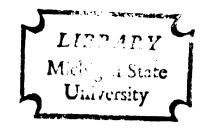
#### THE EFFECTS OF HIGHWAY IMPROVEMENTS ON AGRICULTURAL PRODUCTION: AN ARGENTINE CASE STUDY

Thesis for the Degree of Ph. D.
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Fred D. Miller
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#### This is to certify that the

#### thesis entitled

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#### ABSTRACT

# THE EFFECTS OF HIGHWAY IMPROVEMENTS ON AGRICULTURAL PRODUCTION: AN ARGENTINE CASE STUDY

by Fred D. Miller

Historically, highways have been evaluated by engineers. This situation has been unsatisfactory to many economists and, as a result, the past decade has produced a noticeable increase in contributions to highway studies from The expanded interest, however, has led to diseconomics. agreements about which benefits and costs should be included in the analyses, obscured some of the direct relationships between roads and economic benefits, and, consequently, cast doubt on the meaning of the obtained results. This study does not attempt to substitute a new method of evaluation for those used currently. Rather, it focuses on an important sector of the Argentine economy, agriculture, to answer the research question, "Will improvements in highways substantially increase agricultural production?" Decisions as to whether road construction should be undertaken are not made, but they can follow from this type of study if agricultural production is considered sufficiently important to the economy.

The problem was studied in southern Argentina in the semi-arid area bordering National Highway 35 between Bahia Blanca in the province of Buenos Aires and Santa Rosa, capital of the province of La Pampa. The conclusions were based on background material from sources in Buenos Aires and Bahia Blanca and personally collected field data from farms in the region.

A particular government unit was selected for specific concentration following an examination of the geographic conditions and historical events of the region as they affect the agricultural and transportation sectors. The partido (county) Puan was chosen because it contained an unpaved section of Route 35 and has representative characteristics which allow conclusions to be generalized to the region. Systematic personal contact with the producers was made possible by the focus of interest on a smaller area. The partido was divided into sixty-eight divisions from each of which a farmer was chosen for an interview. A questionnaire furnished information about farm methods and aspirations as well as about expectations of production changes made possible by road improvements. Another questionnaire delivered to the principal marketing organizations of the partido yielded data about marketing and transportation and the types of changes in them which are possible. With a knowledge of the farmers'

attitudes and techniques and of the probable savings in marketing and transport costs, it was possible to estimate the prospective gains from road improvements. These results were then generalized to the entire Bahia Blanca-Santa Rosa region to the extent that they were applicable.

It was found that the producers do not expect significant economic gains to arise from road improvements. there were doubts that those benefits that do accrue from road improvements will result in greater agricultural pro-In an area that is served by railroads and a system duction. of "secondary" dirt roads the contribution of added transport facilities is smaller than would be the case in an area which has a marked shortage of facilities. The cost reductions arising from road improvements are not a large percentage of total costs and institutional factors prevent all of them from being passed to producers. Even when producers receive the benefits from cost reductions, production increases are limited by an apparent inertia on the parts of producers which makes them slow to take advantage of improved conditions and by the physiography of the region.

Because of the region's particular characteristics it is difficult to make far-reaching statements which are applicable to other parts of the country or the world. It is suggested, however, that more specific studies be made since

many are, at present, generalized to wider areas. If more detailed investigations were undertaken this perhaps would not be the case and roads would be viewed more realistically.

# THE EFFECTS OF HIGHWAY IMPROVEMENTS ON AGRICULTURAL PRODUCTION: AN

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Ву

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#### CHAPTER I

#### INTRODUCTION

Although the evaluation of highway construction projects has a relatively short history, it is considerably longer than the economist's interest in the subject. This is particularly true in reference to less developed nations. Since the 1930's the more economically advanced countries have attempted sporadically to appraise the effects of roads and road improvements, usually within the engineer's frame of reference. Not until the 1950's did the literature reflect much interest in transport evaluation problems in developing regions, and this, also, was mostly by engineers. For various reasons, past results have satisfied few, including, and perhaps especially, economists. Recently, economics has attempted to contribute more to highway evaluation in less developed areas, but many of these efforts have been unsatisfactory as well, at least partially because of the approaches utilized. This economic feasibility study of a highway in a less developed nation, Argentina, employs a method of evaluation different from those used previously.

For a number of reasons such as the shortages of capital, techniques, awareness, desires, or other necessary

elements, the building of roads generally has been spasmodic. In many cases when roads were built the needs were apparent and the results favorable. According to Hans Adler, "some of the most obvious investments can be made simply by looking at a map and at the location of major industries and population centers. But this is not true after the most obvious highways have been constructed, nor does such a simple approach permit an adequate judgement about priorities over time, among the modes of transport, or between transport and investments in other fields." Undoubtedly some of the most economic construction sites have been ignored. Even when the best location was chosen there was little concern that the quality of the road was the most suitable. The benefits arising from road construction, however, did not lead people to ask the question, "Would the benefits have been greater with a different use of funds?" The failure to investigate the effect of highways more thoroughly stems, in part, from the difficulty in deciding how many of the changes which occur after a road is constructed can be attributed to it. Until the last few years there has been little emphasis or interest in choosing between location and quality alternatives Thus, roads have been discussed in in a systematic manner.

<sup>1&</sup>quot;Economic Evaluation of Transport Projects," chapter 9 in <u>Transport Investments and Economic Development</u>, ed. Gary Fromm (Washington, D.C.: The Brookings Institution, 1965), p. 171.

terms of customary construction methods, engineers' physical dimensions, and financial costs.

Now that many of the visibly useful roads have been built, a greater need exists for developing more sophisticated project evaluation techniques. This is true not only for constructing new highways, but for improving existing roads The deterioration of roads resulting from increased traffic has created pressure to seek more money and machinery for road construction. Assistance has been sought from such agencies as the United States Aid for International Development (A.I.D.) and the International Bank for Reconstruction and Development (I.B.R.D.) which require project proposals from prospective recipient nations, and, consequently, road evaluations have been encouraged. The appraisals have been made primarily by engineers who have given little attention to the economic problems involved. An awareness of this limitation was acknowledged by A.I.D. when a grant was made to The Brookings Institution for the study and improvement of existing methods of evaluation. Although a number of constructive suggestions have arisen from the research of The Brookings Institution, they have not yet been widely applied and some deficiencies persist.

Given the early lack of interest in the evaluation of highway construction projects, the primordial position of engineers, the belated, but increasing, enthusiasm of economists and the presence of international agencies in the

matter, it is no wonder that a number of approaches and methodologies have been developed. It is important to examine the history of these so that our study can be seen in proper perspective.

Common methods. -- The currently applied highway evaluation methods have evolved from engineering project analyses. Engineering studies have existed on a number of levels of complexity. The simplest criterion of "minimizing construction costs," was first used and is still employed. It requires no more than a passing look at what the economic benefits and costs might be. More common, however, is the study which computes benefits which accrue to road users in terms of such elements as savings in driving time, fewer accidents, and lower vehicle maintenance expenditures, and weighs these against the costs of construction, meintenance, and administration of the highway. Both benefits and costs are expressed in discounted present value terms so that the estimated opportunity cost of capital, and variable benefits and costs over time are considered. These data provide a calculable benefit-cost ratio or internal rate of return on investment. With them it is decided which of three or four roads--suggested on the basis of suspected locational advantages in construction or use--should be constructed.

This benefit-cost method requires only a list of the benefits which accrue to actual users of the highway and ignores those received by persons who do not personally use the

road. Also, it can obscure the real issue of whether <u>any</u> road should be constructed, since even with a benefit-cost ratio of greater than one an alternative investment might be more profitable for the economy. In an economically advanced nation it is possible to compile an adequate list of technical statistics, as has been done in the United States by the American Association of State Highway Officials, and make reasonably accurate predictions of human reactions to a new or improved highway. Hence, within the confines of the method a satisfactory job can be done. However, the lack of statistics and greater uncertainty in human reactions in less developed nations often lead to inaccurate results on which to base decisions, even within this limited scope.

A realization of the restricted range in the calculation of benefits and costs prompted the estimation of the effect of highways on national income. This is an extension of engineering data by the economist on a macro-economic level. With this method, figures are assigned not only to benefits derived by the actual users of the road, but to quantifiable economic benefits accruing to the community as well. Often these calculations are capable of showing impressive favorable comparisons between total benefits and the costs of highway construction, maintenance and

Road User Benefit Analysis for Highway Improvements.

A Report by the Committee on Planning and Design Policies,

American Association of State Highway Officials (Washington,

D.C.: American Association of State Highway Officials, 1960).

administration. It is usually added that benefits will be even greater in terms of non-measurable social gains such as improved education, safety, and communication. Surely, a great many benefits do arise from road construction, but this approach, unfortunately, has produced a one-sided consideration of their magnitude in relation to costs. Particularly, little attention has been directed to losses in national income due to road construction. Such matters as encouragement of industries which damage existing industries are not acknowledged. Also, there are always non-measurable social losses when social change occurs and old habits and attitudes are upset, but these are not recognized. If increases in national income and social benefits arising from highway construction are included in calculations decreases in income and social losses also should be considered.

Even if the problem of unequal weighting of benefits and costs is overcome there remain immense measurement problems. With the poor statistics available in most less developed countries, the only factors which can be measured reasonably accurately are the construction and maintenance costs of the highway. These costs are also difficult to estimate over a period of time, especially in an atmosphere of government instability, inflation, and periodic resource shortages. When estimates are made in terms of national aggregates (often the only data available), the crucial microsocio-economic factors can easily be overlooked. In any

case, the predicted magnitude of gains and losses is contingent upon people acting according to particular assumptions. Certainly, the conclusions are unreliable if these assumptions are inaccurate or do not fit reality, as often is the case with assumptions about groups of people.

Recent improvements in method. -- While the entrance of economists into the field of road project analysis has expanded the engineer's frame of reference, there is still much room for improvement. Two products of The Transport Research Program of the Brookings Institution are especially helpful in bettering project analyses. In one, Clell Harral outlines steps to use in evaluating all road projects, emphasizing that the evaluator should bear in mind the accuracy of his figures in quantifying variables and his facts in enumerating benefits and costs. 3 He consolidates past streams of thought and places them in a setting of concern for interrelated sectors--both steps are helpful in achieving In the other, George Wilson asserts that there more realism. should be an awareness of complementary relationships between transportation and these sectors and stresses that human reactions should be examined rather than merely stated as assumptions. 4 He writes that "Noneconomic, or institutional,

<sup>&</sup>lt;sup>3</sup>Preparation and Appraisal of Transport Project. A Report for the Transport Research Program (Washington, D.C.: The Brookings Institution, 1965).

The Impact of Highway Investment on Development (Washington, D.C.: The Brookings Institution, 1965).

factors--often assumed away--make the impact of improved transportation uncertain." It is also suggested that

If economic growth is really a question of people, then the aggregative, national income approach might miss the essence of the process of development. Tying the analysis to specific industries and regions should permit a closer contact with individual response mechanisms, which is essential to a fuller comprehension of economic growth.

Both of these studies acknowledge the difficulty in finding accurate data and the pitfall in making over-simplified assumptions about the human element involved. Wilson, particularly, suggests more regional studies to gain an understanding of the micro-economics in project evaluation as a step in explaining the aggregates of the macro-approach.

In summary, the history of highway project evaluations has produced various approaches to the problem with occasional dominance of both engineers and economists as evaluators. Inadequacies in common methods and in their application more recently have led to steps toward an approach to economic evaluation on a micro level. Controversies have arisen as to the positions of the engineer and the economist, the measurement and relative inportance of intangible benefits and costs, the use of statistics, and whether studies should be made on a national or regional level. Representatives of all basic methods, with their

<sup>&</sup>lt;sup>5</sup><u>Ibid</u>., p. 11.

<sup>6&</sup>lt;u>Ibid</u>., p. 170.

aberrations, are still in use with the oldest, that of the engineers, most widespread.

Argentine efforts.—Highway project evaluations in Argentina reflect the diversity of approaches and include infrequent applications of the newer methods. The early history of road building in Argentina consisted primarily of connecting agricultural areas to railroad stations or to Buenos Aires. As there was little or no controversy over the feasibility of this plan or the points between which a road should be built, road planning and building were entirely engineering problems. When reactions arose against the centralization in Buenos Aires, more emphasis was given to building roads in the directions of the ports of Bahia Blanca or Rosario or to the railroads leading to these cities.

Still, these were projects for engineers.

of national benefits to be gained from specific road projects.

This entailed little more than quantifying the type of benefit which the engineers acknowledged verbally and suggesting

Eew more indirect benefits. The economic factor also has been discussed in terms of the effects of transportation on specific industries. In some of these, road transportation is considered to be a significant element. In this category belong two studies relating agriculture to transport. They

Agri-Research Inc., "Adjusting Grain Marketing Facilities and Practices in Argentina to Meet Projected Requirements." A study by an A.I.D. mission to Argentina

contain sections referring to the relationships between transportation and grain in one case, and transportation and cattle in the other. Both consider roads to be relatively important, but discuss them only in general terms with recommendations that they should be improved. Studies directly related to the topic of highway investment and its effect on agriculture do not exist, as the economic approach has not yet been specifically applied.

In 1962, a thorough study of Argentine transport media was completed. 8 It dealt with the history and nature of all branches of transportation and their effects on other economic sectors on a national level. Engineering and macroeconomic concepts were used. A complete description of the highway system of that time was given, as well as plans for future construction. However, little has been done with this study since then, and it remains useful only as a description of conditions existing at the time of writing.

There are few, if any, Argentine studies using an economic approach for evaluating road construction projects.

The National Highway Administration (Vialidad Nacional) decided to build the highway with which this study is concerned

<sup>(</sup>Buenos Aires, 1962). Charles V. Wooten, and James R. Snitzler, "The Domestic Transportation Requirement of the Argentine Cattle Industry." A Report Presented to C.A.F.A. D.E. by a U.S. A.I.D. mission (Buenos Aires, 1961).

Aires: Ministerio de Obras y Servicios Públicos, 1962).

on the basis of engineering criteria. The economic sections of the several reports concerning the project included only the following reasons as economic justification for construction: (1) The road is in an important zone. (2) Goods take this route to the port. (3) It is impassable when rainy and dust obscures visibility in dry periods. (4) It is inadequate for the volume of trucks, and (5) It causes truck loads to be reduced. Conceivably, highway construction could be justified with these factors, but it certainly cannot be inferred from a mere statement of the problems.

The most recent highway study in Argentina concerns the province of Corrientes. 10 The section that is devoted to economics is an extension of engineering data and quantified assumptions about future possibilities. It is placed in the mainstream of macro-economic studies when it concludes that "The areas sown to principal crops will expand by an average of 143 per cent" over a twenty-year period. 11

<sup>&</sup>lt;sup>9</sup>In the Reports on National Route 35. <u>Código de Tramos de la Vialidad Nacional de Caminos</u>, Vialidad Nacional (Buenos Aires). A number of large notebooks concerning Route 35 contained only one-half page discussing economic factors, with the rest devoted to engineering relationships and costs of construction.

<sup>10</sup> Feasibility Study Highway Plan, Province of Corrientes, Argentina. A Report Prepared by Brown and Root Overseas, Inc. (Buenos Aires: Consejo Federal de Inversiones, 1966).

<sup>11 &</sup>lt;u>Tbid</u>., p. 85.

A micro approach. -- While highway evaluations by Argentines for domestic projects have been predominantly engineering studies, many of the recent projects carried out under the auspices of international organizations have combined an economic emphasis with an engineering approach. either case conceptual problems remain since a benefit-cost ratio, at best, can be used effectively only to decide the best project from an economic efficiency point of view. 12 Certainly, extra-economic considerations are important to national planners in deciding whether a project is feasible. This study does not attempt to correct the deficiencies of benefit-cost methods, but, rather, to accentuate the focus on the economic effects which can be expected from highway improvements. It employs a micro-economic method which differs from what has been tried in other countries and from what has been done in Argentina. Rather than deal with the entire array of benefits and costs, it is concerned with the direct relationship between highway improvements and agricultural production. The area of concentration is narrowed so that the dubious imputations to intangible benefits and costs is avoided. National data are used sparingly since Argentina fits Wilfred Owen's description of less developed countries in general in that "Neither national production

<sup>12</sup> See Arthur Maass, "Benefit-Cost Analysis: Its Relevance to Public Investment Decisions," Quarterly Journal of Economics, XXXX (May, 1966), pp. 208-226.

statistics nor data on past and present freight movements are complete and reliable, and they seldom cover a sufficient period of time [for statistical analysis]."13

This study differs from past works in being regional in nature. It is based on information gained from persons in the agriculture and transportation sectors rather than on inferences drawn from assumptions about them. It is believed, in accordance with Owen, that "To arrive at a specific physical requirement for transport . . . it is essential to depart from national aggregates and build estimates of traffic (and) . . . physical needs . . . from the ground up. "14 By working on a micro level, it is possible to compile statistics personally and to know the limit of their accuracy.

The conclusions reached will not permit a final construction decision in that the totality of benefits will not have been considered, but the most important element from the standpoint of project feasibility will have been emphasized. This does not deny the existence of indirect and noneconomic benefits or deny their importance. It is believed, however, that the direct relationships are obscured when these less tangible factors are included and that if a definite influence of highway improvements on agricultural production can be shown, stronger statements can be made. The indirect or

<sup>13</sup> Strategy for Mobility (Washington: The Brookings Institute, 1964), p. 49.

<sup>14</sup> Ibid., p. 52.

unquantifiable benefits and costs can be weighed with greater understanding following such a study, since there will be an awareness of receptivity to new ideas and of propensities to change, but these subjective aspects of the evaluation will not be undertaken here.

Theoretical expectations.—It is useful to explore the implications of value theory for our problem before any empirical analysis is undertaken. The research question is "Would the improvement of roads lead to a substantial in crease in agricultural production?" The position of road transportation in the agricultural marketing process must be established if this question is to be answered. If the production functions of the principal agricultural products are set forth, the various ways in which road transport affects these products can be ascertained.

We can gain some insight by examining the production functions of two important products—wheat and cattle. These products comprise the majority of the output of the area with which we shall be concerned and the other goods (mainly other grains and sheep) are produced from the same basic inputs.

The quantity of wheat produced on the farm is determined by the following production function:

(1)  $Q_{wf} = f(L, S, N, K, O_1, O_2)$  where

 $Q_{wf}$  = quantity of wheat produced on the farm

L = land

S = seeds--including specific varieties and their
 preparation for planting

N = fertilizer

K = capital goods--including farm machinery and storage facilities

O<sub>1</sub> = personal labor and entrepreneurship

O<sub>2</sub> = hired labor

The quantity of cattle produced on the farm is similarly expressed as:

(2)  $Q_{cf} = f_1 (L^1, P^1, N^1, K^1, O_1^1, O_2^1, A^1)$  where

 $Q_{cf}$  = quantity of cattle produced on the farm

 $L^{1}$  = land--including natural pasture

p<sup>l</sup> = cultivated pasture--including grains

 $N^1$  = fertilizer

K<sup>l</sup> = capital goods--including equipment for cultivated pasture and fencing for animals

O<sup>1</sup> = personal labor and entrepreneurship

 $0_2^1$  = hired labor

 $A^1$  = animals

Both of the production functions are concerned with production on the farm. A more important variable, however,

is the total product which reaches the market place. Road transport exerts its influence between the time when the products are harvested on the farm and their arrival at the point of sale. Consequently, the production functions will be expressed in terms of the quantities of the products marketed.

The quantity of wheat marketed ( $Q_{wm}$ ) depends on the transportation services (T) and the quantity of wheat produced on the farm ( $Q_{wf}$ ) or

(3) 
$$Q_{wm} = g (T, Q_{wf})$$

Similarly, the quantity of cattle marketed ( $Q_{\rm Cm}$ ) depends on transportation services ( ${\bf T}^1$ ) and the quantity of cattle produced on the farm ( $Q_{\rm Cf}$ ) or

(4) 
$$Q_{cm} = g$$
,  $(T^1, Q_{cf})$ .

In (3) and (4) the inputs in (1) and (2) can be substituted for  $(Q_{wf})$  and  $(Q_{cf})$  respectively. Equations (3) and (4) are written in this briefer form to emphasize transportation.

The money prices of the goods after they are produced on the farm are important in determining the quantity to be marketed. These prices must be considered since they are determining factors in how much of (or whether) a product will be sent from farm to market. If the prices fall to a point where an alternative use of the products would be more

profitable e.g., on-farm consumption of cattle or use of wheat for seed in the next year, the quantity transported could be lowered appreciably or even reduced to zero.

The production functions are more informative if the transportation variable is divided into its particular components. When nothing more than the variables (T) or  $(T^{\perp})$ is examined there is no distinction between road and railway transport. In this case goods can be sent by any transport media and road improvements need not affect the transport variables if they do not result in a change which makes hauling by truck more attractive than shipping by train. helpful to introduce two variables to make the distinction clearer. The variable (Tr) will be used to represent road transport and (Tt) will signify transportation by train. With this difference one of the variables can take a coefficient of zero or the two means of transport can share the shipments depending on the prices of their services and the nature of the goods. Price, of course, includes not only freight rates, but losses due to delays, breakage, strikes, theft, and other factors.

Another transportation variable is also necessary.

This, (Tf), is to represent the shipments by truck over

"feeder roads" from farms to towns. The variables (Tr) and

(Tt) represent shipments from towns to market places. The

products must first reach the towns by "feeder roads" before

they are carried over main provincial roads and national highways to marketing centers.

The production functions for the quantities of cattle and wheat marketed can now be expressed as

(5) 
$$Q_{wm} = h (Q_{wf}, Tr, Tt, Tf)$$
 and

(6) 
$$Q_{cm} = h_1 (Q_{cf}, Tr^1, Tt^1, Tf^1)$$

Production functions of this form can be used to show how transportation influences the marketer and how road improvements can affect agricultural production. Essentially, all changes in the use of transportation arise from a lower price for transport services. The effects, however, are conveyed in several different ways.

First, road improvements mean a greater supply of transportation and a consequent lower price for transportation services. We can expect that some farmers will change the quantity of transportation services consumed because of the lower price. All or none of the goods could be changed from rails to roads, depending on the relative prices of the services and substitution possibilities. The improvement of a main highway would have an effect on the movement of goods between the town and market if the price of road transport were lowered and more were utilized. A change in the quantity of goods marketed would be expected since the payments for transportation would be reduced. This can be viewed as a direct and immediate increase in total product (Q<sub>wm</sub> or Q<sub>cm</sub>).

Transport can also affect production by facilitating farm to town shipments. This would require improvements of "feeder roads." It would be expected, to the extent that producers use the "feeder roads," that total product would increase immediately. In both this and the previous case gains in production result from reductions in transportation costs even if nothing more is produced or sent to market.

Second, total product can be increased by removing obstacles to marketing wheat and cattle produced on the farm. If production is limited by trucking facilities which cause delays and losses e.g., extra storage charges for wheat and weight losses in cattle, road improvements could remove the problem and enable more products to reach the market. Hence, once again, gains could arise with no more production on the farm. These effects most likely would be shown in changes in (Tf) since obstacles to transporting goods are usually present primarily with "feeder roads."

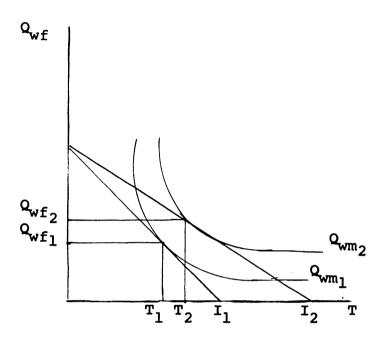
Third, a less immediate, but probably greater, increase in production arises from the use of resources released by transport savings. A new combination of inputs could lead to a greater quantity of output  $(C_{\rm wf} \ {\rm or} \ C_{\rm cf})$ . This could be realized through lower marginal costs which would allow the utilization of new inputs or by a recombination of already used inputs in a more productive manner.

These effects are somewhat different in nature i.e., (1) lowering the price of existing transport where goods would reach the market anyway, (2) removing obstacles and reducing losses to produced goods, and (3) allowing a new combination of inputs to increase production on the farm. They each can be reduced to the same concept, however, which is lowering the price of transportation to the producers. It is always possible to haul goods if a high enough price is paid--even if someone must go to the extreme of drying a muddy road artificially or bulldozing tracks in front of a These methods are not followed only because their costs are too high. In every case in which roads are improved the supply of transportation is increased and the prices of transport services are expected to fall. Immediate gains are received from the price reductions. Depending on how the released resources are used, production can be increased even more with a new input-mix.

This result can be elaborated in terms of the model. It is known that the marginal products per dollar of all inputs, are equal if we assume that inputs are used in their least cost combinations. When the price of any input is reduced, more of it will be applied and a greater use of all other inputs will result, provided that there is a degree of complementarity between them.

The above point can be clarified by the use of isoquants. Using the inputs from (5) we can express ( $Q_{wm_1}$ ) as

being determined by  $(Q_{wf})$  and either (Tr), (Tt), or (Tf). (T will be used in our analysis.)



 $(Q_{wm_1})$  is an isoquant expressing a specified level of production with various combinations of inputs utilized per unit of time. Production initially will take place at a point such as  $(Q_{wf_1}, T_1)$ . If transportation becomes cheaper as a result of road improvements, more transport services will be utilized and the new isocost line will be  $(I_2)$ . A higher level of production  $(Q_{wm_2})$  will be attained and, if the inputs are complementary, more of both inputs will be used. The new production point will be  $(Q_{wf_2}, T_2)$ . If the inputs are not complementary then there is no reason to assume that  $(Q_{wf})$  will increase. Also, if more  $(Q_{wf})$  obtains there is no quarantee that it will be used to increase

 $(Q_{wm})$ . In agriculture, though, complementarity in inputs is a reasonable assumption and the first reservation is not a strong one. Second, it is assumed that an optimum amount of wheat is being held at the point  $(Q_{wf_1}, T_1)$ . If more is produced on the farm it is expected that more will be shipped to market. Hence, if we assume that  $(Q_{wf})$  will increase we can expect that  $(Q_{wm})$  will be greater as well.

Once again, in terms of the production function for wheat, if the quantity of wheat marketed depends on the quantities of inputs

(5) 
$$Q_{wm} = h (Q_{wf}, Tr, Tt, Tf)$$

then the total cost of production is a function of the quantity of wheat marketed and the prices of the inputs

(7) 
$$TC_{wm} = (Q_{wm}, P_{t_r}, P_{t_f}, P_{t_p}, P_{Q_{wf}})$$

Assuming that firms (farmers) are perfect competitors, a fall in any input price will lead to a fall in the marginal cost of the product, a greater utilization of inputs and increased production. Consequently, the industry output will increase and as the supply curve shifts down, the industry price will fall. The lower price for the industry will cause a reduction in output by at least some firms and partially offset the increase in production.

In summary, it is asked if the improvement of roads will lead to an increase in agricultural production. On the basis of value theory it is suggested that road improvement projects will, in fact, lead to production increases. the production functions for both wheat and cattle marketed it has been shown both verbally and graphically that a reduction in price of one of the inputs, transport, will cause more of all inputs to be used and production to be increased. The magnitude of the increase will depend on the reduction in costs which road improvements allow, the way in which inputs are recombined and the elasticity of the industry demand curve. Consequently, these latter factors i.e., cost reductions, recombination of inputs, and the nature of the agricultural market must be empirically explored to see if the conclusions suggested by the theoretical analysis will hold.

The possibilities of the theoretical expectations materializing depend on a number of factors within the economy. The conceivable limitations imposed by institutional factors must be examined if the increases in production are to be estimated accurately. With the theoretical basis outlined above we will now determine empirically how an autonomous improvement in roads can be expected to affect agricultural production.

Organization of the study. -- The area of interest is the semi-arid region surrounding National Highway 35, between

the cities of Bahia Blanca, in the province of Buenos Aires, and Santa Rosa, the capital of the province of La Pampa. This is an agricultural zone which produces primarily cattle, sheep, and small grains, of which the majority is shipped to the port of Bahia Blanca. While the area is generally fertile, the increase in production has been about equal to the national average which, according to the Ministry of Agriculture statistics, has increased only .5 per cent per year between the periods 1935-39 and 1960-63. Many of the people living in the zone feel that paving Route 35 is essential for economic progress.

There exists a faith that a highway will act as a catalyst for economic development. While new road construction has sometimes possessed this catalytic quality, it is by no means certain that this faith is justified in the case of highway improvements. In ascertaining to what extent this feeling is justified, we concentrate on the section of the highway which is not yet paved so that comparisons can be made between it and a section which was paved in recent years. It will be hypothesized that production can be increased substantially by paving the highway. The hypothesis will be accepted or rejected on the basis of the framework suggested above and to be elaborated in the chapters to follow.

La Neuva Provincia (Bahia Blanca), October 12, 1966, p. 2.

Chapter II begins the development of the topic by defining the limits within which a change in transportation can effect agriculture. The geographical characteristics of the region are described so as to delineate the natural bounds within which the agrarian sector must operate. The histories of population movements, transportation, and agriculture are traced briefly for the nation, with particular reference to the Bahia Blanca-Santa Rosa region, so that their bearing on the present production climate can be understood.

In Chapter III attention is focused on a specific area within the region, the <u>partido</u> (county) Puan, where the unpaved section of Route 35 exists. The farmers, their methods, and their readiness to change was examined to enable prediction of the ways that they would react to a change in the transport input.

In Chapter IV the concentration on the <u>partido</u> Puan continues, but emphasis is shifted to the highway and rail-road systems. Their structure and its particular relation to agriculture is analyzed so that it can be shown how a change in transportation affects agricultural production.

Chapter V recounts the thoughts of producers concerning road improvements and their opinions on how these improvements will affect their production. It is based on interviews with persons active in the agricultural sector within Puan.

In Chapter VI particular findings in Puan are applied to the area in general, and any factors which might have made them different from those that would have resulted with other methods of examination are decreased.

Finally in Chapter VII we discuss the degree of confidence which can be placed in our conclusions about the effects of highway improvements on agricultural production.

Suggestions are made for future studies.

## CHAPTER II

## GEOGRAPHICAL AND HISTORICAL ENVIRONMENTS

Highway improvements and agricultural production have relevance to specific geographic and historical environ-One of the problems with many highway project analyses is the encompassing assumptions made about peoples of diverse areas without considering their environments. To avoid this, and because it is believed that one cannot accurately predict changes resulting from highway improvements without understanding the framework within which they take place, the geographic conditions and historical events which have formed and are forming the "zone of influence" of Route 35 in the Bahia Blanca-Santa Rosa region will be discussed. More specifically, the soil and rainfall characteristics will be de-SCribed as they relate to the agricultural and transportation sectors. The histories of national migrations, transportation, and agriculture will be traced within the context of the physiography and with special attention to the Bahia Blanca-Santa Rosa region when it differs from the more general pattern.

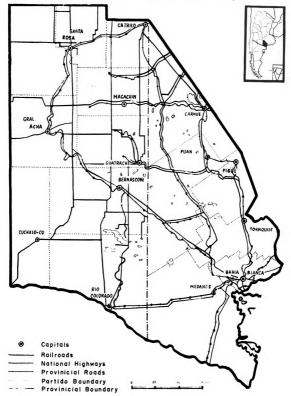
The "zone of influence" of Route 35 extends from the port of Bahia Blanca in western, west-northwestern, and

west-southwestern directions. Its limits are marked by the National Highways 33 to the north and 22 to the south, the unproductive portions of the province of La Pampa to the west and, in some cases, the dominance of the City of Buenos Aires (see Map 1). While there is traffic from as far away as the provinces of Rio Negro, Mendoza, San Luis and Cordoba, it is sparse and very rarely includes agricultural goods. The highway is most important to people in the area between Santa Rosa and Bahia Blanca. This covers the southwest of the province of Buenos Aires and eastern La Pampa.

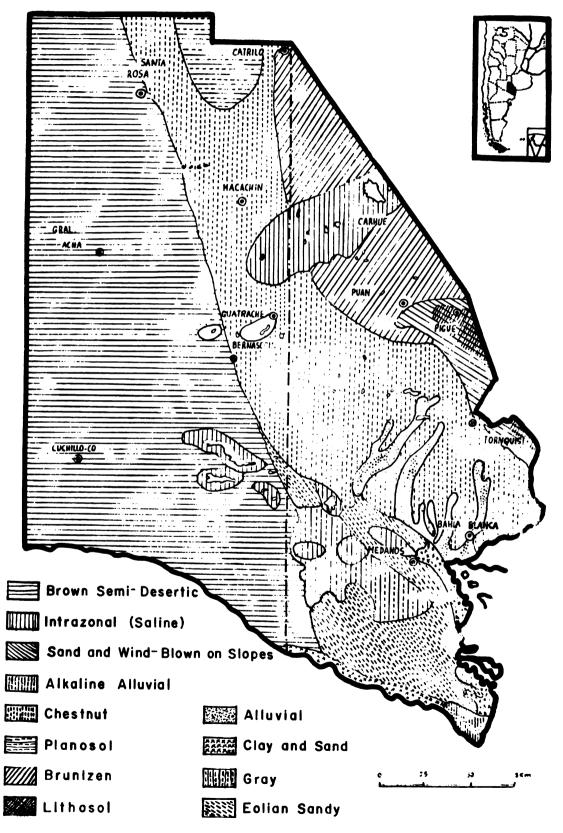
The area is characterized by more diversified climatic conditions and topography than is present in the flatter, more temperate pampas to the north. From Sierra de la Ventana, a small range of mountains rising to an altitude of about 3,700 feet the LiThosols (mountain soils) near Pique in the eastern portion (of Map 2), the land levels to the south and west--broken only by occasional areas of gently rolling hills and saline depressions. The greater part of the region is flat or slightly undulating pasture land with a smaller Proportion used for the cultivation of small grains. A rather abrupt change in the relatively homogeneous grass- ${f l}$ ands is found after passing an arc drawn from slightly below Bahia Blanca to just west of Santa Rosa. This arc delineates what is known as the "fertile crescent," to the

About 60 per cent of the productive land is used for cattle, 20 per cent for crops, 15 per cent for sheep, and 5 per cent for various other products.

MAP I Transportation Networks and Political Divisions in the Bahia Blanca — Santa Rosa Region



MAP 2
Soil Types in the Bohia Blanca-Santa Rosa Region

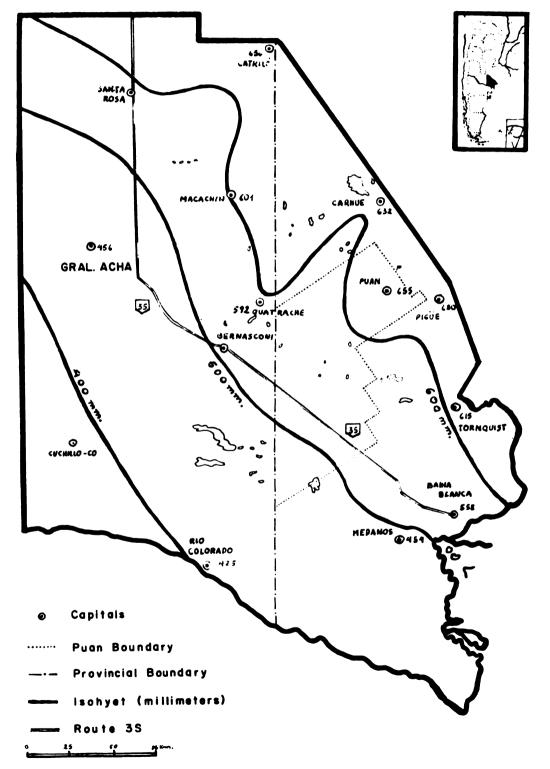


north of which the land is relatively more productive, and marks, roughly, the isohyet of 500 millimeters per year (see Map 3). Near the limit of the "fertile crescent" and farther west and south are seen the stunted forests co-existing with dense undergrowth and interspersed plains. Passing still farther beyond the fertile crescent a more desert-like, arid zone is encountered, with vegetation consisting of little more than dry clumps of grass and bushes. Within the bounds of this transitional region is seen the transformation from the smooth, fertile pampas with more than 650 millimeters of annual rainfall, to an equally flat, but unproductive, arid zone of forests and deserts with less than 400 millimeters of precipitation per year.

Soils and Rainfall. -- To understand this zone and its limitations, attention must be given to the interaction of soils and rainfall, the primary natural determinants of both agricultural production and the ease of transportation. These factors largely define what and how much can be produced, the capacity of dirt roads to support the movement of production, and the necessity and feasibility of constructing paved roads.

While those limits on agricultural production which are set by the components and moisture content of the soil can always be altered by the discoveries of subterranean water, the use of methods to preserve soil humidity and

MAP 3
Yearly Rainfall in the Bahia Blanca-Santa Rosa Region



fertilizers, basic natural elements do not permit a large amount of profitable manipulation. In general, the loose, wind-blown soils of the area are dry with little organic content and, consequently, susceptible to both wind and water It is seldom profitable to improve the soils with fertilizers because of the variability both in frequency and volume of precipitation. Within this region, the relatively more abundant rainfalls in the Autumn and Spring provide the majority of the about 350 to 650 millimeter annual averages, but in these seasons, also, variations are considerable. the northeastern area, with the most abundant moisture, it might be profitable to utilize fertilizers, but even here, yearly rainfall varies from less than 300 to over 900 millimeters.<sup>2</sup> Furthermore, the rate of evaporation is about 800 to 850 millimeters per year and, hence, only in the wettest years is the moisture maintained by the soils. 3 There can be little flexibility in production until methods are found to extend the zone's physical capacities.

The variety of soil types in the region permit a number of levels of agricultural production. In the rich Pasture lands of the northeast, cattle and grain production

In the southern portion of the region the "coefficient of variation" or precipitation in the year of most rainfall divided by precipitation in the year of least rainfall, is greater than four, the highest classification in the country. Most of the region is between three and four, which is still relatively high.

<sup>&</sup>lt;sup>3</sup>Francisco de Aparicio, and Horacio A. Difrieri (directors), <u>La Argentina, Suma de Geografía</u> (Buenos Aires: Ediciones Peuser, 1958), II, 121.

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are relatively greater and, when the rainfall is adequate, other products can be grown as well. The poorer soils of the south will sometimes not profitably support crops or animals. The majority of the soils are suitable for limited production of cereals and pastures with sizeable crops accompanying well-distributed precipitation. There is some variation in that oats are more easily grown in the chestnut and brunizen (brown-black) soils of the middle and northern sections of the region while rye is a more popular crop in the less fertile western pastures. Wheat and hay barley are harvested in almost any area that will support a crop, with wheat being the hardier of the two. Some areas of the south and west which contain sandy and semi-desertic soils with little organic matter are not capable of producing cereals and are used only for cattle. Generally, the unimproved soils make difficult the introduction of new types of crops or animals so that the decision to be made is between types and quantities of grains, cattle, and sheep.

For several reasons the soil-climate combination is Conducive to "mixed farms," i.e., farms with both crops and livestock. Where it is possible to plant grains, the un-certainty concerning rainfall leads the majority of farmers to raise cattle as insurance against a poor harvest. The fluctuating prices of cattle and sheep occasionally make ranching less profitable than crops. Livestock are raised, however, since besides fulfilling the insurance functions,

they furnish a use for land which is held out of cultivation on alternate years, some fertilizer for the soil, and a source of food for on-farm consumption. If crops are not feasible, farmers produce cattle and sheep alone, but seldom is it the case that farms have crops without livestock.

Above the arc of the "fertile crescent" the economic holding is considered to be a "mixed farm" of 300 to 350 hectares. A Richer lands permit an average of one cow or four sheep per hectare. Below the arc, about 500 hectares are necessary because cereals often cannot be grown and production consists of large herds of cattle and sheep. As many as three hectares are needed per cow and a hectare cannot support two sheep. Between these bounds, there are, of course, varying land capacities. While the limits can be altered, changes usually arise as a result of fluctuations in natural elements, e.g., more cattle per hectare are grazed in years of greater precipitation. A permanent extension of the fairly restrictive limits will surely require the application of new techniques.

The transport of products is facilitated since roads are generally flat, wide, straight, and capable of supporting relatively large loads, but it is hindered by moisture in

The term "economic holding" or "economic size farm" appears in the literature and is commonly used in the area. It apparently originated in a study which calculated the quantity of land necessary to permit a family to earn a "reasonable living."

rainy periods and dust and wind in the summer. The lack of a road maintenance program adds to the difficulties. greatest driving problems arise in the northeast where the fertile, brunizen soils become muddy and impassable with, at times, only about thirty millimeters of rainfall, and in the south where the sandy areas are difficult to cross when there is a lack of moisture. The chestnut soils and pasture lands comprising the majority of the region are sometimes impassable with about forty or fifty millimeters of rain, but many areas are still passable with this amount of precipitation because the layer of tosca beneath the topsoil provides a hard base for traction. 5 To the south and west, the soils combine a layer of tosca and a sandier topsoil to make them even less susceptible to rainfall problems. In almost every case, movement is possible along much of a road, but there are frequently several areas within each fifteen or twenty kilometers which easily become impassable. If these areas were eliminated or improved, the days in which transit is prevented could be reduced considerably.

In the summer months, even in the more difficult areas, with a rainfall of about fifty millimeters, a loaded truck can pass by the middle of the next day and such a rainfall does not occur every year. In winter, in the problem areas, transport is stopped for an average of about two weeks

<sup>&</sup>lt;sup>5</sup>Tosca is hard clay.

per year by less rainfall than in the summer, since the higher humidity level preserves the moisture on the road. During winter months, transport is less important, however, as fewer products are marketed. It is fortunate that in zones where average precipitation is higher and dirt roads become more difficult to use, distances to be travelled are shorter. While there are problems with roads and many complaints about their restraints on mobility, it is questionable whether they act as significant limitations on agricultural production. It is the lack of comfort and the inconvenience and insecurity of not knowing if it will be possible to drive the following day, rather than the actual road conditions, which present the greatest problems.

there are few natural barriers on the flat plains and, as has been mentioned, the soil, with its tosca base, is capable of supporting heavy loads. The infrequent forested areas and saline depressions or lakes can easily be avoided and present minimal problems. Construction is further facilitated by the accessibility of materials. Gravel deposits and tosca are common. The basic components of the highways constructed are two layers of tosca covered by two layers of asphalt. The barriers to road construction are not geographical as these ingredients are readily available. The highways which are constructed are deteriorated rapidly by the natural elements. This, though, is as much a problem with the quality

of the original pavement and the lack of a maintenance policy as with unfavorable climatic conditions.

In summary, while there are physical limitations on both agriculture and transport, their effect is as much one of insecurity as of confining boundaries. There exist restraints on the types of animals and crops which are adaptable, but within these restraints the region is periodically capable of high production when agricultural methods are well-applied and precipitation is sufficient. In other years, when one of the frequent droughts lasts too long or many frosts occur, production is greatly reduced. products of the region often are marketed with few difficulties, but, in other years, transportation is costly. wrong combination of a good crop and poor roads leads to losses and this combination is practically always present for some producers. Highway construction could reduce both insecurity and transport costs immediately and perhaps have a greater effect, depending on both the extent to which the transport sector inhibits production and how ready the producers are to take advantage of better conditions.

<u>Population movements</u>.--Population size and composition is crucial in the agricultural development of a nation. In the case of Argentina, immigrants, through their original impacts and, later, through internal population shifts, were instrumental in the molding of the farm structure. From

1830 to 1857, while Europeans were migrating to the United States, the doors were closed to immigration to Argentina and few changes took place within the country. However, in the period which followed, a number of economic opportunities arose and Argentina became a desirable destination for the European immigrant. By 1869, there were 210,000 foreign born; by 1895, 1,000,000; and by 1914 there were 2,400,000 within the country. Although there was some immigration following World War I, the major population changes since that time have been internal shifts from farms to rural towns or from farms to cities. The early positions of the immigrants and the domestic migration which followed have been responsible, to a large extent, for the distribution of farm holdings and farm population which now exists.

The immigrants who arrived in Argentina were subject to varying, but usually well-intended public policies, and a fairly consistent and less well-intended social reception. Most of the governments made token efforts to prevent the expansion of <a href="latifundias">latifundias</a> and to reach some sort of equal distribution of land. However, large landholders prevailed and were successful in preserving their power. They

Torcuato S. Di Tella, Gino Germani, Jorge Graciarena et al., Argentina, Sociedad de Masas (Buenos Aires: Editorial Universitaria de Buenos Aires, 1965), p. 28.

<sup>&</sup>lt;sup>7</sup>Aldo Ferrer, and E. L. Wheelwright, "Industrialization in Argentina and Australia: A Comparative Study," Unpublished working papers from Instituto Torcuato Di Tella, Sec. I, 8.

were aided in this goal by the sale of large portions of land by the government as an easy way to liquidate a debt. Also, the attempt at colonization, especially in the province of Buenos Aires, was enforced by a weak form of governmental control in the face of a strong desire by landholders to maintain their status. As a rule, the result of government policies, despite their announced intentions, was a more centralized pattern of land ownership.

The people who travelled to Argentina had different characteristics than those who arrived in the United States. The immigration movement to North America was comprised predominantly of people from industrial, northern Europe. the time that immigration was beginning to increase in Argentina, in the 1860's, many of the people were originating in southern Europe. They were immigrants with agricultural backgrounds who were accustomed, in general, to an absolutist system of government and to taking little part in decisionmaking. Often they had no interest in integrating with the Argentines and preferred to form colonies with their own kind. Even when immigrants desired to become a part of the Argentine society, the process was complicated. There was no provision for naturalization in the law of 1876, which was passed to facilitate immigration; and, also, the primary power group, the land owners, discouraged integration or participation in government. Consequently, there were forces

leading to the creation of small groups outside of society's mainstream who contributed their labor to the economy, but had little desire or opportunity to join the Argentines in other aspects of life. The main thrust of these factors led to many immigrants assuming insecure positions as land renters, agricultural workers, or laborers in industries associated with agricultural processing. 8

Without an established status and often with little trade experience outside of agriculture, the new arrivals had limited alternatives. Those who could afford to buy land could not do so in the best areas and those who sought to rent plots were offered only short-term contracts because of increasing land values. Agricultural and industrial laborers were free to search for the best jobs which were available, within the scope of their often modest capacities. The lack of secure positions caused the settlers to leave little that was permanent, such as schools and towns, which were the by-products of immigrants in other nations. this organization of agriculture, it was relatively easy to shift workers to the city in World War I when the nation was forced, on a small scale, to begin the process of industrialization. However, the industrial base was not developed after the war and the migration to the cities was slowed until after the Depression of the 1930's prompted a more

<sup>&</sup>lt;sup>8</sup>See Oscar E. Cornblit, Ezequiel Gallo (h), and Alfredo A. O'Connell, "La Generación del 80 y sus Proyectos: Antecedentes y Consecuencias," Chapter 2 in Argentina, Sociedad de Masas.

definite change in the social structure. During the Depression reduced trade with other nations led to forced import substitution of some products, and fewer opportunities to sell agricultural goods. Many of the members of the labor force responded to the relative shortage of jobs on the farm by moving to the cities. Agricultural laborers, tenant farmers, and small landholders were, naturally, the first to leave.

By the mid-1940's, when Peron assumed power and began to encourage industrialization, many persons were still available to be shifted to the cities and to provide an urban labor force. An internal migration was stimulated by Peron's attempts to attract workers to industrial occupations, and, at the same time, the relative worsening of the agriculturalist's position. This migration is still taking place although the "push" of poor farm conditions and "pull" of the city have less force than when they were purposely stimulated. A recent study lists the following reasons as important in causing members of the rural sector to move to more urban areas:

- (1) new techniques lead to fewer agricultural workers required;
- (2) an increase in contract as opposed to permanent workers;
- (3) the division of land among heirs results in plots which are too small;
- (4) the attraction of conveniences in the cities such as schools, water and electricity;

- (5) an expansion of extensive cattle ranching, eliminating some farmers;
- (6) the droughts of 1949-50 and 1960-61 forcing some from the land;
- (7) the problem with erosion in semi-arid areas. 9

  To some extent, this migration has been from the countryside to rural towns, but because of the lack of conveniences in many towns, it is more often to larger cities. By 1963, the internal shifts had left only 19 per cent of the people on the land, well below the percentages in other Latin American nations. 10

The most noticeable change in the agricultural structure in the zone of the pampas is the reduction in non-owner operated farms from 119,900 farms in 1947 to 50,200 in 1960. 11 About one-third of this decrease can be accounted for by an increase in land owners while the remainder can be explained by factors which have already been mentioned. The change to an ownership position has been motivated by such things as the utility of land as a hedge against inflation, the status accompanying landholding and a desire for tenants and sharecroppers to purchase the land on which they have worked for a number of years.

Onsejo Nacional de Desarrollo, Tenencia de la Tierra (Buenos Aires: Consejo Federal de Inversiones, 1964), Vol. 1, 2nd Part, 25-27.

<sup>10</sup> Ferrer, and Wheelwright, op. cit., Sec. 3, 1.

Plan Nacional de Desarrollo 1965-1969 (Buenos Aires: Consejo Nacional de Desarrollo, 1965), p. 42.

The disparate assortment of farm sizes and the unsystematic agrarian structure can be understood in view of the fact that the diverse forces which encourage both emigration from the rural areas and the purchase of land are operating on an originally very unequal distribution of land ownership and an unstable population. The range in sizes of farms in southwest Buenos Aires province is illustrative of the situation (see Table 1). It shows at least 15 percent of the land in five categories of land holdings. When it is considered that the "ideal" economic unit is in the 300-499 classification, it is seen that more than 80 per cent of the land is being exploited in a manner which is, in this sense, "uneconomic." Furthermore, if, as is widely believed, land Owners, as opposed to renters, are the best developers of the farms, since they are more likely to make long run investments and give attention to soil management, the nearly equal distribution of owners on one hand and renters and Sharecroppers on the other shows about one-half the farms and One-half the land being exploited in a less than "ideal" manner. 12

Transportation. -- Transportation has always been especially important in Argentina because the major production and consumption areas frequently are not the same. Besides fulfilling the function of connecting domestic

<sup>12 &</sup>quot;Distribución de la Propiedad Agraria en la Pro-Vincia de Buenos Aires," <u>Revista de Desarrollo Económico</u>, I (Oct.-Dec., 1958), p. 206.

production centers, roads and railways carry the produce from interior points to the coast, where agricultural products historically have supplied, and still constitute, more than 90 per cent of the nation's exports. Geographically, there are no appreciable obstacles in the way of highway or railroad construction, but imposing problems remain in the transport sector. A brief look at Argentina's history helps to explain the reason for the poor transportation facilities which exist and their often uneconomic combination.

Table 1. Distribution of farms by size in southwest Buenos Aires Province, 1958.

Hectares	Number of Farms	Percentage of Farms	Hectareage	Percentage of Hectareage
10-49	3627	25.9	93,392	2.3
5 O- 299	6430	46.0	902,344	22.1
30 <b>0-</b> 499	1679	12.0	639,370	15.6
50 <b>0-</b> 999	1284	9.2	861,095	21.1
100 <b>0-</b> 4999	862	6.2	741,444	18.1
5000 and over	107	1.0	848,741	20.8

Source: "Distribución de la Propiedad Agraria en la Provincia de Buenos Aires," Revista de Desarrollo Económico, (Oct.-Dec., 1958), p. 211.

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Argentina, unlike most nations, jumped from the oxcart to the railroad age while spending little time in the building of roads. The unimproved road network which the nation possessed for decades was adequate, perhaps, for an isolated and unprogressive economy, but certainly was not capable of supporting the economic changes which transpired around the middle of the nineteenth century. Foreign investors, primarily from England and France, sought to transform the transportation structure by building railroads, in order to gain the benefits of the agricultural production potential in the internal regions. At first, from the initial investments in railroads in 1854, only a modest growth was seen and in 1871 there were still only 852 kilometers of rails. After this date, however, the increasing production and willing buyers abroad combined to induce impressive in-Creases in rail construction so that a total of 12,475 kilometers had been laid by 1891, mostly within the fertile province of Buenos Aires. 13 The growth continued as production was augmented and as agriculture was expanded to new areas. Railroads were improved at the expense of highway construction, and roads were relegated to the function of linking farming areas with railroad stations. As described by Scobie,

The railroads were mere feelers which probed into the zones of cereal, cattle, and sheep to gather in

S. Di Tella, Gino Germani, Jorge Graciarena et al., op. cit., 51.

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freight for the ports. They fulfilled the immediate transport needs of the countryside and at the same time inhibited the construction of roads. The railroads did not want competition and so for decades the only roads permitted were the mud ruts radiating from the railroad station . . . Roads remained as they had for three centuries—dusty shallow troughs or long canals, according to the season. 14

In 1907, the shortage of roads was officially recognized by the Mitre Law which exempted railroads from taxes if they spent 3 per cent of their profits on roads approaching their stations. While the law did assist road construction, the emphasis was still on building roads leading to railways. As early as 1915, it was reported that the major obstacle to agricultural production was the lack of roads. 16

The previous trend in transportation was changed in 1932. A law was passed which established the National Highway Administration, a system of taxes to raise revenue specifically for highways, and a long-range highway construction program. The law achieved a degree of success in that the mileage of maintained national highways increased almost 170 per cent in the fifteen years following its ratification. 17

James Scobie, Revolution on the Pampas: A social history of Argentine wheat 1860-1910 (Austin, Texas: The University of Texas Press, 1964), p. 62.

Transportes Argentinos Plan de Largo Alcance (Buenos Aires: Ministerio de Obras y Servicios Públicos, 1962), App. III, p. 18.

<sup>&</sup>lt;sup>16</sup><u>La Nación</u>, January 29, 1915, p. 8.

Transportes Argentinos Plan de Largo Alcance, op.

However, once roads were constructed with purposes other than serving railroads, the railroads began to feel the competition. This fact followed logically from characteristics of national development. The early and continued emphasis on the external market rather than inter-provincial trade led to a series of towns housing railroad stations along lines to the ports. The marginal status of the immigrant produced few desires to build towns in other places. Naturally, when roads were built, there were not many destinations other than these same towns and, consequently, they were usually constructed parallel to railways. 18

The uneconomic duplication of transport facilities which resulted was an important factor in the railroad decline which began in 1932. The returns to railroads were reduced so that even fewer funds were available for improving services and their competitive position worsened. The Depression, and later the War, limited expenditures on railroads which might have countered the highway competition so that the capacity of freight cars could not support the demand for shipments by railway. In some instances the increase

<sup>18</sup> See Map 1. This situation is illustrated today by the railways and national and major provincial roads in the region of influence of Route 35, which, in a number of cases, are parallel. When this is not the case usually the towns are not within the fertile crescent and were built after the railway boom.

<sup>19</sup> Alfonso Arnoldo, Geografía Económica Argentina (Buenos Aires: Editorial Kapelutz, 1963), p. 107.

in truck transport was forced as a means to handle goods for short and medium distances with security. Following the nationalization of the railroads in 1947, and the ensuing continual deficit, this tendency has been increased so that trucks were and are often called upon for hauls of longer distances which an efficient rail system could handle more economically.

During the administration of Peron, from 1946 to 1955, transport facilities deteriorated. Railroad services continued to decline and the slack was not taken up by highway construction. After Peron's departure, the new governments made several attempts to increase expenditures on highways and hoped to facilitate agricultural development in this Despite their indications of administrative interest, little was accomplished and the actual mileage of national highways maintained in 1960 was lower than in 1948. 20 with this reduction in road capacity on a national level, highway transportation was increased because (1) more truckers were using existing roads, (2) there was a very modest in-Crease in provincial road construction and (3) probably most important, railroad services had "out-declined" any deterioration which road transport services might have suffered. tween 1952 and 1963 rail tonnage hauled fell 50 per cent, although the number of ton-kilometers was reduced only 30 per

Transportes Argentinos Plan de Largo Alcance, loc.

cent, since railroads were still less expensive for longer distance deliveries. 21 Recently, there has been a governmental recognition of transportation problems in the form of studies and statements, but suggestions have often not been backed by money. When road construction or railroad improvements have taken place there has been little attention given to their coordination.

Transportation in the area between Bahia Blanca and Santa Rosa is adequate in some respects, but, in general, reflects the problems which are typical of the country. On the positive side, the road system has some relatively good dirt roads and also some recently paved highways which are in excellent condition. Also, in some parts the railroad service is sufficient. On the other hand, many of the dirt roads are inadequate and the roads paved more than four or five years ago are in poor repair. All roads suffer from a very im-Perfect or non-existent maintenance policy, but this has not Yet taken its toll on the newly constructed highways. road network is complemented by two national railways, the Roca Railroad and the Sarmiento Railroad that, regardless of intentions, are not equipped to offer consistently satisfactory service. More than 87 per cent of the freight cars  $\mathbf{i} \, \mathbf{n}$  the Sarmiento Railroad are over forty years old and in the Roca Railroad, the same percentage of cars is over thirty

Plan Nacional de Desarrollo 1965-69, p. 68.

years old. In the Sarmiento Railroad 80 per cent and in the Roca Railroad 67 per cent of the cars are considered to be in "very bad" to "normal" condition. 22 Even in their poor state, however, railroads are the desired means of sending agricultural goods to Bahia Blanca because their rates are lower. But, the unavailability of railroad cars, periodically poor service and incidence of strikes has led many to utilize trucks instead. Most of the livestock and about one-half the grains that have reached Bahia Blanca since 1961 have been hauled by truck. 23 Both systems of transportation have a great deal of room for improvement and the order in which they are improved will be influencial in the distribution of future freight movements.

With a railway that is inadequate to satisfy the demand for its services and a trucking industry that is expanding more rapidly than the supply of highways, the transport administration should decide how transportation resources can be best allocated. Most changes are having the effect of increasing the use of trucks beyond the present level which is already straining road capacity. Truckers now haul grain all year, rather than in the harvest season only, because of

Plan de Desarrollo Económico-Social, Provincia de Pampa (Buenos Aires: Consejo Federal de Inversiones, 1965), p. 70.

<sup>23</sup> Agri-Research, Inc., op. cit., p. 147.

the many granaries on individual farms and increased storage facilities in the towns and at the port. A proposed new unloading facility at the port, to be made especially for trucks, should enable the truckers to gain a larger share of the market. The over-used highways are being put in even worse condition as the trucking industry usurps freight which an efficient railroad could carry less expensively. Each change which aids road transport further injures the competitive position of the railroad. Railroads are still used because of the rate differential, but a recent rate increase has narrowed one of the railroad's only remaining advantages. Ideally, rail service should be improved and a more equal allocation of freight shipments initiated, but there is no indication that such a policy will be implemented. There are many possibilities for arriving at a more efficient .use of transport resources, but, because little is known as to what steps will be taken, it is impossible to predict the Zone's future.

Agricultural development. The development of the Present conditions surrounding the production of cattle and Crops can be described more easily following the discussion of population movements and the evolution of transportation. Cattle ranching emerged from the decades of the 1850's and 1860's with a relative advantage over cultivation. With a stronger historical base, the marketing of livestock received

the early benefits of technology. The British, with their capital and more advanced techniques, facilitated proper selection in cattle breeding and assisted in the shipment abroad of the finished product by investing in railroads, saladeros, and frigoríficos. 24 Foreign demand, especially British, provided a powerful incentive for livestock development and the fertile plains of the pampas were wellsuited for the industry. Furthermore, the extensive nature of ranching was not inhibited by the early lack of roads and 1abor, since these shortages imposed no limitations on the grazing of vast herds of animals that could easily be driven on—the-hoof to railroad stations or marketing centers. Even be fore the force of the immigration wave was felt, cattle ranching had become a flourishing industry and as early as the period 1880-84 it was responsible for almost 90 per cent of the nation's exports. 25

The cultivation of crops, unlike cattle raising, required labor and more diversified transportation to reach
large scale proportions. The planting of wheat, and other
crops to a lesser extent, was expanded when immigrants with
agricultural interests entered the territory newly-opened by

Saladeros are meat salting establishments which commercially preserved the meat for long periods so that it could be shipped to distant markets. Frigorificos are meat packing houses which facilitated the shipment of refrigerated meats.

Ricardo Ortiz, <u>Historia Económico de la Argentina</u> (Buenos Aires: Editorial Raigal, 1955), I, 312.

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the railroads. However, in the 1860's and early 1870's crops were limited to farms alongside the railways and were not common. Scobie was perhaps, too strong in stating that Argentina "needed a major injection of European laborers if it was to be anything other than a land of scrawny cattle and sheep. The habits of three centuries were deeply embedded in an urban population that subsisted on commerce, politics, and on enormous herds exploited with a minimum of 1abor, but was essentially correct in suggesting that labor was needed for agricultural development. 26 In 1872, there we re only 73,000 hectares of wheat, but as more immigrants came its adaptability was recognized and production stimu-1ated. 27 By 1878 more wheat was exported than imported and by 1891 there were 1,320,000 hectares of the grain under cultivation. 28 More advanced techniques were introduced with the emphasis on the world market and other crops such as corn, barley, oats and rye were added. All of the requisites for a modern agriculture were laid by 1880 to 1900 ac-Cording to Federico Daus, but there were some peculiarities within the farm structure which discouraged flexibility. 29

<sup>&</sup>lt;sup>26</sup>Scobie, op. cit., p. 30.

P- 81.

<sup>&</sup>lt;sup>28</sup><u>Ibid</u>. Scobie, <u>op. cit</u>., p. 38.

Aires: Editorial Nova, 1961), p. 43.

The area that was opened by the railroads, colonization schemes, and Roca's "conquest of the desert" fell into the hands of speculators and large landholders. related earlier, the immigrants who provided the much-needed labor had few jobs available other than as small landholders, tenant farmers or common laborers. "For each thirty-one who had a small parcel of property, fifty to one hundred hectares, sixty-nine were peons, renters of land or sharecroppers."30 Wheat proved to be an ideal crop for this system as it could be produced extensively on large estates, with a number of peons, or on small plots by one-crop farmers with little capital. In the cases of the tenant farmers, the short-term contracts and uncertain social position led to the seeking short-term gains. There was little interest in or ability to experiment with new crops and methods or to take any lasting interest in managing the soil. The large landholders had neither the inclination nor the pressure to change production methods. By the turn of the century, however, crop production shared almost equally with cattle more than 95 per cent of the nation's exports. 31 From this period until about 1929 there was a notable increase in capital applied to farming and some emphasis on improving plant varieties. The agricultural sector, though, was more capable of

<sup>30</sup> Gaston Gori, (Pedro Raúl Marangoni), <u>El Pan Nuestro</u> (Buenos Aires: Galatea-Nueva Visión, 1958), p. 32.

<sup>31</sup> Ortiz, <u>op. cit</u>., p. 312.

expanding existing products with existing methods than of varying the output-mix and improving techniques.

Agricultural expansion up to 1930 had been primarily a matter of extension, with the help of new capital, to new lands to produce the same product. 32 There were few problems in raising and marketing cattle and crops. However, in the 1930's, good lands were no longer available for expansion and the World Depression made it difficult to market that which was produced. Without the customary ease in exporting and the consequent inability to procure necessary industrial goods, Argentina was forced to de-emphasize agriculture and produce some of the goods which it could no longer import. The agricultural sector necessarily relied more on internal demand to absorb its produce. The 1930's were hard times for the farmers and the relatively poor rural conditions encouraged a readjustment of the marginal workers from the land to the city.

The pressure for population shifts was controlled to an extent by the national government's attempts to assist the farmers. In 1933, a policy of purchasing grain and Guaranteeing a market was introduced, and in the same year, steps were taken to control the internal price and quality of meat in an effort to make it more exportable. In 1935, price controls were also imposed on grains. The successes

<sup>&</sup>lt;sup>32</sup>Ferrer, <u>op. cit.</u>, p. 184.

of these policies varied in these few years, but by the end of the 1930's several good production years put an end to the controls. During World War II, however, controls were resumed.

After the War, and Peron's consolidation of power, the sale of crops came under government direction. Between 1945 and 1949 the agricultural harvests bore the full impact of Peronist policies. 33 The Argentine Institute for the Promotion of Trade (I.A.P.I.) supervised the purchase and expost of agricultural produce and used the proceeds from the operations to finance industrialization. The farmer rece ived compensation depending on government calculations of costs of production and, at times, this meant less than onehalf the world price. 34 With this system, while the external terms of trade for crops were improving, producers failed to reap the benefits. In 1950, cattle production, also, came under government supervision, but was subject to a less Stringent pricing policy. Actually, between 1949 and 1959, relative prices began to favor agriculture, but the trust and knowledge gap, as well as a lack of cooperating factors, failed to elicit a response by the producer. 35

Ferrer and Wheelwright, op. cit., Sec. V, 23.

<sup>34</sup> Elizabeth R. D. Ravizzini, <u>Investigación Sobre Precios Agropecuarios</u> (Buenos Aires: Secretaría de Estado de Agricultura y Ganadería de la Nación, no date), p. 19.

Panorama Conjunto para el Desarrollo Agropecuario e Industrial (Buenos Aires: Consejo Federal de Inversiones, Vol. I, Sec. A, 232.

During the last half of Peron's presidency, between 1950 and 1955, farmers were offered some protection from a fall in the world prices by the I.A.P.I. purchases, but the internal prices were still low, and consequently, a low agricultural base was established on which to expand production. Since the farmers had failed to benefit from the good years in the 1940's, they had few reserves on which to draw. Peron's encouragement of industrialization drew workers from the land, while high import duties on machinery prevented their replacement with capital goods. The rural workers who 1 = ft the land did not create cheaper machines for farm use to **fill** their positions. As a result, the area planted in crops was decreased approximately 32 per cent and much of the land was taken over by livestock producers who were less affected by losses in labor and shortage of machinery. 36 This entailed a large scale shift from agriculture to ranching and a definite loss in the momentum which crop production had gained by the end of the 1930's. The Peron period resulted in financial losses, a reversal of the previous increases in Capital and technology, and perhaps as important, a loss in confidence in the government.

In 1956, following the termination of the Peron regime, strict government controls were ended and a number of steps were taken to bring agrarian production back to pre-war

<sup>36&</sup>lt;sub>Gori, op. cit.</sub>, p. 128.

levels. Among the most significant agricultural contributions of post-Peron governments has been the creation of organizations to assist the farmer. The National Grain Board (La Junta Nacional de Granos) has freed the grain market, sustained minimum prices, and supervised marketing and quality standards. The National Meat Board (La Junta de Carnes), and its predecessors, established a central market in Buenos Aires and since has sought to improve meat marketing methods. The research centers and extension agencies of the National Institute for Agricultural Technology (I.N.T.A.) have made progress in research and disseminated its results farmers since its founding in 1957.

These and other government branches are still relatively new and, in some instances, spent several years just getting organized. Nevertheless, they have achieved a degree of success, although it is difficult to appraise because of the variables in the agricultural sector. Between 1953 and 1960 agricultural production was almost stationary, but this lack of progress can conceivably be attributed to the influence and lasting effects of the Peron period. The early 1960's when the results of the new organizations might have been felt, there was a prolonged drought which made the years poor ones for agriculture. Since 1964, production figures have improved and, in some cases, pre-war

<sup>&</sup>lt;sup>37</sup>Ferrer, <u>op. cit.</u>, p. 215.

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levels have been reached, but these gains are at least partially attributable to the more abundant rainfalls which have produced sizeable wheat crops.

cent production increases must be sustained. Argentina is the only major grain exporter that now ships less abroad than before the War. 38 In the pampas, certainly the richest agrarian zone of the country, agricultural output is not appreciably greater than thirty years ago. The national government is understandably concerned and is trying to induce increases in grain production, especially wheat, through its agencies and with price incentives, but has been relatively unsuccessful. The overall impression is not that people react negatively to changes in relative prices and governmental assistance, such as tax deductions or easy credit, or that there are unexplained changes in agriculture, but rather, that there are remarkably few changes.

The postulation of reasons for the lack of response by the farm sector, as it is reflected in the Bahia Blanca-Santa Rosa region is important since these reactions are crucial in determining what will be the farmer's response to a Change in the transport input.

<sup>38</sup> Walter Kugler, <u>La Argentina en el Año 1964, Dis</u>-<u>Cursos</u> (Buenos Aires: Secretaría de Estado de Agricultura y Ganadería, 1964), p. 119.

Agriculture in the Bahia Blanca-Santa Rosa region .--Since the Bahia Blanca-Santa Rosa region is physiographically transitional, a conscious effort must be made to overcome natural conditions if the farmer is to maintain consistently a high level of production. If this effort is complemented by proper choices in animals and seeds and types of machines, and the combination is applied intelligently, favorable results can be, and have been, obtained. There are many opportunities to increase production without applying more capital. Impressive gains have been made by utilizing the methods wha ich are suggested by I.N.T.A. For example, by merely varyire the timing in planting of a particular variety of wheat, **from** April 20 to June 1, the agriculture experimental station in Guatraché showed a difference of 17 per cent in annual yields over an eight year period. 39 Probably a great deal the problem of stationary production could be understood if one could answer the question, "Why don't more farmers use the techniques which are available to them?"

Two fundamental reasons for the lack of responsiveness stem from the demographic background of the region.
With its variety of land qualities the zone of Route 35 has
more complex historical antecedents than other areas. Within the fertile crescent, large landholders controlled much

<sup>39</sup> Roberto Oscar Leiboff, "Técnicas para la Incrementación de la Producción Agropecuaria en las Regiones Marginales Semiáridas," Mimeograph (Bahia Blanca, Universidad Nacional del Sur, no date), p. 6.

of the early farming land through purchases from the government or speculation. This land was served by railroads and consequently, the owners had an option of working the land extensively themselves or renting it to tenants. Today, many tenants remain in the area, as do small land owners who were eventually able to purchase the land which they worked under contract. Farther south, immigrants were able to settle directly on some of the land since its relatively low productive capacity made it less desirable to Argentines. As a result, the area now has many small plots and, in sections, at least 95 per cent of the land is farmed by its In the drier, less productive areas the land was settled following Roca's "conquest of the desert." Large land grants were given after the zone was freed from Indian control and many substantial holdings remain today. There are usually extensive cattle ranches if the land is managed by the owner, or tenant farms if the land is capable of crop production. This background, and the social evolution which followed, produced farms of all sizes and holdings of all types.

Recently, changes have been in the direction of more land owners and a breaking-up of large farms. There is no good evidence that renters are less responsive than owners, or that farmers in so-called "economic-size units" apply methods more rapidly than those in larger or smaller exploitations. But, it is generally believed by the renter that

it is not good economic sense to make permanent investments or to spend time with land management unless he plans to use a farm for a number of years. Also, the small farmers agree that they do not have the money with which to experiment or the financial reserves which would allow them to take chances. Producers on large farms have little pressure to experiment, although it is done, when they have interest in the land. Generally, owners are more concerned with long-run production qoals than are renters, and farmers on medium-sized plots are most apt to carry them out by using the resources available to them. To the extent that these maxims are correct, farmers in this area are not optimally operating with the best combination of the two characteristics, i.e. mediumsize farm worked by its owner. Until the efficient combination is reached there will continue to be a number of degrees of responsiveness inherent in the basic structure and incentives to change will probably be less successful than would be possible with a different agrarian organization.

A shortage of farm machinery is often blamed for low production and static techniques. Most farmers do have fewer machines than they desire and many have fewer than they need, but the problem often is not as it is represented. Historically, machines have been relatively expensive and their shortage has arisen from a lack of purchasing power. However, since the early 1960's the use of machinery has been encouraged by the national government, with the most

conspicuous inducement being an income tax deduction of up to 100 per cent for expenditures on farm improvements.

Specifically, farm improvements have taken the form of machines rather than investments in fertilizers, herbicides, or other factors which facilitate the application of new methods and increased production. Farm machinery has increased noticeably, but most of the increase has been comprised of tractors or harvesters, which permit the perpetuation of present techniques in a less costly manner, rather than a device such as a "sub-soiler" which is capable of increasing yields in a new way. Hence, while there is a shortage of machinery it is not as pronounced as the shortage of the most productive machinery.

In 1965, Walter Kugler, the Secretary of Agriculture, stated that, in some respects, the Argentine farmer was thirty years behind his counterpart in the United States and called for a technical revolution to narrow the gap. 40 Certainly he was correct in saying that more machinery is needed, but without accompanying changes in methods, yields per hectare will not necessarily be increased. Perhaps more production would be possible with more machinery and surely it would be at a lower cost to the farmer when he is using a tax deduction to buy a machine. But increased capital expenditures, alone, are not the solution to lagging production.

<sup>40</sup> Kugler, op. cit., p. 191.

The changing agricultural policies since the 1930's have imbued the farm psychology with a lack of confidence in the government. Producers have a reluctance to change methods or to make long-run plans. With the high rate of inflation which has been customary in recent years, the pervasive air of insecurity has been intensified. In general, "The Government" is a scapegoat for explaining the relatively low production and the continued use of traditional farming methods. The present effects of its actions perhaps do not justify the government's image. Nevertheless, time is required to overcome the producers attitudes.

The negative view of the government has been preserved by just enough policies which farmers find noxious. First of all, there are many studies ending in proposals for changes in policy which, although they may never materialize, create uncertainty. More concretely, in the past, after announcing a minimum price for grain, the National Grain Board agreed to raise this price if costs of production rose before the grain was marketed. This pledge was not honored. Annother time, the price was not announced until after all crops were planted so that farmers did not know which crop would be most profitable. Last year, 1966, an emergency tax was levied on land owners without previous warning. This year, there are plans to reduce the income tax deduction for farm improvements from 100 per cent to 60 per cent and this is seen as harsh in light of the progressive tax rates, which

rise to a maximum of 45 per cent. The provincial government of Buenos Aires is adding to the government image and offended the farmer's sense of fair play by attempting to collect unpaid taxes. The prevailing thought, which has some validity, is that the government receives a great deal of money and produces few tangible results in exchange, e.g. roads and buildings.

On the positive side, the national agencies which promote crop and cattle marketing, the research and extension services of I.N.T.A. and the relatively easy credit for farm improvements are beneficial results of past expenditures. The problem has been that the benefits have not been recognized. Much of I.N.T.A.'s research remains unapplied. Each year money to be loaned for the purpose of farm improvements is not requested. While the National Grain Board is appreciated, especially in its sustaining of minimum prices, one hears more about the absence of compensating prices for cattle and sheep. The psychology of the farmer is partially understandable in view of his often uncomfortable history, but it appears that there presently are fewer reasons for complaints than in the past and that the atmosphere of reluctance to change is itself a greater inhibition than oppressive government policies.

Inadequate transportation is also regarded as a limitation on production. Although it is seldom impossible to sell those goods which are produced, there is a

disinclination to send them to markets in Bahia Blanca and Buenos Aires where prices are higher. Normally, the sale of both crops and livestock takes place within small towns and few problems arise in their transportation. The supply of trucks is adequate for desired deliveries so that the only drawbacks are the permanently inadequate roads in the sandy or forested areas and the roads which are temporarily impassable in times of abundant rainfall. In the first case, products which cannot be shipped cannot be grown, and, in the latter instance, there are, at worst, delays and cost increases.

When products are sent to Bahia Blanca or Buenos Aires more difficulties are encountered. The problem, though, is more one of delays than of inaccessibility. In sending grains to Bahia Blanca railroad cars can be ordered several days before they are needed or trucks can be hired with less advance notice. Trucks can be stopped by rainfall and, also, often must wait in the port several days before unloading. In the cases of both train and truck, then, there are problems with delays, with those in trucking being more expensive to the sender. Unlike wheat, there is no problem in unloading livestock, but delays caused by impassable roads are more costly in terms of losses of animal weight. Also, the prices in livestock markets fluctuate appreciably and one or two days can make a considerable difference in the total value of a truckload of cattle.

The time element is viewed as the primary reason for not producing dairy products on a more than local scale. Daily train service does not exist and trucks cannot reach Bahia Blanca each day as would be required in the case of milk. It is debatable whether there is adequate demand for dairy products from all of the zone of Route 35 and whether the more attractive prices for cattle in Bahia Blanca and Buenos Aires would remain as high if producers in the zone had easy access to the markets. However, improvements in roads surely would reduce the time and cost necessary in marketing agricultural goods. Any further effects would depend on how the farmers use the newly released resources.

A factor which is extremely important, but difficult to evaluate, is the farm psychology which exists. This is as much a result as an explanation of other problems. The inertia within the rural sector is acknowledged by the I.N.T.A. technicians, the minority that attempts to bring about changes, and even those that have been using the same procedures for years. Some attribute it to Latin blood, others to lack of pressure to alter methods because life is comfortable without them, and still others see the combination of all of the factors which inhibit production as significant. Certainly the failure to undertake major investments can be attributed to unprofitability or lack of confidence in the economy, but why someone will not plow twice rather

than once or choose the best variety of wheat to plant and plant it at the most opportune time is difficult to explain in terms of confidence and profitability. Those that have been successful with simple but fruitful changes do not seem to have a great influence on the majority who continue to operate with "plant and hope" methods. Kugler showed an awareness of the problem in writing that the nation must change the attitudes and modify the forms of thinking of many farmers so that they will use the natural factors available. 41 A recent study has found that the principal cause for the backwardness of the agricultural sector is the failure to use the new technology and this failure results from a lack of willingness as well as a lack of means. 42 While the problem on the national level is to make more technology available for use, that on the local level is to make more use of what is available.

From these limiting factors, one, highway transportation, was chosen to ascertain if its improvement is capable of increasing agricultural production. Its effects might be either direct in reducing costs or increasing production or indirect in reducing some of the other inhibitions in the agricultural sector and thus augmenting production. In either

<sup>41 &</sup>lt;u>Ibid</u>., p. 38.

<sup>42</sup> El Sector Agropecuario Frente a la Expansión Económica (Buenos Aires: Consejo Nacional de Desarrollo, 1962), Sec. II, 5.

case, they can be isolated more easily if studied on a regional basis. For this reason a particular <u>partido</u>, Puan, is being focused upon in the ensuing chapters.

## CHAPTER III

## AGRICULTURE IN PUAN

Puan is the third largest partido in the province of Buenos Aires. With its dimensions of sixty kilometers by one hundred fifty kilometers at the broadest point it is about the size of a county in the United States. Its elongated shape places its limits from about eighty kilometers to almost two hundred kilometers from the port at Bahia Blanca and this shape and location make the partido ideal for more intensive study. Puan includes land within three of the four major rainfall zones in the region between Santa Rosa and Bahia Blanca and contains representative types of soil and vegetation. 1 The forty-four unpaved kilometers and a paved sector of Route 35 which traverse the partido allow a comparison of expectations and aspirations before the improvements of a dirt road with the actual effects of paving in an almost identical area. The highway, because it is near the 500 millimeter isohyet, divides Puan into fairly definite north and south regions with distinct characteristics. north, about two-thirds of the area, is typified by small

<sup>&</sup>lt;sup>1</sup>See Map 3, showing the rainfall zones in the region and specifically, in Puan.

farms, intensive methods, and more diversified production than the south. Most farms in this region are from 200 to 400 hectares, with the largest reaching 2500 hectares. The south contains extensive farms as large as 10,000 hectares and, where the conditions are better, as small as 400 to 500 hectares.

Road quality varies generally according to these north-south limits as well. There is a large difference between the best tosca roads of the north and the worst tracks in the south, where a road is a section of flat land on which the growth of bushes and grass is not high enough to prevent a pick-up truck from passing. Between these extremes, both sections of the partido contain dirt roads of varying qualities which are occasionally impassable because of rainfall. These farms and road characteristics can be found within other partidos of Buenos Aires or departamentos of La Pampa, but not within one governmental unit.

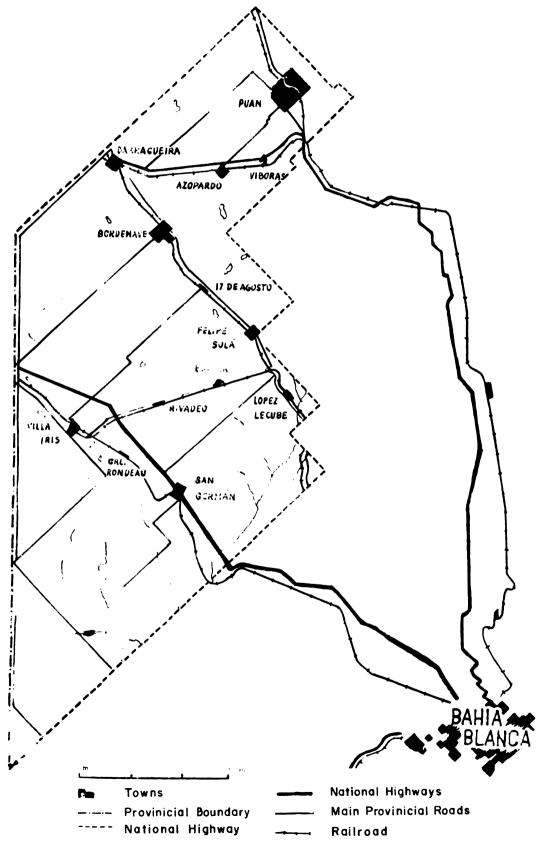
Puan ranges from the fertile land in the north where 650 millimeters of annual rainfall make possible the growing of wheat, oats, barley and rye as well as the raising of cattle and sheep, to the south where 460 millimeters of rainfall, poorer soils, and natural obstacles, in places, allow the production of cattle alone. In the north only about 10 per cent of the land is unarable and although animal pests exist, they do not present production problems. The "economic-size" farm is considered to be 300 hectares, but

it is possible to live well with less. Most of the renters of land are centered in the northern section of the partido on the smaller plots on which the wheat crop is more certain. In the south, on the other hand, about one-half the land is not suitable for cultivation and at least 500 hectares are considered necessary to provide a reasonable living. rye, and hay barley are grown on some farms in the south, but, with the forests and sandy soils, crops frequently cannot be grown. Livestock can graze in the forests and underbrush, but here, too, there are limitations. The wild boar, pumas, and foxes make sheep production impossible in some areas and can limit lucrative activities to cattle alone. Puan is more fertile in the extreme north and wilder in the extreme south than most of the Bahia Blanca-Santa Rosa region, but the major part of the partido is similar to other partidos and departamentos in that it is a transitional area which is conducive to both livestock and crops.

People. -- Puan has a population of 21,144, grouped mainly in several centers, the largest being Darragueira (4,748), Puan, the capital (3,387), and Villa Iris (1,911). Each of these towns (and the others shown on Map 4) has or had a train station and is now served by an adequate dirt

The figure for the <u>partido</u> is a 1966 estimate while those for the towns are from 1960. All data are from the Dirección de Estadísticas e Investigaciones, Ministerio de Economía y Hacienda, Provincia de Buenos Aires.

MAP 4
Towns and Transport Networks in Puan



road. There have been some shifts from farms to towns and towns to cities, but the size of the population is not appreciably different than it was twenty years ago. The actual on-farm population has been reduced by the substitution of machines for labor and the improved mobility which allows a farm owner to live in a town or city while working the land, but this decrease has been compensated for by the greater number of persons providing services within the towns.

People living in the northern and southern extremes of the <u>partido</u> can commute from Bahia Blanca by National Highways 33 and 22 respectively. This is more common in the south, as the farms are larger and one can more easily leave a foreman in charge. In the north the distribution of the towns is such that frequently a farmer can live in town and reach his farm, by car, within fifteen to twenty minutes.

More producers live on the farm, however, and choose between Route 35 and the railways for travelling or for sending products to Bahia Blanca.

Puan is similar to other <u>partidos</u> in showing a slow overall increase in the growth rates of both population and production, with losses in some areas being out-weighed by gains in others. It differs from others in that some producers have the choice of taking alternative routes to Bahia Blanca while farther west the people must choose between railways and Route 35.

The most recent agricultural census, in 1960, showed Puan with 1,381 farms on its 561,584 hectares. The size distribution of the exploitations is broad, which is representative of the area, but more of the variance can be explained by economic necessity than in the cases of other partidos (see Table 2). More recently, the trend has been toward more renters purchasing the land which they farm, which means, since they seldom rent plots of more than 500 hectares, more land owners and smaller holdings. Because of the category limits, precisely how much land is farmed in "economic units" of 300 to 500 hectares is not known, but as much as one-half could be within this range. Actually, there do not seem to be great differences in methods between producers on various size farms in the same zone, although distinctions are noticeable between zones because of soil and climate dissimilarities.

between renters and owners of land in that the former are more likely to farm a small plot intensively with an emphasis on wheat rather than a mixed farm. If the renter plans to purchase the land or to renew his contract, as is the custom, his techniques vary little from those of land owners, with the exception that his investments tend to be in goods which

<sup>&</sup>lt;sup>3</sup>Censo Nacional Agropecuario, 1960 (Buenos Aires: Direción Nacional de Estadísticas y Censos, 1960), p. 56.

can be removed from the land. In 1960, the land owners, who comprised about 50 per cent of the producers, farmed 60 per cent of the land, while the rest was worked by renters.<sup>4</sup>

Table 2. Distribution of farms by size in the <u>partido</u> Puan, 1960.

Hectares	Number of Farms	Percentage of Farms	Hectareage	Percentage of Hectareage
Up to 25	100	7.3	1,093	. 2
25-100	136	9.9	10,305	1.8
100-200	290	21.2	47,975	8.5
200-400	506	37.0	153,501	26.3
400-1,000	268	19.5	157,209	28.0
1000-2,500	58	4.2	89,827	16.0
2500-5,000	11	.8	34,362	6.1
5000-10,000	9	.7	57,312	12.0

Source: <u>Censo Nacional Agropecuario, 1960</u> (Buenos Aires: Dirección Nacional de Estadísticas y Censos, 1960), p. 56.

As is typical of the area, the majority of income arises from agricultural industries. In the only income study in Puan, in 1964, crops accounted for 51 per cent and livestock for 25 per cent of total product. The remainder

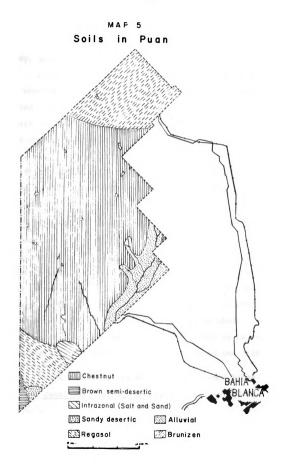
<sup>&</sup>lt;u>Ibid</u>. These figures are not stated precisely because of inconsistencies in data.

of the output was primarily services to persons in agriculture. Construction and industry, between them, were responsible for only  $1\frac{1}{2}$  per cent.<sup>5</sup>

Crops. -- Wheat is and has been the predominant crop in Puan and annually constitutes about 90 per cent of the marketable harvest. The soils and climate of the area are very suitable for "hard" wheat, which is ideal for making bread and has a high export value. Of the many varieties of "hard" wheat which exist, there are several which are most often used, depending on the timing of the rainfall and other factors such as differences in resistance to pests, strength of stalks, suitability for pasture and idiosyncrasies of the soils on particular farms. Each variety has about the same yield if its "life-cycle" is coordinated with rainfall and the humidity of the soil. The technicians at the I.N.T.A. station near Bordenave have ascertained which varieties of wheat are best adapted to the zone, and their recommendations are well-known and often applied. Even when prescribed techniques are not followed, the wheat harvest is typically more lucrative than that of other grains and if there is only one crop on a farm, it is usually wheat.

<sup>&</sup>lt;sup>5</sup>From the Dirección de Estadísticas e Investigaciones, Ministerio de Economía y Hacienda, Provincia de Buenos Aires. It should be noted that 1964 was a very good year for crops and that the numbers of livestock were lower than normal because of the drought from 1960 to 1963. Crops and cattle usually divide agriculture's share of the partido's income in approximately a 6.4 ratio.

Despite the advantages of wheat, farmers also cultivate barley, oats, and rye. About 10 per cent of the marketed crop of the partido is brewery barley, while hay barley, oats, and rye are used primarily to provide pasture for livestock. When the yields of these pasture crops are substantial they are sold, but, more frequently, the harvest furnishes seed for the coming year only. Even brewery barley is generally not chosen as a crop to be sold at the beginning of the year, but, rather, is cultivated when the rains do not provide enough moisture in May or June to plant the desired variety of wheat. This alternative is available, however, only in the middle and northern sections of the partido where the chestnut and brunizen soils are suitable for brewery barley. The cultivation of the other cereals also varies with soil qualities; barley for pasture, like wheat, can be grown in practically any area of Puan; oats are most common in the north of the partido where there are brunizen soils and more abundant rainfall; and rye is found in the southern and western regions of the partido, utilizing the chestnut and sandier soils (see Map 5). When the crops are planted specifically for pasture, a variety with a long life-cycle is chosen so that the planting can take place as early as March. The harvest, if it is thought profitable, can then be completed before that of the wheat crop, which is in December or January. The relative proportions of the grains grown and sold in Puan are illustrated by 1966, a typical year, in



which there were marketed 130,000 tons of wheat, 15,000 tons of brewery barley, 2,000 tons of oats, 1,500 tons of hay barley, and 1,000 tons of rye.

Fruits and vegetables are not cultivated extensively, even where the soil and climate are conducive to their production. Their market is limited to local towns and several farmers can usually satisfy the demand. There is no type of fruit or vegetable produced on more than 5 per cent of the farms, since most people find it easier to purchase them. A shift in the composition of products is not likely because of the relative advantage which grains have gained in both production and marketing.

Livestock.--About 60 per cent of the land is used for the production of the 175,000 cattle which exist in Puan. On all but seventy of the 1,381 farms breeding and/or fattening of cattle is practiced, with three-fourths of the land devoted to breeding. In the north, where each hectare can support one bovine, ranching is viewed as a less profitable, but more secure activity than is cultivating wheat. In the south, on the more extensive farms which require as many as three hectares per animal, cattle are seen as the primary,

<sup>&</sup>lt;sup>6</sup>From Ministerio de Agricultura, Buenos Aires.

<sup>7&</sup>lt;a href="Censo Nacional Agropecuario">Censo Nacional Agropecuario</a>, 1960, pp. 87-91, 99-

<sup>8&</sup>lt;u>Tbid</u>., pp. 63, 128.

and sometimes only means of earning a living. The common practice in both the north and south is to breed the animals and then send them further north, to central Buenos Aires, for fattening. However, in some cases, even in the less fertile south, the pastures are capable of fattening the animals and sales are made directly.

The process of raising cattle can be simple. begun by accumulating either Aberdeen Angus or Shorthorn cattle, depending on preferences, since there is little difference in raising the two varieties. The cattle are grazed on natural or annual pastures, bred, and sold when their ages, weights, or prices suit the producer. A minimal amount of management is required, if the farmer chooses to let the cattle breed and feed freely. About 70 per cent of the cattle ranchers operate with techniques midway in complexity between this most simple procedure and the methods which are used successfully in more agriculturally advanced nations and suggested by I.N.T.A. 9 Ideally, pastures should be better managed, perennial pasture planted, and the required amount of grazing land reduced, while a reserve of hay is ac-The animals using this feed should be systematically selected, vaccinated against foot and mouth and Bang's diseases, and maintained in clean pastures. Attention ought to be given to the number of bulls and cows within each

<sup>9</sup> Information received from I.N.T.A. station at Bordenave.

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pasture so that the number and quality of calves can be controlled. It is best to send calves to be fattened as soon as they are weaned, if fattening does not take place on the same farm. Actually, even this most complicated process is not difficult and entails only more concern for sanitation, types of food, and a conscious management of the reproductive process. The low animal production is evidence that the best methods are not used. According to the I.N.T.A. technicians there is an awareness of many of the proper techniques, but farmers are either not receptive to change, or lack the technical or economic resources to adopt them.

Sheep were introduced on a large scale during the Depression when it was valuable to have a cash producing product at least three times per year; it was customary to sell wool twice and a percentage of the animals at a third time. Since that time they have become common and producers on more than 1,000 farms keep between 490,000 and 500,000 sheep. As many as four sheep can be fed on each hectare and the pasture can be of a lower quality. They are an inexpensive form of on-farm consumption and provide food insurance against droughts. This is not the case in the south,

<sup>10</sup> Only fifty-five cattle are produced for each 100 maintained as compared to about 90 per cent in a similar area in the United States.

ll Censo Nacional Agropecuario, 1960; p. 132, and Dirección de Estadísticas e Investigaciones, Ministerio de Economía y Hacienda, Provincia de Buenos Aires.

however, where they provide a cheap source of consumption for carnivorous animals if they are not corralled at night. The extra effort and risk required in caring for them is responsible for their absence in the wilder areas.

Recently, in the north, the raising of sheep has recently become less popular, since the money price is sometimes lower than that of two years ago, and this has been with a rate of inflation of greater than 25 per cent per year. With the fluctuating prices in Buenos Aires, one of the marts for producers of Puan, a farmer often receives less for his animals than it costs to raise and ship them. They are still maintained for their wool, but of the two varieties, Lincoln and Corriedale, only the finer wool of the latter is withstanding the competition of synthetic fibers. It is troublesome to gather sheep for shearing their wool and eliminating their parasites, to which they are very susceptible, and in many cases their economic benefits do not outweigh their disadvantages.

Pigs are also raised to a limited extent, but they are used primarily for on-farm consumption or to satisfy local demand. Chickens, eggs, and milk are used by restaurants and stores within small towns. Cattle and sheep easily dominate the animal products and are the only ones marketed on a large scale.

Mixed farm methods. -- The mixed farms of the north require more complicated management than a one-product

exploitation. 12 Suggested methods are the same as in the south, where only cattle are reared, but the balancing of crops and cattle makes their implementation more complex. Since livestock represent insurance against a poor crop as well as a source of food and income, the producer must consider more factors in administering the farm. Even when more variables are introduced, however, there are few differences in the techniques applied.

At the beginning of the year, there are tentative plans to use about one-half of the fields for cattle and one-half for wheat. The farmer is very much dependent upon rainfall and is prevented from formulating more than rough ideas of how long to keep an animal before it is sold and which variety of wheat to plant if the precipitation falls at the desired time. Since crops are bound more by the climate, livestock become balancing factors which can be manipulated according to the conditions which arise. While cereals require decision as to the time of planting, little more attention is necessary and, after they are sown, the farmer needs only to wait for the rain to determine the success of the crop. On the other hand, cattle and sheep are managed

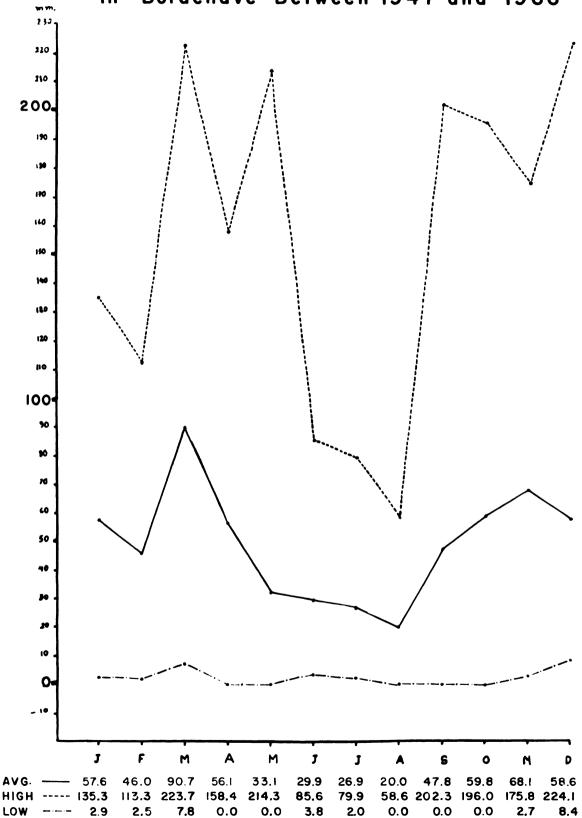
<sup>12</sup> Since there are 1311 farms with cattle and 1094 with wheat out of a total of 1381 exploitations, there are over 1000 mixed farms in the <u>partido</u>. These statistics are from the <u>Censo Nacional Agropecuario</u>, 1960.

<sup>13</sup> See Graphs 1 and 2 showing yearly and monthly rainfall in Bordenave and demonstrating the variability in precipitation.

Between 1947 and 1966 Bordenave GRAPH Yearly Rainfall in 1000 200 200 õ 007 100 007 \$30 700 001

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GRAPH 2
Monthly High, Low, and Average Rainfall in Bordenave Between 1947 and 1966



according, not only to the weather, but also the farmer's need for money, the fluctuation of market prices, the success of the grain crop, the ages of the animals, and the abundance of pasture. These factors often delay decisions on cattle marketing to several weeks before they are sold. The changes in tentative sales plans which are necessitated by external factors are in numbers of animals, however, rather than in methods of production.

By the end of January, usually, the wheat crop has been harvested and the cattle and sheep are allowed to graze on the remaining grasses in the field. There are plans to sow the last year's pasture land with wheat and these fields will be plowed once or twice before the sowing takes place. A long life-cycle winter cereal is planted for pasture about March so that it can be used in conjunction with the natural pasture which often exists.

If rains do not fall in March or April and pastures become depleted, fewer animals can be kept on each hectare and some must be sold. When rainfall in April or May is inadequate for the farmer to plant his desired variety of wheat, he must either change to a variety with a shorter life-cycle or plant brewery barley. Little precipitation is expected in July or August so that pastures must be adequate to sustain livestock over this period. If food is not sufficient, the number of animals is reduced. At such times the farmer must be aware of market prices as dry periods are

often geographically widespread, and the volume of animals sold can drive prices below a level which covers costs. Occasionally, income deficiencies can be alleviated by the sale of wool, which is often stored in anticipation of a better price. Heavy rains usually occur in November and parts of October and December so that pastures are replenished. However, if the rains are infrequent and/or in small quantity, so as to lower the yields of wheat, livestock must be sold to offset the reduction in expected income.

By December, the cereals which were planted for pasture are harvested for seed and for sale if the crop justifies. The wheat crop is then harvested in the period from mid-December through January, if it was not limited by a shortage of rainfall, frosts, or hail storms. Wheat is either harvested personally with equipment which the farmer has available, or with rented machinery, of which there is seldom a shortage at this time of the year, and hired manpower, which is sometimes scarce. After the harvest, the cattle are shifted to the recently used wheat fields and the process begins again. The numbers of livestock may be larger or smaller, depending on the needs of the past year and plans for the future.

While conditions can be harsh for producers, some years pass in which crops and livestock are unhindered by natural elements and all tentative plans materialize. Actually, the production environment of a mixed farm operating

in an area of variable climate, rather than presenting problems only engenders some constructive habits in producers. The mixed farm system, by its nature, requires a rotation of crops and animals rather than the cultivation of wheat year after year. In the process, land is made more fertile than would be the case without crop rotation and resources are not permitted to be idle. The variable rainfall forces a conscious selection of wheat varieties and an awareness of the correct time to plant them. New seeds are used every one or two years, and trials are performed by many farmers to ascertain which variety is most adaptable to their land. In the field of wheat selection the farmers, as a whole, are probably more advanced than in any other technical area.

Unfortunately, innovations are most often made by altering components within the system of production rather than in procedures which would change the system. The use of a better tractor or a newer seed is far more common, and less effective, than planting crops for soil enrichment, taking preventive steps against erosion, or practicing a barbecho which would elevate the entire framework within which production takes place. 14

In preventing innovations, on the other hand, the mixed-farm system is responsible for inhibiting progress.

<sup>14</sup>A <u>barbecho</u> is the process of plowing land and leaving it idle for, preferably, about five months. It is done to kill weeks and increase the soils' humidity.

By alternating fields between cattle and wheat, so as to leave no land idle, the farmer limits his flexibility and discourages the adoption of soil management techniques. Although requiring a break in the cycle and the freeing of land from crops and livestock for a period of time, these techniques would produce better long run results. The crucial factor lacking is a reserve of hay to maintain cattle while soils are being worked. Farmers have been reluctant to adopt the idea of hay reserves for cattle because it represents a break from the time-tested procedures, but a change is considered essential in progressing beyond present land capacities and as helpful in improving the land so that the variability of the weather will have less influence.

Production techniques. -- The absence of modern agricultural techniques described in Chapter II is as applicable and as difficult to explain in the case of Puan as it is in the greater Bahia Blanca-Santa Rosa region. The partido is subject to the same climatic limitations, distribution of farm sizes and ownership, shortage of the most productive machines, lack of confidence in the government, transportation problems and inhibiting psychology. In Puan, the organization which is doing most to improve the situation is the local I.N.T.A. station. It is an accessible experimental farm and extension agency, specializing in crop production, within a two hour drive of at least 90 per cent of the

producers in the <u>partido</u>. Locationally, it is at a disadvantage because it is not situated within a town and, consequently, few farmers visit the station without making the trip for this explicit purpose. Locational disadvantages are at least partially offset by its extension services which provide meetings at centers of agricultural activities, such as agricultural cooperatives, to disseminate knowledge of modern methods.

In experiments which have been conducted at Bordenave, including trials of plant varieties, various orders in planting crops, the use of several quantities of fertilizers, and barbechos for different time periods, techniques have been developed to increase yields appreciably. For example, wheat production, has been increased from the area normal of about 960 kilograms per hectare to 1100 kilograms after the application of 130 kilograms of nitrogen fertilizer per hectare; to 1250 kilograms with a barbecho five months before planting; and to 1500 kilograms with the application of both a five-month barbecho and 130 kilograms of nitrogen fertilizer. These experiments were conducted between 1964 and 1966 and perhaps will be less (or more) impressive when repeated over a period of time.

Even with the increased yields gained by using fertilizers, the cost is such that one loses money when they are used alone and profits are only about one-third as high as is normal in the area when they are used with a five-month barbecho. With present conditions, the use of fertilizers can be made profitable only by a reduction in their cost-something which the government could initiate. On the other hand, barbechos have continually increased production, as they require no more than the use of available machinery for a simple plowing process and then a period of time in which the field lies idle. The benefits have outweighed the cost of maintaining a reserve of hay for the livestock which cannot feed on the fields when they are idle. In this case, the government has less opportunity to provide price incentives and the producer must introduce the process himself.

The most significant increase in production at the station has arisen from improvements in the use of the moisture which exists e.g., <a href="barbechos">barbechos</a>, sub-soilers for perforating the soils beneath the surface, and contour plowing methods. A major obstacle in the way of the acceptance of these methods, besides the interrupting of the mixed farm routine, is the generally fatalistic view of rainfall as <a href="the">the</a> source of water and, consequently, the essential factor in production. The variability in the frequency and volume of <a href="tainfall">tainfall</a> has led to a "plant and hope" philosophy rather than inducing producers to search for methods to offset its effects. There are few people who keep rainfall statistics; only one study of subterranean water for irrigation was found, and attempts to preserve soil humidity by eliminating weeds or with <a href="barbechos">barbechos</a> are not widespread. Consequently,

after the crop is chosen, usually wheat, the precipitation before the sowing of the seeds is the primary determinant of the area planted, and the rainfall frequency and quantity between this time and the harvest is the principal factor governing the size of the crop. If this reliance on rainfall is decreased by the application of newer methods, improvements in transportation and more efficient tractors or harvesters will have greater effectiveness since the cost reduction which they provide will apply to a greater level of output.

It is estimated by the technician in charge of extension activities that of the farmers in the partido about 10 per cent use very poor methods, while 70 per cent continue to produce in the manner to which they have become accustomed, with only occasional changes. Although some of the more progressive producers feel that production in the partido could be as much as doubled with no new application of capital--merely working with one's head--the extension agent believes that a 20 per cent increase would be a more accurate estimate. He attributes the greater increase shown on the I.N.T.A. farms or by the more proficient producers to better physical conditions and to more capital applied to the land. The instances in which one farmer produces from sixteen to eighteen bags of wheat per hectare while another in a nearby field produces over thirty bags are not rare and demonstrate the untapped production possibilities. Some of

the differences can be explained by variations in expenditures, but frequently in such cases there are basic dissimilarities in methods. Surely, there are farmers who would like to update their techniques and cannot afford to do so and others who are discouraged from doing so by noneconomic factors. Most common are responses to a neighbor's better output such as "Rodriquez was lucky this year," or "the rains missed my field." Suggestions by I.N.T.A. technicians that the production increases are due to the application of better techniques often meet with comments (after the departure of the I.N.T.A. agent) of "I.N.T.A. works more with theory than with practical conditions" or "perhaps those methods work on some farms, but I've worked this land for twenty years and know it better than those technicians." Others acknowledge possibilities of improving production, but see no pressing need to do so in view of the more or less comfortable life which exists. 15 The implications of the attitude are important. Even if government agencies were to decrease prices of machines, fertilizers, and herbicides, to lower taxes, and to employ other incentives, they could not remove the inhibitions on production.

<sup>15</sup> The producer's net profit for wheat production is about 25 per cent according to the National Grain Board and I.N.T.A. figures. The net profit on cattle production begins at a higher level, about 50 per cent, but decreases with poor management so that typically it is at only a slightly higher level.

Although some producers acknowledge the effectiveness of new techniques and assert that they would like to update their own methods, they maintain that the cost of doing so is too high. In Puan the argument that farm improvements are too expensive is not convincing. Producers have enjoyed a tax deduction of up to 100 per cent for expenditures on farm improvements and such investments are frequently worthwhile if money is available. Credit is relatively easy to obtain and few farmers, with personal property to use as collatoral, have difficulty in acquiring funds. The Bank of the Nation (Banco de la Nación), which was designed to lend to farmers, loans money in the amounts of receipts for farm expenditures for up to five years at an interest rate of 15 per cent. Even though this is a negative real rate of interest, considering the 20 per cent annual rate of inflation since 1962, many funds go unrequested.

The problems confronting Puan in the future are not identical to those perpetuated by simple models and the differences should be stressed. The development of agricultural regions is sometimes achieved in textbooks by the building of trust and confidence in the national government, which will bring money back to the agricultural sector that, because of insecurity, was invested in other areas; by the removal of inhibiting policies that limit production; and by the provision of more cooperating factors to remove crucial

bottlenecks and raise production. While all of the elements of the models are present in Puan, to some extent, their applicability can be over-estimated.

First of all, even with the high rate of inflation, there does not exist a large problem of funds flowing out of the farm sector because of insecurity or investment disincentives. In this area of relatively small farms, practically all profits are invested in goods which fall into the category of farm improvements. This is not only what most farmers in Puan desire to do, but also it is encouraged by the tax deduction for expenditures on farm development. Consequently, the quantity of money which can be brought back into agriculture is small. With a policy designed to reclaim outflows of funds it can be hoped, at best, to draw investments from outside the agrarian sector, but with the predomination of relatively small plots, this is not likely.

The most obvious governmental inhibitors are the progressive personal income tax (with rates of up to 45 per cent) and relatively high prices of such things as machines, fertilizers and herbicides. While both taxes and prices can be problems, they are not as important as they are often represented to be, in view of the easy credit and tax deductions. Also, on some farms, a greater problem than the lack of machinery is the over-capitalization in machines which can be used only a short time per year. The failure

to invest wisely is at least as important as the inability to invest.

The removal of bottlenecks by the provision of cooperating factors is not precisely applicable either. Although problems with transportation and storage facilities,
for example, can alter the timing of the farmers' actions,
there are no bottlenecks which prevent producers from acting
as they choose. The improvement of these facilities would
reduce costs and effort in the production process, but it is
debatable whether they also would have significant effect on
the quantity produced.

The principal problems in Puan are the lags between the availability and application of new techniques. Solving them is a matter of encouraging the shift of present expenditures of time and money into new fields. This has been accomplished most successfully by promoting the use of experimental plots on individual farms, for if results of new processes are seen as personally beneficial, their use is expanded. Evidences of increased production at the I.N.T.A. station or on the more progressive private farms are less convincing as a farmer is interested in the adaptability of a procedure to his own farm rather than to the region in general. The process, however, is by its nature a slow one.

Actions in Puan are better explained on a micro rather than a macro level. An hypothesis based on the encompassing assumption that all those being affected by a national policy

decision will react as "economic men" is less capable of accounting for the conduct of the farmer in Puan than an explanation beginning with, perhaps, a community indifference curve analysis. The "economic man" assumption is applicable in the cases of reactions which require no change in the slopes of production transformation curves. For example, if a farmer is faced with two costs of shipping products to market, he will choose the lower one, if services are roughly comparable, for his decision has no effect on the combination of factors of production. However, if it is assumed that a farmer will alter the slope of his transformation curve by making use of new factors of production, conclusions are likely to be unreliable. In terms of changes in the transportation input, the reduction in costs arising from less expensive rates can be counted on; however, less immediate effects on production are by no means sure.

Presently, almost all agricultural inputs are improving; techniques are more sophisticated; plant and animal varieties are adaptable to specific areas; machines are increasing in number and quality; marketing has been facilitated, etc. The only factors which do not seem to be moving forward are the availability and use of water, the number and quality of workers, and transportation facilities. In the first case, techniques have been developed to make better use of available moisture, and, in the second, machines are

being introduced to substitute for the worker. The solution to the transportation problem—the building of highways—appears to be less subtle, but this remains to be shown. The immediate benefits arising from cost reductions following improvements in highway transport are examined in Chapter IV and in Chapter V, it is ascertained what benefits can be expected to accrue to farmers from new combinations of inputs.

## CHAPTER IV

## TRANSPORTATION IN PUAN

The transportation facilities in Puan are representative of those in the Bahia Blanca-Santa Rosa region. There are roads ranging from overgrown ruts to newly paved highways, a noticeable increase in the size of the trucking industry, and a railroad with old cars and occasionally poor service. While there exists an awareness of road inadequacies everywhere in the zone it is especially prominent in Puan because of the lack of paved highways. This is accentuated by the unpaved section of Route 35, since those living close to it are most conscious of the inconveniences which it imposes. Furthermore, a citizen's group, the Movement to Pave Route 35, is active in preserving a recognition of the problems so that the improvement of the road will be encouraged. Many persons believe that the paving of the route is important, if not necessary, in elevating the area economically.

Interest here is focused on the effects of road improvement on production in the agricultural sector which, it
will be recalled, produces about 75 per cent of the product
of the area. By concentrating on Puan it will be shown

specifically how the transportation structure is related to agriculture. More particularly, the influences of road improvements on agricultural marketing methods and costs will be discussed so that the magnitude of proposed benefits can be estimated. Since Puan is a representative partido, the conclusions should be applicable to the region.

Roads in Puan. -- The road network between Bahia Blanca and Santa Rosa is a combination of national, provincial, municipal and private routes. Its most important component, National Route 35, is composed of nine sections; three within the province of Buenos Aires and six within La Pampa. Only two of these, both within Buenos Aires, are not in "good" to "excellent" condition. The section leaving Bahia Blanca has eight kilometers without pavement while the remainder, thirty kilometers, is in very poor repair. Approximately fortythree kilometers of newly paved highway lie between this first section and the forty-four entirely unpaved kilometers in Puan, stretching from San German to the provincial border. Once the driver leaves the national highway, he finds a mixture of public and private roads which have in common being of dirt and being poorly maintained. The main provincial which are adequate between towns, are complemented by roads a vast system of roads and tracks. Every one or two miles

A section, or <u>tramo</u> in Spanish, signifies a portion of the highway of about 40 kilometers which is contracted for and constructed separately from the others.

there is at least the beginning of a road, many of which are no longer functional because of degeneration with use or lack of traffic. With all of these routes, the network does not lack adequate mileage, but is short of roads that are improved and well-maintained.

While variations in road quality within a zone depend on the quantity of traffic, the maintenance policies, and the nature of improvements, those differences among areas are influenced by soil composition as well. There is a significant dissimilarity in the more easily-muddied, occasionally impassable brunizen soils of the north and the sandy and gray soils of the south which are, in places, too loosely packed to provide traction (see Map 5). Between these extremes there is a combination of brown, chestnut, and gray soils with elements of saline or brunizen soils intermixed. The greater part of the area is comprised of these more transitable soil types with a hard layer of tosca a few inches beneath the surface. The roads in these areas were graded wide enough for at least two large trucks to pass and, because of their favorable soil qualities, problems arise only when there is a heavy rainfall or in places where the black or sandy soils predominate. While vehicle maintenance costs are undoubtedly higher on most of these roads than is the case on paved highways or well-maintained dirt roads, problems with rainfall, as in the north, or impassability, as in the south, are much less common.

It was decided to question truck drivers from Puan about road conditions so that their effects on transportation could be determined. Unfortunately their responses to a preliminary questionnaire were not only inconsistent, but contradictory with those of the agriculturalists and marketing agents who hired their services. Some drivers asserted that roads are intransitable from ninety to 180 days per year--practically any time when there are ten to fifteen millimeters of rain. According to producers and representatives of marketing organizations, however, problems in sending goods to Bahia Blanca are encountered for only about fifteen days during winter and an occasional day in summer. They contend that roads prevent movement only after thirty or forty millimeters of rainfall in the areas with brunizen soils; that it takes more precipitation to hinder transportation farther south with the lighter soils and tosca base; and that transit is possible after as much as eighty to one hundred millimeters of rainfall on the sandy soils. In fairness to the estimates of the truck drivers, it should be pointed out that "intransitable" can be defined differently by someone operating a truck, who does not care to risk being stuck or increase the chances of damage. This, perhaps, can explain some of the large variation in responses. ever, because drivers said that they can complete from eight to twelve trips to Bahia Blanca per month, with an average of three days per trip, it becomes difficult to rationalize the figures.

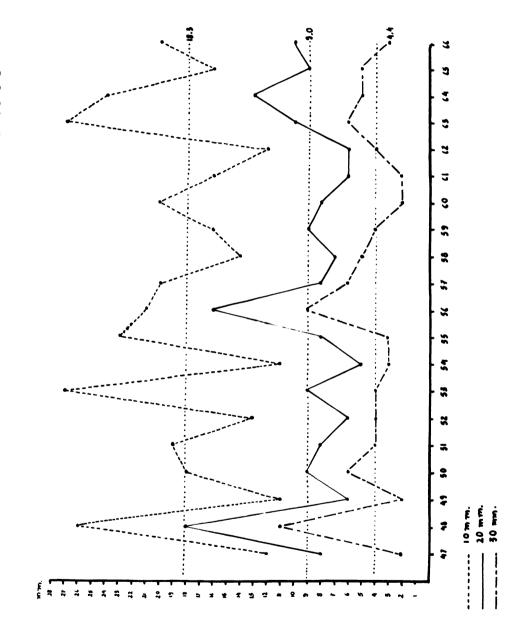
There is no doubt that there are road problems, and that sometimes they are inconvenient and costly, but they are usually exaggerated by both drivers and producers. The rainfall statistics support the assertions of the producers and marketers, since the days that roads could be impassable, even with only thirty millimeters (slightly more than one inch) of rainfall, average less than four and one-half per year for the past twenty years. Because roads are not impassable for a greater period than this, their main effect on transportation appears to be one of occasionally causing loads to be reduced and increasing costs of operation and maintenance of vehicles.

Transportation industries. The increase in the number of trucks in the past years indicates that conditions are not so bad as often portrayed. A number of drivers have purchased better vehicles and many entrants into the industry, have newer trucks. Consequently, there are more vehicles in better condition than was the case a decade ago. However, this increase, while providing better services, has caused

<sup>&</sup>lt;sup>2</sup>Statistics are from the I.N.T.A. station at Bordenave. With 605 millimeters of rainfall per year, the location is of representative humidity for the <u>partido</u>, but more than an average between the extremes of the north and south. Allowing for a heavy rainfall making roads impassable for several days, an estimate of two weeks intransitability seems appropriate. (See Graph 3.)

GRAPH 3

Number of Days with Rainfall of Ten, Twenty and Thirty Millimeters in Bordenave Between 1947 and 1966



problems within the industry. The periodic shortages of work led some to cross provincial boundaries in search of freight, but, in turn, this resulted in complaints from drivers in other provinces, and, finally, in a law prohibiting the practice. Competition has further been limited by the government's fixed tariffs in terms of kilogramkilometers for hauling production anywhere within the province. With the present limitations on mobility and standard prices of services, many have found it beneficial to associate with the trucking centers, in Puan, Darraqueira, and Villa Iris, which receive orders and allocate them among mem-These movements toward more trucks, less mobility, fixed rates, and larger business centers for drivers have limited competition, but have facilitated the marketing of goods for those who deal in agricultural products by regularizing service and providing more opportunities to send freight by trucks.

The fixed rate per kilogram-kilometer is important since it means that a driver on the best paved highways and worst of dirt roads receives (officially) the same payment. This situation aids the farmers in Puan relative to those in other areas since, with less pavement, they receive more services for the same price, but, at the same time, it limits the benefits which they can gain from road improvements. The paving of all highways could take place and, while reducing

costs to truckers, allow producers, at best, to ship more securely and save time since tariffs would remain unchanged. However, in practice, the official rate has become more a figure around which to bargain than an accepted price. On paved roads or dirt roads of good quality the official rate is usually accepted, but truckers become scarce in some zones, for example, the forested and sandy areas of the south, when they are not induced by a bonus rate for their travel on poor roads. In other cases, drivers accept less than the official rate when competition between trucks increases or where an attempt is made to procure some of the business which otherwise would go to railroads. In effect, shipments are made on the basis of personal contracts, some of which vary appreciably from the official rate.

The personal contracts with truck drivers make it difficult to estimate the prospective savings for producers arising from road improvements. Generally, it is expected that little change in farm transportation costs will arise from paving national or major provincial highways since, for dirt roads, they are in good condition and producers would pay an identical sum for sending goods across them after their paving. Improvements in roads in more out-of-the-way areas seemingly would lead to a reduction in transport payments, but, even in these instances, the matter is not entirely clear. The truck driver would benefit by the road improvement as he would be able to provide more rapid services

with fewer chances of breakdowns and damages to goods. With fixed rates or with little competition between truckers however, the gains need not reach the producers.

The railroads compete in varying degrees with highway transportation, depending primarily on their tariffs. When there is a large divergence in prices for their services, they haul heterogeneous products, but when the differential narrows, the differences in the qualities of the services offered cause shippers of each class of good to choose between them. The greater speed, mobility, and reliability of trucks, and personal contact with the truck drivers cause some to utilize highway transportation, but the presence of all-weather hauling and, most of all, lower freight charges work in favor of the railways. When competition occurs, the parallel construction of the principal roads and railways intensifies it, because the points of origin and destination are practically always the same. Unfortunately for the railways, just as there is a frame of mind that advocates road improvement, there exists a prevailing thought that rail service is poor. Practically everyone has a story about delays, strikes, misplaced wool, or dead animals resulting from shipment by rail. Even if these instances are not common, the stories are influential in offsetting the rate advantage of the railways and determining choices between road and rail use.

While railways have a few of all of the difficulties which are attributed to them, the major problem for their users is a lack of freight cars. The people that send freight by rail are familiar with the type of service to expect and make their decisions accordingly. Of the agricultural products in this area, railroads are used primarily for shipping Truckers can compete for wheat haulage, but, with present service, it is difficult for railroads to compete for truck cargo, i.e., cattle and sheep. There is much more freight which could be sent by train if the railroad's lower rates were complemented by better service. Hence, if roads were improved, it would be possible for a simultaneous change in railroads to offset any relative advantage which might have accrued to highway transportation. In this case, the farmer's position would be enhanced, but it would not have been as a result of road improvements. On the other hand, the strengthened trucking industry, after the road construction, could damage the competitive position of the railroads. A higher price might be demanded for shipments of goods by rail for which the two industries did not compete. Also, as happened between San German and Villa Iris, road improvements can shift freight to highway transport to an extent that causes a discontinuation of rail service and, perhaps, leaves some producers in a worse position since supplies no longer reach them by railway and they no longer have the alternative to send goods by train. The problem,

then, becomes more complicated when an area is served by both railways and roads and, depending on the competitive positions of the two industries, road construction can harm some farmers while assisting others. When the users of the transport facilities are sensitive to change in roads and railroads, as is the case in Puan, the effect of progress by either industry must be viewed in relation to the present condition and probable future position of the other.

Marketing .-- The marketing structure within Puan is particularly suited to making the producer independent of changes in transportation facilities. The towns, because they have developed around railroad stations and, later, have become trucking centers, house the entire organization for the sale of the farmer's products. In the case of grains, the harvest is stored in private granaries or in bags in the fields until it is sent by truck to a market. If a farmer lives near Bahia Blanca he can send cereals directly and avoid the extra charges for unloading in a rural town and loading again on a truck or a railway wagon. Most farmers, however, live far enough from the port so that the difference in rates between trucks and trains is greater than the labor charge for an extra loading and unloading process. quently, sales are usually made within the towns to agriculture cooperatives or to independent commercial organizations. When this is the case, the cereals are sent to one

of the grain elevators present in almost all population centers in Puan, as prescribed by the purchaser. At this time the producer's job is completed and he must only wait for payment--usually a five month process.

There is little to choose between cooperatives and commercial enterprises as a place of sales since they offer similar terms. Some find it more convenient to sell to the cooperatives, in whose profits they share, while others consider the opportunity to discuss the sale at an independent organization more important. Many sales are split between the two types of purchasers for no reason other than to receive money from two sources. The terms offered by the purchasers are similar because both sell a large quantity to the National Grain Board and receive time payments according to the Board's program. At times, grains are sold directly for export or to flour mills or breweries to the north so that another type of contract is arranged. The latter opportunities, however, are less common.

Upon receipt of the grains, the marketing organizations make contracts with the National Grain Board or one

Payment is based on the plan by the National Grain Board which pays 70 per cent of the total within 10 days and 10 per cent on days 90, 120, 150 after that date.

Another important type of contract is for sales on the black market. This is done in several ways, the most common being the sale of wheat to a person who solicits the grains on particular farms at a price lower than the market price in exchange for immediate payment.

of the other sources for sales mentioned above. Most often they attempt to send all that is sold to the port at Bahia Blanca by train. After ordering freight cars in advance they encounter few problems with volume shipments. casional unavailability of wagons necessitates the periodic use of trucks so that a contract can be fulfilled, but trucks are seldom the first choice. Sometimes, when the Grain Board needs grain rapidly, its administrators pay the difference between the rail and the truck tariffs so that more is hauled by truck than the venders, themselves, choose. preference for railway cars is reinforced by the Grain Board's practice of unloading them before trucks in normal Partially as a result of this policy and partially times. because of inadequate unloading facilities, trucks must usually wait two or three days, and at times over ten days, to unload. From Puan at least 80 per cent of the grains are hauled by train and there would be a higher percentage if more cars were available.

Cattle and sheep can also be sold in the towns so that the farmer need not rely directly on transport facilities. With a large quantity of animals, the producers send them personally to the larger meat markets in Bahia Blanca and Buenos Aires, or to the North for fattening. Customarily, however, animals are sent to the frequent auctions held in almost all population centers. Sometimes the farms are close enough to the auction place so that they can be driven

on-the-hoof, as is common with unfattened animals. The fattened livestock lose about as much weight in value terms, by walking to the auction as the cost to ship them by truck so that the latter, more convenient method is used. Once the animals are sold, the purchasers send them, almost always by truck, to be butchered or fattened. Railroads can be used for this purpose, but the losses of weight and greater chance of injury during the more time-consuming trips usually preclude this possibility. 5

The only other major product, wool, is sent in the same process as grains or livestock, either to a town for future sale by someone else or directly to Bahia Blanca. In both cases the wool ultimately arrives at the market in Bahia Blanca by truck. It is easy to ship wool by train, but custom and problems with losses have maintained the emphasis on truck delivery.

The farmer's opportunities to gain from improved highways are limited by their current marketing methods and means of sending production to the port. Producers make direct payments to truckers primarily for short farm to town shipments. Usually, marketing intermediaries are responsible for shipping production so that farmers have little personal contact with the truck drivers. Consequently, if producers are to benefit, gains from road improvements must first be

<sup>&</sup>lt;sup>5</sup>This situation is not peculiar to the zone, as it is also the common practice in areas of the United States.

received by trucking enterprises, then passed to marketing intermediaries, and finally transferred to farmers. When savings accrue to trucking enterprises, there is no guarantee that they will be passed on to either producers or intermediaries because of the fixed trucking tariffs.

If the institutional structure were changed so that cost reductions were passed on from truckers, it is probable that producers would be the recipients. When direct payments are made from producers to truckers the savings would be received immediately. When the intermediaries receive and ship products they would have to pass savings to the producers if the producers were to benefit. Since cooperative and marketing organizations compete not only among themselves but also with the farmer's alternatives of personally sending or hauling goods to Bahia Blanca, it is likely that the farmers would ultimately receive the gains from road improvements.

Transportation costs.--It is necessary to estimate the magnitude of cost reductions arising from road improvements so that if government action lowered the trucking rates or allowed truckers to compete freely, the savings which could be passed on will be known. A list of costs which is published in revised form each year by the National Grain Board allows a demonstration of the effects which can be expected

from road improvements. Since these data are from 1966 the actual money values have changed slightly, but their relative weights should not have been altered significantly. figures listed are for a hectare of wheat with an assumed output of 1.000 kilograms per hectare, slightly higher than the 960 kilogram average. This farmer is assumed to live fifteen kilometers from the town, a realistic assumption. As is the custom, he harvests the crop himself instead of hiring a contractor, and sends it to town by truck and to the port by The elaboration of costs shows 11.7 per cent of the total cost of planting, harvesting, and marketing a hectare of wheat attributable to transportation and, of that, only 2.6 per cent is assigned to farm to town costs. With the present system of bonus rates for poor roads it is this 2.6 per cent which could be reduced if all highways were improved. reduction is highly unlikely, in fact, since remote feeder roads are below priorities of national and provincial highways and, even if it were applicable, it would result in no official reduction in marketing costs. 7

<sup>&</sup>lt;sup>6</sup>The National Grain Board data were fit to the conditions of the area at the Bordenave I.N.T.A. station (see Table 3).

<sup>&</sup>lt;sup>7</sup>The possibility is even more improbable when it is considered that the unpaved portion of National Highway 35, if paved according to a contract being negotiated, will take at least ten years to complete from the first pavement plans.

Table 3. Cost of production in 1966 pesos for a hectare of wheat in Bordenave.

Type of Cost	Cost	of	Percentage of Sales Price
Direct Costs			
Including plowing, seeds, herbicides, harvesting, imputed return to land and other items.	2,918	39.2	29.2
Indirect Costs			
Including imputed personal income, taxes, amortization of capital and other items.	3,327	44.7	33.3
Commercialization and Taxes			
Excluding transportation	332	4.5	3.3
Transport From Farm to Town	195	2.6	2.0
Transport From Town to Port	680	9.1	6.8
Total	7,452	100.1	74.5

Source: National Grain Board as applied by I.N.T.A. technicians to the Bordenave area.

A similar calculation is difficult to make for cattle production because of the number of reasons for which the animals are sold and variable time periods for which they are raised. While wheat is more or less a uniform product, cattle can be marketed as several distinct products, with different sexes and ages being sold for reproduction,

fattening and slaughter. The easiest and most accurate estimate of the share of the cost of transportation in the marketing process is the per cent of the sales prices which transportation comprises (see Table 4). For the major classes of cattle which are marketed, transportation is only from 2.6 per cent to 3.4 per cent of the sales price. It is estimated by the manager of the largest cattle auction firms in the area that the profit margin is as high as 50 per cent for the most efficient producers. This implies that payments for transportation are, at most, less than 7 per cent of the cost of production and marketing. This is certainly a small percentage for road improvements to affect. Even if there were no transport costs, the savings would not be large.

Sheep and wool show similar low figures for transportation payments as percentages of sales prices (see Table 5). Transportation costs range from 8.7 to 12.3 per cent of prices for the principal classes of sheep while the percentages for wool are only 1.3 and 2.0. The actual costs of production for sheep and wool are extremely difficult to calculate because of the variable methods used in raising the animals and the existence of many types of wool as byproducts. Transportation costs are insignificant in shipments of wool, but more important in the case of sheep. The relatively larger share of the sales price which is attributed to the transport of sheep is because of a low price for the animals rather than high costs for trucking services. Truck

Transportation costs as percentages of sales prices for cattle sent from Darragueira to Bahia Blanca. Table 4.

Type of Cattle	Kilos Per Animal	Pesos Per Kilo	Value Per Animal	Animals Per Truck	Value Per Truck	Cost Per Truck	Costs as Percentage of Sales Prices
Fat Steer	400	09	24,000	28	672,000	18,805	2.8
Steer Calves	220	63	13,860	45	723,700	18,805	2.6
Cows	400	20	20,000	28	560,000	18,805	3.4
Heifers	300	09	18,000	32	576,000	18,805	3.3

Note: (1) Cattle are sent from the area in approximately the following percentages: fat steers 10, steer calves 30, and cows and heifers 60. (The principal cattle auction firm for Source: Emilio M. Biondini S.R.L.

the zone.)

Transportation costs as percentages of sales prices for sheep and wool. 5 Table

Product	Basic Unit	Pesos Per Unit	Units Per Truck	Value Per Truck	Cost Per Truck	Transportation Costs as Percentages of Sales Prices
Sheep						
Ewe	l animal	850	190	161,500	19,805	12.3
Castrate lamb	l animal	1200	190	228,000	19,805	8.7
Ram lamb	l animal	950	220	209,000	19,805	9.5
Ewe lamb	l animal	1000	220	220,000	19,805	0.6
Wool						
Fine	10 kilos	1000	1500	2,400,000	30,000	1.3
Coarse	10 kilos	1000	1500	1,500,000	30,000	2.0

(1) These figures are averages of variable prices and qualities. Notes:

Emilio M. Brondini, S.R.L. (Remotes-Ferias) Casa Torre--A marketing organization. Sources:

<sup>(2)</sup> Sheep data are for shipments from Darragueira to Bahia Blanca.

<sup>(3)</sup> Wool data are for shipments from Villa Iris to Bahia Blanca.

rates have been increasing in the past years while the absolute price for sheep is lower than in 1965. Even if transportation costs were reduced considerably, sheep production would not be much more lucrative because of the low retail price.

The data presented for livestock and wool are only approximations. They represent averages in June 1967 and are subject to change because of the variable prices and qualities of the products. Nevertheless, it is not likely that they will be altered enough to make the transportation costs as percentages of sales prices substantially different. With transport comprising 8.8 per cent of the sales price for wheat; cattle and wool having a much smaller proportion, between 1.3 and 3.4 per cent; and sheep a slightly higher figure of up to 12.3 per cent, an estimate of about 8 per cent is a reasonable approximation of the upper limit for agricultural products in the partido. 8 If the net profit is assumed to be 25 per cent, this means that transport costs comprise about 10 per cent of the costs of producing and marketing agricultural products. The monetary benefits which the truck drivers pass on to the producers must fall within a range from 0 to 10 per cent of the costs of production. The unpaved section of Route 35 comprises just over one-fourth

With grains accounting for 50 to 60 per cent of the value of production and cattle for 20 to 25 per cent, sheep and wool are comparatively insignificant. Consequently, the relatively higher transport costs for sheep and lower costs for wool do not strongly affect the 8 per cent approximation.

the journey from Bahia Blanca to Darragueira and its improvement could not have a large effect on the total costs of shipments. Any gains which are possible are not certain since the official truck rates would not have changed.

These computations have been made assuming that the present conditions will be in effect when the road improvements are made and this seems to be the best assumption. ever, it is informative to postulate a competitive trucking industry which would pass on all of the gains from road improvements to the producers, or to the marketing intermediaries who would, in turn pass them on to the producer. latter assumption is reasonably applicable to the present economic system but the former is improbable. The official rate, being set in the capital, is not likely to change because of road improvements in the southern portion of the province. Furthermore, the failure to account for costs gives the truckers no knowledge of what should be passed on to producers and almost any apparent gain is rationalized with the high rate of inflation because costs are also rising.

The best cost data for vehicle operations and maintenance are those from <u>Transportes Argentinos</u>, <u>Plano de</u>

<u>Largo Alcance</u> which were taken from the American Association of State Highway Officials pamphlet and modified to Argentine conditions. It is assumed that after a road improvement the highway will remain in its improved state and that traffic

will continue at the same rate. Actually, both of these assumptions are contrary to the recent experiences within Puan, as highways have deteriorated and traffic has increased with time. The money costs are no longer applicable so they have been converted to indices.

<u>Vehicle</u>		Road	
	Paved	Gravel	Dirt
Truck (10-12 ton)	54.9	80.1	100
Truck (25 ton)	53.8	80.1	100

Since there is no appreciable difference in relative costs of operation for trucks of unequal tonnage on any one type of road, the costs will be considered to be in a 100:85:55 relationship for all trucks. That is, the costs of driving on paved roads and gravel roads are 55 and 80 per cent respectively of the costs of driving on dirt roads.

With these cost data the production within the radius of influence of Darragueira was examined. Darragueira was chosen because it is the marketing center in the <u>partido</u> most distant from Bahia Blanca and because it is necessary to travel more provincial roads before arriving at Route 35. It is assumed that Route 35 is paved; that all provincial roads are gravelled; that products are hauled by truck; that

Transportes Argentinos, Plano de Largo Alcance, op. cit., App. I, p. 41.

traffic will be diverted to the new pavement; and that movement from farms to town is on unimproved local roads. With these assumptions the greatest amount of cost decrease should be demonstrated, so that the theoretical model will indicate the largest gains which could accrue to truck drivers and be passed on to producers. 10 The above indices are multiplied by the number of kilometers of a section of highway of a given quality to arrive at the results in Table 6. It is demonstrated that with a national and provincial road construction program, (a more ambitious proposal than can be expected), the operating costs for vehicles could be reduced 18.9 per cent. Since traffic diversion requires more kilometers to be travelled than the present route direct to Bahia Blanca, the savings would be slightly less. Even if 20 per cent is accepted as the upper limit for savings for truck drivers and the entire amount is passed on to producers, this is applied only to the 8 per cent of the product sales prices or the 10 per cent of production and marketing costs which transport comprises. With the optimistic assumptions that have been made, the decrease in total costs would not reach 2 per cent. It is this 2 per cent which can be viewed as an increase in the quantity of production marketed since it is no longer necessary to pay this amount (in kind) for transportation.

This excludes losses arising from delays caused by rainfall or "tie-ups" at the port, so that on some occasions losses would be greater.

Reductions in transportation costs between Darragueira and Bahia Blanca as a result of the improvement of provincial roads and Route 35. rable 6.

Section of Road	Cost Index x Kilometers Before Improvement	Cost Index x Kilometers After Improvement	Percentage Reduction
Farm to Town (15 kilometers)	1,500	1,500	0
Darragueira - Bordenave (15 kilometers)	1,500	1,200	20
Bordenave - La Pampa Border (44 kilometers)	4,400	3,520	20
La Pampa Border - San German (44 kilometers)	4,400	2,420	45
San German - Bordeau (76 kilometers)	4,180	4,180	0
Bordeau - Bahia Blanca (8 kilometers)	800	800	0
Total	16,780	13,620	18.9

Plano de Largo Alcance applied to Source: Data from Transportes Argentinos, the roads between Darragueira and Bahia Blanca.

Origin and destination study. -- It was originally planned to make an origin and destination map to show freight movements by rail and road so that the degree to which road improvements would reduce costs could be estimated. tionnaire was delivered to the managers of the cooperatives and the largest private enterprise dealing with grain to gather this information (See Appendix 1). Also, the trucking companies which haul livestock in the zone were questioned about the quantity of animals shipped from specific points. The relative percentage of products sent by truck and train are easy to acquire, but the total product transported is difficult to obtain. It is estimated that 80 per cent of the grain is sent by rail and about 80 to 90 per cent of the livestock and wool are sent by truck, but, because of institutional factors, the estimates of quantities involved are not accurate. Sales on the "black market" prevent accurate disclosures from producers and marketers so that it is difficult to discover how many products come from a particular area. There are totals listed for loads at each railroad station, but, without a knowledge of the quantity of freight sent by truck, these figures are dubious guides for projections. The bills of lading of trucking enterprises could supply the information, but they are filed in chronological order, with no concern as to origin or destination. The time necessary to compile the data would not be justified since the end result would still not show

all of the freight shipped--only that by major companies.

Often statistics are in non-comparable forms such as heads

of cattle and weights of shipments so that an interpolation

is required with already incomplete figures.

A highway traffic study could provide a clue to the amounts carried from given zones, but one is available only for one point on Route 35 between the provincial border and Bahia Blanca and this is for only three week-end days of December each year. No trends are evident in the available figures, except, perhaps, more traffic in the years since the paving of several sections of Route 35. This can be explained by increases in vehicles and problems with railroad service as well as by any other factor. Even if there were a distinct trend, a sample based on three days of week-ends on successive years, with no notation as to the type of products carried, allows no unequivocal conclusions.

A problem has been avoided by working with the marketing center which has the highest transportation costs, Darragueira, and showing that the costs are insignificant. The areas nearer to Bahia Blanca and Route 35 would show smaller cost reductions. Thus, while precise statistics are not available for the <u>partido</u>, the upper limit of cost reductions has been calculated and, because it is so low, the more detailed figures for intermediate areas are not necessary.

Role of transport. -- The future traffic flow depends on the relative improvements in roads and railways and the subsequent rate differentials. Whenever the rates are close enough to prompt a comparison of services, the railroads lose business, but there is no guarantee that the ser**v**ice differential will continue. The railways, being national enterprises, are more likely to make large changes at one time, while changes in trucking are slower because of the numerous independent enterprises. On the other hand, even with new cars and better facilities there is no quarantee that services by the railroads will change appreciably, while with improved highways it can be relied upon that truckers will take the easiest route. There are too many possibilities to predict the future, but, if the past is the best predictor, no rapid changes should be expected and the assumption that conditions will continue in more or less the same manner is the most accurate possible.

Without knowing the future, it can be stated that even the estimated maximum cost reduction arising from high-way improvements is not a large percentage of total costs. While the cost reduction possible ranges from 1 to 2 per cent if the production climate remains unchanged after road construction, even if all freight were assumed to travel without cost, the decrease in costs of production would reach at most, about 10 per cent. Evidently there are not

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many problems in selling goods or in transporting them from the farm to the market. A greater difficulty is encountered in the port than in the fields. If road improvements are to increase agricultural production substantially, it must be shown that the time and cost reduction in sending products to market can be used advantageously, or that the improvements will promote a higher output in another manner. The use of these savings in time and resources and other possibilities of increasing production which transport makes available are examined in Chapter V on the basis of interviews with producers in Puan.

## CHAPTER V

## INTERVIEWS IN PUAN

If agricultural production is to be increased substantially by road improvements, as hypothesized, the major impetus must be provided by the realization of new opportunities which accompany them or by the application of previously unutilized techniques which they promote. It has been shown in Chapter IV that lower truck tariffs will not appreciably reduce the costs of production for agricultural goods. Here, increasing production in a more indirect manner was studied through personal interviews with farmers from Puan. If the less direct effects of improved highways are to be assessed accurately, it is essential to know the post-construction plans of the producers. Most studies assume that people will take advantage of the opportunities which become available. A consideration of expected actions on a regional level allows the proof of this assumption. Although it cannot be inferred from high aspirations that the effects of construction would be significant, a failure to anticipate increases in production is an indication that they would not. If road construction is to have a substantial impact, intentions to expand production or produce in a more

efficient manner are important if not necessary. The expectations of the producers were examined in reference to other factors which would facilitate or hinder their fruition. With this information, the probable effects of highway improvements were estimated.

Questionnaire.—A questionnaire for farmers in Puan was prepared, following a preliminary examination of the partido, so that data relevant to the farmer's expected reactions could be obtained (see Appendix 2). The primary purpose of the questionnaire was to gather information about the relationships between road improvements and agricultural production, but it also provided an opportunity to acquire an understanding of the methods, problems and desires of the farmers. There were sections soliciting a description of the farm, discussions of the problems with natural elements, the sales processes, the role of transportation, the effects of government policies, and the factors determining investments, and a chance to make comments about any subject not mentioned.

The order and form in which the sections were used was considered important. Always, they were employed consecutively, but variations in the sequences of specific questions were common. Each section was used as a topic for discussion, with any question which could not be brought into the conversation asked specifically before proceeding to the next section. The parts of the questionnaires concerning the sales processes and transportation were

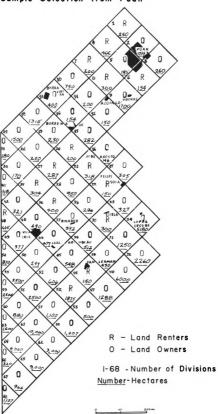
emphasized since they provided the most significant information. Questions bearing on government policy and investments were asked only when there was a rapport established with the interviewee. The presence or absence of these questions was not crucial since those sections utilized directly in the study had already been completed.

The questionnaire was delivered orally so that there was more flexibility and clarity than would have been the case had the farmers written the answers themselves. There was not a large communications problem although three farmers needed "interpreters" for some questions (an "interpreter" in this case is one who translates North American Spanish to farm Spanish). Several questions about problems with soils, rainfall, winds, weeds, and other natural factors followed a description of the size and location of the farm. The responses to these questions provided little information of practical value for the study, but furnished an opportunity for the mutual adjustment to accents. Also, beginning with these innocuous subjects helped allay suspicions regarding the ultimate motivation of the questionnaire e.g., fear that information given would be used for tax collections.

Sample Selection. -- Puan was divided into sixty-eight divisions of 10,000 hectares and a farmer was chosen from each for an interview. Location and distance are crucial in

This was not possible on the border of La Pampa so that there were eight sections of 5000 hectares. The study would not have suffered from the projection of the section into La Pampa since the transportation problems are the same. Nevertheless, all producers were taken from Puan. See Map 6.

MAP 6 Sample Selection from Puan



transportation so a method of sample selection was employed which allowed observations of those producers situated next to Route 35 as well as those in the extremities of the partido. It would have been possible to base the sample on the sizes of farms or the system of land holding. Both of these methods, however, could easily have led to a poor geographic distribution. Smaller farms and land renters are centered in the north of the partido, where there are fewer transportation problems, while larger farms and land owners working the land are more common in the south where road transport is often difficult. These approaches could have led to inadequate geographic coverage and to conclusions that those who work larger farms and owner-producers have more transportation problems. While they may have, this is not because of the size of the farm or the system of land holding, but, rather, the location of the farm. The geographic sample was not biased by these locational differences and, in fact, was based on them. It did not prohibit the drawing of inferences from responses of both owners and renters and producers on large and small farms, since representatives of these classifications followed from a sample based on geographic differences.

The selection of farmers from the sixty-eight divisions was possible in several ways. The generally sanctioned methods entail the use of random numbers in choosing a sample

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either from the total population or from stratified segments of the population. These were considered unrealistic, however, in view of time limitations, inaccessibility of some farms in the south and the difficulty in obtaining accurate information from farmers without a personal introduction.

A random number method would have been possible if allowances were made for secondary or tertiary choices when a candidate was not available—either because he chose not to answer or was away from the farm. It is doubtful, however, that the time and expense would have justified the results.

A list of names was procured from the I.N.T.A. station which provided both candidates and a type of introduction as a substitute for these more orthodox approaches. With this list, though, there would have been definite biases toward the more progressive farmers who work with I.N.T.A. and in the direction of producers of crops, since the technicians from the station work with cultivation rather than livestock.

The method finally decided upon was, in a sense, a compromise between the two types which have been mentioned since it had a random nature and the advantage of providing an introduction. In the northern two-thirds of the <u>partido</u> practically everyone operates a "mixed farm," situated no more than twenty kilometers from a town. The great majority

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of producers are members of an agricultural cooperative. <sup>2</sup>
Representatives from each division are found within a radius of the towns or, more specifically, the cooperatives. With this knowledge it was decided to go first to the managers of the cooperatives to learn the particular characteristics of the area and to acquire introductions to several farmers in its radius of influence. The managers were usually extremely helpful, with the exception of two cases, and it was easy to meet one or two farmers in the retail store section of the cooperative. <sup>3</sup> From them names of others were obtained.

often trips to the farm accompanied the interview and these trips were essential in finding some producers. There were a number of unsuccessful visits to farms which found the suggested candidate in town or in another area. If those living closest to town are more likely to be in the cooperative at any given time, there was a bias in this direction. However, it did not appear to be strong since the towns in the north are not difficult to visit for practically any producer. Once farmers in other divisions were suggested

There are 13 agricultural cooperatives in the <u>partido</u> distributed as follows, Azopardo 1, Bordenave 2, Darregueira 2, 17 de Agosto 1, Felipe Sola 1, Lopez Lecube 1, Puan 2, San German 1, Villa Iris 2. They act as "middlemen" in the sale of products and also retailers of consumers goods for their members. About 95 per cent of the producers in the north are members of at least one cooperative.

Both cooperatives with which there was trouble were in Bordenave. Consequently, it was necessary to find farmers by asking acquaintances from neighboring divisions for introductions. Fortunately, Bordenave is centrally located so that there was no problem in covering the divisions.

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as candidates to be interviewed this reason for bias no longer existed.

After a person from each division surrounding a town was chosen another town was selected and the process repeated. When first entering an area from which no producer had been questioned, two or three farmers were found per day for the interview of from forty-five minutes to two hours. When producers from specific divisions only were needed as many as two or three days were required to find a farmer to be interviewed.

In the southern third of the partido the problem was different. There are large farms at distances of as much as sixty kilometers from town, which are sometimes impossible to reach in a small car. These farmers often raise cattle only and do not belong to a cooperative. (They can sell their animals at cattle auctions and buy supplies from "general stores" so that a cooperative is not necessary.) There are as few as one farmer per division so that the process of selection is less difficult, although locating the producer can be more time consuming. It was possible to meet some of the farmers from the areas which are inaccessible for a small car at cattle auctions, others at their homes in Bahia Blanca, and others after being transported by a farmer in a pick-up truck. With this variety of meeting places there was no particular locational bias since those living in the most

difficult-to-reach areas were found away from their farms. The introductions were facilitated by the manager of the cattle auction organization with whom most of the producers deal. The process was the same as in the north, after the initial presentations.

Responses.—There were differences in responses between divisions, but the little variation in conditions in any particular division did not lead to significantly diverse opinions on transportation. Anyone within a division can give a more or less representative account of problems so that there was less fear of biasing the sample with a particular sample selection procedure. The most likely bias was that those interviewed were more intelligent than the average, but, if this was present, it did not harm the study. If there had been a method yielding less intelligent producers the communications problem might have negated the advantage of more random selection.

There were few problems in obtaining information, probably because of the use of personal introductions, the inoffensive order of the sections, and the selective use of the controversial topics. Because of the prevailing desire not to divulge information which could be used to check on income tax statements, and the presence of government agents making assessments in a nearby area a problem could have arisen. Some obviously false responses concerning levels of

production and investments were received, but these presented few difficulties in sections relevant to transportation. At least one producer, however, traced a causal connection from better roads to more production to higher taxes and, consequently, was wary of answering whether more production would obtain with road improvements. Generally, when information was inaccurate it was not because of suspicions, but, a desire to give some answer rather than none. Only one person refused to answer questions because of uncertainty about motives for the questionnaire while several others expressed their unwillingness indirectly to the person who was to make the introduction. Their reasons included embarrassment, lack of time, and doubts as to the ultimate use of their responses. Generally, the producers were helpful and rather than apprehensive were pleased to give tours of their farms and discuss agricultural and transport problems.

The method used seemed to elicit adequate answers to the questionnaire, especially considering the limitations to which a foreigner is subject in conducting such a survey. The selection of producers and the questioning of each in the same manner were not done according to orthodox statistical methods, however, there was little that was orthodox in the entire situation. The presence of a North American in the country inquiring about farm problems probably elicited more unusual responses than would have been the case had the

interviewer been Argentine. In an area where the farmers are not accustomed to students or universities with interests in production problems it was difficult for them to understand why a North American had an interest in Argentina, in Puan, and, specifically in one particular farm. Also, the reactions could have varied because of the place at which the producer was interviewed. There is little similarity in meeting someone in his office in Bahia Blanca while dressed in coat and tie and "waving someone down" on horseback, clothed in dust, fifty kilometers from a rural town. Even with the unique circumstances and pragmatic method employed there were not unexplained aberrations in opinions or deviations in the sample from expected distributions of land holdings, size of farms, and distances from railroads, paved highways and Bahia Blanca.

Sample size distribution and location.—The distributions of farms by size are very similar for the sample and the population from which it was drawn (see Table 7). In Puan 56.5 per cent of the farmers work 54.3 per cent of the land in plots of between 200 and 1,000 hectares. There are 54.4 per cent of the producers in the sample who farm land in plots of the same dimension. Hence, in this range of farm sizes, the sample provides an accurate approximation of the number of farms in the partido and the quantity of land which these farmers use. In a study of the relationship between highway improvements and agricultural production it is

better for the sample to represent the proportion of land in a classification rather than the numbers of farmers working it. If the products which must be transported are directly related to the number of hectares, as seems to be the case, the sample should represent the amount of land which farmers control rather than the percentage of the total number of farmers which the producers comprise. For those farms of less than 200 hectares, the 13.2 per cent of total farmers interviewed falls far short of the 38.4 per cent of all farmers in the partido, but is a reasonable approximation of the more meaningful 10.8 per cent of the land which they have under production. Farmers with over 1,000 hectares comprise only 5.7 per cent of the total in Puan, but these producers control 34.1 per cent of the land. The sample percentage of 32.3 is, once again, very near the latter figure.

Table 7. Distribution of farms and producers in the sample and population in Puan.

Size Category (hectares)	Percentage of Farms in Sample	Percentage of Farmers in Population	Percentage of Land in Categories
Less than 200	13.2	38.4	10.8
200 to 1000	54.4	56.5	54.3
Over 1000 to 10,000	32.3	5.7	34.1

Source: <u>Censo Nacional Agropecuario</u>, 1960 (Buenos Aires: Direccion Nacional de Estodistica y Censos, 1960), p. 56 and Personally collected data.

Actually, the nature of the geographic division and sample selection procedures made impossible an approximation of the number of farms in each category of farm size. The partitioning of the partido resulted in a number of divisions with no farms with less than 1,000 hectares so that inherent within the process was a sample of greater than 5.7 per cent. Also, farmers with less than 150 hectares were not interviewed, since they were not presented either by cooperative managers or their friends. Both factors led to a poor approximation of the numbers of farmers in the farm size classification. However, because the sample closely indicated the quantity of land farmed in each classification it was considered more suitable for drawing inferences.

The only irregularity in the sample distribution of farms by size was the greater frequency of farms in the category of 1000-1499 and 2500-4999 than in adjacent categories (see Table 8). This is attributable to the government's system of land division in which land was apportioned in 10,000 hectare blocks and then subdivided into fourths and eighths. As a result, there are more farms with 2500 and 1250 hectares than with the uneven magnitude which surrounds them.

Table 8. Size of farms and type of land holding in sample drawn from the partido Puan.

Hectares	Farm Worked by Land Owner	Farm Worked by Land Renter(a)	Number of Farmers
0-199	6	3	9
200-399	14	9	23
400-599	6	2	8
600-799	3		3
800-999	4		4
1000-1499	6		6
1500-1999	4	1	5
2000-2499	1		1
2500-4999	5		5
5000-7499	2		2
7500-10,000	2		2

<sup>(</sup>a) "Land renters" refers to both tenants and share-croppers. Some also own land.

Source: Personally collected data.

The land renters in the sample had smaller plots, as expected, with all but one under 600 hectares.  $^4$  The proportion of renters in the sample distribution, 22 per cent, was much lower than the 40-50 per cent in the population.

<sup>4&</sup>quot;Land renters" is used as a general term for both tenants and sharecroppers. Some producers in this class also owned land.

This is explained by their predominance in divisions in the north from which one, only, could be chosen. This probably did not lead to any differences in the replies concerning marketing methods. However, if land owners innovate more rapidly, responses concerning expected changes in production could have indicated a greater responsiveness than is characteristic of the population.

The distances between farms and paved highways, railroad stations, and Bahia Blanca reveal no peculiarities since variations are controlled by the process by which the partido was divided and the sample chosen (see Table 9). Data concerning distances yielded less information than would be possible if all transport facilities were homogeneous since the number of kilometers is not as important as the quality of the road. A farmer living sixty kilometers from a paved road in the north can be in a better position than one only thirty kilometers from pavement in the south. Perhaps more important than the distance from a paved road is the distance from a railroad station, which is synonymous with distance from a town (except in the case of San German). The sample figures showed most farmers within easy access of railroads so that the marketing of those goods which are sent by railway require little road transport. The nearness of the railroad stations, relative to paved highways, demonstrated the possible opportunity for railroads to gain a share of the trucker's market. The distances from Bahia Blanca were

diverse, with the greater number of farms between 110 and 130 kilometers resulting from the elongated shape of the partido. In all cases, the time and cost required for transportation is more pertinent than the number of kilometers. The relationship between them, while direct, is not always proportional and this must be considered when inferences are made.

Table 9. Distances of farms from a paved highway, a railroad station, and Bahia Blanca in sample drawn from the <u>partido</u> Puan.

Kilometers	Distance from Paved Road	Distance from Railroad Station	Kilometers	Distance From Bahia Blanca	
<b>0-</b> 5	7	17	70-79	2	
6-11	3	12	80-89	0	
12-17	8	8	90-99	6	
18-23	10	10	100-109	7	
24-29	4	3	110-119	12	
30-35	16	11	120-129	11	
36-41	6	3	130-139	6	
42-47	5	2	140-149	3	
48-53	4		150-159	4	
54-59	. 2	1	160-169	9 4	
60-65	2		170-179	9	
66-71	1	1	180-189 2		
			190-200	2	

Source: Personally collected data.

Changes in Production. -- The sections of the questionnaire which are relevant to increasing agricultural production by improving roads were analyzed with respect to the
sizes and tenancy of the farms in the sample and their distances from a paved highway, a railroad station, and Bahia
Blanca. It was then seen if differences in responses were
related to any of these factors.

An important means by which highway improvements can lead to increases in agricultural production is by facilitating the sale of products which are now marketed. In some zones of the country poor transportation is responsible for higher costs and physical losses and, consequently, lower production than would be possible. In Puan this is most easily caused by inclement weather and/or poor roads which make difficult and expensive the hauling of goods. The farmers were asked, "Could you sell more of what you produce with all-weather roads?" so that the strength of this factor could be determined (see Table 10). 5 The responses did not

<sup>&</sup>lt;sup>5</sup>The term all-weather roads, was accepted to mean paved national highways and improvements of all other roads to a degree that permits driving on them all year. It is not likely that many local roads will be improved in the foreseeable future, but this was not considered important in asking the questions. With the hypothesized improvements it was possible to see if roads on any level are considered limitations on production.

The usual response to this question was "yes," but it was not recorded as affirmative unless the producer could say how or in what manner more could be sold. The belief that roads are important led to many "yes" answers, but these were changed to "nos" on second thought or when description

Table 10. Could you sell more of what you produce with all-weather roads?

Hectares		Farmers Replying Affirmatively				
Less than 200	9	0				
200 - 499	28	2				
500 - 999	10	1				
1000 - 1999	11	2				
2000 - 10,000	10	2				
Land Renters	15	0				
Kilometers from Paved Road						
Less than 20	18	3				
20 - 39	31	1				
40 and over	19	3				
Kilometers from Railroad						
Less than 10	22	5				
10 - 19	16	1				
20 and over	30	1				
Kilometers from Bahia Blanca						
Less than 100	8	1				
100 - 139	37	2				
140 and over	23	4				

Source: Personally collected data.

indicate that roads act as a significant limitation on the quantity of products sold. Only seven of sixty-eight respondents believed that road improvements could lead to changes in sales. One of these seven foresaw a negative effect because better roads would increase competition and, consequently, lower prices. The other six believed that profits would be greater since it would be easier to send cattle to the markets in Bahia Blanca or Buenos Aires where there are higher prices. It is interesting that no one suggested that more cattle could be sold, but only that higher prices would be received for the same production. Also, no one expected changes in either the volume of sales or the prices of crops. It is difficult to generalize from the small number of farmers who expect changes and to show relationships between their expectations and size, land holding, and distance factors. It is perhaps significant, however, that no land renter anticipated greater sales, that those producers expecting to sell cattle at higher prices were farmers on generally larger plots, that four of the seven lived in the category of farmers most distant from Bahia Blanca, and that five of seven lived within ten kilometers of a train station.

of what would be done differently was required. The later questions received fewer immediate affirmative replies since it was known that an answer had to be given to an ensuing "how?" or "why?" This could lead to a bias if people did not want to explain answers but was considered necessary because of the tendency to reply affirmatively with no factual bias.

These relationships conform to characteristics of the area. Land renters are frequently more concerned with crops than cattle and no crop producers expected benefits. It is usually the larger farmers who send cattle to more distant markets since they are capable of filling a truck with their own stock and speculating on prices. The other relationships stem from the nature of cattle shipments. The desire to send to more distant markets by those living near railroad stations indicates that trains are not used for hauling cattle, as is the case. As expected, those living farthest from Bahia Blanca could benefit most in shipping cattle as poor roads present a relatively greater problem.

Although it appears that roads do not strongly inhibit the sales of products, road improvements can still have an appreciable effect on the level of production. This can be conveyed either by new opportunities or releasing resources which can be used more productively. The producers were asked, "Could (would) you produce more with all-weather roads?" to examine the strength of the stimulus of road construction (see Table 11). The question referred to both increases in output of the goods presently produced and the introduction of new products.

It was expected that answers to this question would be over-optimistic because of the general faith in roads as a crucial element in marketing. However, only fourteen of sixty-eight replied affirmatively. This is important evidence

Table 11. Could you produce more with all-weather roads?

Hectares	Farmers in Category	Farmers Replying Affirmatively				
Less than 200	9	1				
200 - 499	28	6				
500 - 999	10	1				
1000 - 1999	11	3				
2000 - 10,000	10	3				
Land Renters	15	3				
Kilometers from Paved Road						
Less than 20	18	2				
20-39	31	6				
40 and over	19	6				
Kilometers from Railroad						
Less than 10	22	2				
10 - 19	16	5				
20 and over	30	7				
Kilometers from Bahia Blanca						
Less than 100	8	2				
100 - 139	37	4				
140 and over	23	8				

Source: Personally collected data.

that producers think that they are now producing all that they care to market and, in combination with the answers to the previous question, is evidence that all that is produced is sold.

It is noteworthy that four of the fourteen were from the south (divisions 61,63,64,68) and were inhibited by poor local roads, so that a road construction program might not alleviate their problems. In each of these cases the poor roads (or lack of roads) prevented the profitable planting of wheat in which the farmers indicated an interest. If more of the area could be "opened-up" perhaps other farmers would find it feasible to plant wheat, but this is more a problem of new road construction than road improvement.

of the other ten producers, six felt that new types of products such as chickens, pigs, vegetables and milk could be produced and sold at more distant markets. The remaining four farmers foresaw the planting of more hectares of wheat if roads were improved. No one had a good idea of increases in production. Estimates ranged from 10 to 100 per cent.<sup>6</sup>

One of the two who foresaw a 100 per cent increase in production said that he would not change techniques or products himself, but that others would. He was against altering his methods or product-mix because the land originally belonged to his mother-in-law and he thought that it would bother her if he initiated changes. It is not expected that the "mother-in-law effect" is strong in the zone, but such non-economic factors are probably more important than is the case in more developed economies.

The failure of more farmers to anticipate greater production is likely attributable to the geographic limitation of the area within which a farmer has little land on which to introduce new products and usually must be content with shifting between cattle and crop production. In all, eight farmers indicated that better roads would lead to more crops since it would be easier to transport the harvest. one mentioned producing more cattle so roads evidently do not limit livestock production, although, as was seen previously, they do limit the markets to which animals can be sent. Even if there is a shift from cattle to crops, an increase in production is not certain since cattle, perhaps, were originally produced more efficiently. If a producer changes from less than optimal cattle ranching to less than optimal wheat farming, it is difficult to estimate the net gain or loss in production.

The distance factor seems to be important as there appeared to be more farmers than would be expected in the categories with producers most distant from paved roads, railway stations, and Bahia Blanca. Many of those who desired to produce new goods or shift their product composition were limited by the lack of local roads so that the situation would not improve even with a construction program on the national and provincial level.

There is no doubt that transportation costs would be reduced by road improvements, but how much this reduction

would benefit farmers is debatable, because of the price structure of the transportation industry. The farmers are not considered to be good judges of the magnitude of the benefits which they will receive, but their opinions have important implications. In response to the question "Could you reduce your transportation costs with all-weather roads?" twenty-five farmers, or 37 per cent, replied negatively (see Table 12). This was prompted by either a lack of problems now or a belief that the trucking companies would receive the benefits of road improvements. Most of them foresaw more rapid transport and better service, but believed that they would not be reflected in lower costs. (It would be reflected in less damage to goods and time savings, but these factors were not considered to be of prime importance, as they do not now impose serious problems.)

Those that anticipated cost decreases estimated their magnitude, but little confidence can be had in their accuracy since accounting for costs is rare. Even if the range of cost reductions were accepted as accurate (it appeared to be over-optimistic) the reductions in costs of production and marketing would only be on the order of 3 or 4 per cent at the highest.

The types of benefits suggested were lower extraofficial truck tariffs because of greater trucking capacity,
smaller weight losses for cattle, the opportunity to purchase
trucks to be operated privately, direct shipments to Bahia

Table 12. Could you reduce your transportation costs with all-weather roads?

Woods was			Cost	Reduc	tion		
Hectares	0	Less Than 10	10- 19	20 <b>-</b> 29	30- 39	40- 49	50 and over
Less than 200	2	3	2	2	0	0	0
200-499	11	1	7	5	1	0	3
500-999	4	3	2	0	0	1	0
<b>1</b> 000-1999	3	1	3	2	0	0	0
2000-10,000	5	1	1	0	2	1	0
Land Renters	3	6	3	2	0	0	1
Kilometers from Paved Highway							
Less than 20	8	1	4	3	1	1	0
20-39	8	5	11	3	3	0	1
40 and over	9	3	0	3	1	1	2
Kilometers from Railroad							
Less than 10	10	2	3	3	1	1	2
10-19	6	3	4	2	0	0	1
20 and over	9	4	8	4	4	1	0
Kilometers from Bahia Blanca							
Less than 100	3	2	1	1	1	0	0
100-139	14	5	8	4	2	2	2
140 and over	8	2	6	4	2	0	1

Source: Personally collected data.

Blanca, and greater ease in farm administration. Some expected gains to accrue to other producers because of a more sophisticated transport and marketing network, but anticipated few personal advantages. When this question is viewed in relation to the first two concerning the increase in production and sales it appears that farmers will earn more but enjoy no increase in the quantity of products marketed. Without exception the sixty-eight farmers responded that profits were used for farm improvements, so it follows that gains from transportation will be used to increase commodities for on-farm production or consumption. Since most expect no increase in production, the implication is that consumption will rise. 7

There is no apparent pattern in the relationship between cost reductions and distances from paved highways, railroad stations and Bahia Blanca. This can be attributed, partially to a lack of familiarity with costs and to what extent they can be reduced. Also, it is perhaps indicative of the varying effect of distances on costs or, in other words, that particular problems with particular roads are more important than distance per se.

<sup>&</sup>lt;sup>7</sup>Certainly all profits are not used for farm improvements as can be verified by the homes which some possess in Bahia Blanca. It is common to declare that all expenditures are on farm improvements to avoid taxes. Also, it appears that more gains would be used to increase production than is generally anticipated.

The widespread failure to affirm that there are possibilities to increase production and sales, even with expected cost reductions, could substantiate the contention that the producers do not believe that they lack modern methods. Alternatively, it might imply that the producers consider any improvements too expensive to be offset with gains from cost reductions, e.g., heavy machinery. Either of these beliefs makes agricultural extension work difficult since a producer cannot be convinced that a change in his techniques is desirable if he believes that he uses the best available and that he could be aided only by the application of costly innovations.

Only sixteen of sixty-eight producers (less than one-fourth) affirmed that they would change production methods if roads were improved (see Table 13). Perhaps the failure of more producers to anticipate changes was because road improvements in the area would not have a strong effect on production or because it is thought that there are no available methods which are utilized. The changes in methods in ten of the cases were not in farming techniques, but, rather, shipping more by truck to Bahia Blanca. The remaining six believed that more modern techniques and more machines would

<sup>&</sup>lt;sup>8</sup>Oddly enough, there was a recurrent opinion in the interviews that road improvements would not benefit the interviewee personally, but sizable benefits would accrue to others and that the interviewee used the most modern methods, but that other producers did not.

Hectares	Farmers in Category	A	В
Less than 200	9	3	2
200-499	28	8	14
600-999	10	2	2
1000-1999	11	0	1
2000-10,000	10	3	0
Land Renters	15	4	7
Kilometers from Paved Roads			
Less than 20	18	3	5
20-39	31	8	8
40 and over	19	5	6
Kilometers from Railroad			
Less than 10	22	8	6
10-19	16	3	6
20 and over	30	5	7
Kilometers from Bahia Blanca			
Less than 100	8	0	2
100-139	37	9	9
140 and over	23	7	8

Source: Personally collected data.

follow from road improvements. The failure of many to foresee changes stems from the fact that a number of farmers do
not need improved roads for marketing their production.

Truck drivers are able to reach the farms and the products
can be sold in the towns a short distance away. Poor roads
are an inconvenience, but not a costly one.

It is likely that some changes in production methods will require a longer period of time to be initiated. ever, only nineteen of sixty-eight felt that more changes in methods would occur over time as a result of road construction (see Table 13). Furthermore, not all the respondents believed that the results would be favorable. producers on smaller farms thought that transportation improvements would enable more people to live in larger towns or cities and lead to the vanishing of the small towns and the close source of supplies which they provide. The general belief was that social effects of road building would be farreaching and that these would somehow lead to the application of improved techniques. Neither the specific techniques nor the mechanism by which the application would be conveyed were mentioned. Those producers with farms closest to Bahia Blanca anticipated no changes in techniques even after a lapse of time so that benefits, in whatever manner they are transferred, perhaps will be greater in the more rural zones.

It was not expected that the responses relevant to paving Route 35 would show predicted increases in production since

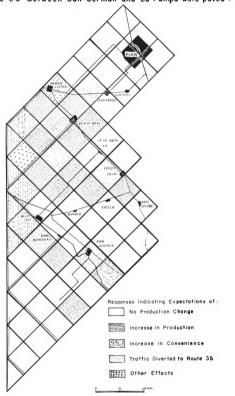
questions concerning improvements in highways in general did not result in expectations of production changes. answers of the producers, however, yielded some interesting relationships. The producers were asked, "What would you do differently if the 44 kilometers of Route 35 between San German and La Pampa were paved?" and "What did you do differently after the section of Route 35 between San German and Nueva Roma was paved?" (See Maps 7 and 8.) With respect to the section between San German and La Pampa forty of sixty-eight persons expected no production changes. forty were, with a few exceptions, situated in the northern or southern extremities of the partido or had farms very close to Route 35. In the north and south there were no plans to take advantage of the new pavement while those near the road felt that the road already allowed adequate trans-The farmers who had highest hopes for better conditions were those living from five to fifty kilometers from the highway who believed that diverted traffic and more convenience would follow its paving. Only four of these producers, however, forewaw production increases. 10

<sup>&</sup>lt;sup>9</sup>The section between Nueva Roma and San German is the middle of the three between Bahia Blanca and La Pampa. The paving was completed in 1964.

<sup>10</sup> Increases in conveniences and diverted traffic could also lead to small increases in production if they resulted in lower costs. These responses are grouped separately, however, since the farmers did not anticipate that they would significantly affect the quantity of goods produced.

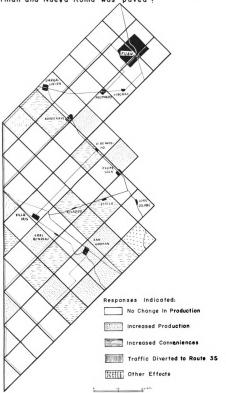
MAP 7

Responses of Farmers Interviewed to the Question, "What Would You Do Differently if the 44 Kilometers of Route 35 Between San German and La Pampa were paved?"



MAPR

Responses of Farmers Interviewed to the Question, "What Did You Do Differently After the Section of Route 35 Between San German and Nueva Roma was paved?"



The expectations accompanying the prospective pavement can be checked against responses concerning the paved section between San German and Nueva Roma. In this case, also, there were negligible effects in the northern and southern extremes. Not many of the producers near the road were interviewed since most of the section is not in Puan, but those who were within about twenty kilometers of the section felt that they received benefits from the construction. Probably, as some indicated, those between twenty and fifty kilometers do not receive the benefits that they expect without simultaneous improvements in "feeder roads." The number of producers who can reach the pavement depends on the quality of "secondary" roads in any case, but, generally it appears that better conditions will accrue mostly to those producers located between, perhaps, five and twenty-five kilometers from the new construction. It is interesting that more producers believed that production was increased and conveniences were more abundant after the pavement of the middle section than anticipated production increases following the improvement of that portion of the highway between San German and La Pampa. This is peculiar because there are more chances for diverted traffic in the section which is unpaved at present. Possibly, it indicates that there will be greater increases in production than the producers expected, But the increases would not seem to be much greater since forty-five producers, rather than forty, as in the case of

the now unpaved section, believed that the pavement had no production stimulating effect.

The general opinion seemed to be that roads are desirable and it is expected that they will have an appreciable effect on the economy, but that this effect will not be through increased agricultural production. With agriculture accounting for 75 per cent of the <u>partido's</u> output, and services to people in this sector comprising a large share of remaining product, it is difficult to conceive of another manner. There are long run improvements possible, but these cannot be expected to be great according to the earlier responses of the producers in reference to changes over time.

Other influences on production. -- It must be reemphasized that these are only opinions of producers and, while important, they are not the determining factors in production. Those farmers who did not foresee production increases might find their expectations change while those who aspired to produce or sell more with improved roads might find their actions hindered by an unanticipated factor. Changes by the government or within the agricultural sector could facilitate innovations or the dissemination of more advanced techniques which would enhance the farmer's position and enable him to gain greater benefits from roads. The relative improvements of truck and railway transportation can have a bearing on gains by farmers as well. Furthermore,

a new law encouraging competition in trucker's tariffs could encourage the passing of savings from the transportation to the agricultural sector. Although a number of theoretical possibilities exist, no major changes are expected.

The most conspicuous improvement attributable to the scale of operations in recent years is the wheat unloading facility for trucks at the port at Bahia Blanca. Since 1961 trucks have carried approximately one-half the wheat which has reached the port and this encouraged plans for the construction of the machine, which is now in progress. This development can be attributed to increases in trucking, but not necessarily to highway improvements, since two of three road sections nearest Bahia Blanca were unimproved until the paving of one in 1964 and no greater percentage of the wheat crop has been hauled by truck after this date. The crops have been larger, though, and the increased number of trucks has led to a more urgent need for the facility. There are not other readily apparent increases in the scale of operations which could benefit agriculture.

Undoubtedly, the south could benefit by road building and road improvements. These could enable the profitable production of wheat and the direct shipment of cattle from the ranch rather than from a more distant loading point. The increase in grain production could be considerable, but it is doubtful that it would be accompanied by lower unit costs. The lands are less suitable for production than in

the north and, even with better roads, transportation costs probably would be relatively higher. The fields must be cleared of forests and underbrush and because of the cost of doing so the increased production would most likely be achieved with a smaller profit margin than in the north.

The transportation costs for cattle would not be radically effected. Animals lose little weight walking from a farm to a truck loading point. Afterwards, the greatest weight losses occur in the first hours of their trip to market. Hence, regardless of the point of departure the weight losses are about the same. Any savings accruing to the producer would be in time and convenience and the alternative cost of the labor utilized in the movement of cattle—none of which is large.

This is an "opening-up" problem, to an extent, and such a project in this area is more capable of increasing the production of that product already produced, cattle, than of a product to be introduced, such as wheat. There is no additional expenditure for ranching, but the costs of preparing the land and the initial investment in cultivating machinery can be sizable. It is possible that highway improvements would lead to the encouragement of a number of relatively less efficient or high cost wheat producers.

The increased production of crops and cattle in which some producers indicated an interest is not certain.

When previously unexploited land is brought into production, output will increase. This will be at a higher cost per unit than currently produced goods, but will presumably provide a reasonable return on investment if it is undertaken. The quantity of new production is uncertain since the relatively high costs of procuring initial capital are prohibitive for many of the farmers in the area.

When land used for cattle is transferred to wheat the effects on total product are unknown. The relative price structure which prompts changes in output composition is complicated. The price of wheat is set by international forces until it falls below a nationally sustained level, but in either case it is determined by forces external to the farmers in Puan. During harvest time, when a large quantity of wheat is marketed, the price is usually at the sustained level. At other times it is bid up as much as 30 per cent higher. The prices for cattle fluctuate all year depending on many factors. Production decisions are based on relative prices, but the decisions can be very different depending on when they are made. Changes in product composition are sometimes made on the basis of a speculative price for wheat. If the rainfall fails to reward the decision, a loss in product can arise. These losses cannot be immediately recovered, since wheat usually cannot be grown on the same land in successive years. Most farmers use half of their land for wheat and half for cattle to avoid such

problems. Changes in product composition, because of their uncertain results, occur only after persistent price differentials.

Those producers with plans to take advantage of the opportunities to sell cattle at more distant markets will probably find more difficulties than anticipated. price differentials between rural auctions and Buenos Aires and Bahia Blanca, but these are based primarily on transportation costs. The volatile market sometimes produces appreciable differences in profit margins and alert cattle dealers take advantage of them. This entails volume sales and speculation. Better highways would permit more speculators to operate and the greater quantity of cattle supplied in the urban markets would surely reduce the price differential. The producers in Puan could reduce their transportation costs and would receive a relative advantage over other areas which do not have paved roads. savings would likely be larger than the slight price decrease which the greater quantity supplied would precipitate.

The introduction of new products, in which a few producers indicated an interest, would be more difficult than they think. Some believed that improved roads would enable such products as chickens, eggs, and milk to reach a steady market in Bahia Blanca. Even if there were all-weather roads, though, there would be problems in disposing of the products once they reached the city according to the

wholesale distributors in Bahia Blanca. When shortages do arise they can be alleviated by suppliers at points closer to Bahia Blanca than Puan. The few producers that indicated an interest in diversifying production could probably do so without affecting the market and would profit if the transportation costs were not prohibitive. However, it is doubtful that large scale production would find a market. If techniques are assumed to be equal, it is sure that the cost per unit would be higher in Puan than in areas closer to Bahia Blanca, because of the greater transportation input.

In the short run, the introduction of new products is not probable, both because of limited demand and the general inertia of production. Roads do not now present overpowering limitations on new products and highway improvements would probably not alter any market enough to make a new product much more profitable. Many do not produce all that is possible with adequate roads, at present, so it is not likely that more would be done with road improvements. More could be produced if roads were clearly an inhibiting factor but this is rarely the case. These resources that are released by highway improvements are consumed by a number of factors, including leisure, so that their effect on production need not be significant. This is emphasized when the rate of inflation does not permit an understanding of whether gains are real or monetary. Even if they are known to be real, anticipated higher costs can cause a slow adoption of new techniques and new products.

agricultural production is debatable. There is a belief that the increased mobility and association with the urban community which improved roads foster would provide some type of "spillover effect," but the mechanism for this is not known. Certainly, agricultural extension work and farm administration could be facilitated, but even now roads present more of an inconvenience than an impossible situation. If, as some believe, the destruction of small towns will accompany road construction the calculation of benefits and their comparison with the costs to those who suffer from the reorganization would be impractical.

The social effects of road improvements are not a part of this study and are relevant only as they increase agricultural production. With the existing difficulties in quantifying social benefits the estimation of their effects on agricultural production is even a more remote possibility. It is not likely that the effects will be great in the relatively near future since there is not an attitude of change among the producers. If road construction cannot be justified on economic efficiency grounds and it is doubtful that it can, then it must be improved on some other basis or not at all.

The total cost of the highway improvements is not relevant to this study since there is not a meaningful estimation of total benefits with which to compare it. Even if

an approximation of benefits were available (this would entail a number of assumptions about who gains and loses--and over what period of time--from the construction of forty-four kilometers of national highway and the improvement of provincial roads) a conclusion concerning the profitability of the road project is limited by the conceptual problems in measuring costs. Assumptions must be made about traffic flows and road conditions over time and in both cases accuracy is difficult to achieve. If it is assumed that the traffic flow and road conditions will remain the same, as is often done, the common tendency of increasing traffic and deteriorating roads are ignored. There is not an easy way to resolve the problem. The financial costs of construction are obtainable but they are not the most desirable figures since the real cost to the economy is the alternative to which the funds could be put. The common assumption of a 6 or 8 per cent rate of interest as an opportunity cost is no more than an easy way to avoid the problem. The opportunity cost of the money for highway construction in Puan is a hypothetical use of funds for improving a national or provincial highway in another area.

Post-construction studies of road profitability have not been attempted and, consequently, the actual benefits from most roads are unknown. Investments in road improvements could be immensely productive, provided a 6-8 per cent return, or produce very small returns if, for instance, the

new road caused the people in several small towns to disband and forced the discontinuation of competing rail services to an extent that made some people worse off. Any attempt to arrive at a specific percentage is a study in itself. While it provides no solution to the problem, a study showing the effects of highway improvements on agricultural production allows educated guesses about the profitability of road construction.

It has been shown in Chapter IV that the cost reductions to producers arising from improvements in highways in Puan would not be greater than about 2 per cent and that there are few obstacles which improved roads would help to overcome. Consequently, the immediate effects on the quantity of production marketed are not great. In terms of "payments in kind" which must no longer be made for transportation services, the increase in the production marketed would be equivalent to the reduction in transport costs. This, however, would be a cost reduction for producers only if the trucking enterprises pass on the gains arising from better road conditions—something which cannot be relied upon.

If it is assumed that all cost reductions are passed on to the agricultural sector, some production increases can be realized. New products or larger quantities of present products could result from new inputs or new combinations of inputs. The cost reductions, though, are not of a magnitude which permit large increases in output. Even if they were,

the attitudes of the producers indicate that few changes in output are anticipated. Without the belief that greater production can be attained and the desire to produce more, cost reductions arising from an increase in the supply of transportation can be expected to have only minimal effects. Consequently, road improvements in Puan would not have a large effect on agricultural production and, as a result, cannot be expected to have a significant impact on the economy.

## CHAPTER VI

## BAHIA BLANCA-SANTA ROSA REGION

It has been shown that the improvement of Route 35 and its adjoining "feeder roads" cannot be expected to have strong effect on agricultural production in Puan. A substantial increase surely cannot be obtained with the present production and transport environments. Even if the circumstances in the partido were ideal for utilizing new opportunities, it is improbable that production could be raised substantially by means of road improvements. These results, however, are not directly applicable to the region between Bahia Blanca and Santa Rosa. The conclusions reached in Chapters IV and V must be modified since the factors which make Puan suitable for specific study also make unique the interaction between its transportation and agricultural sectors. Puan was chosen because the unpaved portion of Route 35 is within its boundaries. Conveniently the heterogeneous physiographic features which are present make it very representative of diverse conditions in other parts of the region. Its disparate road qualities and soil types and varying quantities of rainfall permit the study of a wide variety of relationships between agricultural production and transportation. The production methods and approaches to problem solving are similar throughout the area, but the problems to be solved in Puan are not precisely the same as those in other partidos or departmentos. In some cases differences could lead to larger gains in production and in others smaller. The factors which would permit or promote greater increases in production or prevent those factors which are present in Puan from functioning are considered so that more general comments can be made.

Effects on highway improvements. -- In generalizing from the results in a partido to a broader region it must be remembered that every governmental unit has a unique size and location. Puan was the best partido for specific study, but its location and elongated shape allow producers a greater number and type of transportation alternatives than are present in other areas. In the northern extremes of the partido there are problems with easily muddied brunizen soils, while in the south there are practically impassable roads of low quality. These conditions make it difficult to reach Route 35 and would prevent the producers in the zone from receiving all possible benefits from the paving of the highway. It is not necessary for a number of farmers to use Route 35, though, since Route 33 in the north and Route 22 in the south provide access to Bahia Blanca. In the central portion of the partido the unpaved part of Route 35 presents only a small problem since provincial roads enable many

producers to by-pass some or all of the highway. Some people do not use the unpaved section of the route because provincial roads are of equal quality and are closer to Bahia Blanca. Part of this traffic would certainly be diverted, if the section were paved, with the quantity depending on the differences in distances to Bahia Blanca over the dirt and paved routes. If many extra kilometers had to be driven to arrive at the pavement, it is doubtful that it would be utilized by those who had the choice, since the dirt roads are adequate.

The producers living in areas bordering Route 35, nearest Bahia Blanca would be affected variously by the paving in Puan. The effects would be diverse, but probably small and insignificant in increasing agricultural production. The most likely are as follows: (1) The newly paved section would be of little importance since the people already travel on paved highways and have the alternatives of using Routes 33 and 22. (2) There would probably be more traffic following the road improvement and this usually makes trucking services easier for producers to obtain. But, increased movement would deteriorate highways more rapidly so that any benefits would be at least partially offset. If the trucking industry did not expand, the increased demand for trucks in Puan could eventually lead to a higher price for their services and, consequently, higher costs for farmers nearest Bahia Blanca. It is more likely, though, that the quantity of trucks would

increase or, at least, that the same trucks could be used for more time so that the capacity to ship products would be greater. There are not now problems in obtaining trucks and none of these factors would be expected to appreciably alter this situation. (3) The farmers would have easier access to the west for attending cattle auctions or purchasing supplies, but there are now no great problems in these respects. Most of the producers and all of the towns are located off the main road so that improvements in principal routes would have weaker effects. (5) In the long run, it is possible that economies of scale in the marketing of cattle and sheep would arise. If an increase in the quantity of goods sent by truck were to lead to better processing facilities, the producers near Bahia Blanca would benefit. There are no major innovations foreseen, however, (with the exception of the truck unloading facility which is in the construction process) and even if there were it would be difficult to estimate the portion which is attributable to road improvements. Since there are no salient existing problems in marketing and no prospects for changing this situation, the paving in Puan is not important to producers in this area.

The producers in the <u>departamentos</u> of La Pampa view the unpaved portion of Route 35 differently than the farmers in Puan or closer to Bahia Blanca. For them, the section is forty-four kilometers of dirt which cannot be easily bypassed, in an otherwise paved national highway. At the

border of La Pampa the section constitutes one-third of the distance to the port while at Santa Rosa it is less than oneseventh of the journey. Its share of the total distance becomes less significant when it is considered that "feeder roads" must be used to arrive at the highway. Paving the section in Puan would not lead to large reductions in transportation costs, but travelling would be easier than previously during periods of heavy rainfall. 1 Traffic is not frequently stopped by rainfall, but impassable roads can be costly and inconvenient when they occur. When the weather is inclement in Puan, it is often equally so in the areas surrounding Route 35 in La Pampa. Consequently, when conditions are poor, truck drivers do not begin journeys to Bahia Blanca since they must start from towns connected to Route 35 by dirt "feeder roads." If there are problems with rains, they are usually general enough so that both "feeder roads" and Route 35 will not be used. If there are no problems, then the cost difference between driving on these forty-four kilometers of dirt and a paved road are not great enough to result in the changing of many decisions. Driving problems arise primarily when rainfall is irregularly

The cost reductions, following the American Association of State Highway Official's figures modified for Argentina used in Chapter IV, would be about 20 per cent for the one section. If this were one-fourth of the entire journey it would represent a saving of 5 per cent of total transportation costs. This is relatively small since transportation costs are not more than 10 per cent of agricultural production and marketing costs.

distributed and these occasions are infrequent.<sup>2</sup>

Production differences. -- The differences in production between Puan and other areas within the Bahia Blanca-Santa Rosa region are relevant to particular products. marketing of wheat there are opportunities which are open to producers in Puan and not available to farmers in La Pampa. Within about ninety or 100 kilometers of Bahia Blanca it is profitable to send wheat to market in trucks hired personally. The differential in truck and train tariffs is usually less than the cost of the loading-unloading process which is necessary when wheat is sent to a marketing organization in If the section were paved, more people in Puan could town. avoid sales to intermediaries and deal directly with buyers in Bahia Blanca. Many producers are willing to send wheat by truck even when the rates are higher--choosing to pay more for the saving of time, added convenience, and security.

In La Pampa, after road improvements, it would still be more profitable to send grain by train, but the relatively more attractive alternative of highway shipments would likely divert some traffic. This is especially important when a

<sup>&</sup>lt;sup>2</sup>Products which are shipped from the provinces of Cordoba and Mendoza can be "tied-up" when they enter the area from farther north. Freight from these areas is practically always industrial goods and is not of interest in this study. It is conceivable that fruits or grains could be sent from these points to Bahia Blanca, but, at present, Buenos Aires is as close and has better facilities with which to handle them. Diverted traffic would require improved facilities as well as improved roads.

shortage of freight cars makes it necessary to haul more by truck. Some of the farmers in La Pampa, to the south of Route 35, would probably take advantage of the improved road since railway stations are, for them, more distant. The greater convenience and security could cause a shift in < traffic from railways to roads. The possibilities of diverted traffic would be even greater if there were competition among truck drivers and less than the official rate were collected, as in some parts of Puan. Generally, the wheat traffic in La Pampa would be expected to continue as normal since the above possibilities are applicable only in marginal cases. Most of the benefits from traffic diversion would accrue to producers in Puan.

When the wheat crop in the vicinity of the province of Cordoba is inadequate to supply the flour mills located there, the millers rely on wheat from the Bahia Blanca-Santa Rosa region. Much of this is sent by truck. Some producers in Puan and closer to Bahia Blanca could profit by contracts with millers if Route 35 were paved, although the quantity of wheat sent is not large or consistent from year to year. At such times the millers offer higher prices than those of the towns or the port so that any factor which aids the shipments to the north would not only reduce transport costs, (assuming that wheat was to be sent to Cordoba anyway), but assist in making sales at higher prices as well.

The immediate effects of improving Route 35 on livestock marketing would be stronger in Puan than in other areas since almost all animals in the <u>partido</u> are hauled by truck. Bruising and/or weight losses of cattle and sheep are not appreciably different on dirt and paved roads and rainfall is usually not an important obstacle. Therefore, gains to producers depend primarily on the decisions of the six trucking enterprises which haul livestock in the zone. The savings would have to be transferred at the time when the enterprises jointly set their rates, which are uniform throughout the region. The reduction in tariffs (or, more realistically, the smaller increase), would not be large since cost reductions arising from the use of forty-four newly paved kilometers are not great.

More benefits could accrue to some producers in Puan and those in other areas who are enabled to send livestock directly to the market in Bahia Blanca rather than sell at local auctions. The improvement of Route 35 would not alter the decisions of many producers since there would be no difference in the cost of the haul. At times, however, the higher prices in Bahia Blanca more than compensate for the transportation payments from the town and those farmers with easy access to Bahia Blanca realize the better sales opportunities. These profits would decline as more producers took advantage of the price differences and increased the quantity supplied, so that after the improvement of the road system the difference might no longer exist.

In a few cases cattle traffic from La Pampa which now goes to Buenos Aires by railroad or by truck could be sent to Bahia Blanca if roads were improved. Some producers in Puan indicated an interest in sending more livestock to Buenos Aires by truck, upon the completion of Route 35, so that revenue might be increased by altering shipments in this manner as well. When benefits could be gained they would be, in the majority of instances, through personal shipments of livestock to take advantage of higher prices in previously untapped markets, rather than cost reductions from improved roads.

One of the reasons that benefits from road construction near Bahia Blanca would not be greater is the dominance of the markets in Buenos Aires. Highways are important only as they relate to the points which they connect. In respect to Route 35 the effectiveness of road improvements is limited by the marketing facilities in Bahia Blanca. If the agricultural marketing capacity in Bahia Blanca were increased, then the city would exert a stronger influence on the area. At present, farmers are content to sell to intermediaries or at local markets because of a road system which makes difficult profitable shipments to more distant markets. If roads were improved so that access were gained to Bahia Blanca the farmer's position would be enhanced. If the producer gains access to both Bahia Blanca and Buenos Aires, however, the latter city is often chosen so that highway

construction would have fewer favorable effects than would be possible if Bahia Blanca had comparable facilities. As in Puan those farmers near the roads and farther away than twenty or twenty-five kilometers would probably receive few benefits from the paving of Route 35. If a "feeder road" construction program were completed, the magnitude of benefits received would be limited by the deficient facilities in Bahia Blanca. The producers would be no worse off with road improvements, but they would not be as well off as would be possible with the existence of more cooperating factors.

When savings are made possible by road construction the uncompetitive trucking industry prevents their reaching the producers. The fixed rates for carrying wheat are often not followed, but the companies which haul cattle conform to the mutually agreeable tariff for the region. Road improvements, then, provide direct financial savings to trucking companies (and to wheat producers when unofficial rates are charged), but less direct savings in time and security for the farmers. A more competitive trucking industry would ensure more gains for the producers.

Even if all the gains from road improvements were passed on, however, it is not likely that great changes would take place. There is not a dynamic spirit which is prevented from functioning because of limitations imposed by transportation and there are no impressive possibilities to be made available by road improvements. Consequently, the small

quantity of released resources or new opportunities cannot be expected to result in substantial gains in production.<sup>3</sup>

The changes in agricultural production in the Bahia Blanca-Santa Rosa region arising from the pavement of Route 35 cannot be precisely calculated on the basis of a study in In livestock production, however, there is no one partido. apparent reason why benefits should be greater elsewhere than in Puan and wheat producers in the partido probably fare better than most. Generally, there are few differences between farmers in Puan located twenty or thirty kilometers from Route 35 and similarly situated farmers in La Pampa. In both cases the absence of a "feeder road" system reduces the benefits which could be received by improving the main highways. Furthermore, even the presence of better "feeder roads" would not significantly alter the situation since there are no evidences of "arrested" desires to introduce new products or to change methods, or burdensome problems in marketing production. Without more marketing difficulties and a relatively more important role of transportation, road improvements cannot precipitate large changes.

The paving of other sections of the highway have not produced results which indicate otherwise. The three sections in La Pampa nearest the provincial border were paved in 1964

In George Wilson's study most cases of economic stimulation resulted from sharp decreases in transportation rates. This would definitely not be the case here.

and 1965 and there have been no noticeable changes in production according to the technicians at I.N.T.A. and statistics of the Ministry of Agriculture. This does not preclude the possibility that changes have obtained or will obtain in the future. If they have occurred, however, they are certainly not substantial and there is no evident reason to expect effects to be stronger in the future.

<sup>4</sup>Production statistics are not changed in response to small increases in output. They are calculated by tabulating results of questionnaires to farmers. Usually, farmers are reluctant to admit production gains so that their answers are multiplied by the "coefficient of lies" mentioned earlier. Again, for example, of 5 per cent could go unreported and would not be discovered with the statistical procedures used.

When changes in production have occurred they have been related to the quantity of rainfall. A longer period of time than two or three years is needed to distinguish between changes attributable to rainfall and those arising from better roads.

## CHAPTER VII

## CONCLUSIONS

In Puan and, more generally, the Bahia Blanca-Santa Rosa region it is concluded that highway improvements would not lead to a substantial increase in agricultural production. According to I.N.T.A. there are opportunities to generate such an increase if the right element is found since there are untapped production possibilities. There is no indication, however, that road improvements can provide this key factor. As Wilson states, "Transport is no more an initiator of growth than any other form of investment or deliberate policy. Sometimes it can be strategic, but so can any other type of investment." In this case another type of investment is needed. It is informative to re-state why road improvements cannot exert a stronger influence and to see the more general conclusions which can be drawn.

A road can have a variety of effects on production depending on the production climate and the opportunities which are available or that can be made available. It could be the case that road improvements as opposed to new construction, are seldom capable of promoting large economic

Wilson, op. cit., p. 218.

benefits. The successes which road construction projects have achieved and the fact that paved roads are present in developed countries have given rise to the belief that road construction projects will stimulate the economy. It cannot be generalized from profitable <a href="mailto:new">new</a> construction that road <a href="improvements">improvements</a> will have impressive effects. Also, that paved roads are present in more developed countries does not imply that they are a necessary prerequisite for development. In fact, in many cases (including the United States) they have been constructed after other sectors of the economy were well developed.

Bahia Blanca-Santa Rosa region.—There are several reasons why road improvements would be expected to have fewer effects in the Bahia Blanca-Santa Rosa region than in other areas. The region is equipped with railroad facilities and a system of dirt roads which provide access to both towns and larger marketing centers. The main roads to be improved and the railroads run parallel and serve the same towns. Consequently, the improvement of roads can furnish few new transport alternatives. Only if road construction would substantially lower costs, release resources, or broaden alternatives would significant results be expected. Perhaps an "opening-up" situation is necessary to satisfy these requirements. Only in the southern portion of the region does an "opening-up" possibility exist and there the

physiographic features set a restrictive upper limit on development.

The physiographic characteristics always set the bounds within which road improvements can function. In the Bahia Blanca-Santa Rosa region there are few opportunities to introduce new products so that, at best, the paving of roads could help expand production of present outputs on which roads now set no particular limitations. In the south production could be expanded only with disproportionately higher unit costs. The problems with preparing the land for production, variable climate, and limited soil capacity preclude higher gains.

Within the physical environment road improvements can exert an influence on agriculture primarily through the producer's actions. If the people react promptly and strongly to better conditions a few released resources could result in a re-combination of inputs and a large increase in production. There are now available opportunities which are not used however, and their realization is not limited by roads. Consequently, better roads cannot be expected to alter the situation since they could be responsible for no particular breakthroughs. Perhaps the sizes of the land holdings or the systems of tenancy limit the reactions. Alternatively, the pace and level of living might be such that the psychic costs of changing them outweigh any prospective financial benefits. Whatever, the reason, there is

a noticeable inertia in production. Farmers have produced the same products for a number of years and are accustomed to "time-tested" production methods and marketing techniques. Without stronger aspirations to change methods, expectations of effects of highway improvements cannot be high.

Even if there existed a conducive physical environment and plans to take advantage of opportunities when they arose, the effects of road improvements on producers could be limited by marketing facilities. Without cooperating factors at the end of a road, its paving cannot produce favorable results. In this region production can always be sold, but the delays and added expenditures make it less profitable than need be. Road improvements must be accompanied by expanded livestock and grain handling facilities if they are to achieve maximum effectiveness.

Investments in roads, as in other fields, must be viewed in relation to the complex of factors in which they operate. Perhaps this is more important in the case of roads since the physical presence of a road does little or nothing if vehicles are not present to utilize it. Furthermore, without "feeder roads" to connect a main highway to internal areas, the highway's effectiveness is impaired. In the Bahia Blanca-Santa Rosa region there has been no problem in expanding the trucking industry to carry the produce where roads exist. However, there has been a deficiency of well-maintained "feeder roads." The responses to questionnaires

in Puan reflected the belief that without a system of roads significant effects of paving Route 35 had not previously been felt. Also, effects were not expected to arise from future highway construction projects, if "feeder roads" were not improved as well. A coordination of highway improvements with provincial roads and with other factors is necessary for maximum benefits. In this region, though, even without a conscious coordination of important factors, producers can arrive at the paved roads and can sell what they like, but it is at a slightly higher cost and with less convenience.

The Bahia Blanca-Santa Rosa region is not representative of a situation typically associated with agricultural economies. There are not overbearing problems with capital invested outside the agricultural sector, impossible obstacles to overcome in production or marketing, or an appreciable absence of cooperating factors. Limitations on production arise, to an extent, from all of the above factors. None, however, appears to be so strong as the psychic costs which outweigh the benefits from the adoption of modern techniques. It is not likely that road improvements will assist the solution of this latter problem.

Although there are limits to the benefits to be recevied, road improvements will provide some savings. Theoretically, the producers should be the recipients of gains from reductions in vehicle operations and maintenance expenditures and in transportation costs after they are passed on by

trucking enterprises and "middlemen." The truck tariff structure and marketing methods do not ensure that the theoretical expectations will materialize. The prospects of rate reductions following road improvements are not favorable, since the wheat truckers officially operate on the basis of rates set in the provincial capital and the cattle truckers on the basis of what the trucking enterprises decide. Cost savings need not be passed on to the producers with this system.

Theoretical considerations.—The physical and institutional factors in the area strongly distort the theoretical expectations elaborated in Chapter I. Briefly, it was expected that the increase in the supply of road transportation would lower its price and cause a greater application of all inputs used in producing the marketed output. The output would increase for all of the firms (farmers) and, consequently, the industry and lead to a lower industry price. The lower price, in turn, would be reflected in lower output by at least some of the firms and a smaller industry output than after the original expansion.

It has been emphasized that the increase in the use of the transport input is not so great as would be the case in other areas. There are fewer transport problems and road improvements do not necessarily solve those that exist.

Once the supply of the transport input is increased, the

fall in its price would be less than expected. The fixed rates for carrying both wheat and cattle by truck prevent vehicle maintenance and operation costs from being passed on to the producers. Some savings would accrue to the farmers in terms of saved time and conveniences and in lower transport costs to the extent that truck drivers "unofficially" competed for business. They would be small, however, and no large increases in the utilization of other inputs could be anticipated. Since there are relatively fixed proportions in input use, it would not be expected that any input would be increased markedly more than others. The combined effect of a small decrease in operating costs for the trucking enterprises and the probability that only a small percentage of this decrease would be passed on limits the capacity to re-combine inputs and increase production. Besides, the producers, in general, demonstrate a small propensity to do so. The consequent increase in output for the industry must be small. The price support policy for wheat guarantees that increased output will not precipitate a price decline below an established level. The same is not true for cattle and increased output could lead to a lower industry price and a consequent reduction in the output of some firms. A large change in any direction is not likely since the magnitudes dealt with are not sufficiently important to alter present production levels.

Because of the limitations on the benefits to which agricultural producers are subject after a government investment in road improvements, a goal of increasing agricultural production a substantial amount is not likely to be reached. The alternatives for the government are either to remove the institutional obstacles, to justify the road improvements in another manner, or to attempt to increase agricultural production by other means. In the Bahia Blanca-Santa Rosa region it is doubtful that production can be increased by road improvements even if institutional factors, e.g., fixed truck tariffs, are altered. The savings accruing to farmers would not be great enough. If the road project cannot be justified as an investment, it perhaps can be rationalized by its merits as a consumption good. Surely, greater conveniences and other social benefits would result. It is doubtful, though, that the economy can afford such large expenditures on consumption goods.

If the goal of increasing agricultural production is focused on, better means of reaching it are apparent. If an investment in highways is necessary, more maintenance machines and operators could very likely have a greater impact. With a consistently efficient maintenance policy, the problems with unpaved roads could be minimized and practically eliminated. The most conspicuous investment for increasing production, outside of the transport sector, is an increase in I.N.T.A. agents to disseminate and encourage the use of

modern techniques. In terms of alternatives, one kilometer of paved road is equal to approximately four extension agents for three years or that of a maintenance machine and an operator for five years. Both extension agents and maintenance machines could apparently have a greater influence than paved highways in this region.

The small positive effects suggest that prospective road improvements should be examined closely and that post-construction evaluations would be helpful. Perhaps more post-paving evaluations would lead to more pre-paving studies by elaborating variables or showing unanticipated results or unjustified expectations.

Methodology.--The approach used here does not permit a decision on whether the construction should take place since the economic and social benefits and costs arising outside of the agricultural sector are not considered. In many regions of less developed countries, however, the agricultural sector product approximates the economic product so that if road improvements do not lead to better conditions in the agrarian sector, they must be abandoned or justified in a more nebulous manner as social or consumption goods. If the economy cannot support expenditures on consumption goods, a more appropriate allocation of funds can be chosen. When the emphasis is on the highway rather than the goal, other pertinent investments are often ignored. If an increase in

agricultural production is the desired goal and highway improvements are viewed as one of the ways to achieve it, other possibilities are not obscured. When road evaluations are made on a regional basis with particular goals in mind, perhaps the impression that roads are panaceas for many economic problems would be dispelled and realistic alternatives made evident.

The common methods do not emphasize the distinction between consumption and investment factors or the regional examination of a road in the context of the transport and related sectors of the economy. The motivations for making the project evaluation is one of the reasons why these steps have not been taken. When an engineering enterprise that desires to construct a highway or a representative of a country with hopes of gaining financial aid evaluates a prospective project their plans often are to include as many benefits as possible and to present the proposal in an attractive manner. The result has been a one-sided evaluation of benefits and costs, the stressing of less important factors and, surely, some unwise investments. This study suggests, in the case of Route 35, that results would be less impressive than was anticipated before the construction. With the micro approach and concern for the sectors within which the road improvements operate, there is less chance of mistaking future benefits and a better possibility of demonstrating the sources from which changes will arise.

It is difficult to postulate the conclusions which the common methods would reach in the case of Route 35 because of their many levels of sophistication. An engineering method probably would not consider the project profitable if it weighed cost reductions to road users against construction and maintenance expenses since changes in costs would not be large. With this approach, the evaluation could justify the project only if it were felt that suggested, though unquantified, social or economic benefits would be great and this is not probable. If the engineers assume that the road will be improved and merely work with technical relationships (as happened with Route 35), the construction is possible, but if there were alternative highways, it would be much less likely.

A person working with both engineering and macroeconomic methods can justify any project if enough benefits
are considered. For example, if benefits were taken to the
extreme of education from a new school or a new variety of
wheat discovered after a highway improvement was concluded,
almost any project could be found to be profitable. Depending on the evaluation and its purposes, the improvement of
Route 35 could be accepted or rejected, but there is the
possibility of rejection in this zone, whereas in other areas
the acceptance with a usual cost-benefit method can be almost certain.

While no new approach for evaluating a highway project has been presented here, ideas for changes in common methodologies are implicit. By concentrating on the principal sector in the economy which a road improvement could benefit and demonstrating that results would be insignificant, it is suggested that methods which sanction such projects are obscuring the issue. The engineering method which slights economic factors and the expanded approach which lumps all benefits together while ignoring costs on a parallel level can lead to a misunderstanding of a highway's effect on the economy. Especially in less developed countries it is important to have more economic considerations in project analyses than are present in engineering studies. It is also essential that attention be given to investment priori-If a "benefit is a benefit" as in many studies, the question of whether an increase in the supply of transportation will have a direct or long lasting influence, or the most vital influence, on the economy is blurred. It would be valuable to incorporate a regional study of the principal sector or sectors in the current approaches so that crucial economic factors can be accentuated.

#### APPENDIX I

# QUESTIONNAIRE FOR AGRICULTURAL COOPERATIVES AND "MARKETING ORGANIZATIONS"

# 1. Description

- a. Name of organization
- b. Town
- c. Composition of clients
- d. Zone of influence
- e. Products quantity and percentage of business in the zone

# 2. Marketing process

- a. From whom do you receive products?
- b. To whom are products sent?
  - 1. Percentage by truck
  - 2. Percentage by railroad

### 3. Transportation

- a. What are the advantages and problems with railroads and trucks?
- b. What are your plans for the future with the now higher railroad tariff? What will you do if railroad service is improved?

- c. What effect would road improvements have on your business? On costs? On sales?
- d. What would you do differently if the section of Route 35 between San German and Meridiano V were paved?
- e. What did you do after the paving of the section between San German and Nueva Roma?
- f. Do you have problems with rainfall on dirt roads?
  - 1. How many millimeters cause traffic to be stopped?
  - 2. How many days per year are the roads impassable?
- g. What are the effects of dirt roads on costs, time, and the amount loaded?
- h. Does Route 35 have important effects on other areas, e.g., Santa Rosa, Cordoba, Mendoza?

### APPENDIX II

# AGRICULTURAL QUESTIONNAIRE FOR PRODUCERS IN THE PARTIDO PUAN

- 1. Description of the farm.
  - a. Division of the partido. (Corresponding to Map 6.)
  - b. Number of hectares.
  - c. Land tenancy.
  - Distance from a paved highway.
  - e. Distance from a railroad station.
  - f. Distance from Bahia Blanca.
- 2. Natural problems.
  - a. Do natural factors impose large limitations on production?
  - b. Is the wind a problem?
  - c. Are there problems with weeds?
  - d. Are there problems with carnivorous animals or parasites?
  - e. What is the relationship between rainfall and production?
  - f. Do you attempt to improve the soils with:
    - 1. fertilizers?
    - 2. crop rotation?
    - 3. barbecho?

- g. Do you usually use varieties of new plants or new seeds?
- h. Do you experiment with seeds?
- i. Do you work with I.N.T.A.?

### 3. Products.

- a. What types of crops do you cultivate? What percentage of the total is each type?
- b. What types of livestock do you raise? How many animals per hectare?
- c. Why do you have this mixture of products? For how long have you had it?
- d. Do you begin each year with production plans?
  Based on what?

## 4. Sales process.

- a. In general terms, how and where do you sell your products? Are there problems in doing so?
- b. To whom do you sell your crops? In what proportion?
  - 1. National Grain Board?
  - 2. Cooperatives?
  - 3. <u>Casas de Comercio</u>? (private businesses)
  - 4. Other?
- c. To whom do you sell your cattle?

## 5. Transportation.

a. What means of transportation do you use for crops and cattle?

- b. Railways or highways are used more? What are the benefits of each?
- c. Could you sell more of what you produce with allweather roads?
- d. Could you produce more with all-weather roads? (more of the same products or introduce new ones). Which products? How?
- e. Could you reduce your transportation costs with allweather roads?
- f. Would you change your methods if more roads were improved?
- g. Would there be more changes in more time?
- h. What would you do differently if the 44 kilometers of Route 35 between San German and La Pampa were paved?
- i. What did you do differently after the section of Route 35 between San German and Nueva Roma was paved?
- j. Which routes do you use most now? Do you have problems with rainfall? With how many millimeters?
- k. What would you do if the railroads were improved?
- 1. Do you have problems with the port?
- 6. Government policy.
  - a. Is the National Grain Board important for you?
  - b. What role does I.N.T.A. play?
  - c. Is the export and import policy important?

- d. How difficult is it to obtain credit?
- e. Are the taxes on land a problem?
- f. Do the taxes on production present a problem?
- g. Are government policies responsible for differences in methods? More or less production?

#### 7. Investments.

- a. What factors determine your investments?
- b. Where do you invest your profits?
- c. What are the effects of inflation?
- d. What are the effects of changes in prices (relative)?

# 8. Comments, observations.

- a. Are there methods which you would like to apply but for some reason cannot?
- b. Are there any particular problems which haven't been covered?

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