be remembered that Italy has been granted special concessions on corn import prices until 1972. Therefore, for most of the period of this study Italian producers will continue to have an advantage over northern Europe producers in this respect.

[62] Filippo Sassetti, op. cit., p. 26.

of total production costs.[63] This amount, though small in proportion to the total cost, will cause some increase in price at the retail level. It is doubtful that consumer demand will be greatly affected since all grain-consuming livestock will be expected to share in the general price rise.

Quantity of Poultry Meat

1. Statistical Analysis of Historical Factors Influencing Poultry Meat Production: Single equation regressions were used to quantify the influence of the factors believed to be major determinants of poultry meat supply. In the 1953-1965 period these were: (1) cost reducing technology, (2) decreasing feed grain prices in relation to poultry price, and (3) the structural change associated with integration.

Independent variables used in the equation were wholesale price of broilers and market corn price, both deflated by the index of consumers prices, and time (1953 = 1). Some explanation of the price and time variable is required. Time series data for poultry prices at farm level are unavailable. The use of deflated wholesale prices results in regression coefficients that overstate the influence of price on

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[63] Georgio Amadei, "The Economic Consequences of an Increase in Price of Feed Grains," Revista di Politica Agraria, No. 4 (December, 1965), pp. 21-37.

supply. The amount of the upward bias is related to the size of the farm-wholesale margin. From prices quoted earlier it is apparent that this margin has approached 100 percent. Therefore elasticities derived from the equation should be interpreted with this in mind. Time was included to represent all excluded variables. In particular, it is assumed to be a measure of the impact of technology and integration on output.

The results of fitting the equations to the data are shown in Table IV-7. The sign of the poultry price regression coefficient is consistent with economic theory but corn price does not have the expected negative sign. Both price coefficients are significant at the .06 probability level and time at less than the .01 level. With this formulation 97 percent of the variation in supply of poultry meat is explained by the variation of the independent variables.

Although the tabled value indicates the possibility of positive serial correlation, results from using the Durbin-Watson d statistic were inconclusive at the five percent level. Examination of the table of simple correlations reveals the two independent variables, corn price and poultry meat, are highly intercorrelated with time. Such multicollinearity tends to distort the estimates of the coefficients and their standard errors. The relatively large estimate of the standard error presented reflects this and further

TABLE IV-7. REGRESSIONS FOR EXPLAINING ITALIAN POULTRY MEAT PRODUCTION AND EGG PRODUCTION, 1953-1965 AND DERIVED ELASTICITIES

Region	Constant	Price of Broilers	Price of Corn	Time	$\bar{R}^2$	D. W. Statistic	Standard Error of Estimate
Italy	-4385.8779 (979.1187) (.00)	0.0348 (.0157) (.06)	0.3370 (.1575) (.06)	335.5439 (30.0564) (.00)	.967	1.27	182.7424
Elasticities at the Means		1.225	1.001				
		Ratio of Egg Price to Corn Price	Price of Hens				
Italy	1523.5909 (1513.9831) (.34)	-332.7353 (93.6844) (.01)	0.0520 (.0273) (.09)	164.3480 (23.9440) (.00)	.913	2.04	144.6526
Elasticities at the Means		-0.481	0.750				

Figures in parentheses are in order, estimates of standard errors and significance levels of the regression coefficients.

reduces confidence in the coefficient for corn price.

With these reservations elasticities were computed for poultry meat with respect to real prices lagged one year. The estimated value was 1.225 computed at the means of the time series. This estimate should be viewed as an upper bound because wholesale prices are used for estimations and a more acceptable elasticity for the 1965-1975 period would be judged to be in the range of 0.50 to 0.84. The elasticity of poultry meat supply with respect to corn price is 1.001.

2. Projections to 1970 and 1975: To project poultry meat supply to 1970 and 1975, the regression equation was extrapolated using the expected percentage change in price from Subproject III. These results show 1970 output to be 429,037 tons of meat, an increase of 26.1 percent from the 1964-65 level of production. For 1975 an increase of 31.7 percent to 564,943 quintals at the low price estimate was obtained and 590,181 quintals, a 37.6 percent increase over 1964-65 at the high price forecast.

These estimates indicate a reduction in the rate of past growth because the price projections employed assume substantial reductions in farm level real price of poultry meat and increased corn prices. Technology is now available in Italian broiler production that will lead to scale economies and increased competition among producing units. Considerable exodus of less efficient producers combined with lower producer prices may be expected. Continued growth under these conditions will come from large units that can survive with lower profit per unit.

Egg Production

Historical Production and Marketing Patterns

Like broilers, egg production has changed much in recent years. It is experiencing improved technology, greater output and lower prices. Integrated business arrangements are again the primary cause.

The National Incubators Union estimates that in 1964 20 million selected hens in industrial units produced an average 200 eggs each for a total of four billion eggs.[64] About 49 million hens in farm flocks produced 110 eggs each for a total of 5.39 billion eggs. In addition, five million hens produced about 140 eggs each for hatcheries. On the basis of these estimates 42.5 percent of commercial egg production in 1964 came from industrial flocks. By contrast, in 1962 another source estimated that 90 percent of egg production came from family-type poultry farms.[65] While all of the eggs produced in industrial flocks are placed on the

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[64]Enea Grarneri, "Il Mercato Europeo del Pollame e delle Uova," Giornate Avicole Varesine, Vol. I (Giugno 26-30, 1965), p. 50.

[65]Ufficio Italiano del U.S. Feed Grains Council, op.cit.

market, 75 percent of the rural production is consumed on the farm. The remaining 25 percent is sold directly to consumers or in small lots to retailers.

The structure of the commercial egg market is still heavily dependent on wholesalers. For example, in the largest producing province of Forli', 88 percent of egg sales passed through this market. In the region of Reggio Emilia sales to wholesalers was the principal channel but sales through farm cooperatives increased from 8.5 percent in 1964 to 23.8 percent in 1965.

The National Cooperative Consorzio of Poultry Farming (CONAV) has been established by the Agricultural Ministry to bring some order to egg marketing. Since farm production is concentrated in the months of February to September, prices and quantities have tended to fluctuate widely. The Consorzio seeks to pool and grade eggs to reduce wide price swings. Egg standards defined by the National Consorzio and approved by the Ministries of Agriculture, Industry and Health provide for first and second quality. Weights in first quality increase in five gram increments from 45 to 65 grams and carry the names of "Extra, Standard, Average and Baby."[66] Second quality eggs are not placed on the market for direct consumption but are broken and sold in volume.

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[66]Giuseppe Perticara, "Sui Problemi della Qualificazione e Distributione del Avicole," Giornate Avicole Varesine, Vol. I (Giugino 18-22, 1964), p. 76.

With changes in production techniques and marketing flows has come changes in organization of firms producing eggs. Particularly noteworthy is the trend to fewer and larger units. A study by the Chamber of Commerce in Italy reports 32,650 industrial farms for commercial egg production and 2,980 of these have more than 1,000 birds. Some are quite large. For example, Cip-Zoo, a feed and hatchery business collaborates with Ovo-Motta, a large food and bakery chain to maintain 600,000 hens producing over one hundred million eggs per year. Agangelini, a large grain importer and feed mixing firm operating in the center and south of Italy is planning for a one million layer operation to produce 250 million eggs per year. Management feels that capital requirements are so great as to cause little competition. Even farm producers are finding it necessary to have 5,000-6,000 hens for a profitable operation.

The substantial increase in supply since 1960, the present buildup in production potential and the small increase in per capita consumption foretell of severe competition in the industry. As with other forms of poultry, trade agreements signed with Eastern European countries, particularly Poland, call for payment to Italy with eggs in lieu of hard currency. Combined, these factors point to downward pressure on egg prices which in fact, has steadily occurred since 1960.

Such a situation might well be expected to have a dampening effect on the country's egg production. Without doubt, lower prices will cause some exodus of the less efficient producers. The effect on number of eggs produced is not so clear. The proportion of eggs produced in modern, integrated arrangements is still relatively small (42.5 percent in 1964) leading to the expectation that technology may continue to reduce costs faster than prices will fall. Further, plans of large integrators at this stage are for continued investment. Once this capital becomes committed, it will be expected to continue in production as long as egg prices do not fall below variable costs of production. Viewed in this perspective, egg production may be expected to increase although at somewhat of a reduced rate.

Quantity of Eggs

1. Statistical Analysis of Historical Factors Influencing Egg Production: A regression analysis was employed to analyze past relationships over the period 1953-1965. Total egg production for the country was assumed to be a function of the ratio of real egg prices to real corn prices as a measure of the profitability of production, the salvage value of hens and time as a dummy for technology and other nonprice variables.

The equation provides little help in defining the price effect on output. Because egg prices trended downward over the period considered while production increased, the coefficient for egg prices when entered as a separate variable or as here in a ratio assumed a negative sign instead of the expected positive value (the problem may also be due to incorrect specification since data to more correctly explain nonprice effects was unavailable). The coefficient was highly significant statistically while hen price was less so but with the expected sign.

As expected, time, reflecting the influx of technology and integrated business arrangements was an important variable. Results show supply has increased an average 164.3480 quintals per year over the 1953-65 period. For the future a slower rate of growth is likely given the present higher level of technology as well as the effect from expected lower egg prices.

An estimate of the response of egg production to changes in the price ratio was computed from the equation. Sign disregarded, the estimate indicates that a change of one percent in the price ratio would be associated with a 0.48 percent change in egg output. Cull hens appear to have considerable weight in producers decisions since a one percent increase in hen price is expected to be associated with a 0.75 percent change in the same direction in egg production.

2. <u>Projections to 1970 and 1975</u>: In making projections the egg and corn price percentage changes expected from 1964 to 1970 and 1975 in Subproject III were employed. With these prices the price ratio continues to decrease through

1975 indicating lower profit margins from egg production. Hen prices were assumed to decrease the same relative amount as broilers and projected prices were deflated by an index of consumer prices expected to rise three percent per year. To project future egg production the equation in Table IV-7 was employed but the trend variable was increased 15 percent over that estimated from the sample period. The reason was an expectation of much more expansion by large integrated concerns.

The projections show an expected output of 528.9 metric tons of eggs in 1970, an increase of 15.6 percent over 1964-65. This rate of growth is almost half the 32.8 percent increase from 1959-60 to 1964-65 and is explained by the lower egg prices and higher feed grain prices expected and the resulting exodus of many marginal producers. Continued expansion from large scale operations is expected to 1975. In that year national egg production is expected to be 600.8 metric tons at the low price assumption and 622.0 tons if the higher egg price prevails. These levels of production would mean a 13.6 percent increase over the 1970 projected figure at the lower egg price and 17.6 percent at the higher price.

In summary, both poultry meat and egg production is expected to expand but competition will be much more intense. Larger units using very efficient technology will dominate production and many of these will be closely united with grain importers. Exporting countries will find Italy an increasingly difficult market for poultry products except those countries like Communist China and Eastern Europe that sign trade agreements to purchase manufactured goods.

CHAPTER V

SUMMARY AND CONCLUSIONS

The central objective of this study was to project Italian production of grains and livestock and by comparison with projected demand determine the trade surplus or deficit of each commodity. These projections in turn are dependent upon an evaluation of the expected rate of change in farm structure, adoption of technology and adjustment to market prices expected under the Common Agricultural Policy.

To meet these objectives multiple regression analysis was employed to explain past changes in output of grain-meat products as a means of understanding the impact of key causal variables in each of four geographic subdivisions of the country. These equations, adjusted where necessary to account for noncomparability of the sample period and the future were used to make 1970 and 1975 projections. Since data aggregated at this level may falsely interpret future trends, the projections were tested by computing budgets representative of situations and localities producing a large proportion of each commodity. Assuming that producers react optimally, relative profitability indicates expansion or contraction of the product and served as a check on the projections.

Summary

Initially, descriptive material on Italian agriculture focused attention on the diversity of production conditions and the relatively large number of independent family farmers that by U.S. standards are small, highly labor intensive and committed to a traditional farm organization. The role of government policy was discussed pointing out that goals favoring the increase of family farms as part of a broader policy of reducing unemployment has actually contributed to an increase in small units incapable of mechanization and scale economies except through cooperative participation. The resulting high-cost production of many products, especially livestock, will place Italian agriculture at a disadvantage vis-a-vis other members of the community when all trade restrictions are removed.

Not all production is antiquated. A modernized agriculture is beginning to take form with the influx of capital and management from outside traditional agriculture. This form is most recognizable in the production of poultry meat and eggs and to a lesser degree in pork production. It is from this source that future increases in livestock production must come.

Poultry production has been the most dynamic sector of Italian agriculture. Poultry meat production increased 5.2 times from 1955 to 1965 and egg production increased 1.4 times in the same time span. Modern buildings, equipment and strains of chicks used to produce 90 percent of the broilers make output as efficient as almost any other country. A smaller but rapidly growing proportion of egg production is similarly produced. Output expansion of both has been so rapid that prices have generally trended downward over the past decade. This trend is expected to continue and will place greater emphasis on large-scale, efficiently managed production. Although the combination of lower product prices and increased feed grain prices will lower profit margins, technology will enable larger producers to continue output expansion.

Poultry meat output is projected at 429 thousand tons in 1970, 26.1 percent above 1964-65, and 565 and 590 thousand tons in 1975 (66.1 and 73.5 percent increase) at the two price alternatives. These levels of output would still leave an expected deficit of over 90,000 tons of poultry meat at all but the most favorable supply position of 1975, Table V-1. The deficit does not represent an inability of Italian producers to meet requirements but reflects the effect of lower prices on output and the exodus of less efficient operators.

The deficit in egg production is projected to widen from the 89 percent self-sufficiency rate of 1964-65. Egg output in 1970 is expected to be about 100 thousand tons less than consumption and 120-140 tons less by 1975. Production could be much greater if present plans for very

TABLE V-1. MEAT AND LIVESTOCK PRODUCTS: PRODUCTION, CONSUMPTION AND SUPPLY-DEMAND BALANCE, 1964-65 AND PROJECTIONS TO 1970 AND 1975

Item	1964/65	1970 Low	1970 High	1975 Low	1975 High
	(carcass weight in metric tons)				
Beef and Veal					
Production[a]	540,177	558,305	594,719	579,352	667,000
Consumption[b]	838,922	1,227,300	1,227,300	1,649,700	1,649,700
Deficit or Surplus	298,745	668,995	632,581	1,070,348	982,700
Percent Self-Sufficient	64.4	45.5	48.4	35.1	40.4
Pork					
Production[a]	396,920	490,263		556,808	569,486
Consumption[b]	404,119	504,700		577,400	577,400
Deficit or Surplus	7,199	14,437		20,592	7,914
Percent Self-Sufficient	98.2	97.1		96.4	98.6
Poultry					
Production[a]	340,111	429,037		564,943	590,181
Consumption[b]	358,087	520,700		659,900	659,900
Deficit or Surplus	17,987	91,663		94,957	69,719
Percent Self-Sufficient	95.0	82.4		85.6	89.4
Other Meats[c]					
Production	222,000	286,900		324,400	324,400
Consumption[b]	222,000	286,900		324,400	324,400
Deficit or Surplus					
Percent Self-Sufficient	100	100		100	100
Total Meats					
Production	1,499,197	1,764,505	1,800,919	2,025,503	2,151,067
Consumption	1,823,128	2,539,600	2,539,600	3,211,400	3,211,400
Deficit or Surplus	323,931	775,095	738,681	1,185,897	1,060,333
Percent Self-Sufficient	82.2	69.5	70.9	63.1	67.0

. . . continued

TABLE V-1 (continued)

Item	1964/65	1970 Low	1970 High	1975 Low	1975 High
Milk					
Production[a]	8,970,900	9,771,647	10,079,032	11,331,336	12,047,678
Consumption[b]	8,985,330	10,440,200	10,440,200	11,866,800	11,866,800
Deficit or Surplus	14,430	668,553	361,168	535,464	(-)180,878
Percent Self-Sufficient	99.8	93.6	96.5	95.5	101.5
Eggs					
Production[a]	457,700	528,900		600,800	622,000
Consumption[b]	514,092	632,200		742,400	742,400
Deficit or Surplus	56,392	103,300		141,600	120,400
Percent Self-Sufficient	89.0	83.7		80.9	83.8

[a]Sources are the respective tables in Chapter IV.

[b]Sources are per capita consumption estimates from V. L. Sorenson multiplied by population.

[c]Includes horse meat, sheep and goats, and miscellaneous. Production of sheep and goat meat is 39,400 tons in the base period and projected to be 33,164 and 30,056 in 1970 and 1975. Horse meat is 13,700 tons in 1964/65 and projected to be 10,107 and 8,793. Miscellaneous meats are assumed equal to consumption.

large producing units of some integrated concerns materialize.

In contrast to growth in poultry output, the cattle sector is the most problematical aspect of Italian agriculture. Beef and veal annually comprise about 50 percent of meat consumption and with a relatively high income elasticity and rising real incomes, increased demand is expected. Production, however, is impeded by the traditional structure and small size of producing units. As recently as 1961, 51 percent of Italian cattle came from family farms of less than 10 hectares in size. Expansion of cattle numbers on these farms is severely limited by inadequate food supplies, size of buildings and capital to purchase improved breeding stock and feed.

Even though an estimated supply elasticity of 0.3 indicates that response to higher beef prices is expected, capital restrictions, the inability to change farm organization and the out-migration of the two major groups producing cattle, family farmers and mezzadria, point to only a small increase from the traditional sector. Rather, cattle increases must come from feed lot operations financed by large family farmers or integrators from the feed and meat industries. Projected beef prices indicate that profits will be sufficient to expect increased output from this source even with rising feed grain prices and labor costs. A major obstacle at this point is a dependable supply of feeder cattle. Increasingly, imports have been sought to meet this need but with the pessimistic view of cattle production in Europe, feeders in needed numbers will likely be available only at premium prices.

These effects enter the projections in Table V-1 that show rising beef and veal production failing to keep pace with consumption. From a present self-sufficiency rate of 64.4 percent, domestic beef and veal production is expected to be only 45.5 or 48.4 percent of consumption depending on price assumptions in 1970 and 35.1 or 40.4 percent in 1975. Total beef and veal production (with veal comprising a declining proportion of the total) is expected to be 558 or probably nearer 600 thousand metric tons in 1970, an increase of 3.3 to 10.1 percent over the 1964-65 level. If feeder cattle and feed are available, production could increase as much as 23.4 percent in the ten years to 1975. Even so, deficits of 633 thousand and 983 thousand tons under the most favorable price conditions are foreseen by 1970 and 1975. This would require beef imports in 1970 at approximately twice 1964-65 rates and three times as large in 1975 if projected consumption is met.

If consumer demand for meat is satisfied, an increasing proportion of pork and poultry meat will likely be substituted for beef and veal. Per capita consumption has been rising although most pork is consumed in processed form. Production of both meats is more easily adapted to changes in demand than cattle since structure is less of an impediment and scale of producing units favors adoption of modern technology. The estimated elasticity in fact, indicates a one percent change in swine price to be associated with a 0.17 percent change in the same direction in swine numbers.

Production of pork is projected to increase 23.5 percent and consumption 24.9 percent from 1964-65 to 1970. These rates of growth would mean a slight deficit of about 14,000 tons of pork. Between 1964-65 and 1975 an increase of 40.3 percent in output if the lower of two price assumptions is realized and 43.5 percent at the higher price is expected. Consumption, projected to increase 42.9 percent will create a deficit of 20.6 thousand tons in the first case and only 8,000 in the second.

Based on these projections, Italy's self-sufficiency in all meats steadily declines from 82.2 percent in 1964-65 to about 70 percent in 1970 and 63 or 67 percent in 1975 depending on the price expected. Import demand for all meats would be expected to be around one million tons by 1975 practically all in beef.

The increase in livestock and poultry numbers and changes in feeding methods has created a strongly rising demand for feed grains. It was initially hypothesized that a large part of this demand would be met by a substitution of feed grain surface for land planted to wheat as price ratios changed under the Common Agricultural Policy. Our results did not substantiate this assumption to any great extent.

Wheat surface is expected to decline but only at a slightly faster rate than in the past ten years. For many farmers wheat is a major income source that is familiar, easily mechanized and part of long-term rotations. Regression results show it to be the only grain with any price responsiveness, however, and lower prices combined with out-migration will reduce surface planted. But potential yield increases from additional fertilizer and improved seed are expected to keep production near levels of the 1960-65 period.

Feed grains show little response to price change and with the exception of corn there has been essentially no improvement in yields in the past decade. Income from small grain does not compare favorably with wheat under present or expected yield and price relationships. Corn was estimated to have a supply elasticity with respect to its own price of 0.05 but a much higher response to change in wheat price. Rising yields as hybrid seed and fertilizer are used and more favorable prices will cause farmers to replace wheat with corn in many areas where irrigation is possible. If irrigated surface is optimally used in terms of total feed production, some surface will probably also shift from producing forage to corn.

Projections of animal feed requirements reflect three trends in Italian animal husbandry: (1) consuming units of each type of livestock are projected in Chapter IV to increase in number, (2) all types of livestock are being fed larger quantities of grain and (3) an improvement in the conversion of feed to meat and livestock products as improved feeds and breeds of livestock are used. The first two represent increased feed grain requirements but the third indicates a decrease in total feed needs including grains.

Feed grain requirements for 1964-65 were based on the input-output coefficients in the budgets appearing in the Appendix. Since these budgets generally represent a more efficient conversion of feed to livestock products than prevails on typical farms, the grain requirements were adjusted upward to conform with the estimate of total grain fed reported in the source in Table V-2. Changes in the rate of grain feeding over time were estimated by computing a ratio of total feed grain consumed by animals and equivalent animal units.[1] The ratio increases annually from 0.442 in 1959 to 0.819 in 1964 but then declines slightly to 0.747 in 1965. Based on this trend the rate of grain feeding is assumed to increase 10 percent per year from 1965 to 1970

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[1]To convert all livestock and poultry to equivalent feed consuming units, the following factors were applied to numbers: all cattle, 1.0; calves, 0.25; sheep and goats, 0.14; swine, 0.20 and chickens, 0.01. Horses, mules, etc. were not considered because of inadequate data and their relatively small grain consumption.

TABLE V-2. GRAINS: PRODUCTION, UTILIZATION AND SUPPLY-DEMAND BALANCE, 1964-65, AND PROJECTIONS TO 1970 AND 1975

Item	1964-1965	1970 Low	1970 High	1975 Low	1975 High
	(thousand metric tons)				
Feed Grains					
Requirements	9,231	11,811	12,065	13,802	14,642
Animal Feed[a]	8,293	10,746	11,000	12,624	13,464
All cattle	3,342	5,258	5,513	6,287	6,948
Swine	2,350	2,520	2,520	2,918	2,984
Poultry Meat	643	759	759	932	974
Eggs	1,382	1,708	1,708	2,037	2,108
Other	576	500	500	450	450
Human Food[a]	378	320	320	280	280
Industrial Use[a]	291	385	385	509	509
Seed[a]	223	302	302	322	322
Losses[a]	46	58	58	67	67
Supply-Domestic Production[b]	4,512	4,987	4,987	5,315	5,073
Deficit	4,719	6,824	7,078	8,487	9,569
Percent Self-Sufficiency	48.9	42.2	41.3	38.5	34.6
Food Grains[c]					
Requirements	9,362	8,644	8,644	8,819	8,819
Animal Feed[a]	74	80	80	110	110
Human Food[a]	8,475	7,884	7,884	8,054	8,054
Industrial Use[a]	--	--	--	--	--
Seed[a]	755	605	605	580	580
Losses[a]	58	75	75	75	75
Supply-Domestic Production[b]	9,211	8,703	8,703	8,829	9,508
Deficit	20	59	59	10	689
Percent Self-Sufficiency	99.8	100.7	100.7	100.1	107.8

. . . continued

TABLE V-2 (continued)

Item	1964-1965	1970 Low	1970 High	1975 Low	1975 High
<u>All Cereals</u>					
Requirements	18,593	20,455	20,709	22,621	23,461
Animal Feed	8,367	10,826	11,080	12,734	13,574
Human Food	8,853	8,204	8,204	8,334	8,334
Industrial Use	291	385	385	509	509
Seed	978	907	907	902	902
Losses	104	133	133	142	142
Supply-Domestic Production	13,723	13,690	13,690	14,144	14,581
Deficit	4,870	6,765	7,019	8,477	8,880
Percent Self-Sufficiency	73.8	66.9	66.1	62.5	62.1

[a] Source: Istituto Statistico delle Comunita' Europee, <u>Agrarstatistik</u>, various issues. 1970 and 1975 are projected estimates.

[b] Actual production and projections from tables in Chapter III.

[c] Rice represents about 600 thousand tons per year in addition.

and a somewhat lower rate of seven percent from 1970 to 1975. The increase in the rate of grain feeding, especially to beef and dairy cattle, more than compensates for expected gains in total feed conversion.

Total feed grain requirements for animal feed in Table V-2 are expected to rise 29.6 percent from 1964-65 to 1970 at the low projection of livestock numbers and 32.6 percent at the more probable higher rate. The expected expansion to 1975 would be 52.2 or 62.3 percent greater than 1964-65 feed requirements. The largest absolute quantity of feed and the greatest increase would be fed to cattle as both numbers and grain feeding rates increase. This assumes that the basic cattle feed, now based on forage, must include much greater quantities of feed grains if expansion in numbers occurs.

Feed grain used for purposes other than animal feed is also reported in the table. Use for human food is projected to decline following the trend to lower consumption of polenta, a corn product, in the traditional consuming region of the north. Moderate increases are foreseen in other use categories.

Total feed grain requirements are projected in Table V-2 to rise from 9.2 million tons in 1964-65 to 11.8 or 12.1 million tons in 1970 depending on cattle numbers and to 13.8 or 14.6 million tons at the two 1975 alternatives. Domestic supply, only half of total consumption in 1964-65, is projected to rise 10.5 percent to 1970 and about 18 percent to 1975. The projected deficit in feed grain supplies is expected to widen from 4.7 million tons in 1964-65 to 6.8 - 7.1 tons in 1970 and 8.5 - 9.6 in 1975. The self-sufficiency ratio continues to decline and by 1975 only one-third of total needs are expected to be produced within the country. Corn represents about 85 percent of feed grain use but the largest percentage increase is likely to be barley as more cattle producers utilize the "Preston Method" of feeding.

Food grain requirements in Table V-2 are expected to change little from present levels of use. If meats, fruits and vegetables are available at reasonable prices per capita consumption of grains will decline. At the projected demand and supply levels a very slight wheat surplus may be expected. This quantity will be greater by the extent that milling requirements cause imports of hard wheats to blend with Italian wheat. In addition Italy is the common market's largest rice producer, annually growing 600-700 thousand tons and exporting over 100 thousand tons. Production of rice steadily declined until 1964 but since has increased as prices have risen. A small increase is foreseen to 1975 in response to higher EEC price but expansion will be limited by high labor costs and competition with corn for irrigated land.

The national deficit expected for all grains closely approximates that of feed grains alone. In 1970 approximately two-thirds of total grain needs are projected to be domestically produced and somewhat less in 1975 as feed grain needs continue to increase. Total external needs for all grains is estimated at about seven million tons in 1970 and 8.5 to 8.9 million tons in 1975.

Conclusions

In the course of this study it has been evident that changes in Italian agriculture have not kept pace with changes in other sectors of the economy. This failure, combined with limited agricultural resources, place the country at a relative disadvantage in grain-livestock trade with other EEC members and limits its ability to provide desired food needs. Policy makers generally recognize the problem and are attempting to capitalize on Italy's natural advantages in producing wine, fruits and vegetables for trade within the EEC and manufactured goods for trade both within and outside the community.

In regard to commodities of interest in this study structural rigidities and size are especially noticeable in grain and cattle production. Wheat is a major income source and farmers are reluctant to reduce plantings of this crop to produce more feed grains which have lower yields (except corn) and sell at lower prices. The absence of price response of feed grains and the high price of wheat established relative to the world market price make it difficult to bring about needed adjustments. It is likely that a small surplus of soft wheat will be made more difficult by French exports. Italian wheat producers may, in fact, find themselves delivering wheat to the EEC price support agency while more French wheat is purchased by Italian industries. In contrast, increasing quantities of feed grain imports will be needed if the livestock industry is to develop.

The expected feed grain deficit will provide attractive markets for all corn exporting countries. U.S. corn exporters are under some handicap in the Italian market because of a reputation for blending high moisture corn that may arrive in poor condition and because bilateral trading agreements often favor grain exporting countries that purchase Italian manufactured goods.[2] Since most imported corn at present is fed to poultry and swine, U.S. corn is also at a disadvantage to Argentine plata corn. If promotional efforts now underway are successful in demonstrating that U.S. yellow corn with additives can provide the same coloration in eggs and poultry meat the market position of U.S. corn for this use will improve. U.S. corn will definitely be more in demand for cattle feed as both numbers and rates of grain feeding increase.

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[2]The Federal Appeal Certificate that prevents the buyer from disputing the grade of U.S. corn is also a major point of dispute among all European grain importers but is at least partially compensated by U.S. companies willingness to guarantee grain quality.

An increasing quantity of U.S. corn is being re-exported to Germany as Italian importers take advantage of an EEC concession to import corn and barley at lower prices until 1972. Italy's exports of corn increased from eight thousand tons in 1962 when the regulations became effective to 676 thousand tons in 1965. Unless further restrictions are imposed by the EEC, transhipment to northern European countries will draw larger quantities of U.S. corn to Italy until 1972.

Italians are expected to demand much larger quantities of beef and veal than can be supplied from domestic sources. Argentina at present is the largest source and is expected to maintain its dominant position. U.S. beef is at a market disadvantage because corn-fed, marbled beef is less desired than younger, forage-fed animals and most U.S. beef is priced above competing countries.

The Italian livestock industry is also expected to need substantial imports of feeder cattle. Most Italian feeders are offspring of dairy-type cows on family farms and supply is inadequate for even present needs. Imports have come in increasing numbers from Eastern Europe with France and Germany supplying animals irregularly. Past experience with U.S. dairy calves was not satisfactory because of high shipping costs and arrival in poor condition. Overcoming these two obstacles would lead to expanded sales of U.S. calves on the Italian market.

Milk is produced jointly with cattle meat and attempts to increase beef output will provide increased quantities of milk. This in itself is not undesirable for Italy since it currently imports some fresh milk and large quantities of milk products. Projections show the possibility of a slight surplus milk output in 1975 that could be exaggerated if milk production per cow, which in recent years has remained constant, increases as present breed and feeding improvements become effective. The major threat, however, is not from Italian milk production but from its EEC partners. Increased exports of fresh milk, milk powder and cheese as surpluses develop in these countries could place high-cost production in Italy at an extreme disadvantage. Without doubt, Italian production of both cattle meat and milk will be adversely affected by milk flows within the EEC.

In total, Italy represents a growing market for feed grains and meats. Trade flows with the other five members of the community will continue to mount but these countries anticipate deficits in these same commodities. Foreign exchange for food purchases could provide a problem for Italy and increased purchases will probably be attempted from countries willing to sign exchange agreements to purchase Italian industrial products. U.S. exporters should find ready markets for grains but will face greater price and nonprice competition in supplying needed meats.

BIBLIOGRAPHY

BIBLIOGRAPHY

Books

Aiello, Carlo. La Dinamica della Struttura Agricola mel Mezzogiorno, Cassa per Opere Straordinarie di Pubblico Interesse mel'Italia Meridionale, Roma, 1964.

Antonietti, Alessandro, D'Alanno, Attilio and Vanzetti, Carlo. Carte delle Irrigazioni d'Italia, Istituto Nazionale di Economia Agraria, Roma, 1965.

Barberis, Corrado. Le Migrazioni Rurali in Italia, Milano, November, 1960.

Barbero, Giuseppe. Riforma agraria italiana, risultati e prospettive, Milano, December, 1960.

Biondi, Paride. Indagini sui costi di produzione della carne e del latte in aziende della pianura, Emilia, Unpublished thesis, Bologna, 1963-64.

Cassano, Cosimo. La realta agricola umbra, Istituto Nazionale di Economia Agraria, Quaderno No. 7, Perugia, 1964.

Cassano, Cosimo. Le previsioni economiche per gli allevamenti suini, Istituto Nazionale di Economia Agraria, Foligno, April, 1965.

Cassano, G. La produzione ed il mercato delle carni - problemi attuali e prospettive, Unpublished thesis, Perugia, Anno accademico 1963-64.

Castellani, L. Il mercato della carne bovina nel comune di Torino, Milano, 1962.

Chironi, Giuseppe. I costi della meccanizzazione nelle zone cerealicole della Sicilia, Osservatorio di Economia Agraria per la Sicilia, Palermo, April, 1965.

Cianferoni, R., Catola, A.M., and De Cillis, Elisa. Condizioni e prospettive economiche di comuni montani, Roma, 1964.

Di Cocco, Enzo. La Dinamica della Utilizzazione dei Terreni dei Tipi d'Impresa e delle Dimensioni Aziendali mei Poderi Disabitate, Indaginisullesodo Rurale in Emilia-Romagna, Accademic Nazionale di Agricultura, Vol. I, Bologna, 1964.

Fuá, G., Research on Italian economic development 1861-1964, (S.S.R.C. team) Unpublished manuscript, Faculty of Economics, Ancona, June, 1965.

Grazzani, Rosanna. La dinamica della produzione del latte, Milano, 1965.

Guerrieri, Giuseppe. I poderi abbandonati in provincia di Perugia nel quadro dello spopolamento mezzadrile, Roma, 1956.

Guerrieri, Giuseppe. Struttura, dinamica e problemi dell' agricoltura in Umbria, Centro Regionale per il Piano di Sviluppo Economica dell' Umbria, Torino, June, 1964.

Medici, Giuseppe. Carta dei tipi d'impresa nell'agricoltura italiana, Istituto Nazionale di Economia Agraria, Roma, 1958.

Medici, Giuseppe. I tipi d'impresa nell'agricoltura italiana, Istituto Nazionale di Economia Agraria, Roma, 1951.

Medici, Giuseppe. La distribuzione della proprieta fondiaria in Italia, Istituto Nazionale di Economia Agraria, Roma, 1956.

Medici, Giuseppe, Sorbi, Ugo, and Castratano, Antonia. Polverizzazione e Frammentazione della Proprieta Fondiaria in Italia, Istituto Nazionale di Economia Agraria, Roma, 1962.

Orlando, Giuseppe. La politica dei mercati agricoli, Torino, 1965.

Patuelli, Vincenzo, Vita difficile della mezzadria, Bologna, 1964.

Pescatore, Gabriele. Probleme economici e sociali delle trasformazioni irrigue, l'esperienza del Metapontino, Centro di Specializzazione e Ricerche Economico Agrarie per il Mezzogiorno, Milano, April, 1964.

Rossi, Alfio C. La meccanizzazione agricola in Italia e nei paesi dell comunitá economica europea, Foligno, August, 1965.

Ufficia Italiana del U.S. Feed Grains Council, La Carne Bovina, Produzione e Commercio, Roma, 1965.

Ufficia Italiano del U.S. Feed Grains Council, La Produzione Avicola in Italia, Roma.

Zucchi, Giulio. Problemi e Prospettive della Produzione della Carne in Italia, Istituto di Economia e Politica Agraria, Bologna, 1963.

Articles, Bulletins and Periodicals

Agra Europe, London.

Amadei, Georgio. "The Economic Consequences of an Increase in Price of Feed Grains," Rivista di Politica Agraria, No. 4, December, 1965.

Bacci, Mario Livi. La dinamica demografica delle regioni Italiane, previsioni al 1981, Svimez, Roma, 1964.

Baldoni, R. "Il Problema della Carne in Italia, Risulati Economici in una Prova di Produzione del Vitellone con Impiego di Soli Concentrati," L'Informature Agrario, No. 8, February 24, 1966.

Baldoni, Remigio. Osservazioni sulla organizzazione di una azienda zootecnica in zona irrigua dell'Italia centrale, Vol. XI, the 7th Serie, Vol. 140th, Firenze, 1964.

Bandini, Mario. "Agricoltura Europea e Kennedy Round," Progresso Agricolo, Anno XII, No. 5, Bologna, May, 1966.

Barbadoro, Idomeneo. La feder-consorzi nella politica agraria Italiana, Roma, 1961.

Benvenuti, A. and Panattoni, A. "Ricerche sulla granicoltura Toscana alcuni aspetti tecnici ed economici della coltura nella campagna 1962-63," L'Agricoltura Italiana, Pisa, January-February, 1964

Bianchi, Remo F. Prove orientative di alimentazione dei vitelloni da carne con soggetti interi di razza chianina-perugina, Vol. XVIII, Perugia, 1963.

Bonciarelli, Francesco. "Dosi crescenti di azoto e rendimento del grano," Progresso Agricolo, Anno X, No. 1, January, 1964.

Borbioli, Elvio. "Aspetti tecnici della valorizzazione nei riguardi della produzione della carne bovina in Toscana," Convegno per la valorizzazione dei prodotti tipici dell'agricoltura Toscana, Firenze, 1965.

Brunelli, Paolo. "L'Allevamento Suinicolo nell'Impresa Casearia," Rivista di Suinicoltura, Anno IV, No. 5, May, 1963.

Buiatti, Pier Giovanni. "Economic and Technical Problems Connected to Meat Production," Atti del I° Convegno Zootecnico Interregionale por la Toscana-Marche-Umbria, Foligno, December, 1964.

Buiatti, Pier Giovanni and Martilli, Marcello. "Problemi Tecnici ed Economici dell'Allevamento Suino in Italia," Rassegna Suinicola Internazionale, Reggio Emilia, May, 1966.

Camera di Commercio Industria e Agricoltura, Foggia. Convegno Internazionale del Grano Duro, Atti, Foggia, May, 1962.

Camera di Commercio Industria e Agricoltura di Reggio Emilia. Convegno Internazionale sui ricoveri e le attrezzature per l'allevamento dei suini, Atti, Reggio Emilia, 1964.

Camera di Commercio Industria e Agricoltura Varese, Alimentazione e fertilitá, realzione presentata al III convegno della sezione Italiana dell'associazione mondiale di avicultura scientifica, (Giornate Avicole Varesine June 27-July 1, 1963), Varese, 1964.

Camera di Commercio Industria e Agricoltura Varese. L'Avicoltura Italiana e i Rapporti con i Paesi del MEC e Terzi, (Giornate Avicole Varesine June 18-22, 1964), Varese, 1965.

Camera di Commercio Industria e Agricoltura Varese, Sviluppo, Produzione, Scambio delle Uova e del Pollame nei Paesi del MEC, (Giornate Avicole Varesine June 26-30, 1965), Varese, May, 1966.

Centro di Addestramento Professionale Agricolo. Atti, 1° Convegno Zootecnico Interregionale per la Toscana-Marche-Umbria, Foligno, December, 1964.

Ciaffi, Bruno. "Risultati Tecnici ed Economici dell'Ingrassamento dei Vitelloni nelle Marche," Convegno Nazionale Produczione della Carne Bovina, Firenze, February, 1960.

Corley, Joseph R. "The European Economic Community: Agricultural Imports and Exports," Foreign Agricultural Trade of the United States, January, 1967.

Elia, Pietro. "Ricerche mella Meccanizzazione Integrate della Coltura del Granturco," Meccanizzazione Agricola, Anno V, No. 2.

Fabrizi, Carlo. "La Diffusione dei Supermarcati in Italia," Rivista di Politica Economica, No. 10, October, 1965.

Fobucci, Piero. "Alimentazione con il Metodo Preston in Emilia," Rivista di Zootechnia, Anno XXXIII, No. 10, October, 1965.

Frey, Luigi. "La Pianura Lombardia Irrigua sta Divenendo Zona Depressa," Mondo Economico, Anno XVIII, No. 44, November, 1963.

Geri, Giancarlo. "Produzione di Carne ed Alimentazione Umana: Indirizzi e Pregiudizi in Italia," Suinicoltura, Anno VI, No. 2, Bologna, February, 1965.

Giorgi, G. Aspects du developpement structurel de l'agriculture en Italie, No. 10, September, 1962.

Graziani, Augusto. "Konjunktur und Entwicklungspolitik in Italien," Zeitschrift fur die Gesonte Staatswissenschaft, Vol. 121, No. 4, October, 1965.

Grinzato, Francesco. Dei Prezzi del Mais in Relation alle Esiglnze delle Produzione Veneto Inserita in Campo Nazionale e Comunitario, Convegno Nazionale della Maiscoltura, Treviso, 1966.

Hexem, Roger W. "Factors Affecting Beef and Veal Production in Italy in the Near Future," Draft Report, U.S. Department of Agriculture, Economic Research Service, Washington, D.C., June, 1965.

Macchine e Motori Agricoli. Anno XXIV, No. 2, February, 1966.

Manfredi, Enzo. "Aspetti Economico - Tecnici dell Impiego di Macchine Operatrici Agricole," Agricoltura delle Venezie, Anno XVII, No. 6, June, 1963.

Manfredi, Enzo. "Mechanization Problems in Maize Production," L'Informatore Agrario, Anno XVII, Verona, February, 1966.

Mariani, G. "Sorghum as an Alternative to Maize," L'Informatore Agrario, Anno XXII, Verona, 1966.

Meregalli, Angelo. "Influenza del Piano di Alimentazione sull'Accrescimento, la Capacita di Utilizzazione degli Alimenti e le Caratteristiche di Macellazione nei Vitelloni Chianini e Pezzati Neri Frisoni," Rivista di Zootecnia, No. 4-5, Firenze, 1965.

Mondo Economico, Anno XXI, No. 36, September, 1966.

Montani, Mario. "Utilizzazione e Costo della Trattrice Agricola," Macchine e Motori Agricoli, Anno XX, No. 4, Aprile, 1962.

Orlando, Giuseppe, "Due Fondamentali Problemi del Marcato Suino," Rivista di Suinicoltura, Anno III, No. 9, September, 1962.

Perticara, Giuseppe. "Sui Problemi della Qualificazione e Distributione del Avicole," Giornate Avicole Varesine, Vol. I, June, 1964.

Pini, Pier Luigi. Una trasformazione nella collina Toscana nella sua realta agronomica ed economica, Vol. VII-Serie 7th, Firenze, 1961.

Proni, G. "Il Riordinamento Fondiario e il Part-time Farming come Strumento di Valorizzazione dell 'Agricoltura Torinese," Rivista di Economia Agraria, Anno XVIII, No. 3, Milano, 1963.

Raimondi, Raimondo. "Influenza del Peso di Macellazione sulla Produsione Economica di Vitelli Piemontesi all'Ingrosso," Istituto Zootecnico e Caseario per il Piemonte, Rivista di Zootecnica, Torino, 1965.

Raimondi, Raimondo. "Prova Comparativa di Ingrassamento fra Vitelloni Meticci Piemontese della Coscia x Frisona e Vitelloni di Razza Frisona," Rivista di Zootechnia, Anno XXXVIII, No. 2, February, 1965.

Reina, Adriano. "Zootecnia e Azienda di Stato per le Foreste Demaniali," Agricoltura, No. 9, Roma, September, 1965.

Ricci, Angelo. "I Costi di Produzione alla Azienda Zootecnica Ravennate - Costo di Produzione del Grano," La Romagna Agricola e Zootecnica, January, 1966.

Sasetti, Filippo. "Attualita e Provisioni sul Mercato dei Prodotti Avicoli nel MEC," Giornate Avicole Varesine, Vol. I, June, 1965.

Schmidt, Carl T. "The Italian Battle of Wheat," Journal of Farm Economics, Vol. XVIII, November, 1936.

Selleri, Cesare. "Il Credito Agrario in Italia, Considerazioni e Proposte," Rivista di Politica Agraria, Anno XII della Nuova Serie, No. 3, Bologna, September, 1965.

Sorbi, Ugo. Alcuni aspetti tecnici ed economici della commercializzazione delle carni di suino fresche, Reggio Emilia, May, 1966.

Stelly, Randall and Kirby, James E. "Developing Markets for U.S. Agricultural Commodities in Italy - an Economic Evaluation," Texas Agricultural Experiment Station Bulletin MP-539, College Station, Texas, September, 1961.

Tofani, Mario. "Gli Attuali Indirizzi della Politica Agraria Italiana e i soui Riflessi nei Tipi d'Impresa," Milano, 1962.

Tofani, Mario. "Il dazio sul Grano nella Politica Agraria Italiana," Rivista di Economia Agraria, Vol. IX, No. 4.

Tofani, Mario. Situazione attual e possibilita di sviluppo degli ordinamenti agrari nelle azienda di collina, Milano, 1960.

Tofani, Mario and Giorgi, Enzo. "Situazione Attuale e Tendenze della Produzione di Carne Bovina in Italia," Convegno Nazionale per i Problemi della Produzione, Valutazione, Commercio e Distribuzione della Carne Bovina, Firenze.

Tsu, Sheldon and Koenig, Ernest. Italian Agriculture: Projections of Supply and Demand in 1965, 1970 and 1975, U.S. Department of Agriculture, Economic Research Service, Foreign-68, Washington, D.C., January, 1964.

Utenti Motori Agricoli. "La Meccanizzazione Agricola in Italia, Trattrici, Motori, Carboranti," Roma, 1965.

Willms, Enno Friedrich. Versuch einer Quantifizierung von Getreideangebotsfunktionen in der Europaischen Wirtschaflsgemeinschaft, Kiel, 1966.

Zanini, Emilio. "1966-1970 Programma Quinquennale le Possibilita Tecniche di Sviluppo dei Settori-Chiave," Agricoltura, Anno XIV, No. 12, Roma, December, 1965.

Zucchi, Giulio, "Le ricqrrenti crisi avicole in rapporto alla dinamica del mercato e della produzione," Giornate Avicole Varesine, June 18-22, 1964. Varese, 1965.

Public Documents and Reports

Accademia Nazionale di Agricoltura. Funzioni e servizi del mercato dei prodotti agricoli, Bologna, 1962.

Accademia Economico - Agraria dei Georgofili. Atti del convegno nazionale peri problemi della produzione, valutazione commercio e distribuzione della carne bovina, Firenze, February, 1960.

Atti della Conferenza Nazionale del Mondo Rurale e dell Agricultura. "La Polverizzazione e la Fragmentazione della Proprieta Fondiaria." Studie Monografie, Vol. III.

Comitato dei Ministri per il Mezzogiorno. Direttive per la predisposizione del primo piano pluriennale di coordinamento degli interventi pubblici nel mezzogiorno, (Art. 1 of the law No. 717 of the 26th of June, 1965), Roma, 1965.

European Economic Community Statistical Office. General Statistical Bulletin, No. 2, 1966.

Federazione Nazionale delle Casse Mutue Malttia per I Coltivatori Diretti. Famiglie senza giovani, ipotesi demografiche in ordine alla diminuzione delle imprese coltivatrici nel 1970, 1975, 1985, Roma, 1966.

Federazione Italiana dei Consorzi Agrari. Il Credito Agrario-Istruzioni Pratiche-Legislazione, Roma, June, 1963.

Federazione Italiana dei Consorzi Agrari. Indigine nella Fertilizzazione in Italia.

Federazione Italiana dei Consorzi Agrari. Per una Moderna Agricoltura, Roma, 1965.

Federazione Italiana dei Consorzi Agrari. Prontuario Razionamento Bovini-Suini-Ovini e Note di Pollicoltura, Roma.

Gazzetta Ufficiale. No. 233, Anno. 105th, Act No. 756 of the Civil Code, 1964.

Gazzetta Ufficiale. Roma, February, 1967.

Institute of American Poultry Industries. Statistical data on the Italian Frozen Food Market, Italy, 1966.

Istituto Centrale di Statistica. Annuario di Statistica Agraria, Roma.

Istituto Centrale di Statistica, Annuario Statistico Italiano, Roma.

Istituto Centrale di Statistica. Annuario di Statistiche Zootecniche, Roma.

Istituto Centrale di Statistica. Bolletino Mensile di Statistica, Roma.

Istituto Centrale di Statistica. "I Conti Nazionali dell Italia," Nuova Serie - Anni 1951-1965, Supplemento al Bullettino Mensile di Statistica, No. 3, Roma, March, 1966.

Istituto Nazionale Economia Agraria. Annuario dell'Agricoltura Italiana, Roma.

Istituto Nazionale di Economia Agraria. Carta della Utilizzazione del Suolo d'Italia, Milano, June, 1961.

Istituto per le Ricerche e le Informazioni de Mercato e la Valorizzazione della Produzione Agricola. Rapporto previsionale carne bovina, Roma, December, 1964.

Istituto per le Ricerche e le Informazioni di Mercato e la Valorizzazione della Produzione Agricola. Rapporto previsionale cereali foraggeri (granoturco-avena-orzo-segala), Roma, November, 1964.

Istituto per le Ricerche e le Informazioni di Mercato e la Valorizzazione della Produzione Agricola. Rapporto sulle tendenze a medio termine dei consumi alimentari e delle produzioni agricole, Roma, July, 1966.

Ministero dell'Agricoltura e delle Foreste. Piano quinquennale di sviluppo dell'agricoltura, Roma, 1962, 1964 and 1965.

Ministro del Bilancio. Progetto di Programma di Suiluppo Economico per il Quinquennio 1965-69, Roma, January 21, 1965.

Organization for European Economic Cooperation. Low Incomes in Agriculture, Problems and Policies, Agricultural Policy Report, Paris, 1964.

Organization for European Economic Cooperation. Survey on the Organization of Marketing Poultry Meat with Special Emphasis on Broilers, No. 58, Paris, 1961 Series.

SVIMEZ. Trained Manpower Requirements for the Economic Development of Italy, Targets for 1975, Roma, 1961.

Unione Italiana delle Camere di Commercio Industria e Agricolture. Struttura dei canali di distribuzione della carne, del pesce, del pollame, della pasta, dei prodotti lattiero-caseari, degli abiti confezionati, Roma, December, 1965.

United Nations, Food and Agriculture Organization. Monthly Bulletin of Agricultural Economics and Statistics, Rome.

United Nations, Food and Agriculture Organization. Production Yearbook, Rome.

United States Department of Agriculture, Agricultural Attache. (Translation) Provisions for the Development of Agriculture in the Five-year Period, 1966-1970 (Green Plan II). Law No. 910 of October 27, 1966.

United States Department of Agriculture, Economic Research Service. Preliminary Computer Printout, EEC Trade Study.

APPENDICES

APPENDIX TABLE 1. FARM NUMBERS BY CLASS OF SURFACE, TYPE OF MANAGEMENT AND GEOGRAPHIC AREA, 1961

Area	Farm surface							
Type of management	0- 1,00	1,01- 5,00	5,01-10,00	10,01-20,00	20,01-50,00	50,01-100,00	100,00	Total
Northern Italy:								
Total	224.274	1.401.451	1.668.872	1.722.207	1.300.665	576.100	2.713.070	10.006.637
Family Farms	206.567	1.625.039	1.309.482	1.108.290	811.543	253.936	157.437	5.474.115
Salary	9.639	53.188	57.974	113.556	260.504	297.786	2.547.983	3.341.044
Colonia Parziaria	892	105.585	290.353	491.843	224.750	23.390	6.767	1.143.585
Other	5.173	17.641	10.647	8.515	4.047	988	882	47.893
Central Italy:								
Total	97.390	750.227	813.151	1.008.853	793.187	352.054	1.497.638	5.312.499
Family Farms	85.205	528.126	334.813	320.120	252.850	80.096	37.939	1.639.147
Salary	6.098	39.136	59.057	94.506	181.280	181.077	1.435.280	1.988.435
Colonia Parziaria	1.922	170.492	420.773	588.528	352.894	88.493	771.185	1.645.194
Other	4.164	12.475	6.496	5.702	6.164	2.389	2.334	39.722
Southern Italy:								
Total	258.049	1.483.158	1.024.584	776.457	700.066	434.846	2.006.971	6.683.844
Family Farms	224.411	1.271.951	832.416	538.990	407.437	186.013	172.059	3.633.279
Salary	49.795	97.463	88.023	86.614	152.535	163.263	1.742.475	2.329.479
Colonia Parziaria	6.728	33.612	69.900	90.172	59.212	24.524	14.740	292.510
Other	12.081	80.135	56.817	60.682	80.880	61.044	77.696	428.575
Islands:								
Total	129.976	666.052	470.100	500.625	699.346	581.297	1.521.523	4.568.916
Family Farms	104.767	525.506	348.003	342.792	439.622	339.561	380.713	2.471.062
Salary	17.175	83.822	61.913	76.610	130.443	142.847	987.940	1.500.750
Colonia Parziaria	74	10.834	4.653	11.145	18.512	4.729	2.265	44.257
Other	7.959	63.750	55.530	70.078	110.767	94.160	150.604	552.848
Italy:								
Total	709.689	4.700.888	3.976.707	4.008.142	3.493.264	1.944.297	7.739.202	26.571.896
Family Farms	620.950	3.950.622	2.824.714	2.310.192	1.911.452	859.606	748.148	13.217.603
Salary	82.707	273.609	266.967	371.286	724.762	784.973	6.713.678	9.159.708
Colonia Parziaria	9.616	320.523	842.939	1.181.688	655.368	141.136	794.957	3.125.546
Other	29.377	173.999	129.490	144.977	201.858	158.581	231.516	1.069.038

Source: Istituto Centrale di Statistica, Io Censimento Generale dell'Agricoltura, Volume II. Table 7 (Roma: 1963), p. 46.

APPENDIX TABLE 2. LAND IN FARMS BY TYPE OF MANAGEMENT AND ALTITUDE ZONE, 1947-48, 1961 AND CHANGE

Geographic area	1947-48				
	Total surface	Family farms	Colonia parziaria	Other	Salary
Northern Italy					
Mountains	4.686.067	3.039.008	354.550	53.745	1.238.800
Hills	2.033.505	1.345.287	522.455	18.651	147.114
Plains	3.642.057	1.859.420	686.625	208.583	783.339
Total	10.361.629	6.243.679	1.563.628	280.979	2.167.253
Central Italy					
Mountains	2.081.441	859.700	712.166	18.481	490.994
Hills	2.975.178	603.868	1.526.194	42.603	808.981
Plains	475.771	132.554	182.969	15.682	144.566
Total	5.532.390	1.596.122	2.414.961	76.766	1.444.541
Southern Italy					
Mountains	2.580.750	1.558.558	242.201	46.558	733.423
Hills	3.419.247	1.847.529	638.934	80.495	852.289
Plains	986.465	541.750	142.636	21.811	280.268
Total	6.986.462	3.947.837	1.023.771	148.874	1.865.980
Islands					
Mountains	1.075.595	578.726	216.517	72.606	207.746
Hills	2.920.934	1.616.022	716.493	293.889	294.530
Plains	760.050	411.733	135.456	55.389	157.472
Total	4.756.579	2.606.481	1.068.466	421.884	659.748
Italy					
Mountains	10.423.853	6.035.956	1.525.534	191.400	2.670.963
Hills	11.348.864	5.412.706	3.397.606	435.638	2.102.914
Plains	5.864.343	3.049.547	1.147.686	301.465	1.365.645
Total	27.637.060	14.498.209	6.070.826	928.503	6.139.522

ABSOLUTE CHANGE

Geographic area	Total surface	Family farms	Colonia parziaria	Other	Salary
Northern Italy					
Mountains	-156.969	-985.738	-222.012	-41.472	+875.423
Hills	-94.133	-76.830	-124.223	+390	+121.288
Plains	-149.053	+264.199	-79.466	-192.769	-54.213
Total	-400.552	-798.334	-425.701	-233.850	+1.091.384
Central Italy					
Mountains	-635.905	-319.402	-459.089	-10.019	+152.705
Hills	+444.152	+323.648	-203.728	-15.088	+332.852
Plains	-28.083	+38.788	-113.241	-11.938	+58.308
Total	-219.836	+49.149	-769.690	-37.045	+543.865
Southern Italy					
Mountains	-245.186	-493.905	-179.555	+37.414	+390.870
Hills	-371.667	-44.500	-434.172	+111.848	-4.843
Plains	+314.312	+224.238	-117.533	+130.494	+77.145
Total	-302.541	-314.167	-731.260	+279.746	+463.172
Islands					
Mountains	-183.380	-186.374	-209.245	+6.865	+205.374
Hills	+50.957	+72.414	-687.404	+105.127	+560.820
Plains	-55.318	-20.909	-127.554	+18.976	+74.169
Total	-187.741	-134.869	-1.024.203	+130.968	+840.363
Italy					
Mountains	-1.221.500	-1.985.476	-1.070.119	-7.217	+1.841.312
Hills	+49.432	+289.937	-1.442.822	+202.458	+999.861
Plains	+106.673	+415.667	-432.349	-54.610	+177.965
Total	-1.065.395	-1.279.872	-2.945.290	+140.629	+3.019.138

(continued)

APPENDIX TABLE 2. (continued)

Geographic area	1961				
	Total surface	Family farms	Colonia parziaria	Other	Salary
Northern Italy					
Mountains	4.529.038	2.053.270	132.538	12.273	2.114.223
Hills	1.939.372	1.268.457	398.232	19.042	268.402
Plains	3.493.004	2.123.619	607.159	15.814	729.126
Total	9.961.077	5.445.345	1.137.927	47.129	3.260.637
Central Italy					
Mountains	1.445.536	540.298	253.077	8.462	643.699
Hills	3.419.330	927.516	1.322.466	27.515	1.141.833
Plains	447.688	171.342	69.728	3.744	202.874
Total	5.312.554	1.639.156	1.645.271	39.721	1.988.406
Southern Italy					
Mountains	2.335.564	1.064.653	62.646	83.972	1.124.293
Hills	3.047.580	1.803.029	204.762	192.343	847.446
Plains	1.300.777	765.988	25.103	152.305	357.413
Total	6.683.921	3.633.670	292.511	428.620	2.329.152
Islands					
Mountains	892.215	392.352	7.272	79.471	413.120
Hills	2.971.891	1.688.436	29.089	399.016	855.350
Plains	704.732	390.824	7.902	74.365	231.641
Total	4.568.838	2.471.612	44.263	552.852	1.500.111
Italy					
Mountains	9.202.353	4.050.480	455.415	184.183	4.512.275
Hills	11.398.296	5.702.643	1.954.784	638.094	3.102.775
Plains	5.971.016	3.465.214	715.337	246.855	1.543.610
Total	26.571.665	13.218.337	3.125.536	1.069.132	9.158.660

PERCENTAGE CHANGE %

Northern Italy					
Mountains	-3.3	-32.4	-62.6	-77.1	+70.6
Hills	-4.6	-5.7	-23.7	+2.0	+82.4
Plains	-4.0	+14.2	-11.5	-92.4	-6.9
Total	-3.8	-12.7	-27.2	-83.2	+50.3
Central Italy					
Mountains	-30.5	-37.1	-64.4	-54.2	+31.1
Hills	+14.9	+53.6	-13.3	-35.4	+41.1
Plains	-5.9	+29.2	-61.9	-76.1	+40.3
Total	-3.9	+3.0	-31.8	-48.2	+37.6
Southern Italy					
Mountains	-9.5	-31.7	-74.1	+80.3	+53.3
Hills	-10.8	-2.4	-67.9	+138.9	-0.5
Plains	+31.8	+41.4	-82.4	+1296.5	+27.5
Total	-4.3	-7.9	-71.4	+187.9	+24.8
Islands					
Mountains	-17.0	-32.2	-96.6	+9.4	+98.8
Hills	+1.7	+4.4	-95.9	+35.7	+190.4
Plains	-7.2	-5.0	-94.1	+34.2	+47.0
Total	-3.9	-5.1	-95.8	+31.0	+127.3
Italy					
Mountains	-11.7	-32.9	-70.1	-3.7	+68.9
Hills	+0.4	+5.3	-42.4	+46.4	+47.5
Plains	+1.8	+13.6	-37.6	-18.1	+13.0
Total	-3.8	-8.8	-48.5	+15.1	+49.1

(continued)

Sources: 1) Giuseppe Medici, I tipi d'impresa nell'agricoltura italiana, Istituto Nazionale di Economia Agraria (Roma: 1951), 510 pp.
2) Istituto Centrale di Statistica, 1° Censimento Generale dell' Agricoltura (Roma: Aprile, 1961).

Note: The data from the two sources is not directly comparable since the surface reported by Medici exceeds the surface in the Census by more than one million hectares. The difference is that the Census does not include forests, uncultivated, abandoned or small parks and neglected garden land. An adjustment is attempted by Tassinari (Rivista di Politica Agraria, Sept. 1964) by adding the difference to the land reported by the Census. He believes a fairly good comparison can be obtained for land by type of management but not for mountains, hills and plains because in 1958 some new communes were created and boundaries of others changed.

APPENDIX TABLE 3. SELECTED CROP INPUTS BY MAJOR AGRICULTURAL REGION, 1955-1965

Item	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Mechanization (Hundreds of Tractors and Power Units)[a]											
North	3,207	3,652	4,082	4,514	4,963	5,572	6,186	7,022	7,987	8,909	10,077
Center	804	920	1,005	1,070	1,148	1,250	1,390	1,603	1,855	2,129	2,437
South	574	643	691	745	795	862	946	1,094	1,319	1,577	1,848
Islands	302	347	378	407	442	482	524	573	635	705	786
Italy	4,887	5,561	6,156	6,736	7,349	8,167	9,046	10,292	11,796	13,320	15,147
Irrigation (Hundreds of Hectares)[b]											
North	1,998	2,020	2,077	2,133	2,160	2,187	2,240	2,281	2,322	2,363	2,404
Center	161	174	203	231	242	253	263	274	306	338	370
South	202	211	224	237	274	312	350	387	413	440	466
Islands	122	121	149	177	182	188	193	199	204	208	213
Italy	2,484	2,527	2,652	2,778	2,859	2,939	3,046	3,091	3,245	3,349	3,453
Fertilizer Consumption (Kilograms per Hectare of N, P and K)[c]											
North	61	72	70	65	67	75	70	79	82	76	--
Center	41	47	43	43	44	51	48	48	49	55	--
South	37	40	44	45	49	55	51	54	58	50	--
Islands	21	34	31	32	34	39	38	34	37	39	--
Italy	43	50	50	49	51	57	54	59	61	62	--

Source: [a]Utenti Motori Agricoli, La Meccanizzazione Agricola in Italia, Trattrici, Motori, Carboranti (Roma: issues of 1955-1965).

[b]Antonietti, A. D'Alanno and C. Vanzetti, Carta delle Irrigazioni d'Italia, INEA (Roma: 1965), p. 11. Data was reported only for 1948, 1956, 1958 and 1962. Data for intervening years was obtained by interpolation. The 1963 and 1964 estimate was obtained by adding the surface irrigated under articles 9, 11, 12, 13, 22, 23, 27 and 33 of the First Green Plan. The 1965 estimate was obtained by assuming the same amount irrigated as in 1964.

[c]Istituto Centrale di Statistica, Annuario di Statistica Agraria (Roma: issues of 1956-1965). Data for 1964 was obtained in INEA, Annuario dell'Agricultural Italiano, Vol. XVII (Roma), p. 185.

APPENDIX TABLE 4. ESTIMATED COSTS AND RETURNS FROM SOFT WHEAT, DRY PLAINS OF PO. VALLEY, LOW LEVEL OF MECHANIZATION, 1963-1964[a]

Item	Description	Unit	Quantity	Price	Amount
Gross Receipts:	Grain	quintal	20	L 6,941	L 139,540
	Straw	quintal	16	900	14,400
Income from sale of grain and straw					153,940[b]
Variable expenses:					
Seed (nonselected)		quintal	2.3	6,977	16,047
Fertilizers	N Sowing	quintal	1	3,266	3,226
	N Topdressing	quintal	1	3,199	3,199
	P	quintal	2	1,839	3,678
First plowing:					
Tractor		hour	10	900	9,000
Labor		hour	16	300	4,800
Harrowing:					
Work animals		hour	8	500	4,000
Labor		hour	16	300	4,800
Sowing:					
Work animals		hour	10	500	5,000
Labor		hour	20	300	6,000
Spreading of fertilizer:					
Labor		hour	10	300	3,000
Binding:					
Custom (4.5 hrs/ha)		ha	1	8,300	8,300
Labor per Ha		hour	9	300	2,700
Stacking:					
Labor		hour	6	300	1,800
Transportation and preparation of sheaves for threshing:					
Work animals		hour	20	500	10,000
Labor		hour	40	300	12,000
Threshing and packing grain in bags L.350/ql x 20					7,000
Pressing on threshing floor L. 200/21 x 16 q.					3,200
Stacking of straw:					
Labor L. 50/ql x 16 q.					800

APPENDIX TABLE 4 (Continued)

Item	Description	Unit	Quantity	Price	Amount
Loading grain L.30/L x 20 q.					600
TOTAL EXPENSES					109,150
NET REVENUE OVER VARIABLE EXPENSES					44,790

Cost per quintal of grain L. 5,457

[a]Prices of wheat and all materials are a two-year average of the 1963-64 and 1964-65 crop years reported in: INEA, Annuario dell' Agricoltura Italiana, Vol. XVIII (Roma: 1964 and 1965).

[b]Using projected 1970 prices of 6,651 lire per quintal of wheat in the north, gross income per hectare would total 133,020 lire and net income 23,870 lire. Materials cost would probably change little but yields are not likely to rise sufficiently to offset increases in labor cost so net income would probably be lower still.

APPENDIX TABLE 5. ESTIMATED COSTS AND RETURNS FROM SOFT WHEAT, PO VALLEY PLAIN, HIGH LEVEL OF MECHANIZATION, 1963-1964[a]

Item	Description	Unit	Quantity	Price	Amount
Gross Receipts:	Grain	quintal	40	L. 6,941	L. 277,640
	Straw	quintal	35	900	31,500
Total gross income					309,140[b]
Variable Expenses:					
Seed	Selected	quintal	1.8	9,755	17,559
Fertilizer	N	quintal	3.0	3,199	9,597
	P	quintal	6.0	1,839	11,034
	K	quintal	0.5	4,537	2,268
Weed control	2-4-D	kilogram	1.2	2,400	2,880
Labor and machines					
First plowing	Large tractor	hour	8.0	900	7,200
	Labor	hour	9.7	300	2,910
Prepare Soil	Labor	hour	19.3	300	5,790
Harrowing	Average tractor	hour	3.2	800	2,560
	Labor	hour	3.6	300	1,080
Leveling Soil	Small tractor	hour	0.9	1,000	900
	Labor	hour	1.0	300	300
Weeding	Small tractor	hour	1.5	1,000	1,500
	Labor	hour	2.0	300	600
Sowing	Drill & tractor	hour	2.4	1,500	3,600
	Labor	hour	2.5	300	750
Harvesting-Binding (L 500/quintal x 40 quintal) (.097 per quintal of wheat)					20,000
	MT 50 GV D	hour	2		
	Labor (.38 hour per quintal of wheat		6		
Collecting and Baling Hay (L 300/quintal x 35 quintal)					10,500
	Average tractor	hour	2		
	Labor	hour	4		
Transportation of Grain					
	Small tractor	hour	2.8	1,000	2,800
	Labor	hour	9.6	300	2,880
Transportation and Stacking of Bales					
	Small tractor	hour	6.65	1,000	6,650
	Labor	hour	23.45	300	7,035
	Total expenses				120,375
	Net Revenue over variable expenses				188,765
	Cost per quintal of grain				L 3,009

[a]Prices of wheat and all materials are a two-year average of the 1963-64 and 1964-65 crop years reported in: INEA, Annuario dell' Agricoltura Italiana, Vol. XVII (Roma: 1964 and 1965).

[b]Using projected prices of 6,651 lire per quintal of wheat in the north, gross income would total 266,040 lire and net income 145,665 assuming no change in costs. If yield increases are not sufficient to offset cost increases net income would be somewhat less.

APPENDIX TABLE 6. ESTIMATED COSTS AND RETURNS FROM DURUM WHEAT, AVERAGE LEVEL OF MECHANIZATION, SOUTH ITALY, 1963-64[a]

Item	Description	Unit	Quantity	Price	Amount
Gross Receipts:	Grain	quintal	16	L. 9,025	L. 144,400
	Straw	quintal	10	900	9,000
Total Gross Income					153,400[b]
Variable Expenses:					
Seed		quintal	2	12,281	24,562
Fertilizer	N at seeding	quintal	1	3,226	3,226
	N topdressing	quintal	1	3,199	3,199
	P	quintal	3	1,839	5,517
First plowing,	Large tractor	hour	9	1,000	9,000
	Labor	hour	15.4	300	4,620
Harrow and Level,	Average tractor	hour	5	900	4,500
	Labor	hour	12	300	3,600
Fertilizing	Labor	hour	8	300	2,400
Seeding,	Average tractor	hour	3.5	1,300	4,550
	Labor	hour	7	300	2,100
Howing	Labor	hour	35	300	10,500
Harvesting and Binding, custom		hectare	1	10,000	10,000
Stacking Labor		hour	6	300	1,800
Transport and prepare sheaves:					
Labor		hour	25	300	7,500
Average tractor		hour	4	900	3,600
Threshing	custom	quintal	16	350	5,600
Baling straw	custom	quintal	10	250	2,500
Stacking straw	custom	quintal	10	40	400
Loading grain		quintal	16	25	400
Total expenses					109,574
Net revenue over variable expenses					43,826
Cost per quintal of grain					6,848

[a]Prices of wheat and all materials are a two-year average of the 1963-64 and 1964-65 crop years, reported in INEA, Annuario dell' Agricoltura Italiana, Vol. XVIII (Roma: 1964 and 1965).

[b]Using projected 1970 prices of 9,048 lire per quintal in the south, gross income per hectare would total L 144,768 lire and net income L 35,196 lire.

APPENDIX TABLE 7. ESTIMATED COSTS AND RETURNS FROM HYBRID CORN, DRY PLAINS OF PO VALLEY, AVERAGE LEVEL OF MECHANIZATION, 1963-1964[a]

Item	Description	Unit	Quantity	Price	Amount
Gross Receipts:	Grain	quintal	35	4,886	171,010
	Stalks	quintal	50	300	15,000
Income from sale of Grain + Stalks					186,010[b]
Variable Expenses:	Seeds	kilogram	25	240	6,000
	Fertilizer: N sowing	quintal	1	3,226	3,226
	N covering	quintal	2	3,199	6,398
	P	quintal	3	1,839	5,517
	K	quintal			
	Insecticide for soil	kilogram	20	330	6,600
	Manure	cu m^2	25	1,200	30,000
	Loading, transportation & spreading of manure by hand:				
	Tractor	hour	4	1,000	4,000
	Labor	hour	10	300	3,000
	Main Plowing:				
	Tractor	hour	8	900	7,200
	Labor	hour	10	300	3,000
	Complementary Labor:				
	Average power tractor	hour	3	900	2,700
	Labor	hour	4	300	1,200
	Spreading of fertilizer by hand	hour	10	300	3,000
	Spreading of soil insecticide:				
	Labor	hour	1	300	300
	Sowing:				
	Average power tractor	hour	3	1,500	4,500
	Labor	hour	4	300	1,200
	Howing:				
	Labor	hour	20	300	6,000
	Furrowing	hour	8	300	2,400
	Harvesting of ears by hand	hour	80	300	24,000
	Cutting, loading + unloading of stalks by hand	hour	50	300	15,000
	Threshing of ears L.150/ql x 35				5,250
	Transportation of stalks:				
	Low power tractor	hour	2	1,000	2,000
	Labor	hour	2	300	600
	Total expenses				143,091
	Net revenue over variable expenses				42,908

Cost per quintal L. 4,088

[a]Prices of corn and all materials are two-year averages, 1963-64 and 1964-65, reported in INEA, Annuario dell' Agricoltura Italiana, Vol. XVIII (Roma: 1964) p. 249.

[b]At the projected 1970 and low 1975 price assumption of 5,602 lire per quintal, gross income would be 196,070 lire and net income assuming the same costs would total 52,979 lire. It is not unlikely that variable expenses will decrease with increased mechanization and with costs of nonlabor inputs rising less than wage rates.

APPENDIX TABLE 8. ESTIMATED COSTS AND RETURNS FROM HYBRID CORN, IRRIGATED PLAINS OF PO VALLEY, HIGH LEVEL OF MECHANIZATION, 1963-1964[a]

Item	Description	Unit	Quantity	Price	Amount
Gross Receipts:	Grain	quintal	70 L.	4,886[a] L.	342,020[b]
Variable Expenses:	Seed	kilogram	20	240	4,800
Fertilizers:	N sowing	quintal	2	3,226	6,452
	N covering	quintal	3	3,199	9,597
	P	quintal	4	1,839	7,356
	K	quintal	1	4,537	4,537
Insecticide for soil		kilogram	20	330	6,600
Weed killer		kilogram	4	4,600	18,400
Manure		cu m^2	40	1,200	48,000
Loading of manure with bucket loader		hour	2	1,000	2,000
Labor		hour	2	300	600
Transport and spreading of manure (meccanic)		hour	4	1,000	4,000
Labor		hour	4	300	1,200
Main plowing:					
Average power tractor		hour	6	900	5,400
Labor		hour	10	300	3,000
Complementary labor:					
Average power tractor		hour	3	900	2,700
Labor		hour	4	300	1,200
Fertilizing with fertilizer spreader		hour	2	900	1,800
Labor (including one spreading of fertilizer by hand)		hour	5	300	1,500
Spreading of soil insecticide.					
Labor		hour	1	300	300
Sowing:					
Average power tractor		hour	2	1,500	3,000
Labor		hour	2.5	300	750
Leveling and Furrowing:					
Average power tractor		hour	5	1,300	6,500
Labor		hour	6	300	1,800
Weeding:					
Equipped tractor		hour	1	1,000	1,000
Labor		hour	1.5	450	450
Thinning out:					
Labor		hour	20 L.	300 L.	6,000

APPENDIX TABLE 8 (Continued)

Item	Description	Unit	Quantity	Price	Amount
	Combine harvesting L.369/ql of hernals (type - Laverda M 120 with silas)				25,830
	Irrigation				10,000
	Transportation of grain:				
	Low power tractor	hour	3	1,000	3,000
	Labor	hour	9	300	2,700
	Total expenses				190,472
	Net revenue over variable expenses				151,548

Cost per quintal L. 2,721

[a]Prices of corn and all materials are two-year averages, 1963-64 and 1964-65, reported in INEA, Annuario dell' Agricoltura Italiana, Vol. XVIII (Roma: 1964), p. 249.

[b]At the projected 1970 and low 1975 price assumption of 5,602 lire per quintal, gross income would be 392,140 lire and net income, assuming the same costs, would total 201,668 lire. It is not unlikely that variable expenses will decrease with increased mechanization and with cost of nonlabor inputs rising less than wage rates.

APPENDIX TABLE 9. NUMBER OF COWS ON FARMS BY GEOGRAPHIC AREA, TYPE OF MANAGEMENT AND SIZE OF FARM, 1961.

	Total	Family	Farm	Salary	Farm	Mezzadria		Other	
Class of Surface	Number of Farms	Number of Farms	Number of Cows	Number of Farms	Number of Cows	Number of Farms	Number of Cows	Number of Farms	Number of Cows
North Italy									
0.1 - 1.00	49,725	48,465	57,892	272	500	332	397	636	656
1.01 - 10.00	610,732	542,334	1,298,443	4,047	14,057	60,419	200,826	3,932	10,035
10.01 - 50.00	144,253	94,004	664,734	7,264	111,664	41,209	279,392	1,776	9,006
50.01 - 100.00	6,685	3,184	67,037	2,759	124,066	585	8,578	157	1,137
100.00	2,463	753	15,064	1,598	109,389	107	4,671	5	127
Center Italy									
0.1 - 1.00	19,547	17,628	9,277	149	107	1,039	452	731	270
1.01 - 10.00	210,452	106,624	64,146	1,939	2,098	101,209	43,412	680	350
10.01 - 50.00	79,163	22,181	30,098	2,949	7,379	53,852	25,487	181	148
50.01 - 100.00	2,965	860	1,822	774	5,543	1,324	1,132	7	17
100.00	1,476	158	705	1,150	23,523	163	258	5	106
South Italy									
0.1 - 1.00	38,437	37,513	31,228	343	308	119	31	462	262
1.01 - 10.00	201,892	117,625	116,987	2,805	3,022	15,890	5,439	5,572	4,176
10.01 - 50.00	40,601	27,398	33,039	2,737	5,857	7,940	5,005	2,526	3,308
50.01 - 100.00	3,314	1,634	5,386	954	4,793	304	544	422	1,225
100.00	2,390	688	3,855	1,365	17,041	87	345	250	1,462
Islands									
0.1 - 1.00	13,558	12,538	16,003	739	642	48	3	233	364
1.01 - 10.00	44,018	36,356	45,616	4,463	4,176	1,221	1,179	1,978	2,309
10.01 - 50.00	24,940	18,397	44,367	3,014	10,452	1,175	3,828	2,354	6,304
50.01 - 100.00	4,644	2,839	11,322	1,057	7,411	55	357	693	3,648
100.00	3,294	1,532	9,642	1,216	18,446	14	97	532	6,957
Total Italy									
0.1 - 1.00	121,267	116,164	114,400	1,503	1,557	1,538	884	2,062	1,552
1.01 - 10.00	1,067,094	862,939	1,525,192	13,254	123,353	178,739	250,856	12,162	16,870
10.01 - 50.00	288,957	161,980	772,238	15,964	135,352	104,176	313,712	6,837	18,766
50.01 - 100.00	17,608	8,517	85,567	5,544	141,813	2,268	10,611	1,279	6,027
100.00	9,623	3,131	29,266	5,329	168,399	371	5,371	792	7,652

Source: Istituto Centr[illegible] di Statistica, 1° Censimento Generale dell Agricoltura, (Rome: April, 1961).

APPENDIX TABLE 10. ESTIMATED COSTS AND RETURNS FROM A 30-COW DAIRY HERD SELLING FRESH MILK, IRRIGATED PLAIN OF WESTERN PO VALLEY, 1963-64

Item Description	Unit	Quantity	Price	Amount
Gross Revenue				
Milk, 30 cows at 35 liters per day for 305 day lactation less 18.5 quintals for calf feed	Quintal	3,184	L. 5,872	L. 18,696,448
Calves, sold at 20 days of age at weight of 60 kilos each				1,269,000
	"	16.2	80,000	1,269,000
Cull cows, cull 10 % per year at 5 quintals each	"	15	24,638	369,570
				L. 20,335,018
Total Gross Revenue				
Variable Expenses				
Feed for cows, winter (Nov. 15-Apr. 15)				
Feed mix-3 kilo/cow/day	"	135	6,245	843,075
Hay-12 kilo/cow/day	"	540	2,000	1,080,000
Beet pulp-2.5kilo/cow/day	"	112.5	5,390	606,375
Summer (202 days)				
Feed mix-3 kilo/cow/day	"	182	6,245	1,136,590
Green forage-45kilo/cow/day	"	2,727	366	998,082
Feed for calves - mothers milk 2.5 liters/calf/day/ reduced from sales				
Straw for bedding	"	40	600	24,000
Labor, 2 men full-time	Each	2	829,762	1,659,524
Herd replacements - 10 %	"	3	47,619	142,857
Breeding	"	30	3,000	90,000
Medical and vet Expenses	"	30	3,638	109,140
Electricity	"	30	2,728	81,840
Insurance	"	30	1,157	34,710
TOTAL VARIABLE EXPENSES				L. 6,806,194
NET REVENUE OVER VARIABLE EXPENSES				L. 13,528,825[a]

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APPENDIX TABLE 10 (Continued)

[a]To compare net income in 1963-64 with 1970 and 1975, product prices projected in Subproject III and projected input prices were employed. No change was made in input-output ratios but increases in milk per cow (especially important outside the north) and decreases in labor requirements (most important in the north) would increase net income above the estimates that follow.

For 1970 milk price is projected at 5,959 lire per quintal. It was assumed that cull cows would increase at the same percentage change projected for all cattle, 11.3 percent from 1964-1970, making this price, 27,422 lire per quintal and feeder calves would increase 50 percent more than all cattle to 93,520 lire per quintal. Qualified labor for livestock in the north is assumed to be 25 percent greater in 1970 at 1,037,202 lire per year, mixed feed to increase by the same amount as feed grains, 14.8 percent or 7,169 lire per quintal and hay to increase to 2,200 lire per quintal. Under these assumptions gross income in 1970 would be 20,899,810 lire; variable expenses, 7,621,981 and net income from the 30 cow unit, 13,277,829 lire.

For 1975 it seems reasonable to use the high price assumption for meat and the low assumption for milk. Product prices would then be 5,959 lire per quintal for milk, 34,986 for cull cows (again assuming the same change as all cattle) and 130,400 (again assuming feeders will be 50 percent greater than the change for all cattle). Input costs are assumed to be: labor, 1,555,803 lire per year; feed mix 8,312 (high grain price assumption; and hay, 2,400 lire per quintal. Gross income would be 21,610,726 lire; variable expenses, 9,129,514 lire and net income over variable expenses 12,481,212 lire for the 30 cow unit.

APPENDIX TABLE 11. ESTIMATED COSTS AND RETURNS FROM 20 VEAL CALVES IN THE NORTHERN ITALIAN DAIRY REGION, 1963-1964

Item		Description	Unit	Quantity	Price	Amount
Gross Receipts:		20 calves at 150 kg each	quintal	30	L.59,012	1,770,360
Variable expenses:						
		Feeder calves, 20 days old weighing 55 kg each	quintal	11	80,000	880,000
	Feed	(128 day feeding period)[a]				
		Artificial milk, 4.5 liters per day per calf = 450 grams of milk meal (1 kg = .333 UF)	quintal	11.5	23,700	272,550
		Mixed feed, 1.7 kilo per day per calf (1 kg = .97 UF)	quintal	43.5	8,190	356,265
		Hay, 0.5 kilo per day per calf (1 kg = .454 UF)	quintal	12.8	2,000	25,600
		Labor 3 hours per day	hour	384	345	132,480
		Vet and medicants	each	20	400	8,000
		General expenses (electricity, water)	each	20	200	4,000
		Straw bedding	quintal	30	900	27,000
		Marketing expense 1% of gross				27,900
		Mortality 2% of gross				55,800
		Taxes	each	20	360	7,200
Total variable expenses						1,796,795
Net revenue over variable expenses						-26,435[b]
Cost per kilo of meat						599

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[a] Average rate of gain = .941 grams per day, feed requirements = 3.374 U.F. per day. Feed requirements are averaged over the period. Initially more milk meal is fed and less other feed.

[b] For 1970 veal price is projected in Subproject III to be 66,556 at the high price assumption. Input price changes are assumed to be: feeder calves, 93,520 (50 percent greater than the increase for all cattle); mixed feed, 9,402; hay, 2,200 and labor 431 lire per hour. At these rates, gross income would be 1,996,680 lire, variable expenses, 2,033,821 lire and variable expenses would exceed gross income by 37,141 lire.

In 1975 veal price is projected at 84,895 lire per quintal at the high alternative. Input price projections are feeder calves, 130,400 lire per quintal; mixed feed, 10,901 lire (high price assumption); hay, 2,400 lire per quintal and labor, 517 lire per hour. At these rates gross income would total 2,546,850 lire, variable expenses 2,137,841 and net income

APPENDIX TABLE 12. ESTIMATED COSTS AND RETURNS FROM 50 VITELLI, DAIRY TYPE IN NORTHERN ITALY, 1963-64

Item	Description	Unit	Quantity	Price	Amount
Gross Receipts:	49 animals at 4 quintals each	quintal	196	L.43,911	L.8,606,556
	Manure -- value assumed equal to bedding				
Total Gross Revenue					8,606,556
Variable expenses:					
Feeder calves	20 days of age, weighing 55 kg each	quintal	27.5	80,000	2,220,000
Feed:	First period[a] (128 days) to weight of 150 kg. artificial milk, 4.5 liters/day/calf	quintal	28.8	23,700	682,560
	450 grams of milk meal (1 kg = .333 U.F.)				
	Mixed feed, 1.7 kg/ day/calf (1 kg = .97 U.F.)	quintal	108.8	8,190	891,072
	Second feeding period (218 days) to weight of 400 kgs (U.F. per day = 4.64)				
	Mixed feed, 3.02 kg/ day/calf (1 kg = .92 U.F.)	quintal	322.6	6,245	2,014,637
	Hay, 4.1 kg/day/calf (1 kg = .454 U.F.)	quintal	438.0	2,000	876,000
	Labor, one man for 80 cattle	year	6.2	829,762	518,601
	Vet and medicants	each	50	1,000	50,000
	Taxes and contribute	each	50	1,250	62,500
	General expenses (lights, water, etc.)	each	50	700	35,000
	Marketing (1% of gross sales)				105,332
Total Variable Expenses					7,455,702
Net Revenue over Variable Expenses					L.1,150,854[b]
Cost per kilogram of meat					380

[a] Feed requirements are averaged over the feeding period. Initially, more milk meal and less concentrate is fed.

[b] To compare the income position of cattle production in 1963-64 with that expected in 1970 and 1975 projected cattle and feed grain prices from Sub-project III were employed. In 1970 the expected beef cattle price is 48,890 lire per quintal at the higher price assumption. Input price projections are: feeder calves, 93,520; feed for young animals, 9,402 and for mature stock, 7,169; hay, 2,200 lire per quintal and labor, 1,037,202 lire per year. Gross income at these prices would be 9,582,440 lire, variable expenses, 8,454,700 and income above variable expenses 1,127,740 lire for 50 head of cattle.

In 1975 beef cattle prices are projected to be 62,356 lire per quintal at the high alternative. Input prices are: feeder cattle, 130,400; feed mix for young cattle, 10,901; feed mix for older cattle, 8,312; hay, 2,400 lire per quintal and labor, 1,555,803 lire per year. At these prices gross income would be 12,221,776 lire, variable expenses 10,412,449 and net income above variable expenses, 1,809,327. Any increases in feeding efficiency or economical substitutions of labor saving equipment would increase net income.

APPENDIX TABLE 13. IMPORTS OF LIVE CATTLE PRIMARILY FOR FEEDING, BY IMPORTING SOURCE, 1959-1965.

	1959	1960	1961	1962	1963	1964	1965
Austria	4,062	4,782	28,717	53,180	89,482	39,835	46,766
France	17,471	47,092	50,089	49,219	141,196	55,241	117,205
Germany	67	275	410	709	41,904	83,515	103,477
Yugo-Slavia	20,514	52,169	34,556	37,872	69,065	26,317	12,374
Poland	--	64	11,211	31,046	38,591	55,170	65,985
Hungary	--	1,704	19,352	32,902	76,158	53,219	69,047
Low Lands	15,987	29,633	108,727	27,571	37,026	--	--
Other Countries	13,714	15,239	73,079	18,247	103,685	24,851	11,850
Total	71,815	150,962	326,141	250,746	597,107	338,148	426,704

Sources: Istituto Centrale di Statistica, <u>Statistica Annuale del Commercio con l'Estero</u>, (Roma: 1959-1963).
Istituto Centrale di Statistica, <u>Statistica Mensile del Commercio con l'Estero</u>, (Roma: Dec. 1964 and 1965).

APPENDIX TABLE 14. ESTIMATED COSTS AND RETURNS FROM A 1000 SWINE UNIT IN A DAIRY COOPERATIVE, NORTHERN ITALY, 1963-1964.

Item	Description	Unit	Quantity	Price	Amount
Gross Receipts	1000 Swine @ 165 kg each	quintal	1,650	L.38,386	L.63,336,900
Variable Expenses Feeder Pigs	1050 @ 32 kg each assumes 2.5% mortality	quintal	336	42,420[3]	13,464,528
Feed First Period 32-74 kg, 76 days	Feed Conversion Rate = 3.5, Average Daily Gain = 550 grams, Feed Mix is 16% protein, 40% corn, 19% barley, 25% bran				
	Mixed feed[2]	quintal	1,267.3		7,755,804
	Whey[1] 4 kg/day/swine	quintal	3,192.0	150	478,800
Second Period 74-116 kg, 70 days	Feed Conversion Rate = 4.25, Average Daily Gain = 600 grams, Feed Mix is 14% protein, 51% corn, 15% barley, 20% bran				
	Mixed feed[2]	quintal	1,314		7,592,442
	Whey[1] 8 kg/day/swine	quintal	5,600	150	840,000

[1]Whey has a feeding value of 8 UF and feed mix a feeding value of 95 UF. At this ratio, 1000 quintals of whey will substitute for 84.21 quintals of feed mix. Source: A. Caleffi and I. Nizzala, "L'Alimentazione dei Suini Ingrasso con Siero Scremato, "L'Informatore Agrario, N. 41, (Verona: Ottobre 14, 1965)

[2]Price used per quintal for 1963-64 are: corn 4,972; barley 4,852; bran 4,627; protein 12,750 and 11,350. For later periods prices estimated in Subproject III are employed deflated by the index of all farm goods purchased.

[3]footnote 3 is on the following page.

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APPENDIX TABLE 14 (CONTINUED)--

Item	Description	Unit	Quantity	Price	Amount
Third Period 116-165 kg, 71 days	Feed Conversion Rate = 5.0, Average Daily Gain = 688 grams, Feed Mix is 12% protein, 63% corn, 10% barley, 15% bran				
	Mixed feed[2]	quintal	1,733		9,832,639
	Whey[1]	quintal	8,520	150	1,278,000
Labor	One man for 500 swine	each	2	829,762	1,659,524
Vet & Medicants	300L/hog	each	1,000	300	300,000
Water & Electricity	400L/hog	each	1,000	400	400,000
Total Variable Expenses					43,601,737
Net Revenue Over Variable Expenses					19,735,163

[3]Represents 4 year average over the years 1962-1965 in five market cities in the Center. For 1970 and 1975 the same ratio of feeder pig prices to fat hog prices as prevailed in 1963-64 was assumed.

[4]Estimates of income changes in 1970 and 1975 were made by assuming a 0.5 percent increase per year in feeding efficiency, a rise in labor cost of two percent per year and the pork and grain price projections in Subproject III. The results show a gross income in 1970 of 70,464,900 lire, variables expenses of 49,914,623 and net income above variable expenses of 20,550,277. At the low price alternative of 1975 gross income would be 66,872,850, variable expenses 48,783,972 and net income would total 18,088,878. At the 1975 higher price gross income would be 77,508,750, variable expenses 53,823,960 and net income 23,684,790 lire.

APPENDIX TABLE 15. ESTIMATED COSTS AND RETURNS FROM BROILERS, PRODUCED IN BATTERIES, 10,000 PER CYCLE, FIVE CYCLES PER YEAR, 1963-1964 (Purchasing mixed feed)

Item	Description	Unit	Quantity	Price	Amount
Gross Receipts:					
	9,500 birds at 1.8 kg each and 65 - 70 days old	quintal	171	37800	6,463,800
	Manure: value assumed equal to cleaning cost				
Total gross revenue					6,463,800
Variable expenses:					
	Baby chicks	each	11000	110	1,210,000
	Feed: feed conversion ratio = 2.22 : 1 (3.96 kg of feed for 1.8 kg broiler) first phase, to 5 weeks 1.3 kg per bird, 10,500 birds	quintal	136.5	8000	1,092,000
	second phase, 5 weeks to 65-70 days, 2.7 kg per bird, 9,700 birds	quintal	270.9	7600	2,058,840
	Labor: one man for 70 days	days	70	2273	159,110
	Vet and medicants	each	10000	15	150,000
	Expenses, heating, lighting, water	each	9500	15	142,500
	Taxes, I.G.E. 3.3% on value sold				213,305
Total variable expenses					5,025,755
Net revenue over variable expenses					1,438,045

APPENDIX TABLE 16. ESTIMATED COSTS AND RETURNS FROM A 2000 UNIT INDUSTRIAL EGG OPERATION, BUYING MIXED FEED, 1963-1964

Item	Description	Unit	Quantity	Price	Amount
Gross Revenue:					
	200 eggs per hen (average weight of 100 eggs = 5.70 kg)	thousand	400	25782	10,312,800
	Cull hens 1,600 hens at 2 kg each	quintal	32	60870	1,947,840
	Manure: value assumed equal to cleaning cost				
Total gross revenue					12,260,640
Variable expenses:					
	Baby chicks	each	2200	350	770,000
	Feed for chicks first 8 weeks, 4 kg/chick	quintal	88	7500	660,000
	Feed for pullets, 9-24 weeks, 2000 birds at 12 kg/bird	quintal	240	7000	1,680,000
	Feed for layer, 6-18 months, 1,800 birds at 50 kg/bird	quintal	900	7200	6,480,000
	Labor (½ man unit for 1½ years at L. 622,214 per man per year)	each			466,660
	Vet and medicine	each	2000	200	400,000
	Electricity	each	2000	60	120,000
	Water				30,000
	Gas for heat	each	2000	25	50,000
Total variable expenses					10,656,660
Net revenue over variable expenses					1,603,980