

Report to the Council of
the Instituto Nacional de Tecnología
Agropecuaria Argentina

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ISNAR R40e

**THE DECENTRALIZATION PROCESS
IN THE INSTITUTO NACIONAL DE
TECNOLOGIA AGROPECUARIA
ARGENTINA**

ISNAR

International Service for National Agricultural Research

The International Service for National Agricultural Research (ISNAR) began operating at its headquarters in The Hague, Netherlands, on September 1, 1980. It was established by the Consultative Group on International Agricultural Research (CGIAR), on the basis of recommendations from an international task force, for the purpose of assisting governments of developing countries to strengthen their agricultural research. It is a non-profit autonomous agency, international in character, and non-political in management, staffing, and operations.

Of the thirteen centers in the CGIAR network, ISNAR is the only one that focuses primarily on national agricultural research issues. It provides advice to governments, upon request, on research policy, organization, and management issues, thus complementing the activities of other assistance agencies.

ISNAR has active advisory service, research, and training programs.

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Agropecuaria Argentina

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May 1989

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International Service for National Agricultural Research

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CHAPTER 1

INTRODUCTION

Origins of the Study

On 13 March, 1987, Ing. Carlos Lopez Saubidet, President of the Instituto Nacional de Tecnología Agropecuaria (INTA) of Argentina wrote to Mr. Alexander von der Osten, Director General of ISNAR, requesting continued collaboration. ISNAR had organized a research management seminar for the senior staff of INTA in 1985. This was followed by a study on human resource planning and management in INTA, the results of which are available in the form of a Report¹⁾. In 1987, ISNAR and FAO collaborated with INTA in the organization of a Regional Workshop for the Southern Cone Countries of Latin America. The request this time was for a different purpose. The INTA Council had embarked on a major exercise of reorganizing the research system with a view to decentralizing it so that there was greater participation of producer organizations in the different regions, universities, other institutions, and last but not least, the provincial governments, in the determination of priorities and planning of research. ISNAR was asked to study the process of decentralization, document the changes which were taking place, and provide a feedback to the INTA Council so that the reorganization could be made more effective.

Following this initial request, extensive discussions took place between the President of INTA and the management and senior staff of ISNAR in the course of the former's visits to the Hague. Also, the General Director of INTA, Dr. Edgardo Moscardi, and the Assistant General Director, Dr. David Hogg, visited ISNAR on different occasions and this provided further opportunities to the ISNAR staff to have detailed discussions with them with regard to the organization and management of the system and the changes which were now taking place. Finally, in January 1988 ISNAR offered to send two of its staff members to Buenos Aires to undertake the proposed study.

ISNAR Team and Discussions at INTA Headquarters and in the Field

Dr. H.K. Jain, Deputy Director General, and Dr. Roberto Martinez Nogueira, Senior Research Officer, of ISNAR visited INTA from 21 March to 1 April 1988. They had extensive discussions with the senior management of INTA and with a cross section of research managers and scientists in the field. The team started its work with a briefing by Ing. Carlos Lopez Saubidet at the INTA Headquarters in the course of which he explained the rationale for decentralization and his concept of the development of agriculture in Argentina in the closing years of the century. This was followed by discussions with members of the INTA Council in a meeting called for this purpose by the President of INTA.

1) International Service for National Agricultural Research, R 25e, 1986.

The following members were present:

Mario Leandro Casas, Vice-President;
Aldo Hugo Canton, Rural Intercooperative National Confederation (CONINAGRO);
Rene A. Bonetto, Representative of Federación Agraria Argentina (FAA);
Norberto P. Ras, Representative of Sociedad Rural Argentina (SRA);
Carlos F. Solanet, Representative of the Secretary of Agriculture, Livestock and Fisheries;
Jorge M. Brun, General Secretary of the National Council.

The discussions centered on the evolutionary history of agriculture in Argentina, the contributions it has made and continues to make to the national economy, and some of the broad policy issues with special reference to the role of research. The ISNAR team later held discussions with the General Director of INTA, Dr. Edgardo R. Moscardi and other senior staff members in the INTA Secretariat both individually and jointly. The five senior officers who participated in these discussions included:

David Hogg, Assistant General Director (Control and Evaluation);
Carlos J. Torres, Assistant General Director (Operations);
Liliana Vaccaro, Assistant General Director (Organization and Human Resources);
Juan Nocetti Oyarbide, Assistant General Director (Planning);
Blas Bravo, Director of Institutional Relations.

These discussions centered on the process of decentralization and its implications in terms of the effectiveness and efficiency of the system.

The ISNAR team saw decentralization in action in the course of a field visit when it met some of the key actors directly involved in the process. The team had discussions with some of the newly appointed regional directors, heads of experiment stations, national program coordinators and scientists. The field visit also made it possible for the team to see the newly set up Regional Councils at work. The team was given an opportunity to sit through the meeting of one of these Councils in the Province of Santa Fe. The following Regional Centers and Experiment Stations were visited:

- * Regional Center of the Province of Santa Fe;
- * Regional Center of the Province of Buenos Aires North;
- * Reconquista Experiment Station, Province of Santa Fe;
- * Pergamino Experiment Station, Province of Buenos Aires;
- * San Pedro Experiment Station, Province of Buenos Aires;
- * Balcarce Experiment Station, Province of Buenos Aires;
- * National Center of Agricultural Research, Castelar, Province of Buenos Aires.

In the course of the visit to the Balcarce Experiment Station, the ISNAR team had an opportunity to address a meeting of a Consultative Committee presided over by the General Director and attended by 15 Regional Directors and three Directors of National Centers. Also, at Balcarce the team had detailed discussions with the senior staff of the Faculty of Agriculture of the University of Mar del Plata.

The ISNAR team visited a cooperative society organized for production of certified seeds of improved varieties evolved by the INTA scientists. Also, it saw a field demonstration of an improved farm machine developed by the INTA scientists in collaboration with the private sector.

The Feedback

Back in Buenos Aires, the ISNAR team took another opportunity to meet the INTA President and some of the members of the INTA Council. In the course of these meetings the team presented some of its impressions of the decentralization process and the conclusions which it could draw at this stage. The President of INTA asked the team to provide a detailed analysis of the changes which are taking place along with its recommendations for the future. The present report is in response to this request.

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CHAPTER 2

ARGENTINIAN AGRICULTURE AND ITS TECHNOLOGICAL NEEDS

Nature of Argentine Agriculture

Agriculture of Argentina compared to that of most other developing countries is very different. For one thing, Argentina is one of the world's leading exporters of agricultural commodities - wheat, beef, maize, sorghum, soyabean and several others. The country ranks ninth in the world in terms of export earnings based on its primary farm products. Table 1 shows the production and export value of the country's main agricultural commodities. For another, in comparative terms, Argentina has very little of what might be called subsistence farming. The country is the eighth largest in the world in terms of geographical area with a net arable land of 65 million hectares with another 110 million hectares providing natural grassland to support a large livestock industry. Although there are important differences among the regions, the average size of land holdings is 400 hectares for the country as a whole.

Table 1: Production and export value of main agricultural commodities (1986)

Commodity	Total Production (million tons)	Export value (million US\$)
Wheat	8.900	420
Maize	12.400	732
Soyabean	7.100	565
Sorghum	4.200	145
Peanuts	0.250	31
Rice	0.405	7
Pulses	0.273	85
Sunflower seeds	4.200	131
Linseed	0.565	34
Seed cotton	0.340	2
Vegetables	2.718	20
Grapes	2.750	1
Sugarcane	0.300	24
Cotton lint	0.109	9
Beef	2.800	247
Pork	0.245	45
Milk	6.200	126
Citrics	0.321	33
Tea	0.047	35

Source: FAO Production Yearbook, vol. 40 and FAO Trade Yearbook, vol. 40.

Much of the wealth of Argentina which has given it a pre-eminent position in terms of economic status in the developing world is based on its agriculture. Few other countries have seen such a massive transfer of resources from the rural to the urban sector as Argentina has in the past 100 years. The country does face the problem of a large foreign debt at present but this does not detract from the important contributions which agriculture has made and continues to make to the national economy.

The pampas, a vast expanse of 55 million hectares, constitute one of the world's most fertile plains and in terms of agro-climatic conditions they are virtually a food-producing machine. With assured rainfall in large parts of them, a temperate climate, and high native fertility of the soil, the pampas are made for high-yield agriculture based on science and technology.

Argentinian agriculture has gone through a period of technological innovation in the last 20 years that has resulted in important increases in production and yields. The transformation has meant doubling of grain production and starting a process of substitution of livestock production by crops in some areas, mainly wheat and soyabean. New problems have arisen at the same time and new demands continue to be placed on the agriculture sector. These arise from a stiff competition which Argentina now faces for its export markets from the more affluent Western countries, which heavily subsidize their export trade in food grains, a huge foreign debt and social and political changes creating greater domestic needs. The agricultural scientists face an obvious challenge. Improved technology must make it possible to maximize production from the prize pampas lands without damaging their long-term productivity. The scientists must evolve technologies for intensive crop and animal production which are sustainable. In addition, they must keep the cost of production low. And above all, research must make it possible to diversify the production process.

The New Scientific Challenge

In this situation, policies and institutions will be called upon to play an even more strategic role in the development of agriculture. Even as INTA receives recognition for the important contributions its scientists have made, it must prepare itself for new challenges arising from a more complex situation of changing world markets, of new knowledge generated by the international research system, and of a different social and political reality in the country. Traditionally, with strong federal governments, Argentina has had a centralized political process and social attention was directed to the main problems of the great urban areas and to the agriculture of its main region: the humid pampas.

Argentina with its wide range of agro-ecological conditions produces a large number of crops of industrial and other uses in addition to food and feed grains, fruits and vegetables, and above all, livestock. The scientific challenge is to diversify the improved technology so that more crops see the impact of research and make a greater contribution to the national economy. There is a general feeling that while some of the crops have seen their yield potential increase through scientific research, many others have yet to see a significant advance in their productivity. This becomes clear as we analyse the production and yields of different crops during the past 35 years - a period which has seen the

advent of a high-yield technology in the case of crops like wheat, maize, soyabean and sorghum (Table 2).

Table 2: Yields of different crops in the late 1940s and in 1985 (kg/ha)

Crop	1948-50 (average)	1985
Wheat	1,146	1,617
Rice	2,946	3,252
Maize	1,531	3,613
Millet and sorghum	851	2,986
Roots and tubers	7,774	15,537
Pulses	991	1,079
Soybean	982	1,988
Sunflower seed	743	1,441
Linseed	621	642
Grapes	9,342	8,613
Sugarcane	33,945	49,310
Tea	194	1,105
Tobacco	877	1,043

Source: FAO, World Crop and Livestock statistics

The differential impact of research on the cereal and non-cereal crops partly reflects the fact that many of the latter are grown in lands which are not so rich in their fertility. Some of them are grown outside the pampas or in the drier parts of the pampas. A different type of technology would be needed for these crops with greater emphasis on soil and water management. In agro-ecological terms, the country presents a great deal of diversity. Thus, the 14 agro-ecological zones of the country identified by the soil scientists show problems of various kinds as indicated in Table 3. Only 23 percent of the total land area is suitable for agriculture. A great deal of research organized in the past has shown heavy concentration in lands of temperate climate providing excellent conditions for cereal and beef production. The research service must now address a wider agenda. Water and wind erosion are becoming a serious problem in the pampean region. There is desertification in Patagonia, flooding in irrigated areas and in parts of the pampas, and exhaustion of soil fertility through intensive land use in some parts of the pampas. In the northern regions the problem of sustainability of agricultural development is a major concern. Above all, the arid and semiarid regions that add to almost 70 percent of the country have received relatively little attention from agricultural scientists. It may have been a good strategy in the past to capitalize in the short term on the immediate opportunities offered by the pampas but there are regional, political and social considerations, which are now becoming important for the organization, planning and management of the research system.

Table 3: Soil problems in different agricultural zones of Argentina

Mature of Problem	Corrientes	Delta	Parque Chaqueño	Espinal Chaqueño	Humid Pampa	Semi-Arid	Dry Pampa	Patagonia	Depressed Pampa	Bajos Sub-meridionales	Misiones	Northern Cordillera	Southern Cordillera	Tucumán Oranense
Water Erosion			XX	X	XXX	X	X	X			XXX	XX	XXX	XXX
Wind Erosion			X	X	X	XXX	XXX	XXX				X		
Alkalinity and/or Salinity		X	X	X	X	XX			XX	XX				
Desertification				XX			XX	XXX						
Exhaustion through agricultural use	XX		XXX		XXX									XX
Flooding Land	XXX	XXX	XXX		XX				XXX	XXX				
Salinity in Irrigation Areas				XXX			XXX	XX				XX		
Excess of Permanent or Semi-Permanent Water	XX	XX												
Phosphorous Deficiency	X				X						X		X	
High Levels of Subterranean Water									X	X				X

Agricultural research must also satisfy an increasingly more conscious political constituency which has been articulating its needs in more specific terms. This constituency includes the different provincial governments, the farmers and the producer organizations in the different provinces. Argentina is a federal country and responsibility for development is shared by the federal and the provincial governments.

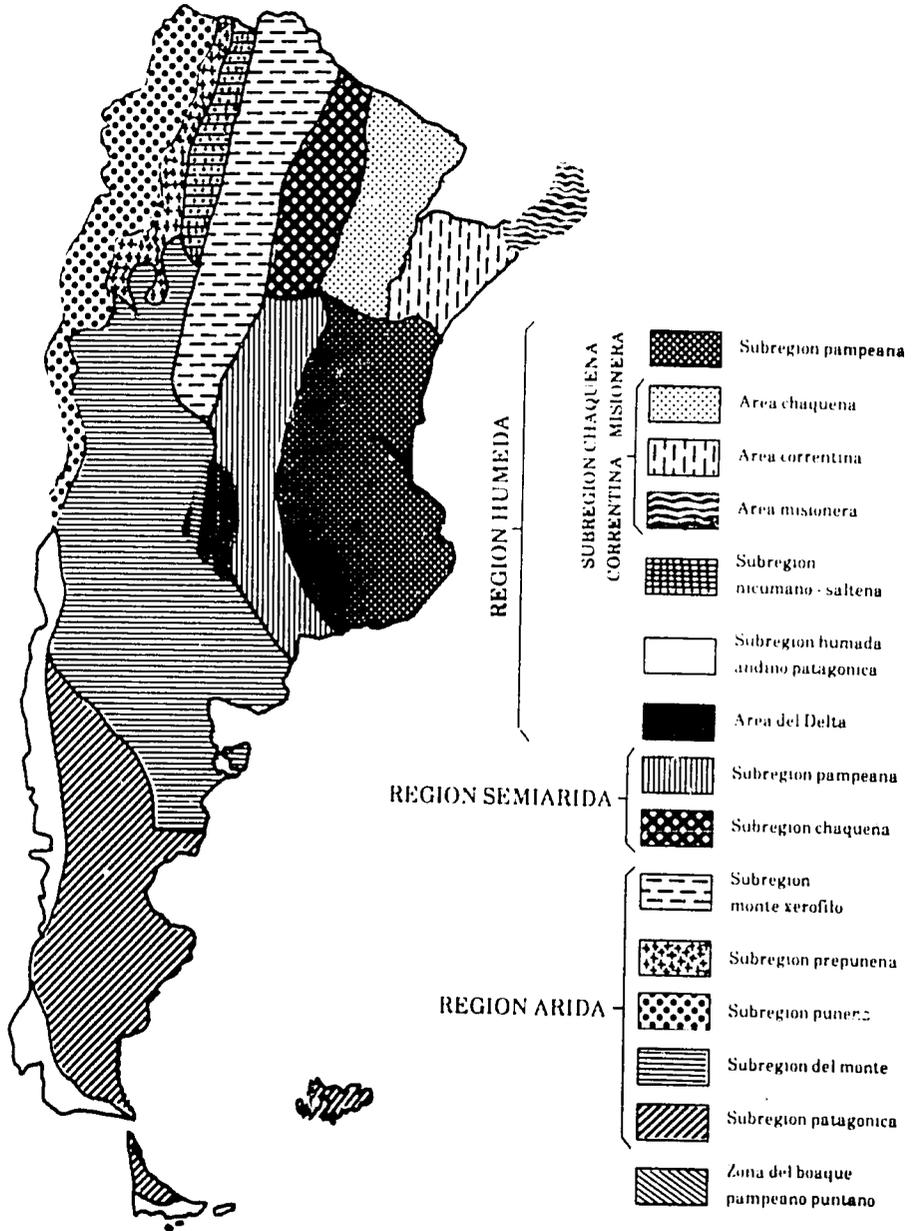
Table 4 lists the different provinces of Argentina and characterizes them in terms of their land area, population and value of agricultural production. It is clear that many of the provinces are very large - some as large as countries of Western Europe - but they differ greatly in the value of their agricultural production. They obviously differ in their agro-ecological conditions as we can see from Figure 1 and demand greater research support. The non-pampean regions are especially important for industrial crops and horticulture.

INTA has a heavy concentration of its research infrastructure and scientific personnel in the pampean region. A new policy would be needed to recognize the diversity leading to a more balanced distribution of scientific and technological capabilities in the different regions including the smaller provinces with a view to harnessing research for greater use of their production resources. Finally, agricultural production in Argentina since the early years of this century has seen a great deal of volatility - an issue discussed in the next chapter. The research system must help to develop institutional and technological policies which would ensure continued growth of the country's agriculture consistent with its natural and other resources.

Table 4: Argentine provinces: Area, population and value of agricultural production

PROVINCE	AREA (Km ²)	POPULATION	VALUE OF PRODUCTION: CONSTANT ,000 PESOS of 1960				
			TOTAL VALUE OF PRODUCTION	LIVESTOCK	ALL CROPS	INDUSTRIAL CROPS	VEGETABLES
Buenos Aires	307,571	10,865,408	79,363	33,815	45,548	8,334	2,061
Catamarca	100,967	207,717	604	92	512	71	328
Córdoba	168,766	2,407,754	17,080	7,449	10,383	643	143
Corrientes	88,199	661,454	5,952	2,809	3,143	745	131
Chaco	99,633	701,392	2,761	776	1,985	1,316	51
Chubut	224,686	263,116	1,161	1,146	15	146	11
Entre Ríos	78,781	908,313	13,403	8,244	5,159	309	10
Formosa	72,066	295,887	1,033	440	592	3,638	96
Jujuy	53,219	410,008	4,069	51	4,742	433	133
La Pampa	143,440	208,250	9,679	4,938	4,742	433	5
La Rioja	89,680	164,217	171	91	81	44	26
Mendoza	148,827	1,196,228	2,312	181	2,130	974	720
Misiones	29,801	588,977	4,646	171	4,475	4,235	28
Neuquén	94,078	243,850	294	197	97	1	19
Río Negro	203,013	363,354	1,449	733	716	34	212
Salta	154,775	662,870	3,352	260	3,092	1,965	354
San Juan	89,651	465,976	935	35	899	390	414
San Luis	76,748	214,416	2,305	979	1,326	18	49
Santa Cruz	243,943	114,941	601	598	3	--	3
Santa Fe	133,007	2,465,546	30,230	11,493	18,737	7,391	460
Stgo. del Estero	135,254	594,920	2,546	600	1,946	240	1,006
Tucumán	22,524	972,655	9,432	169	9,264	7,371	598
Tierra del Fuego	21,263	27,358	105	105	--	--	--
TOTAL:	2,780,091	27,947,446	203,866	78,306	125,560	45,204	7,358

Fig. 1.- Agricultural regions and subregions according to ecological aptitude.



Fuente: Instituto de Suelos y Agrotecnia (INTA).

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CHAPTER 3

ORGANIZATION OF AGRICULTURAL RESEARCH AND DEVELOPMENT OF INTA

The beginnings of organized agricultural research in Argentina can be traced back more than a century. The Department of Agriculture was set up by the Government in 1872 and soon afterwards it was distributing improved seeds to farmers and had established an experimental farm. The first locally trained agronomists graduated in 1888. This early period saw the impact of technology mostly in the form of mechanization which was introduced to consolidate the extensive farming practices. Small implement-making factories were set up around 1880 and these became the precursor of the country's more modern farm machine industry.

Research Support for an Expanding Agriculture

A significant advance in the country's agricultural research capacity was made in 1910 when the first experiment stations were set up under the Department of Agriculture. The cropped area increased during this period in association with greater use of farm machinery and seeds of improved varieties, which were now beginning to be available on a wider scale in crops like wheat, maize and sorghum. The first maize hybrids were released for commercial cultivation in 1945 and at this time there was collaboration between the Pergamino Experiment Station of the Ministry, the Research Units of the Province of Santa Fe and the scientists of the University of Buenos Aires. The dwarf varieties of sorghum were introduced about the same time.

Notwithstanding this early expansion of research activities, the impact was not very great. In fact, a recurring theme in the history of Argentinian agriculture is that following massive increases in production up to the period of the Second World War largely as the result of expansion of area, a decline set in which was to last up to the early 1960s. This can be seen from Table 5 which gives the production of the main cereal crops and oilseeds over a period of more than eighty years starting from the beginning of this century. Table 6 gives the cultivated land area over this period. There has been a great deal of debate in Argentina and many political and social scientists have advanced theories which help to identify the factors responsible for this decline. It is true, of course, that political decisions and economic policies had something to do with this recession in the country's agriculture, while Australia, the United States and much of Western Europe during the same period saw a continuing advance in their agriculture, as can be seen from Table 7. Among the other factors responsible, the role of agricultural research has come in for a great deal of examination. It is recognized that the great production advance in the earlier years of the country was mostly associated with the expansion of agriculture in the pampas and the introduction of mechanized technology, with some support from improved varieties (see Table 2). In the 1940s, the possibilities of expanding agriculture in the pampas had

Table 5: Production of cereals and oilseeds since the early years of the century
(includes 5-year averages)

(million tons)

Period	Wheat	Maize	Sorghum	Sunflower	Soyabeans	Total Cereals & oilseeds	Average growth rate
1900/04	2.538	2.858				6.001	
1905/09	4.302	3.661				9.135	10.4
1910/14	4.003	4.869				10.520	3.0
1915/19	4.558	4.776				10.520	0.7
1920/24	5.485	5.680		0.003		13.410	4.7
1925/29	6.770	7.076		0.001		17.151	5.6
1930/34	6.214	7.744		0.012		17.476	0.4
1935/39	6.634	7.892		0.154		18.040	0.6
1940/44	6.279	8.064		0.519		18.132	0.1
1945/49	5.061	4.201		0.916		13.250	-5.4
1950/54	5.375	2.709	0.011	0.640		11.662	-2.4
1955/59	6.514	3.770	0.318	0.561		14.868	5.5
1960/64	6.080	4.778	1.095	0.634	0.009	16.071	1.6
1965/69	7.329	6.822	1.750	0.895	0.022	19.491	4.3
1970/74	6.368	8.950	4.340	0.930	0.186	23.272	3.9
1975/79	7.788	8.051	5.978	1.149	1.756	27.235	3.4
1980/84	10.926	9.480	6.652	1.896	4.284	34.607	5.4
1985	13.500	11.900	6.200	3.400	6.500	43.548	7.8 ^a
1986*	8.667	12.100	4.000	4.100	7.100	37.440	-14.0 ^a
1987*	8.934	9.250	3.227	2.200	7.200	32.236	-13.9 ^a

Source: O. Barsky, La Agricultura Pampeana, FCE, 1988.

* The decline in wheat production during 1986 and 1987 has been widely attributed to farmers' response to low market price of this commodity. A recovery is expected in 1988 with the increase in price.

^a Growth rate calculated on the basis of previous year.

Table 6: Cultivated land area since the early years of the century
(includes 5-year averages)

(Million hectares)

Period	Wheat	Maize	Sorghum	Sunflower	Soyabeans	Cereals & oilseeds	Average total growth rate
1900/04	3.588	1.516				6.123	
1905/09	5.619	2.710				9.939	12.4
1910/14	6.496	3.525				12.826	5.8
1915/19	6.704	3.743				13.390	8.1
1920/24	6.483	3.234		0.004		12.956	-0.6
1925/29	8.072	4.286		0.002		17.177	6.5
1930/34	7.973	5.895		0.018		19.738	2.9
1935/39	7.632	6.423		0.213		20.721	1.0
1940/44	7.057	5.370		0.815		20.020	-0.7
1945/49	5.985	3.518		1.616		17.616	-2.4
1950/54	5.891	2.750	0.012	1.222		15.827	-2.0
1955/59	5.622	2.877	0.300	1.229	0.001	17.332	1.9
1960/64	5.029	3.356	1.006	1.116	0.009	17.600	0.3
1965/69	6.361	4.168	1.608	1.253	0.021	19.404	2.1
1970/74	5.114	4.497	2.907	1.523	0.139	19.932	0.5
1975/79	5.592	3.389	2.584	1.607	0.378	20.035	0.1
1980/84	6.476	3.586	2.434	1.837	2.205	21.511	1.5
1985	5.930	3.620	2.040	2.380	3.300	21.357	0.2 ^a
1986	5.684	3.820	1.400	3.140	3.340	21.247	-0.5 ^a
1987	4.971	3.650	1.133	1.891	3.700	18.711	-11.9 ^a

Source: O. Barsky, La Agricultura Pampeana, FCE, 1988.

^a Growth rate calculated on the basis of the previous year.

Table 7: Comparative yields of wheat, maize and sunflower in Argentina and some other countries since the 1930s

	1934-38 (average)	1950	1960	1970	1983
(kilograms/ha)					
<u>WHEAT</u>					
France	1560	1780	2520	3440	5133
USA	870	1110	1760	2090	2653
Canada	710	1115	1420	1780	1965
Australia	800	1060	1370	1240	1716
Argentina	980	1110	1110	1280	1713
Mexico	760	910	1420	2900	3733
<u>MAIZE</u>					
France	1580	1240	2350	4980	6316
USA	1400	2350	3420	4500	5120
Canada	2530	2840	3580	5300	5455
Australia	1480	1750	2120	2410	1622
Argentina	1810	1570	1770	2330	2976
Mexico	560	670	940	1200	1657
<u>SUNFLOWER</u>					
France	--	970	1700	1890	1908
USA	880	--	--	1010	1056
Canada	--	470	970	880	766
Argentina	880	770	650	850	815

Source: O. Barsky, La Agricultura Pampeana, FCE, 1988.

been virtually exhausted and it was clear that future advances in production must come through greater productivity, i.e. increased yields per unit of land. This naturally demanded new technologies and the national research service at that time was simply not equipped to provide the needed technological support. The support came in the early 1960s when major increases in yield were recorded in cereals and oilseeds leading to a significant impact in the following years, as can be seen from Table 8.

Table 8: Average yields of cereals and oilseeds in Argentina during the 1960s and 1980s

(tons/ha)					
Period	Maize	Sorghum	Wheat	Sunflower	Soybean
1960/61-1969-70	1.961	1.932	1.350	0.750	1.087
1980/81-1984/85	3.321	3.250	1.808	1.174	2.019
Percentage of increase	69.4	68.2	33.9	56.5	85.7

Source: Secretariat of Agriculture, Livestock and Fisheries, Buenos Aires.

The decision of the Government to decentralize agricultural research and to create a new national institution in the form of the Instituto Nacional de Tecnología Agropecuaria (INTA) must be seen in this context. The weakness of the system at that time can be seen from the fact that in 1956 the Ministry had only 70 technicians even though a number of experiment stations and fields had been established. The greatest limitation was in terms of scientific manpower with none of the technicians holding postgraduate degree qualifications. Considering the overwhelming importance of agriculture to the national economy of Argentina and the fact that the country had already emerged as one of the world's leading exporters of food grains and beef, the research support available at that time was limited, to say the least.

The Emergence of INTA

INTA was created in 1956 through a Government decree. The creation of this new institution was a manifestation of the new role of the State in the promotion of economic development. The Government clearly recognized that decentralization of research from the bureaucratic apparatus of the Ministry would help to create a more favorable management culture for the promotion of scientific work. INTA was created with the consolidation of

all the existing experiment and field stations of the Department of Agriculture including their scientific staff. The objective was to create a critical mass of scientific effort through such consolidation. INTA's mandate was defined as follows:

- * to develop to the utmost farm research, experimentation and extension through institutes, experiment stations and extension agencies;
- * to promote through these services higher farm productivity and profitability and an improvement in the family's standard of living, thus contributing to the development of the rural community.

It is clear that the Government was anxious to stress the social commitment of INTA, especially in promoting the welfare of the rural people.

INTA's status as an autonomous state organization was defined as follows:

- * INTA will be the country's main organization for defining agricultural research policy;
- * it will enjoy financial and administrative autonomy;
- * its resources will come from an export tax on the agricultural products, mainly of the Pampas;
- * INTA will integrate the research and extension functions which earlier belonged to the Department of Agriculture;
- * INTA will seek the participation of producer organization representatives in its management bodies.

Institutional Features and Structure

The INTA Council

The institutional framework and structure of INTA can be seen in the form of four entities. First, there is the INTA Council which is the top policy-making body. The Council provides a strong sense of direction to national priorities in research and decides on budgetary allocation corresponding to these priorities. It also approves the research programs through which these priorities are translated into field and laboratory studies. In addition, the INTA Council lays down the management policy of the organization including the personnel policy for the scientists and other staff. The experience of the last 30 years has shown that few bodies of this kind in other parts of the world wield greater power. The INTA Council is more than a maker of policy; it plays an important role in the implementation of the policy it lays down through its executive function.

The composition of the INTA Council reflects the importance which the Government attached to this body. The Council consists of a Chairman, a Vice-Chairman and a representative of the Secretariat of Agriculture, Livestock and Fisheries - all appointed directly by the Secretary of State for Agriculture in the Ministry of Economy. The other members of

the Council include a representative of each of the four main producer unions of the country and one from the Consorcios Rurales de Experimentación Agrícola (Regional Consortia for Agricultural Experimentation). In addition, there are two representatives of the national universities, one each from the Faculties of Agronomy and of Veterinary Science. The Government obviously wanted to make sure that INTA will maintain a sharp focus on programs and problems of agricultural development in the country working closely with the planners and policy-makers in the Ministry and representatives of the farmers.

Experiment station network and its centralized management

The second institutional entity is the National Directorate which is responsible both for the formulation of scientific programs and their implementation. The National Directorate as the main executive body is also responsible for the overall management of the research system, although, as we saw earlier, the INTA Council shares this function through its strong directing role.

Much of the centralized nature of INTA in terms of its operations can be traced to the National Directorate with its administrative and scientific control over the experiment station network - the third institutional entity of INTA. Most of the decisions with regard to the research programs and allocation of resources to the experiment stations are taken by the National Directorate, which in 1988 managed a network of 40 such stations and sub-stations. This network extends all over the country with a distance of more than 3,000 km. between the stations located at the extreme north and the extreme south. Of the 22 provinces of Argentina only 3 do not have any experiment station located in them. Most of the experiment stations are in the pampean region as can be seen from Table 9. Consequently, a large part of the scientific manpower of INTA is deployed in the pampean region (Table 10). The experiment stations have a broad mandate, most of them carrying out research work relating to commodities produced in their area of influence. In this way, several stations work on the same commodity. The distinction between research centers and experiment stations listed in Table 9 requires a word of explanation. The institutes of the research centers located at Castelar near the capital are at the same institutional level as the experiment stations in the regions. They, however, have a different mandate. They do a great deal of basic research and research relating to conservation and documentation of resources. The three centers are the Veterinary Sciences Research Center, the Plant Sciences Research Center, and the Natural Resources Research Center. A fourth center on socio-economic research has been planned. The Castelar complex consisting of these four centers is INTA's major institutional resource for advanced research work and for research relating to documentation and conservation of resources.

Both the experiment stations in the regions and the research centers at Castelar are headed by a director with management and scientific responsibility for the work of these stations and centers. Attached to each of these stations is an advisory council which approves and oversees their research programs.

On the face of it, the experiment stations would appear to have a regional character distributed as they are in the different provinces.

Table 9: Experiment stations and research centers (1988)

<u>Experiment station</u>		<u>Province</u>	<u>Region</u>	<u>Main fields of research</u>
Anguil	ES	La Pampa	Pampean	alfalfa, beef cattle, sheep, sorghum, forage plants and pastures and soil fertility
Gral Pico	SS	La Pampa	Pampean	comparative tests
Perijamino	ES	Buenos Aires	Pampean	corn, wheat and brewer's barley, forage plants and pastures, swine, poultry production, bees, plant protection
Balcarce	ES	Buenos Aires	Pampean	beef-cattle, potatoes, sheep, summer wheat, forage plants and pastures, weeds, soil conservation
San Pedro	ES	Buenos Aires	Pampean	fruit trees, vegetables
Bordenave	ES	Buenos Aires	Pampean	forage plants
Gral. Villegas	ES	Buenos Aires	Pampean	beef cattle, pastures
Parana	ES	Entre Rios	Pampean	corn, wheat, oilseeds, sorghum, alfalfa, forage plants and pastures
Concordia	ES	Entre Rios	Pampean	citrus, forest trees, soils
Conc. Uruguay	ES	Entre Rios	Pampean	beef cattle, pastures, rice, poultry
Delta	ES	Buenos Aires	Pampean	forestry, stone fruits, vegetables, weeds
Marcos Juarez	ES	Cordoba	Pampean	beef cattle, swine, forage plants and pastures, alfalfa, wheat, corn, sorghum, oilseeds, soils
Manfredi	ES	Cordoba	Pampean	oilseeds, sunflower, sorghum, pastures, bees, microbiology, soils
San Luis	ES	San Luis	Semi-arid	beef cattle, pastures, alfalfa, corn, plant resources, soils

<u>Experiment station</u>	<u>Province</u>	<u>Region</u>	<u>Main fields of research</u>
Rafaela	ES Santa Fe	Pampean	alfalfa, oilseeds, wheat, corn, dairy production
Oliveros	ES Santa Fe	Pampean	wheat, corn, sorghum, oilseeds, pastures, bees, microbiology, soils
Mendoza	ES Mendoza	Template irrigated	grapevine, fruits, plant protection
Junin	SS Mendoza	Template irrigated	grapevine, fruits
La Consulta	ES Mendoza	Template irrigated	vegetables, grapevine, agrometeorological inventory
Rama Caida	ES Mendoza	Template irrigated	grapevine, fruits, vegetables, plant resources, pastures in arid zone
San Juan	ES San Juan	Template irrigated	grapevine, vegetables, fruits, weeds, soils, aromatic plants
Alto Valle	ES Rio Negro	Template irrigated	fruits, grapevine, vegetables, soils
H. Ascasubi	ES Buenos Aires	Pampean irrigated	vegetables, potatoes, pastures, soils
Corrientes	ES Corrientes	Northeast	beef cattle, rice, cotton, forage plants, soils
Bella Vista	ES Corrientes	Northeast	citrus, dark tobacco
Mercedes	ES Corrientes	Northeast	beef cattle, sheep, pastures, plant resources
Misiones	ES Misiones	Northeast	yerba mate, tea, forest trees, tobacco, soils
Saenz Peña	ES Chaco	Northeast	beef cattle, wheat, cotton, oilseeds, soils
Cnia Benitez	ES Chaco	Northeast	cotton, soils, plant resources, local crops
El Colorado	ES Formosa	Northeast	beef cattle, pastures, cotton, weeds
Las Breñas	ES Chaco	Northeast	cotton, beef cattle, wheat, swine, oilseeds

<u>Experiment station</u>	<u>Province</u>	<u>Region</u>	<u>Main fields of research</u>
Reconquista	ES Santa Fe	Pampean/ Northeast	cotton, oilseeds, corn, evaluation of floodable lands
Famaila	ES Tucumán	Northwest	sugarcane, citrus, soybean
Leales	SS Tucumán	Northwest	beef cattle, pastures, corn, sorghum
Catamarca	ES Catamarca	Northwest	aromatic plants, citrus, fruits, grapevine
La Bonda	ES S.del Estero	Northwest	cotton, vegetables, alfalfa, citrus, soils
Salta	ES Salta	Northwest	beef cattle, animal pathology, tobacco, oilseeds, vegetables, forest trees
Abra Pampa	SS Jujuy	Northwest	sheep, llama, alpaca, vicuña
Bariloche	ES Rio Negro	Patagonia	sheep, beef cattle, pastures, plant resources, wild life fauna
Trelew	ES Chubut	Patagonia	vegetables, potatoes, fruits, sheep, soil surface water captation
Santa Cruz	ES Santa Cruz	Patagonia	sheep, evaluation of natural resources
La Rioja	ES La Rioja	Northwest	dry fruit, olive trees & caprine cattle
<u>Research Centers</u>			
Natural Resources		Buenos Aires	soils, agrometeorological inventory, weeds, aromatic plants, plant resources, forest trees
Plant Sciences		Buenos Aires	genetics, plant protection, microbiology, rural engineering
Veterinary Science		Buenos Aires	animal pathology, meat technology
Economic and Social Sciences (proposed)		Buenos Aires	economic research

Note

ES: experiment station

SS: experiment sub-station

Table 10: Qualification of professional personnel at the main stations and centers, September 1985

Institute/Station	Higher Qualification			(M.Sc. + Ph.D.) as % total
	1st degree	M.Sc.	Ph.D.	
CIRN	54	5	2	10.7
CICA	61	13	0	17.6
CICV	72	7	1	10.0
Mendoza	22	4	2	21.4
El Colorado	11	2	0	15.4
Saenz Peña	30	6	0	16.2
Bella Vista	6	3	0	33.3
Cnia Benitez	13	5	1	26.0
Misiones	10	2	0	15.4
Mercedes	11	2	0	11.8
Salta	25	9	5	35.9
Catamarca	16	2	0	11.1
Anguil	25	6	0	18.2
Balcarce	60	16	20	35.6
Bordenave	8	4	0	23.5
Pergamino	39	16	5	31.8
San Pedro	11	5	0	31.2
Hilario Ascasubi	13	1	0	6.2
Bariloche	21	4	0	16.0
Trelew	13	1	0	7.7
Alto Valle	19	4	1	20.8
Parana	21	4	0	16.0
Concep. del Uruguay	16	0	0	0.0
Manfredi	26	2	2	12.9
Marcos Juarez	32	9	0	20.9
Rama Caida	17	3	0	13.4
Rafaela	26	12	2	32.6
Oliveros	12	0	0	0.0

Note: Stations and centers where 10 or more professionals are employed.

Source: Human Resource Planning and Management in INTA, ISNAR Report R25e, 1986.

Thus, in physical terms INTA would appear to be a decentralized organization. However, the experiment stations have had few links with the provincial governments, regional institutions and the local farmer organizations. Nor was much responsibility in terms of decision-making delegated to the heads of the stations. They received their mandate and direction from the Headquarters of INTA in Buenos Aires. It is only recently that serious efforts have been made to initiate a process of decentralization.

National programs

The research strategy of the National Directorate has been to organize most of its scientific activities in the form of a large number of national programs on different commodities or groups of commodities. The basic philosophy has been that the regional research needs could be met through the institution of national programs by making them sufficiently comprehensive - covering under their umbrella most of the commodities including those of regional importance. The research funds were allocated to the experiment stations on the basis of their participation in these national programs, with one of the stations providing a co-ordinating role. The co-ordinating station has the largest concentration of scientific and other resources for that particular program, and in this way, it performs a lead function. Program planning, thus, is a highly centralized process. In 1984 INTA had 38 national programs as shown in Table 11.

Extension agencies and their links with research

The fourth institutional entity of INTA is to be recognized in the form of its 225 rural extension agencies distributed all over the country with more than 500 extension workers. Until recently, the management of the extension service of INTA through these agencies has been the responsibility of the directors of the experiment stations under the control and supervision of an Assistant Director of Extension in the National Directorate in Buenos Aires. This centralized reporting procedure effectively undermined the relationships of the extension workers in the field with the experiment stations in the regions, which are the main sources of new technology. The heads of the experiment stations on matters of extension reported to the Assistant Director of Extension who, in turn, advised the field staff of the extension agencies about new messages to be given to farmers. The decentralization process which is now in progress is having its greatest impact in more directly linking the research stations with the extension agencies, giving full responsibility for setting up policies and programs of action to the regional level.

Another feature of the extension activities of INTA, and, indeed, of the research itself as we saw earlier, is that these activities have been concentrated mainly in the pampean region. Thus, 60 percent of the extension workers have been located in this region dominated by progressive farmers, who are extremely well organized to have access to the latest technological advances through the CREA groups - private consortia for interchange of information, cooperatives and other private sources. It is the farmers in the non-pampean region who probably had greater need in relative terms of support from the extension agencies.

Table 11: National research programs

<u>CROPS</u>	<u>LIVESTOCK</u>	<u>OTHERS</u>
Cotton	Beef Meat	Microbiology
Grapes	Milk Production	Soils Inventory and Classification
Yerba Mate and Tea	Sheep	Natural Plant Resources and Wild Fauna
Fruits I	Pigs	Agrometeorology
Fruits II	Poultry Production	Rural Sociology
Tobacco	Animal Pathology	Genetics
Aromatic Plants	Honey Production	Economic Studies
Wheat and Barley		Rural Engineering
Maize		Soil Conservation and Fertility
Sorghum		Plant Protection
Rice		Miscellaneous
Citrus Fruit		
Oilseeds		
Sugarcane		
Vegetables		
Potatoes		
Forages		
Alfalfa		
Soyabeans		
Forest Trees		

The Growth of INTA

Soon after its establishment INTA passed through a phase of rapid growth. Within a period of 3 years it had doubled its staff to nearly 600 professional scientists and had increased the number of fully equipped experiment stations to 30, and that of the extension units to a total of 80.

Manpower development

During the 1960s INTA passed through a period of institutional consolidation and saw the start of a new policy for scientific manpower development. It is this policy which was to give INTA a basic and applied research capability that took the organization well beyond the stage of adaptive research, which is what INTA was asked to do by the Government when it was first created. A great achievement of INTA is to be seen in the implementation of this policy. INTA sponsored its post-graduate degree training programs in 1960 when there were virtually no post-graduate degree holders in the organization. With some ups and downs during the past 25 years this training program has added enormously to the scientific research capabilities of INTA as can be seen from Table 10. The Table shows the distribution of professional staff holding the first degree and the MSc and PhD degree qualifications at the main experiment stations of INTA. The total professional strength of INTA in 1985 was 1,460 including 55 PhDs and 191 MScs.

Budgetary support

A destabilizing factor inherent in the growth of INTA has been the nature of its budgetary support. The Government took a policy decision while creating INTA that funding support for the new institution will come from a 1.5 percent export tax on most of the agricultural commodities of the pampean region. In many ways this was a step in the right direction because it ensured a continued source of funding for INTA without having to justify budgets to the Government every year. Problems were soon encountered, however, due to two major factors. First, the volume of exports tended to be highly variable as a function of variation in world trade in agricultural commodities. Secondly, the Argentinian currency in relation to the U.S. Dollar has shown marked fluctuations over the years with the result that the resources in terms of dollars have shown a great deal of variability.

From 1958 to 1980 INTA's main funding support came from the export tax. The tax, however, was eliminated from 1981 to 1983 and the resources came directly from the Treasury of the Government. In 1984 the tax was reinstated but it was reduced to 1.5 percent of the exports but excluding most of the regional commodities, approximately a 10% reduction of potential income. The consequences of all these factors was instability, as can be seen in Table 12, which shows the resource position over a long period of time. It will be seen that INTA's average budget has been US\$ 70 million with significant year-to-year variations. Thus, the budget in 1961 was 49 percent of that for 1959. After 4 years of relatively high income, 1984 saw a drop in real terms to a lower level than 1959 after which there was a rise in 1986, but even so, the 1986 figure was 50 percent less than that for 1977 in constant dollars. It should be noted that the inflated figures for the period 1978/1980 are the result of the policy of the Government to overvalue the local currency.

Table 12: Total budgetary support of INTA

YEAR	Total US\$	SOURCE (PERCENTAGE)	
		Export tax	Other sources
1958	5079840	94.73	5.27
1959	9122807	98.20	1.80
1960	23297101	75.17	24.83
1961	20115830	67.21	32.79
1962	16940923	68.72	31.28
1963	19158571	73.67	26.33
1964	22737626	70.14	29.86
1965	16366694	74.79	25.21
1966	20857060	76.99	23.01
1967	20286734	84.69	15.31
1968	21927222	78.64	21.36
1969	24514087	81.67	18.33
1970	23010051	86.92	13.08
1971	17564169	84.07	15.93
1972	16723804	87.56	12.44
1973	33991213	86.54	13.46
1974	31871200	87.88	12.12
1975	10165838	64.48	35.52
1976	38283711	95.14	4.86
1977	80513165	94.55	5.45
1978	92822201	92.31	7.69
1979	128910824	90.19	9.81
1980	117871836	71.04	28.96
1981	79657952	0.20	99.80
1982	29301410	0.00	100.00
1983	30600928	0.00	100.00
1984	40254692	84.47	15.53
1985	64487941	84.07	15.93
1986	60032550	82.16	17.84

Source: A.N.D Planning, INTA

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CHAPTER 4

THE DECENTRALIZATION PROCESS AND ITS PROGRESS

Many developing countries, especially the large ones, were called upon to reorganize and strengthen their national agricultural research systems in the 1950s and 1960s with a view to making science and technology a major instrument for the modernization of their agriculture. Many of them responded by creating new institutions such as INTA which were asked to take over the research function from the Government in order to provide a more favorable environment for scientific research resulting in new production technologies. Almost without exception many of these new organizations have been highly centralized in their structure and operations and this was perhaps to be expected. The need was to consolidate the existing resources, build on them, and provide a strong sense of direction and purpose in the organization and management of programs of agricultural research of great strategic value to the country. In the case of INTA the political and social history of the country also contributed to a structure of this kind.

Many of these institutions are now reaching a stage of greater maturity and they have some solid achievements behind them. They feel far more confident in taking up new challenges and more prepared to delegate responsibility. Further, the countries themselves have grown politically and socially and demand that there is a greater degree of participation in decision-making, especially where the interests of many different clients and social groups are involved. In other words, many of these countries and their research systems today face second generation problems which must be resolved through a further process of reorganization.

INTA's Response to a Changed Situation

INTA's response to this new situation was to initiate a planning process in 1984 to bring about important changes leading to a greater decentralization of the research system. The need for this exercise was brought home from a recognition of the following:

- * increase in the number of public and private institutions involved in scientific research and technology diffusion activities;
- * increase in the number of universities, now to be found in all parts of the country;
- * social changes leading to a greater capacity for articulating demands on the technological system;
- * growth of a significant agri-business sector bringing in new concepts of management, market research, information systems and, above all, the need for more sophisticated technologies for development of the export trade;
- * the growth of the international agricultural research system and the need to link with it more effectively;
- * greater political awareness both at the national and regional level;
- * improved national capabilities to respond to new demands through scientific and technology advances.

INTA approached the issue of decentralization of some of its management and decision-making functions by appointing a Commission called the "Institutional Analysis and Development Commission". The Commission, consisting of Members from outside INTA, was asked to make recommendations for the restructuring of the organization. The Commission broadly recommended:

- * a more participatory institutional model;
- * a more decentralized process of decision-making;
- * improved linkages with the private sector;
- * greater integration with the overall environment of the country bearing in mind its federal character;
- * mobilization of political and social resources in support of INTA.

The Commission's recommendations were widely discussed by the staff of INTA in its different units and with various organizations concerned with the development of agriculture in the country. Finally, a decree was issued by the Government in 1986 proposing a number of changes in the institutional structure of INTA. The Government decided that it may not be necessary to modify the original law which led to the creation of INTA. A better course would be to introduce the proposed changes through a broader interpretation of the provisions which already existed in the original legislation.

The Substance of Reorganization

The reorganization of INTA which is currently in progress involves several major changes. Perhaps the most important of these as far as management of research is concerned is the creation of Regional Centers. These centers have been created by grouping the existing experiment stations in a province (and in eight cases in two adjoining provinces) under the management of a Regional Director, who works closely with a Regional Council. In the case of the province of Buenos Aires, two Regional Centers have been created by grouping the different stations. On the extension side the major change has been that the extension agencies have been linked directly with the heads of the experiment stations in the provinces, doing away with the earlier institution of the Assistant Director of Extension in the Secretariat of INTA, who advised the agencies.

The other important decisions taken during the decentralization process include a reorganization of the National Directorate with a view to strengthening it in terms of its research management functions and introduction of a new research planning and evaluation instrument.

Organization of Regional Centers

Creation of the Regional Centers lies at the very heart of the reorganization process. As pointed out above, a Regional Center in most cases is created by bringing under its umbrella all the experiment stations in a province. In this way the unit of research organization and management in the provinces is at a higher level of aggregation than the individual experiment stations prior to the decentralization process. Table 13 lists the different Regional Centers and the experiment stations and sub-stations included in them.

Table 13: Regional Centers and their experiment stations and sub-stations

Regional Center	Experiment Station	Sub-station	Province
Salta-Jujuy	Salta	Abra Pampa	Salta Jujuy
Tucumán-Stgo. Estero	Famaillá Santiago del Estero	Leales	Tucumán Stgo. del Estero Tucumán
La Rioja-Catamarca	La Rioja Catamarca		La Rioja Catamarca
Misiones	Misiones		Misiones
Chaco-Formosa	Pte. R. Saenz Peña El Colorado Las Breñas Colonia Benitez		Chaco Formosa Chaco Chaco
Corrientes	Corrientes Bella Vista Mercedes		Corrientes Corrientes Corrientes
Entre Rios	Parana Concepción del Uruguay Concordia Delta		Entre Rios Entre Rios Entre Rios Buenos Aires
Santa Fe	Rafaela Oliversos Reconquista		Santa Fe Santa Fe Santa Fe
Cordoba	Marcos Juarez Manfredi		Cordoba Cordoba
La Pampa-San Luis	Anguil San Luis	Gral. Pico	La Pampa San Luis La Pampa
Mendoza-San Juan	Mendoza La Consulta Rama Caida San Juan	Junin	Mendoza Mendoza Mendoza San Juan Mendoza
Buenos Aires Norte	Pergamino San Pedro Gral. Villegas		Buenos Aires Buenos Aires Buenos Aires
Buenos Aires Sur	Balcarce Bordenave Hilario Ascasubi		Buenos Aires Buenos Aires Buenos Aires

Regional Center	Experiment Station	Sub-station	Province
Patagonia Norte	Alto Valle		Rio Negro
	Bariloche		Rio Negro
Patagonia Sur	Trelew		Chubut
	Santa Cruz		Santa Cruz

The management of these Regional Centers is the responsibility of the Regional Director, a new position created for this purpose. The Regional Director, in exercising his/her power, works closely with the Regional Council - a new institution created for the first time. It is the Regional Council which becomes the main instrument for providing an additional client oriented input into the process of research planning in the regions, by mobilizing and articulating the views, concerns, ideas and initiatives of local institutions and producers. The Regional Council is not an Executive Body and the Regional Director is not administratively responsible to it. The Regional Director reports to the National Director but in all the important decisions concerning research planning and the research agenda of the experiment stations constituting the Regional Center, the Regional Director works closely with the Regional Council.

The Regional Council has the following functions:

- * to lay down the research policies and priorities of the Regional Center including statements of objectives, needs and guidelines in the execution of the research policy;
- * to receive and evaluate the technological plan of the Regional Center along with the proposed budget and forward it with its comments to the INTA Council through the National Directorate;
- * to review the Regional Center's technological plan in the course of its implementations, and if necessary, suggest modifications consistent with the objectives as approved by the INTA Council;
- * to identify and evaluate the legal, social, political, economic and organizational factors that affect the process of technological change and make recommendations to the INTA Council and the National Directorate;

- * to propose an expanded research program for the existing experiment stations, and if necessary, propose creation of new stations to the INTA Council through the National Directorate;
- * to decide on the structure of the experiment stations including setting-up new laboratories, demonstration fields and pilot schemes in line with institutional policies and budget forecasts and to make a similar review of the extension service;
- * to suggest modifications to the composition of the Advisory Councils attached to the experiment stations and rural extension agencies.

It will be noted from the above that the Regional Councils have a strong advisory and planning role but their recommendations must be approved by the INTA Council.

The Regional Center Director has the following functions:

- * to prepare the technological plan for the Center along with the corresponding budget, working with the heads of the experiment stations, and submit it to the regional Council for its approval. It is the Council which forwards the plan through the National Director to the INTA Council;
- * to make proposals to the National Directorate for the appointment, promotion and dismissal of the administrative and technical personnel attached to the experiment stations and inform the Regional Council of these decisions;
- * to prepare proposals for establishing new experiment stations or institutes or for expanding any of the existing experiment stations and to submit these proposals to the Regional Council of the Center.

It should be stressed that the heads of the experiment stations constituting the Regional Center report to the Regional Director who, in turn, is administratively responsible to the National Director and not to the Regional Council. The Regional Director has a small group of technical staff to assist in the research management functions.

Reorganization of the National Directorate and Creation of New Instruments of Research Planning

The Secretariat of the National Directorate has been reorganized mainly to create greater capacity in the area of research management. Four deputies assist the National Director in this field and in addition there is a Director of Administration. Their main responsibilities are defined as follows:

1. Assistant National Director of Planning
 - strategic planning
 - operative planning and budget
 - programs and special projects formulation

2. Assistant National Director of Evaluation
 - monitoring
 - evaluation
3. Assistant National Director of Organization and Human Resources
 - organization
 - management of human resources
 - human resources development
4. Assistant National Director of Operations
 - institutional relations
 - promotion
 - programs and projects
5. Director of Administration
 - general administration

The process of research planning and program formulation has been formalized defining the responsibilities at different levels including the forum for discussion of the plans, programs and projects, and the mechanism for their approval. Table 14 summarizes this framework for planning of research.

The New Organizational Structure of INTA

How does the emerging new INTA differ from the old in its structure and organization? This can be seen from Figures 2 and 3 which show how INTA was organized before the process of decentralization was started in 1987 and the changes which are now taking place. It should be stressed that the decentralization process is far from complete. It is evolving as INTA experiments with new ideas.

Table 14: Planning of research programs and the process

PROGRAMMING INSTRUMENTS	GUIDING FACTORS	RESPONSIBLE INSTITUTIONAL LEVEL	FORUM FOR DISCUSSION	APPROVING BODY
FARM TECHNOLOGY PLAN	<ul style="list-style-type: none"> - National farm technology policies - INTA's legal, physical and staff structure 	National Directorate	<ul style="list-style-type: none"> - National Directorate - Regional and Research Center Directors - Coordinators of National Programs - Regional and Research Councils - National Council 	National Council
NATIONAL PROGRAMS (PAN)	Budget ceilings laid down by National Council	<ul style="list-style-type: none"> - Coordinator - Commission with participation from members outside INTA 	<ul style="list-style-type: none"> - National Directorate - Program Committees - Regional and Research Center Councils 	National Council
REGIONAL PROGRAMS (PAR)	Budget ceilings laid down by National Council	<ul style="list-style-type: none"> - Coordinator - Commission with participation from members outside INTA 	<ul style="list-style-type: none"> - Regional Director - Program Committee 	Regional Council
MEDIUM TERM INVESTMENT	Budget resources available in years involved	National Directorate	<ul style="list-style-type: none"> - National Directorate - Regional and Research Center Directors - Regional and Research Councils - National Council 	National Council
<ul style="list-style-type: none"> - Construction and equipment plan (broad areas) - Human resource training plan 				

ANNUAL FARM TECHNOLOGY PLAN	Medium Term Plan	National Directorate	- National Directorate - Regional and Research Center Directors - National Program Coordinators - Regional and Research Councils - National Council	National Council
- Budget ceilings by center and programs - Annual training program				
- National Research Projects	- Program Document - Distribution of resources	Project Leaders	- Plan Technicians - Program Coordinator - Management of Units involved - Center Director	Regional or Research Center Council
- Regional Research Projects	- Document - Program Document - Distribution of resources	Project Leaders	- Project Technicians - Program Coordinator - Management of Units involved - Center Director	Regional Council
- Integrated Projects (Incorporating components of national and regional programs)	- Budget ceilings laid down by National Council	Ad hoc Commission	- Coordinating Commission with representatives from the centers and programs involved	- Respective Centers with regard to projects and/or partial plans - Council with regard to integrated projects and reinforced budget should exist
ANNUAL OPERATIVE PLAN AND BUDGET	- Programming instruments approved at the pertinent levels and budget ceilings laid down by the National Council	- Center Directors - National Directorate (consolidated)	- Center and Unit Directors - Program Coordinators involved - Pertinent Administrators - Overall Consolidation by National Directorate	Regional and Research Center Council

Figure 2: Organizational structure of INTA
(Pre-decentralization period)

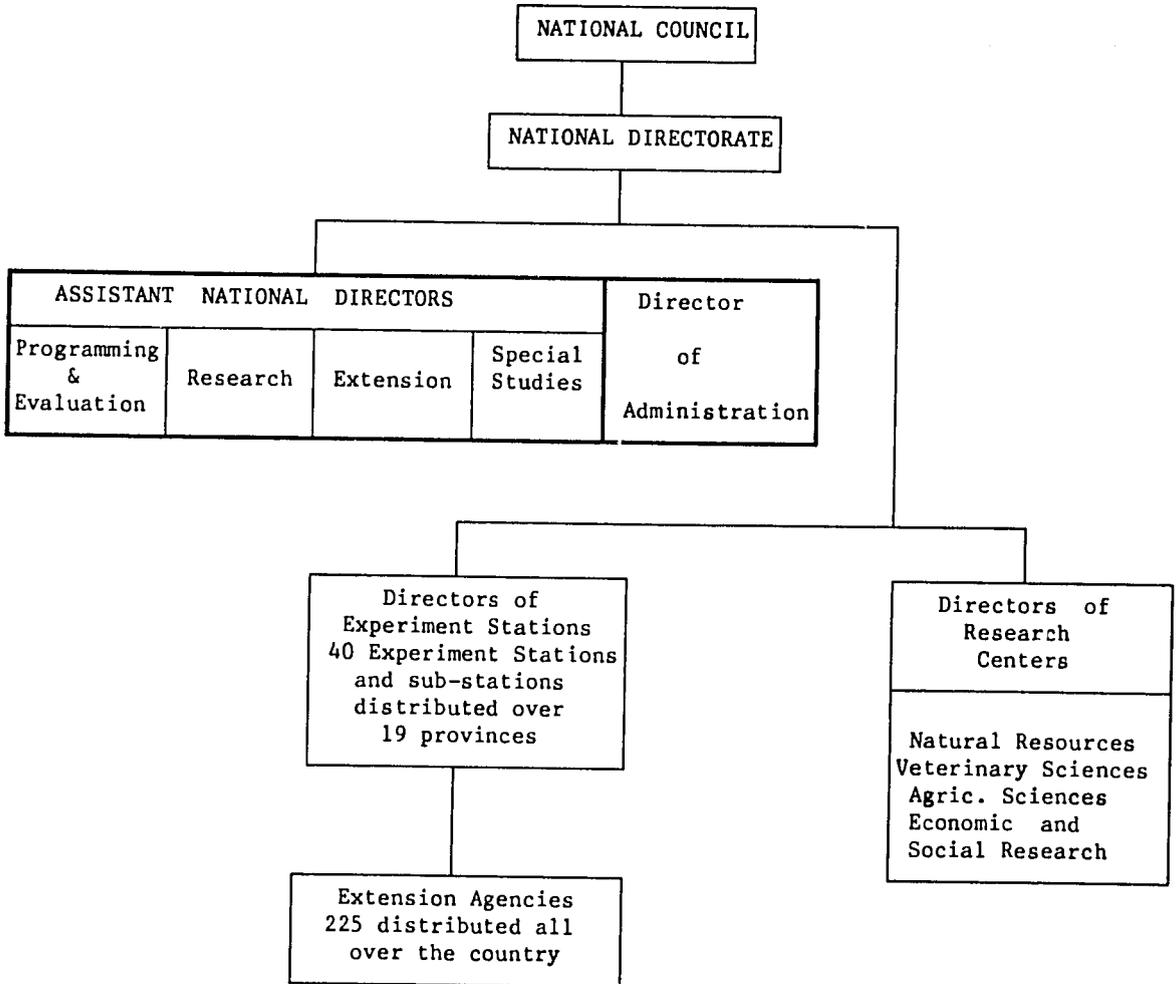
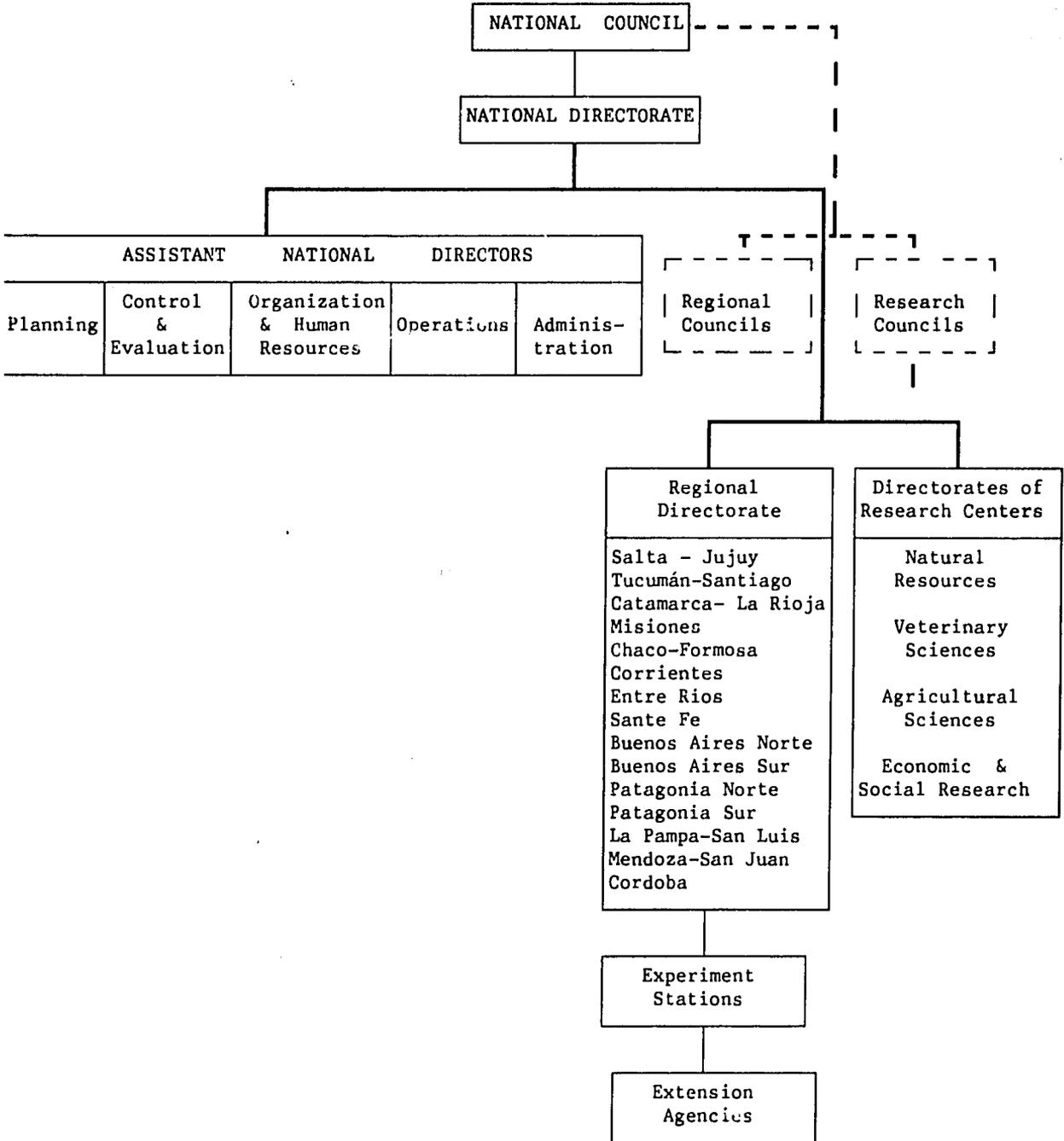


Figure 3: Organizational structure of INTA
(Post-decentralization)



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CHAPTER 5

THE PROCESS OF DECENTRALIZATION AND ITS EVOLUTION

The Rationale for Decentralization

Agriculture in a large country like Argentina by its very nature is a highly dispersed activity practiced as it is by tens of thousands of farmers distributed in all the different agro-ecological regions of the country. Organization of agricultural research to provide technological support to these diverse groups of farmers cannot and should not be a centralized activity. INTA has been conscious of this and has, for this reason, created a widely distributed network of experiment stations and extension agencies in the different provinces of the country, although there is a major concentration of them in the Pampas. However, the process of research planning and management has remained highly centralized. In considering the issue of decentralization, it is important to recognize that Argentina is the eighth largest country in the world with a great deal of agro-ecological differentiation, as can be seen from Table 3 and Figure 1 in Chapter 2. This obviously calls for a national as well as a regional focus in research planning, responding to the broader priorities and the location specific needs.

Secondly, the Government of Argentina with its federal constitution shares responsibility for the development of agriculture with the provincial administrations in the different regions of the country. Some of the provinces in Argentina are as large as countries of Western Europe as we saw in Chapter 1 and normally they would be expected to organize a research service of their own, complementing the federal stream of research. Most countries as large as Argentina have two streams of research, a federal and a regional stream, linked closely through the institution of a number of nationally coordinated programs. This division of responsibility becomes all the more important for the organization of the extension services - a grass root activity which normally belongs to the provincial governments.

Thirdly, both agricultural development and research have many clients and stake holders and a decentralized system facilitates their participation in research planning and their contribution in the strengthening of the research process. Finally, with a network of 40 experiment stations and over 1,500 scientists and technical personnel, efficient administration of the research system presents many problems if the process of decision-making remains highly centralized. In centralized systems of this kind, the management is often overwhelmed with routine administrative work, leaving the senior staff with little time for planning and policy-making which should normally be their main responsibility.

First Phase of Decentralization

The creation of Instituto Nacional de Tecnología Agropecuaria (INTA) through a Government decree in 1956, marked an early step in the process

of decentralization of agricultural research in Argentina. The decentralization at this stage was mainly of an administrative nature with the government deciding to hand over the management of agricultural research to an autonomous organization with close links to the Secretary of Agriculture in the Government. Earlier, the research service had formed an integral part of the bureaucratic structure of the Secretariat of Agriculture in the Ministry of Economy. The 1956 decree opened altogether new opportunities for the management of the research system in terms of its ability to take major initiatives and decisions and the speed with which these could be implemented. The INTA Council with the eminence of its members including representatives of major producer organizations in the country, and exercising all the powers which had earlier belonged to the government, has managed the research system wisely during the past 30 years and created highly favorable conditions for its scientists to make some very valuable contributions. The Council has received powerful support from the General Director of Research (National Director) and the team of senior scientists in the Secretariat of INTA. The success of INTA as a national institution and the outstanding work which it has done for the development of agriculture in Argentina is largely a function of the high quality of its managers and scientists.

With all of its success, however, INTA has remained a highly centralized organization and this was perhaps to be expected in the context of the political and social history of the country. It is only now after a period of 30 years that INTA has started to give serious thought to the process of decentralization of responsibilities in the regions. The major objective of this exercise, as the INTA Council explains, is to provide a greater sense of participation in the formulation of research policy and programs to the different groups in the regions having an interest in the development of agriculture and also to devolve to the regions larger decision-making powers in relation to extension. The groups include the officials of the Departments of Agriculture in the provincial governments, the regional producer organizations, the local university scientists, and other scientific and technical institutions.

The decentralization process has consisted in the main of two major initiatives. These include the creation of the position of Regional Director, and the grouping of experiment stations into a Regional Center. The Regional Director, who heads the Regional Center, constitutes a new administrative layer between the experiment stations in a province and the National Director at the headquarters of INTA. Also, the Regional Director is advised by a Regional Council as explained in Chapter 4.

On the face of it these two institutions of Regional Council and Regional Director appear to correspond to the policy-making and the administrative entities in the form of the INTA Council and the National Director at the national level. In reality, however, the position is quite different. The Regional Director and the Regional Council may at best provide an input in policy-making; they do not make research policy for the region. Their powers in this respect are extremely limited. This is not to say that the new experiment in decentralization has not served a useful purpose. It has, and the ISNAR team saw evidence of it in the course of discussions in one of the Regional Council meetings, which it was invited to attend. The discussions were highly effective in focusing attention

on regional research priorities, in fostering links between the university and INTA scientists and in generating some funding support for research from the provincial government. The limitation is that the Regional Council remains (because of restrictions imposed by the law that regulates the functioning of INTA) largely advisory in character and all the major decisions on national and regional research must still be taken by the INTA Council. Also, the Regional Director has a limited budget and a very small team of scientists to assist him in the management of research in the province. The Regional Director reports to the National Director for important decisions.

So what has the decentralization process achieved so far? It has helped to create an important forum for discussion of problems of agricultural development in the regions in the context of the needed technological support, and it has succeeded in generating very useful interactions among all the interested parties. It has also created a great deal of consciousness about the need for planning of research at the regional level and raised many expectations. It also promoted a closer relationship of the extension service with regional research and with the farming community it seeks to serve. In terms of policy-making and implementation of the regional research programs, however, the process of decentralization has not gone very far.

The Next Phase

If we examine the process of decentralization during the past 3 years, we come to the conclusion that an important first step has been taken but that the process must continue. In the case of an institution as well established as INTA, the need obviously is for an evolutionary approach rather than for a radical transformation which could prove disruptive. What are some of the options which INTA should consider in this regard?

Definition of national and regional research programs

The ISNAR team believes that the current efforts at decentralization could be made more effective with a better definition of the national and regional research programs and mechanisms of their management. The thinking in the INTA Secretariat has been that 80 to 85 percent of the research agenda of the country should be covered by the institution of a series of national programs, leaving 15 to 20 percent of the resources for regional research. The suggestion is that the national programs could be so broad-based and organized as to meet most of the regional research needs and, for this reason, the bulk of the budgetary resources of INTA should be allocated to the national programs.

The ISNAR team believes that the concept and the organization of national programs should be quite different from this approach. These programs in our view should not be conceived to discourage regional initiatives. The fundamental concept underlying the national programs should be to create a high concentration of scientific effort around selected fields of research of strategic importance to the country. Two basic considerations must be kept in view in designing the national programs. First, the national programs should relate to some of the economically most important commodities and production resources of the country. Second, a multi-disciplinary team of scientists should be organized to do

the more advanced work needed for generating suitable technologies in response to the identified priorities. This team should link up with groups of cooperating scientists in the regions, who will help to take these technologies to the farmers through adaptive and on-farm research and research on production systems, in close association with the extension service. The activities of these different groups of scientists at the various stations should be coordinated by a national coordinator.

A framework for the structure, organization and management of the national programs is presented in Chapter 6. The important point to be made here is that the national programs would not cover all the commodities and production resources. Crop and animal production programs which are not of strategic national importance should best be left to regional research. Also, research on production systems including integration of different crops and livestock in sustainable agricultural practices is best carried out in the regions both in terms of its planning and implementation.

If these criteria are used to define the national programs, a more equitable distribution of funds and other resources would be possible between the national and regional research programs. The ISNAR team recommends that as a first step efforts should be made to allocate no more than 50 to 60 percent of the resources to the national research programs. An increased percentage of INTA's resources, as much as 40 to 50 percent, should be allocated for regional research so that the Regional Director and the Regional Council can take up greater responsibility in the planning, organization and management of research in the regions. The Regional Director and the heads of experiment stations in the Regional Centers would continue to be backstopped by the National Director and his team in the management of these programs, especially with regard to their evaluation. The position should be reviewed as the regional research capacity is strengthened and the provinces begin to generate their own resources for such research. When this begins to happen, the Regional Director and the Regional Council should be given greater autonomy in the management and administration of regional research.

Rationalization of the research station network

The process of decentralization which is currently in progress should also be viewed in the context of INTA's network of experiment stations and their functional differentiation. The National Center for Agricultural Research at Castelar near Buenos Aires is for basic research. Its mandate includes studies on the country's production resources, including soils and vegetation, and research in basic genetics and veterinary sciences. The impression one gathers is that the Castelar complex is isolated from INTA's mainstream research in the field and should be brought closer to it. INTA clearly needs a center of this type - the only question is that of its programs. The National Center should be carrying out basic and strategic research - maintaining in the process close contacts with the Regional Centers for a good understanding of the problems in the field. The National Center at Castelar needs a review by the INTA Council to determine its future direction in the context of the current reorganization and rapid advances in science.

The 40 experiment stations and sub-stations which form part of the recently established Regional Centers in the provinces do differ in their research programs as one would expect on the basis of their location, but the difference is not one of a fundamental nature. Most of them carry out applied and adaptive research consistent with the technological needs of farmers in the region. All of them have a regional focus with the proviso that some of them have been additionally designated as a lead center for research on a particular commodity or production resource, which is of wider national significance. This is the closest one comes to the concept of a national research station in INTA's network, with some of the stations having a dual mandate in terms of regional and national research. INTA, in our view, should examine whether this is the best and the most cost-effective way of using its research station infrastructure to promote programs of national and regional research.

Leaving from this consideration the research complex at Castelar, there would be considerable merit in reorganizing the present network of experiment stations into two types - National Research Stations and Regional Research Centers. These will have quite different mandates but a highly complementary relationship. They will be brought together in a close working partnership, especially through the institution of national programs which cut across individual stations.

National research stations and regional research centers

The main purpose of creating the national research stations would be to concentrate the available scientific and other resources in a highly focussed manner on selected commodities and production resources of strategic importance to the country. A careful analysis should help to determine the commodities which are of paramount importance for Argentina's economic and social advancement through their contribution to export earnings and meeting a large part of the domestic demand. The wheat crop provides an outstanding example of this but there would be other commodities and resources. The national research stations should focus their multi-disciplinary scientific and other resources on a single commodity or a group of related commodities (e.g. grain legumes) or a production resource (e.g. soils) and they should be called upon to organize technology-generating research, backstopped by strategic research. They will be in the vanguard of advanced research, maintaining close links with the international agricultural research centers and national programs in other parts of the world. The suggestion here is that it may not be feasible to organize this kind of advanced research on an important commodity or production resource at each of the regional research centers. It would be more cost effective if one station is specifically designated for such advanced research with the required critical mass of scientific effort. Its mandate would transcend regional considerations.

The improved genetic materials and the new concepts of disease and pest control or resource management will be widely disseminated from these national research stations to the regional research centers for adaptive and on-farm research and research on cropping and animal production systems. The present practice of giving a lead function to one of the experiment stations for advanced research is not particularly effective. The dual mandate of these stations in terms of national and regional research results in a loss of focus, and priority considerations tend to

be obscured. The experiment station network in Argentina covers a very wide spectrum of research activities. There is a widely held view which the ISNAR team shares that the need is to evolve priorities and allocate a greater proportion of resources to those research themes that are of much greater significance in terms of their potential contribution to the national economy. The creation of national research stations would provide an important mechanism for responding to these priority considerations.

The regional research centers with this reorganization will have responsibility to provide technological support for the development of agriculture in the regions in which they are located. Their mandate will be three-fold. First, they will organize adaptive and on-farm research on commodities for which the national research stations have primary responsibility for advanced technology-generating and strategic research. They will work to increase the yields and profits from the production systems recommended for the region. For this purpose they will work in close collaboration with the concerned national research stations. Second, they will carry out technology-generating research on commodities and factors of production not covered by the national programs. These commodities would be of particularly great value to the region even if they are not of strategic national significance. Also, they will take up research on production resources, e.g. the problem soils which may be of a regional nature. For example, if soil salinity is a serious problem in one of the provinces the concerned regional research center would be expected to organize the relevant research program to solve it. On-farm research and close collaboration with the extension service in taking the new technologies in the form of an appropriate package of practices to the farmers will be the third component of the mandate of the regional research centers.

How many national research stations of the type discussed above does Argentina need? INTA would be expected to decide on their number on the basis of a detailed economic analysis of the type indicated above. The analysis should cover all the different commodities as well as the major production resources, which constitute the capital for ensuring sustainability of agricultural production in the country. The experience in the past in Argentina and in many other countries has been that in our efforts to increase productivity and profits in the short term the sustainability aspect of agricultural production has not always received serious attention. In general, it would be better to start with a limited number of national research stations and then increase their number if considered necessary at a later stage on the basis of the experience gained. An important consideration must always be to maintain a good balance between research of a regional character and national research, for both are important and have their own value in a complementary relationship.

The decentralization process would be strengthened with the reorganization of the research station network on the lines discussed above. The national research stations should be managed directly by the National Director and the senior staff in the Secretariat. The regional research centers, on the other hand, should be given much greater autonomy in the planning and implementation of their research programs and management of their resources. The Regional Director should be able to make most of the decisions in consultation with the Regional Council.

The role of the National Director in relation to the Regional Centers will be limited to monitoring and evaluation and research coordination. This is how the system should evolve in the next ten years. For the present, however, the National Director will continue to provide a great deal of management support to the Regional Research Centers in view of the very limited managerial resources available to the Regional Directors.

Strategy for Agricultural Research

INTA has done well to take a number of major initiatives during the past three years. These include the process of decentralization and development of closer links with the private sector. These initiatives would be more effective if they were taken within the framework of a strategy for agricultural research in the country in the medium and the long term. INTA should begin to define more explicitly its mission and goals and the mechanisms to achieve them in the context of the country's changing economy and its place in the world. The world food situation has changed dramatically in the last ten years with Western Europe emerging as a major producer of food grains, meat, and dairy products with sizeable surpluses. At the same time the increasing economic prosperity of Western European countries and the European Economic Community's decision to have a fully integrated market by the year 1992 opens for Argentina altogether new possibilities of exports and a different type of trading relationship. Also, many developing countries are in the process of a significant shift in their food habits with increasing income growth. Thus, many of these countries are changing from coarse grains like sorghum, maize and millet to wheat and rice, and there is a greater component of animal protein in the diet of their people.

Research priorities in a changing economy

A more important development is Argentina's own industrial growth involving the emergence of a significant agri-business sector. In the developed countries of North America, Western Europe, Australia, and Japan, a significant component of agricultural research is carried out by the agri-business sector. Thus, a large part of adaptive research and on-farm demonstrations are taken up by the industry leaving the government's research services free to concentrate on the more advanced strategic and applied research. Argentina may not have reached the same level of industrial growth as these developed countries but in many ways it is closer to them than to the developing countries. INTA should, therefore, help to create a climate for the continued advancement of the country's agriculture in which the private sector plays a major role in promoting both development and research. This would mean a great deal of collaborative research with the private sector and some of the recently started joint ventures should be seen as only the first steps in this direction. It is in view of considerations of this kind that INTA needs to formulate its institutional strategy for research in the next 10 to 15 years.

The first major issue which the new strategy would be expected to address is how INTA's research infrastructure can provide greater support to the national and regional programs of agricultural development. Few research organizations in the world find themselves in the fortunate position of having the country's agricultural development policy clearly spelled out for them so that they can relate to it. INTA is no exception in this

regard. However, INTA as a mature institution has the resources to help define this policy. The INTA Council will be called upon to work closely with the Ministry of Economy and the Secretariat of Agriculture to act as a catalyst in the formulation of this policy through the organization of joint task forces, workshops and seminars. Equally, it must collaborate with the major producer organizations and the agri-business sector in helping to define national development policy.

The research strategy document would address many issues in the broad context discussed above, but it should begin by defining the major goals of Argentina's agriculture in the next 10 to 15 years in the context of which INTA would be called upon to provide technological support. It should help to pinpoint the major areas of growth and opportunities where research has the largest potential to make a significant contribution. Further, it should identify problems of wider national significance, such as foot-and-mouth disease, whose eradication calls for the organization of a technological mission with the needed concentration of scientific and other resources. There is a great deal to be said for maintenance research to keep the existing production systems going, but technological innovations around well-defined national goals offer possibilities of a major advance and these should receive special attention. This is a policy issue and not one of resources. The reason research does not lead to more breakthroughs is not so much because of a lack of resources as a clear definition of the goals and concepts for which the research system is working. The INTA Council should be able to define national research priorities and ensure matching resource allocations.

The strategy document should next look at the institutional framework which can best support INTA's mission in the 1990s. The reorganization of the research station infrastructure as we have proposed provides an example of the type of institutional changes which should receive attention. The role of the National Research Center at Castelar should be reviewed. Finally, the strategy should address the issue of INTA's linkages with external sources, especially with the private sector and with the university system in the country.

Links with the private sector and the universities

INTA's joint ventures with the private sector need to be organized within the framework of well-defined policy. INTA should have little problem in evolving such a policy framework because several models of such collaboration exist in the developed countries. The Agricultural and Food Research Council (AFRC) of Great Britain (the British counterpart of INTA), for example, has in recent years helped to promote the formation of an Agricultural Genetics Company in collaboration with a number of private companies. The agreement is that in exchange for funding support which these companies would provide for biotechnology research by the scientists of the AFRC, the results available for commercial exploitation would be first offered to them.

As a first step in evolving policies of this kind, INTA should be organizing consultancy services for the private sector. For the services offered under these protocols, the fees received from the commercial organizations (e.g. the companies producing certified seed from the improved varieties evolved by INTA scientists) will be used to augment INTA's consolidated funds for research. INTA will simultaneously evolve

a promotion and reward system for its scientists which is seen to be fair by all. INTA must avoid creating a feeling of discrimination among its scientists based on an inequitable reward system. This seems to be happening at present when ad hoc decisions are made to reward some of the scientists who participate in the joint ventures. The important point is that problems of this kind can be easily resolved based on the experience of the developed countries from which INTA should be able to learn. Meanwhile, collaboration with the private sector must be intensified for this offers unparalleled opportunities to convert research findings into practical technologies for commercial exploitation in the overall interest of the country.

With regard to its links with the university system in Argentina, INTA must again evolve a long-term policy. It is very clear that INTA was never conceived to be a land-grant type of institution, and yet the commitment of its scientists to work closely with the different producer groups in the country and the decision of the government to hand over both the research and the extension functions to INTA, show that INTA imbibes some of the philosophy of these institutions. The missing component is agricultural education, for the land-grant institutions in the United States are characterized by a trilogy which integrates education, research, and extension service. The ISNAR team is not proposing that INTA become a land-grant institution, but at the same time, INTA has a lot to gain by establishing close links with the faculties of agriculture in the different universities in the country. An outstanding example of this linkage is already provided by the highly synergistic relationship of its Balcarce experiment station where the campus of the College of Agriculture of the National University of Mar del Plata is located. The two institutions have joint research projects and the scientists of the experiment station participate in the teaching programs of the College of Agriculture. The recently concluded agreement with some of the other universities are another step in this direction.

Two other mechanisms are available to promote these links. First, INTA should consider a system of contract research whereby a small part of its funds is earmarked to be offered as research grants to university scientists. INTA must evolve a policy in this regard which will ensure that the research which it supports in the universities responds to its own identified priorities. Second, the Regional Councils are already beginning to provide a forum for the university administrators and INTA managers to discuss programs of joint research. This forum could be made more effective through the participation in the Regional Council meetings of the directors of the experiment stations forming part of the Regional Center. The ISNAR team noted in the course of its field visit that the Council meetings were restricted to the Regional Director and did not include directors of the experiment stations in the region. Normally, they would be the persons who would benefit most from the suggestions made during the course of the Regional Council deliberations, and they are in a strong position to implement them.

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CHAPTER 6

STRUCTURE AND COORDINATION OF NATIONAL RESEARCH PROGRAMS

The rationalization of the research station network of INTA should lead, as proposed in Chapter 5, to two types of stations - the national research stations and the regional research centers. The national research stations whose mandate transcends agro-ecological and provincial barriers would be limited in number and their research would focus on commodities and production resources of strategic importance to the country as determined by a detailed economic analysis. A multi-disciplinary team of scientists at the national research stations would provide the critical mass of scientific effort needed for advanced technology-generating and strategic research on the concerned commodity, group of related commodities, or an important production resource.

Basically, the organization of a number of such national research programs with or without the simultaneous establishment of the national research stations should help to ensure that some of the country's major priorities in terms of agricultural development receive the needed technological support in a highly focused and organized manner, and that the funds available for research are not thinly distributed over too many programs and projects. A common failure of many national research services is that they have a very large research agenda and no effort is made to identify priorities in terms of allocation of resources and the opportunities to maximize impact.

The national research stations should provide the focal point for the organization for this kind of high-priority research. It would be a mistake, however, to believe that the national research stations would be self-sufficient for the implementation of these programs even if they were well equipped in terms of staff and other facilities. In the first place, they must feed the regional research centers with new genetic materials, technologies and concepts, which would be improved and finely tuned through adaptive research at these centers before they can be extended to farmers. The responsibility for the identification and release of new crop varieties and their associated production technologies as well as improved animal production practices rests with the regional research centers. This means that the national research stations and the research programs which they organize must establish close links with the regional research centers.

It is also important to recognize that a national research station cannot do all of its technology-generating work at a single location. The national research stations may have to organize a part of their research program at other locations, which may be naturally more suitable for advanced studies on a particular disease or pest because it is endemic in that area, or may provide specific soil and moisture conditions which are considered important. In such cases, the national research station must enter into collaborative arrangements with one or more regional research centers where part of the work could be carried out. Thus, a national

research program while having its main focus of activity at a national research station or a station specially identified for this purpose, would have some components of its work located at one or more regional research centers.

The national programs, for all these reasons, need a coordinating mechanism which provides a great deal of inter-institutional and inter-disciplinary interaction. The national research programs are, therefore, best described as nationally coordinated programs which help to ensure a great deal of complementarity in the work of the different stations around a priority research theme of national importance. They help to avoid duplication by mobilizing the resources of the different research stations for a common purpose.

Structure of Nationally Coordinated Research Programs

The nationally coordinated research programs are built around three institutional entities; the national research stations (or any other stations identified for this purpose) which have the mandate to organize advanced technology-generating and strategic research on a particular commodity or production resource, the regional centers whose mandate it is to carry out adaptive and on-farm research on this particular commodity and on production systems in response to the needs of the producers in the region, and a national coordinator whose job it is to create a network of scientists from the national research station and the cooperating regional research centers for the implementation of the program. This matrix structure needs to be qualified in the sense that some of the regional research centers would also be expected to participate along with the national station in carrying out advanced research, based on their comparative advantage in terms of agro-ecological, edaphic and biotic factors, as discussed above.

The Coordination Unit would be located in a national research station but it should be stressed that it has an institutional identity of its own. The national coordinator will have a role quite different from that of the director of the research station. The director's main responsibility is to provide managerial and scientific leadership for the station's programs. The national coordinator's main responsibility would be to bring about close cooperation of the concerned scientists from the different participating stations in the implementation of the national program. The coordinator will report directly to the national director and will have the necessary authority and status consistent with these responsibilities.

The coordinator will be a senior scientist recognized for his/her scientific leadership in that particular field. He or she will exercise little administrative control over the scientists of the participating stations, who will obviously be an integral part of the staff of the stations in which they are located and subject to the administrative control of the director of the concerned stations. The coordinator would be expected to maintain close contacts with the directors of all the cooperating stations, and above all, with the national director, who oversees the overall progress of these programs. The Coordination Unit will have a budget of its own to support the activities of the coordinator and the associated staff.

It may be argued that the setting up of two different positions of authority in a research station in the form of the director and the national coordinator could create administrative problems. While this possibility cannot be ruled out, there are major advantages in separating the two positions in relation to the functions to be performed. It is clear that the director of the national (or the lead) research station with his/her larger responsibilities in the field of administration and management of a number of research programs cannot be expected to provide scientific leadership for the nationally coordinated program involving the participation of a number of stations. The coordinator obviously must travel extensively and maintain contacts with a wide group of scientists and research managers. The relationship between the director of the national station and the national coordinator would be based on their scientific status rather than their administrative positions.

Functions of the National Coordinator

The main function of the national program coordinator as discussed above would be to ensure the implementation of the research program through the scientific contributions of all the cooperating centers. The coordinator will assist the national director in defining the responsibilities and research projects of the different participating stations. The research work carried out at the various stations will be presented and discussed at a workshop of the participating scientists. The workshop will be held at least once during the year at one of the stations for the purpose of program planning and review. It should provide a forum for a discussion of the results achieved during the past year by different groups of scientists and for the planning of their work for the next year. The workshop should also provide an opportunity for the national coordinator to present the program's report to the national director. The report should review the major achievements of the program, the problems which have been encountered, and suggestions for its improvement. Further, the workshop should provide an opportunity to consider those technologies which are ripe for testing on farmers' fields in collaboration with the extension service. The senior staff of the extension service would be expected to participate in these workshop discussions to keep themselves informed of emerging new technologies.

The main responsibilities of the national program coordinator may be defined as follows:

- * to help define the objectives and technical content of the nationally coordinated program;
- * to recommend allocation of resources to the different cooperating stations for the implementation of their part of the program;
- * to monitor the progress of work at each center;
- * to organize multi-locational trials of improved varieties and other technologies emerging from the program and consolidate the findings from these trials for presentation, review and recommendations;
- * to organize an annual workshop of all the participating scientists to review the past year's results and to plan the next year's work at each of the centers. The workshop would provide an opportunity

for interaction with the senior staff of the extension service for identification of technologies to be recommended to farmers;

- * to prepare and present an annual progress report of the program to the national director;
- * to liaise with the international agricultural research centers for introduction of new genetic materials and technologies for induction into the national program;
- * to organize training of young scientists from the different cooperating centers.

CHAPTER 7

RECOMMENDATIONS

1. The decentralization process has helped to create an important forum for discussion of problems of agricultural development in the regions in the context of the needed technological support. It has also created a great deal of consciousness about the need for planning of research at the regional level and raised many expectations. In terms of policy-making and implementation of the regional research programs, however, decentralization has not gone very far and the process must continue.
2. The ISNAR team believes that the current efforts at decentralization could be made more effective with a better definition of the national and regional research programs and mechanisms of their management. These programs as conceived at present tend to discourage regional initiative. The fundamental concept underlying the national programs should be to create a high concentration of scientific effort through inter-institutional collaboration around selected fields of research of great economic and strategic importance to the country. Crop and animal production programs which are of primary importance to one or more provinces rather than to the country as a whole should be left to regional research. Also, research on production systems including integration of different crops and livestock in sustainable agricultural practices would be best carried out in the regions both in terms of its planning and implementation.
3. The ISNAR team recommends that as a first step efforts should be made to allocate no more than 50 to 60 percent of the resources to the "national research programs". An increased percentage of resources, as much as 40 to 50 percent, should be allocated for regional research so that the Regional Directors and the Regional Councils can take up greater responsibility in the planning, organization and management of research in the regions.
4. The mandate of the National Center for Agricultural Research at Castelar near Buenos Aires is for basic research. The impression one gathers is that the Castelar complex is isolated from INTA's mainstream research in the field and that it should be brought closer to it. INTA clearly needs a Center of this type - the question is that of its programs. In our view the National Center at Castelar needs a detailed review by the INTA Council to determine its future direction in the context of the current reorganization and the new opportunities offered by rapid advances in science.
5. The ISNAR team recommends a reorganization of the present network of experiment stations into two types - National Research Stations and Regional Research Centers. The two types of stations will have quite different mandates but a highly complementary relationship

brought together in a close working partnership, especially through the institution of national programs. The main purpose of creating the national research stations would be to concentrate the available scientific and other resources in a highly focussed manner on selected commodities and production resources of great economic importance to the country. It would be difficult to organize this kind of advanced research on an important commodity or production resource at each of the regional research centers. There is a widely held view in INTA, which the ISNAR team shares, that the need is to evolve priorities and allocate a greater proportion of resources to those research themes that are of much greater significance in terms of their potential contribution to the national economy. The creation of national research stations would provide an important mechanism for responding to these priority considerations.

6. The regional research centers will have responsibility to provide technological support for the development of agriculture in the regions in which they are located. Their mandate will be three-fold. First, they will organize adaptive and on-farm research on commodities for which the national research stations have primary responsibility for advanced research. Second, they will carry out technology-generating research on commodities and production resources not covered by the national programs. On-farm research and close collaboration with the extension service in taking the new technologies to the farmers would be the third component of the mandate of the regional research centers.
7. The national research stations should be managed directly by the National Director and the senior staff in the INTA Secretariat. The regional research centers, on the other hand, should be given much greater autonomy in the planning and implementation of their research programs and management of their resources. The Regional Director should be able to make most of the decisions in consultation with the Regional Council. The role of the National Director in relation to the Regional Research Centers will be limited to monitoring and evaluation and research coordination. This is how the system should evolve in the next ten years. For the present, the National Director will continue to provide a great deal of management support to the Regional Research Centers in view of the very limited managerial resources available to the Regional Directors.
8. INTA should define its research strategy for the next 10 to 15 years. It should help to identify the major goals of Argentina's agriculture during this period in the context of which INTA would be called upon to provide technological support. It should do so by working closely with the Secretary of Agriculture in the Ministry of Economy and with the major producer organizations in the country. INTA as a mature national institution is well equipped to play a catalytic role in helping to define the country's development policy with which it must relate its own programs. The strategy document should next look at the institutional framework which can best support INTA's mission in the 1990s. Finally, the strategy should address the issue of INTA's linkages with external sources, especially with the private sector and with the university system in the country.

9. INTA's joint ventures with the private sector need to be organized within the framework of well-defined policy. As a first step in evolving policies of this kind, INTA should be organizing consultancy services for the private sector following the model adopted successfully in the developed countries. For the services offered under these protocols, the fees received from the commercial organizations (e.g. the companies producing certified seed from the improved varieties evolved by INTA scientists) will be used to augment INTA's consolidated funds for research. INTA will simultaneously evolve a promotion and reward system for its scientists which is seen to be fair by all.
10. INTA has a lot to gain by establishing close links with the faculties of agriculture in the different universities in the country. An outstanding example of this linkage is already provided by the highly synergistic relationship of its Balcarce experiment station which is located on the campus of the College of Agriculture of the National University of Mar del Plata. Two other mechanisms are available to promote these links. First, INTA should consider a system of contract research whereby a small part of its funds is earmarked to be offered as research grants to university scientists. Second, the Regional Councils are already beginning to provide a forum for the university administrators and INTA managers to discuss programs of joint research. This forum could be made more effective through the participation in the Regional Council meetings of the directors of the experiment stations forming part of the Regional Research Center.
11. The nationally coordinated research programs should be built around three institutional entities: the national research stations (or any other stations identified for this purpose) which have the mandate to organize advanced technology-generating and strategic research on a particular commodity or production resource, the regional research centers whose mandate it is to carry out adaptive and on-farm research on this particular commodity and on production systems in response to the needs of the producers in the region, and a national coordinator whose job it is to create a network of scientists from the national research station and the cooperating regional research centers for the implementation of the program.
12. The coordination center would be located in a national research station but it will have an institutional identity of its own. The national coordinator will have a role quite different from that of the director of the research station. The national coordinator's main responsibility would be to bring about close cooperation of the concerned scientists from the different participating stations in the implementation of the national program. The coordinator will report directly to the national director and will have the necessary authority and status consistent with these responsibilities.