

Food transport in rural areas of Argentina, Bolivia, Brazil, Chile, Paraguay and Uruguay (Expanded MERCOSUR)

José Alberto Catalano

Argentina

FAO Consultant

The current situation

Transport can be defined as the movement of persons, goods and information, by any means and for any purpose, from one place to another (origin to destination). Transport normally involves two complementary components: transport infrastructure, also called “fixed plant”, and transport services, or “mobile equipment”. Neither component can be productive without the support of the other (Gannon and Liu, 2001).

For food products, the transport function adds “place utility” to products through their transfer from production areas, where there is no opportunity for surpluses to meet needs, to urban areas, where they become accessible to consumers. The simple transfer from one place to another adds value to production (Mendoza, 1991).

An efficient transport system is necessary to develop and facilitate economic growth. It fulfils many functions:

- *it provides physical access to resources and markets, thus favouring the marketing of agricultural products, industry specialization and the expansion of production and employment;*
- *it helps to open up new markets, promoting domestic and international trade;*
- *transport improvements reduce transaction costs (inputs and products), leading to economies of scale and specialization;*
- *investments in the transport sector contribute to economic diversification, making a country less vulnerable to adversity.*

Improved transport can help to reduce poverty by facilitating economic growth, thus backstopping specific interventions and fostering rural development. It alone cannot alleviate poverty, however. Poorly planned transport policies and investment programmes can have a negative impact on less privileged sectors, diverting scarce resources from other poverty reduction efforts (Gannon and Liu, 2001).

Transport is highly influential in the overall development of the food chain. The existence of accessible, acceptable, efficient transport is a pre-condition for bringing remote farm areas far from consumer centres into the agricultural

production process. It also enables production and post-harvest technologies requiring new inputs, the long-distance transport of highly perishable products, compliance with very exacting quality standards, the collection of enormous volumes of merchandise, the use of appropriate packing and packaging and the timely delivery of products in good condition.

This paper seeks to set out guidelines for improving the rural transport of food products. These guidelines are intended as a basic input for decision-makers, advisors, researchers, and sectoral and macroeconomic policy planners in the Expanded MERCOSUR countries (Argentina, Bolivia, Brazil, Chile, Paraguay and Uruguay).

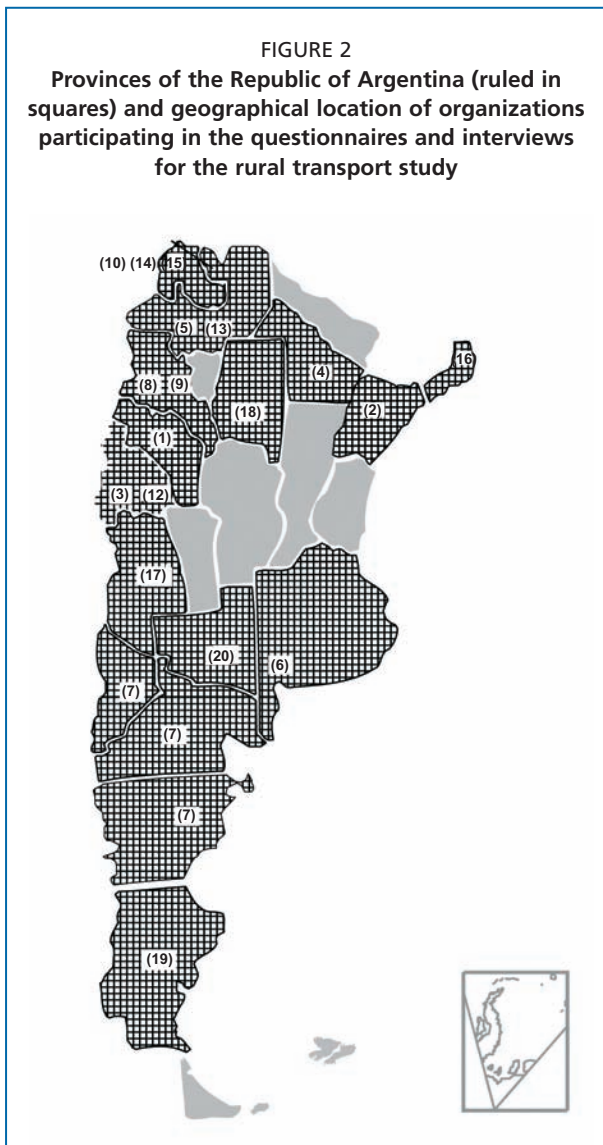
It further intends to make a detailed strategy analysis of rural transport systems for agrofood products, and identify policy and strategy formulation guidelines for improving these systems.

METHODOLOGY

This work is based on a compilation, review and synthesis of reference materials concerning transport systems in the Expanded MERCOSUR area, and their overall context. It also draws inspiration from a survey of primary data deriving from systematic surveys and interviews with technical advisers to smallholders’ associations in Argentina.

The field survey covers various areas of Argentina’s provinces. These include Catamarca, Jujuy, La Rioja, Salta and Santiago del Estero in the Northwest; Corrientes, Chaco and Misiones in the Northeast; Chubut, Neuquén, Río Negro and Santa Cruz in Patagonia; Mendoza and San Juan in Cuyo; and Buenos Aires and La Pampa in the Pampas region. Figure 2 maps the geographical distribution of the interviews. Figure 3 correlates this with the location of smallholders.

A second section analyses the desirable characteristics of rural transport systems for food products, opportunities for holistic solutions, the main problems, the political and social constraints to holistic solutions, the necessary resources and means, institutionality, and desirable benefits of viable solutions.



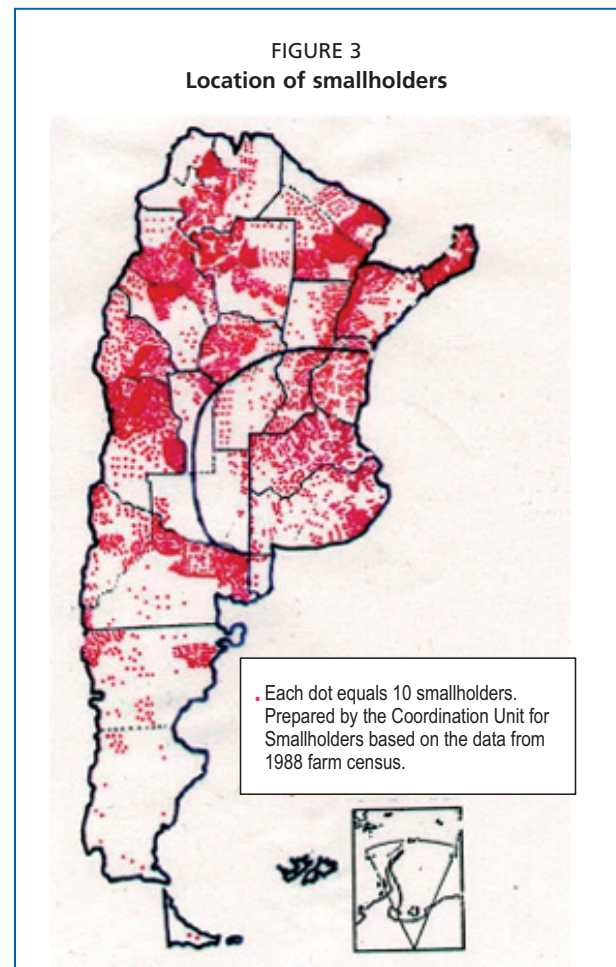
The study begins with a presentation of factors in the transport of food products as they relate to economic growth and poverty. The importance of transport systems in the agrofood chain is described, along with the objectives and methodology used to develop the paper.

This is followed by an analysis of rural food transport systems in the Expanded MERCOSUR countries. It describes the overall socioeconomic and political context of the food sector. It goes on to discuss the socioeconomic characteristics of the rural agricultural sector in general, and of small and medium rural producers in particular. It describes the demand for food transport, the road infrastructure and how it has evolved, and the condition of roads and railways in each country and in the subregion. It covers the main logistical components of food transport and changes in the

marketing channels for small-scale production. Lastly, it looks at the characteristics of food transport in the Expanded MERCOSUR area in terms of the big issues and with reference to small and medium producers, especially in Argentina.

After this, strategies for improving the rural transport of food products are outlined. The desirable characteristics of agrofood transport systems are pinpointed, interventions for addressing its problems analysed, and opportunities and means of promoting improvements for these systems identified. These embrace cold chain viability and feasibility, the key factors in strategic planning, how the success of the response can be conditioned by social and political factors, and the desirable benefits of viable solutions to food transport problems. The factors thus identified are then used to formulate guidelines for food transport strategies and policies.

Lastly, a set of concrete recommendations for improving the rural transport of agrofood products is proposed.



Analysis of rural food transport systems

REGIONAL ECONOMIC, POLITICAL AND SOCIAL CONTEXT

The Expanded MERCOSUR subregion covers a vast land area of 12 666 000 km², with a total population of 238 982 000.

The number of rural inhabitants as a proportion of total population is declining in all countries. The figure has dropped by 44 percent in Paraguay, 18 percent in Brazil, 14 percent in Chile, 10 percent in Argentina and 9 percent in Uruguay.

The overall GDP for the region according to the data for 1998 (ALADI, 2000b) totalled 1 117 188 million US dollars, with a per capita GDP of US\$ 4 949. The GDP is distributed over the countries of the region as follows: Brazil 64 percent; Argentina 27 percent; Chile 7 percent; Uruguay 2 percent and Paraguay 1 percent. The GDP is divided as follows: 22 percent for the manufacturing sector, 19 percent for community, social and personal services, 13 percent for financial and commercial services and insurance, 12 percent for agriculture, 11 percent for commerce, 9 percent for transport, 7 percent for construction, 5 percent for electricity, water and gas, and two percent for mining.

The World Bank figures from 2001 show positive average growth in GDP for the subregion as a whole in the 1990s: 5.3 percent in Argentina, 2.8 percent in Brazil, 7.0 percent in Chile, 3.3 percent in Paraguay, and 2.3 percent in Uruguay. Growth was not sustained, however. There were major fluctuations, and, in some years, negative growth rates or growth of less than one percent, especially in the last five years of the decade.

Internal income distribution is quite inequitable. In Argentina the aggregate income of the richest 10 percent of the population is 28 times more than that of the poorest 10 percent. This proportion has swelled steadily since 1991, when the average figure for the richest was just 14 times greater than that of the poorest.

The political context was characterized by the growing liberalization of commerce and foreign trade. The new policy orientation has entailed a cutback in government intervention with the

private sector playing a new and broader role. Tariffs and the differences between tariffs were reduced, on the whole, and administrative obstacles and non-tariff barriers to trade dismantled.

According to FAO (2002), the year 2001 marked a period of stagnation or recession for most Latin American and Caribbean economies. Sluggish economic growth and unstable financial markets were joined by internal problems linked to weak national demand, macroeconomic imbalances and political instability. These factors translated into a substantial slump in economic activity, with a depressive effect on wages, employment and effective demand for food. The upshot was a big step backwards from the food security standpoint.

The slump in economic growth in all countries produced a pronounced reduction in trade. As demand grew weaker and the prices for export products fell, the region experienced a marked drop in export income. It also cut back on imports, though not to the same extent.

In Brazil, following initial signs of economic recovery in 2000 and early 2001, the country suffered the consequences of a grave power crisis and a worsening economic environment.

In Argentina, undergoing its fourth consecutive year of recession, the economy suffered a severe setback with the complete disappearance of external financing, and faced the complex problem of reducing the fiscal deficit and servicing the public debt. These events cast a very long shadow on Argentina's prospects for achieving a quick recovery, and aroused deep concern for their repercussions on trade and finance throughout the MERCOSUR countries, and in all of South America.

Uruguay also found itself in very difficult circumstances, with a growth forecast for 2001 of less than one percent.

Chile, despite a relative slowdown, will probably maintain a growth rate of some three percent.

The contribution of agriculture to GDP has followed a downward trend in Argentina and Chile in recent years. The figures for 2000 were

4.8 percent in Argentina and 8.4 percent in Chile, whereas slight upward trends were recorded in Brazil (8.9 percent), Paraguay (9.3 percent), and Uruguay (6 percent) that same year.

Various non-tariff barriers to trade such as sanitary and phytosanitary regulations, plus the traditional tariff barriers, are increasingly acting as a brake to agricultural exports in the subregion. Hefty farm subsidies in the industrialized countries are also seen to reduce the region's competitive position in the international market place.

According to ALADI (2000b), production in the subregion in the last five years averaged 1.86 percent of aggregate production for WTO member countries. The output broke down as 33 percent for soybean, 13.3 percent for honey and honey by-products, 11.5 percent for foods of animal origin, 9.2 percent for coffee, 7.8 percent for industrialized goods, 6.3 percent for sugar, 5.8 percent for oilseeds, 5.3 percent for meat, 4.7 percent for wheat and 3.1 percent for clothing.

Some of the main characteristics of intraregional and international overland trade flows in the MERCOSUR countries are identified below:

- trade flows in the region are highly heterogeneous;
- demand is unbalanced, not sustained, and dominated by heavy and highly irregular, undocumented traffic;
- total intrazonal trade by road from 1996 to 1998 averaged some 20 750 000 tonnes/year, whereas intrazonal trade averaged some 6 500 000 tonnes/year;
- the traditional trade flow in the region comprises 63 percent primary products (heavy tonnage and low value added), and 37 percent manufactured goods (low tonnage and high value added). High value-added goods tend to move north and southwards, whereas high-tonnage goods tend to move east or westwards;
- Argentina is the country with the highest volume of trade in terms of tonnage, whereas Brazil has the highest volume of trade in terms of value added;
- the greatest volume of trade within the subregion in terms of both tonnage and value added is between Argentina and Brazil;
- Argentina's main trading partner is Brazil, followed by Chile, and Brazil's is Argentina followed by Chile. The main trading partners for Chile, Paraguay and Uruguay are Argentina and Brazil;

- the main volumes of freight involved in trade flows in the subregion are preferentially and comparatively shipped by sea. This accounts for 49 percent of freight volume, with road transport accounting for 31 percent; river transport 15 percent; rail transport three percent; and air freight two percent.

SOCIOECONOMIC AND POLITICAL CONTEXT OF THE RURAL AGRICULTURAL SECTOR

Niemann (2001) estimates a total of over 6.5 million agricultural and livestock production establishments in the MERCOSUR area. Of these, half are under 10 ha, and almost 90 percent under 100 ha. Some 10.1 percent are in the 100–1 000 ha category, but only 1.1 percent of all establishments are classified as 1 000 to 5 000 ha. Two situations predominate at the country level. In the first (Brazil and Paraguay), one out of two establishments is under 10 ha. In the second situation (Argentina and Uruguay) one out of five is under 10 ha. Table 16 shows the distribution of agricultural establishments by size in the MERCOSUR countries.

In recent decades, and especially since the latter half of the 1990s, growth in the volume of agricultural trade has strikingly outpaced the growth rate of agricultural production. Agricultural exports account for over 60 percent of Paraguay's total exports, half of Argentina's, 30 percent of Brazil's, 53 percent of Uruguay's and only 17 percent of Chile's.

Despite the solid growth in agricultural trade over most of this period, the share of this sector as a proportion of total trade has constantly shrunk with respect to the aggregate trade figure. Meanwhile, the export of other products, especially manufactured goods, has gained in relative importance.

Exports have diversified, widening the product base and increasing value added. Soybean and soybean cake production has developed so much in Argentina and Brazil that Argentina is now the second world producer of soybean, and Brazil the third.

The geographical distribution of trade has also shifted. The European Union and the United States are still the prime destinations for Latin American and Caribbean exports, but the relative position of the developing countries has improved.

Considerable growth in intraregional agricultural trade began in the 1990s. Argentina, Brazil, Paraguay and Uruguay registered one of the major geographic shifts in agricultural trade between the

TABLE 16
Farm distribution, by size and by country, MERCOSUR region

Country	Farmsize (ha)	Amount	Percentage
Argentina	Under 10	88 737	23.5
	from 10 to 100	146 209	38.6
	from 100 to 1 000	115 956	30.6
	from 1 000 to 5 000	21 254	5.6
	from 5 000 to 10 000	3 339	0.9
	over 10 000	2 862	0.8
	Total	378 357	100.0
Brazil	Under 10	3 064 822	52.9
	from 10 to 100	2 160 340	37.3
	from 100 to 1 000	517 431	8.9
	from 1 000 to 5 000	44 748	0.8
	from 5 000 to 10 000	3 538	0.1
	over 10 000	2 125	0.0
	Total	5 793 004	100.0
Paraguay	Under 10	181 393	60.6
	from 10 to 100	105 319	35.2
	from 100 to 1 000	9 307	3.1
	from 1 000 to 5 000	2 356	0.7
	from 5 000 to 10 000	533	0.2
	over 10 000	351	0.1
	Total	299 259	100.0
Uruguay	Under 10	11 051	20.20
	from 10 to 100	22 760	41.50
	from 100 to 1 000	16 975	31.90
	from 1 000 to 5 000	3 811	7.00
	from 5 000 to 10 000	195	0.49
	over 10 000	24	0.10
	Total	54 816	100.00
MERCOSUR	Under 10	3 346 003	51.3
	from 10 to 100	2 434 628	37.3
	from 100 to 1 000	659 669	10.1
	from 1 000 to 5 000	72 169	1.1

mid-1980s and the end of the 1990s, with a surge in agricultural trade within this bloc. Agricultural exports from Argentina to other MERCOSUR countries shot up from 10 to 15 percent during the 1980s to nearly 25 percent in recent years. At the same time Brazilian exports to other countries in the bloc went from negligible to nearly 10 percent. In Uruguay, exports within the trade bloc rose from 40 to 60 percent. The only downward trend was in Paraguay (down from nearly 60 percent to 50 percent), and this is still quite a high figure.

Agricultural imports also tend to be concentrated within specific parts of the MERCOSUR area. Brazil's exports to countries in the bloc rose from 27 to 45 percent. The trend upward also sharpened in Paraguay and Uruguay during the latter part of the 1990s.

The situation from one country to the next is heterogeneous, as is true of the social strata within

countries. However, a number of analyses (IICA, FAO, ECLAC) indicate a rise in technification and sectoral productivity, growing concentration within the food sector, and a burgeoning presence of international capital in agro-industry and commerce (Echenique, 2000).

Restructuring of agroindustrial markets is cited as a major change for food systems in the Expanded MERCOSUR area. Its characteristic features are an infusion of capital investments with new industrial plants and advanced technology from the big multinational agrofood producers and marketers.

The strategy for world brands to consolidate in the regional market through acquisition, mergers or alliances with local firms has implied very intense competition in the domestic agroindustrial sector, and the disappearance of small and medium food suppliers. Their declining number is expected to shrink still further in the near future.

A downward trend in the farm population, the expulsion of the most marginal producers and the presence of vast sectors of small, subsistence farmers in critically unprofitable situations is now being observed in most countries.

In terms of the environment, negative impacts linked with the intensification of production and the short-term outlook of the new operators can also be seen. The presence of international firms offering machinery, equipment, and chemical and biotechnological products acts as a spur to forms of production that may be inappropriate for local conditions.

Despite this, the agroecological approach has been the rural development approach promoted. The agroecological productive strategies of small producers are thought to hold out significant ecological and economic promise, given the expanding market for organic foods.

FOOD PRODUCTION CHARACTERISTICS OF SMALL AND MEDIUM RURAL PRODUCERS

Echenique (2000) offers a qualitative and quantitative description of family farming in the subregion. Family farm systems account for the great majority of all agricultural establishments. The proportions are 93 percent (287 000 units) in Paraguay; 89 percent (44 319 000 units) in Brazil, 85 percent (220 000 units) in Chile, 75 percent (310 000 units) in Argentina; and 60 percent (33 163 units) in Uruguay. There are three distinct types of family farmers:

- the so-called marginal or poor farmers, lacking agricultural potential, borderline, in decline, or semi-salaried workers; this group focuses mainly on home consumption, has the least available land, and not enough income from their own production to ensure the subsistence and welfare of the family;
- the transitional group, classified as intermediary, or true family farms, i.e., capable of simply meeting reproduction requirements but not of generating surpluses;
- the so-called consolidated, capitalized, or integrated producers, capable of accumulating surpluses.

Fully 44 percent of the first group of family farm households in the subregion are living in poverty, with low potential. A further 23 percent are classified as intermediary, and the remaining 33 percent as in a situation of relative accumulation. The first group is proportionally greater in Paraguay with 68 percent of the national total and in Chile with 57 percent. The figures are comparatively lower in Brazil at 41 percent, Argentina at 34 percent and Uruguay at 27 percent. Table 17 quantifies family farm units by type.

Agro-ecological heterogeneity is great in the subregion, as at country level. There are, however, relatively homogenous areas within the subregion:

- the highlands (Argentina, Bolivia, Chile)
- the Chaco (Argentina, Bolivia, Paraguay)
- the Patagonian region (Argentina, Chile)
- the Pampas (Argentina, Brazil, Uruguay).

The predominant products produced by family farmers in each country are as the following:

- Argentina – cotton, yerba mate, tea, tobacco, citrus fruits, vegetables, sugar cane, vines, olives, walnuts, peppers, sheep, goats, cattle (breeding and fattening), honey;
- Brazil – maize, bean, vegetables, fruit, cotton, sisal, coffee, cocoa, soybean, goats, dairy and beef cattle, pigs, poultry;

- Chile – fruit, wine grapes, vegetables, flowers, sugar cane, tobacco, maize, potato, rice, dairy and beef cattle, goats,
- Paraguay: cotton, rice, sugar cane, oranges, vegetables, soybean, tobacco, fruit, cereal grains, yerba mate and tung;
- Uruguay – vegetables, fruit, soybean, dairy and beef cattle.

Table 18 lists in detail the various production systems of family farmers in the MERCOSUR countries.

A certain downward trend in rural poverty is probably best attributed to the decline in the farm population and the exclusion of the most marginal, who have gone to swell the ranks of the urban poor. Country studies ranging from rapid surveys to in-depth studies all clearly reflect the critical profit/loss situation caused by the drop in international prices for the main sectoral products, and the hard competitive situation of family farmers.

Neiman (2001) describes the production trends of small and medium producers in the MERCOSUR countries as follows.

The switch from direct production to contract production in Argentina represents a growing trend among small farmers, and among capitalized family farmers in the Pampas region. This trend has been paralleled by the spread of pluriactivity to address the crisis and as a strategy for adapting to the new context. Smallholders or small farmers outside the Pampas area (who mostly work to supply the sugar, tobacco or cotton agro-industries), are those most vulnerable to expulsion from the sector. They are in no position to address the process of production reconversion due to technological innovation, production changes or new forms of organization.

Small and medium farmers in Brazil are also finding it hard to react to change in a uniform way. Some, induced by agro-industrial firms, are implementing technological change. Others, however, are too specialized to adopt such a strategy on their own initiative, and differentiate so as to access markets. Their chances of competing are thus minimal.

Establishments under 100 ha in size generate most items in the basic food basket. They account for 87 percent of cassava production, 79 percent of the bean crop, 69 percent of maize, and 37 percent of rice. They also account for 65 percent of the cotton crop, 46 percent of soybean and 26 percent of the cattle. The contribution of smallholders (under 10 ha) has been declining in recent years. Subsistence wheat and soybean farmers are concentrated in

TABLE 17
Number of family farms by type

Country	Poor	Intermediate	Capitalized
Argentina*	107 000	103 000	100 000
Brazil	1 793 000	950 000	1 576 000
Chile	130 000	55 000	35 000
Paraguay	195 349	47 536	44 460
Uruguay	9 075	18 735	5 350

*Assuming one-third of poor and of capitalized farmers as intermediate

Source: Echenique (2000)

TABLE 18
Main family farm productive systems or products in MERCOSUR countries

ARGENTINA	CHILE
<p>North-eastern region</p> <p>Predominant systems: yerba mate and tobacco, yerba mate and tea (small and medium holdings), yerba mate, citrus fruits, simple agriculture, breeding cattle, cattle for fattening and wintering, diversified tobacco, diversified cotton, vegetables.</p> <p>North-western region</p> <p>The following predominate: mixed extensive ranching, vines, walnuts, olives, vegetables, mixed cotton/livestock, sugarcane, lemons, burley tobacco, blond tobacco, peppers, and vegetable and fruit growing.</p> <p>Cuyo and Alto Valle</p> <p>The three main systems are viticulture, horticulture and fruit growing.</p> <p>Patagonian region</p> <p>The most representative system is extensive sheep raising, with associated variations: sheep/cattle, and cattle alone.</p>	<ol style="list-style-type: none"> 1. Fruit growing for export 2. Fruit growing domestic market 3. Wine grapes for pisco or fine table wines 4. Horticulture and flower growing domestic market 5. Industrial crops: sugar beet and tobacco 6. Cattle and traditional crops 7. Annual crops: maize and potato 8. Rice 9. Dairy cattle 10. Dryland wine grapes 11. Goats 12. Cattle
BRAZIL	PARAGUAY
<p>Southern region</p> <p>Consolidated: maize/bean, maize/bean/pigs, vegetables/milk, maize/poultry/pigs/bean, maize/cattle/milk/meat, and maize/milk/pigs/poultry/beef cattle.</p> <p>Transitional: maize/bean, maize/bean/vegetables, maize/bean/milk, maize/bean/pigs, and maize/bean/milk/pigs.</p> <p>Borderline: maize/bean for subsistence and small commercial surplus</p> <p>South-eastern region</p> <p>Consolidated: fruit growing (grape)</p> <p>Transitional: cattle/fruit</p> <p>Borderline: cattle/cotton</p> <p>Centre/West region</p> <p>Consolidated: soybean/maize</p> <p>Transitional: dairy cattle</p> <p>Borderline: subsistence</p> <p>North-eastern</p> <p>Transitional: sisal/goats</p> <p>Borderline goats/sisal</p> <p>Northern region</p> <p>Consolidated cacao/cattle</p> <p>Transitional: coffee/cattle</p> <p>Borderline: cattle</p>	<p>Intensive: Annual crops (cotton, tobacco, home consumption); permanent crops (bitter orange), multi-annual fruits (banana, pineapple), horticulture (beets, tomato, carrot), cattle.</p> <p>Capitalized: annual crops (cotton, soybean, maize, home consumption) permanent crops (yerba mate, orange), horticulture (melon, watermelon), multi-annual fruits (banana, pineapple).</p> <ol style="list-style-type: none"> 1. Borderline: annuals (cotton), home consumption (cassava, maize, kidney bean, groundnut) vegetables (tomato, watermelon and hot peppers) 2. In decline: annuals (cotton and rice), permanent (sugar cane, oranges), home consumption (traditional crops). 3. Farmer: grains (soybean, sunflower, wheat, maize), permanent (yerba mate and tung)
	URUGUAY
	<ol style="list-style-type: none"> 1. Capitalized: breeding cattle with improved pasture, agriculture/high performance cattle raising, cattle/high-performance agriculture, high-tech dairy cattle in the south, dairy cattle in the rest of the country, high-tech, mechanized horticulture, mechanized fruit growing. 2. Intermediary or true farmers: skilled livestock breeders without improved pasture, average livestock breeders without improved pasture, less skilled breeders/farmers, soybean and other farmers, low-tech dairy farmers in the South, dairy farmers in the rest of the country, low-tech, fruit and vegetable growing without tractors. 3. Semi-salaried/unsalaried: microholder livestock breeders (<20 ha), microholder farmers/livestock breeders (<20 ha), microholder dairy farmers (<20 ha).

the southern and south-eastern regions. These farmers do have opportunities for adopting and implementing modern production techniques.

A socioeconomic differentiation of small farmers was observed in Paraguay in the 1980s, together with a fall in the comparative numbers of unremunerated family members. Off-farm hiring also expanded, with increasing proletarianization and deteriorating living conditions. There are basically three groups of small farmers. In the central part of the country most farms are under one ha in size with a clear trend toward off-farm

hiring in labour markets in urban centres. In the central-western part of the country, farms of one to five ha predominate, and these households live off their agricultural output. In eastern Paraguay, farmers in the same situation grow cotton and food crops (agricultural diversification and animal husbandry).

The situation in Uruguay is also diversified with respect to agricultural chain competitiveness and producer capacity to cope with the new conditions imposed by the newly opened and deregulated markets. Small family farms with a low level of

technology are prominent in the dairy, vegetable and fruit-growing sectors. They represent 76 percent of the dairy sector, and 40 percent of all farms working in these three subsectors. Almost all their output is intended for the domestic market, and in recent years they have faced a drop in demand and increasing competition from imported goods.

There is a mostly positive correlation between favourable development projections for small-scale farming and the most intensive crops. This is more relevant for some countries, such as Chile and Paraguay (and, for certain items, Uruguay). The main categories are vegetables, fruit and viticulture (Argentina and Chile), and specific tubers. In certain favourable situations where farmers are an integral part of the agroindustrial chain, milk and specific grains such as maize and soybean also look promising.

As for technology and infrastructure, family farmers in the MERCOSUR countries are best described as lacking appropriate technology for family farming, with very little technology available for the subsistence sectors. Technology is generated and disseminated in packages by various public and private agencies, and there is not much room for technology adaptation.

The constraints to technological change on small farms are basically structural in nature. They concern limited access to land and water, declining natural resources, a deep lack of infrastructure, and isolation (poor access to roads, energy, storage, and transport). The markets are far from perfect and farmers have very little bargaining power. Cultural factors and scant opportunities for education and training complete the picture (Echenique, 2000).

In some situations the incorporation of technology has not produced the expected results. This is mainly attributable to constraints on the full potential of technology. One example is the introduction of technological packages despite the presence of hydric stress, and the consequent economic losses.

Surveys and interviews were carried out in Argentina among qualified informants to gather data on small farmer problems with rural transport. The survey adapted a model prepared for a similar study in Central America adapted to the special features of the MERCOSUR study area.

These surveys report on small farmers in different regions of Argentina. They covered fruit growers (25 percent of all cases in the survey), vegetable farmers (30 percent) and producers of semi-processed foods (45 percent). This last

category included all producers with some potential for value added, or whose activities were diametrically opposed to the others. This included honey producers (18 percent), sweet-producing agroindustries (9 percent), industrial crops such as cotton (18 percent), and a fringe of goat farmers (46 percent of the category). It emerged from the survey that *all producers transport their own output where volumes exceed 150 quintals/yr*. In response to the question on the quality of the goods they produce, *every informant reported that the quality of their production was good*.

TRANSPORT DEMAND

Current national and international trade trends have now restructured the demand for transport. Specialized services and better management of transport services (and of all related services such as storage, customs, distribution and delivery) are now demanded.

Present-day transport service demands include the provision of integrated logistics combining science, technology and computerized services to ensure safe and timely delivery. The service provided has to be fast, flexible, reliable and safe to comply with the requirements of the distribution chains.

For small and medium producers, the basic needs for rural food transport concern access to transport from the areas where products are grown, collected or packed for transit, to the areas where they are marketed or processed. These needs include:

- road transitability;
- accessible costs;
- good service quality and availability;
- safe, reliable service;
- good vehicle quality;
- transit times appropriate for the type of product.

Needed improvements in rural transport concern upgraded infrastructure and the provision of services to reduce costs and maintain product quality up to delivery at the market or processing plant.

Transport is often the highest-cost item in the marketing chain. The transport needs of fruits and vegetables vary in accordance with the distance to market, the scale of production, perishability, and product value. The vehicles most in demand for food transport are pickups and open trucks with fixed or canvas tops. Natural ventilation is usually sufficient to prevent overheating of the load.

Data from the surveys and interviews conducted in Argentina identified the transport needs next described.

Most small farmers must hire transport to carry their products: only 25 percent of respondents owned some means of transportation to move their goods to market. Some 65 percent hire a vehicle for this purpose and the remaining 10 percent use some other means such as collective transport or buses.

Producers contract for transport through a middleman. This is a trader who purchases goods at the farm-gate or smallholding, collecting it for later sale, using his own transport. These middlemen normally provide other goods used by farmers but not produced on the farm, such as clothing, utensils and inputs, for which the farmer pays at harvest-time.

The price for the farmer's output is usually very low with respect to the market price. Because middlemen provide a range of services, farmers are heavily dependent on them to buy and market their output.

The demand for transport is highly diverse. Product type and volumes plus the distances covered and potential producer access determine the demand for transport. Survey respondents reported that the vehicles most in demand were pick-up trucks (60 percent), followed by trucks (35 percent), and some other type of vehicle (five percent).

The distances from production zone to market ranged from under 50 km (20 percent of respondents), to 51–100 km (40 percent), and over 100 km (the remaining 40 percent). In other words, products travelled distances greater than 50 km in 80 percent of these cases.

Fundamentally, there are two concrete demands for transport. The first is to carry products from field to town, and this can be met with smaller vehicles. The second is for vehicles to carry the goods to larger markets with a bigger consumer base, and this requires conventional trucks.

Taking the case of onion growers in the province of Buenos Aires, for example, the local transport demand is for highly manoeuvrable, four-wheel drive vehicles with low fuel consumption and medium load capacity. Transport from towns to the big markets calls for trucks that can carry big loads, run at regular times, and offer either ventilation or refrigeration.

Until quite recently rail was the ideal mode of transport for reaching population centres. But now many production zones cannot be reached by rail, even though this mode of transport is probably superior to any form of motorized transport in terms of function, quality, environmental friendliness and safety.

In other cases the demand is undifferentiated. This is true of less perishable products such as dried fruits from Belén and Pomán in Catamarca. In Castelli in the province of Chaco, a high-demand area, the vehicles in use are *whatever is available* (cars, vans, tractors used for towing loads). In the more isolated areas of northeastern Argentina the demand for transport is closely linked to the volume of production and the price paid for the product by the buyer. Producers will not harvest unless they are satisfied they will be paid a good price.

Livestock production, e.g. live or slaughtered kids, requires transport that can meet the requirements set by the relevant oversight agency. The standards are very strict, especially for federal transit, i.e., moving goods from one province to another throughout the country, and even abroad.

ROAD INFRASTRUCTURE

ALADI (2000b) reports that transport accounts for 7.8 percent of GDP in the subregion. Road transport accounts for 31 percent of this figure, taking into account the tonnage carried by road and its FOB value.

Road transport is the most active participant in intraregional trade among the MERCOSUR countries. It also plays an important development role in most of these countries, as it is easier to run roads in all directions than to adapt to river or rail transport.

Deep and continent-wide deficiencies in the provision of infrastructure services had become apparent by the early 1990s. By then the growth of interzonal trade began to exert pressure on the material infrastructure as a whole, particularly on transport infrastructure. Recent World Bank estimates report that up to 15 billion US dollars would be needed every year up to the year 2005 to rehabilitate road networks and expand the transport system.

The transport system in the subregion is best visualized as a set of transport corridors starting from the big ports of Buenos Aires, Montevideo, Río de Janeiro, Santos, and Valparaíso, with few exceptions, and gradually penetrating into the interior.

In the last thirty years, countries such as Argentina and Brazil have tripled the length of their road networks. Almost every other South American country has doubled the length of their paved roads. This expansion, however, did not improve the regional transport system as a whole,

because the most travelled highways received most of the investment. Furthermore, the development of connecting highways between one country and the next was uncoordinated.

The road network in the MERCOSUR region totals 320 000 km of paved or otherwise surfaced roads. According to ALADI (2000b), this transport network can be described as follows.

- Some 14 percent of the road network is paved: in Argentina 27 percent, in Brazil 9 percent, in Paraguay 9 percent, in Uruguay 23 percent, in Chile 14 percent, and in Bolivia 4 percent;
- Paving seems to have been earmarked preferentially for the main roads of each national network. The provincial and rural roads often remain unpaved. The percentage of paved roads breaks down as follows. The best are stretches with top-grade paving (concrete and/or an asphalt layer, accounting for 31 percent of the total). Next come ordinary roads with bitumen or primed surfacing comprising 42 percent of all roads, with the remaining 27 percent comprising improved and/or dirt roads.
- Generally speaking, all roads in the network are passable year-round except in the winter months of June, July and August, when certain stretches are very hard to cross or impracticable due to flooding or snow. The roads mostly sustain heavy traffic in good condition. At cross-boundary junctions, particularly, congestion is sizeable. Some 72 percent of the roads in the network are two-lane surfaced roads, fairly well-maintained and of sufficient capacity.

Intercontinental rail freight transport serves very little of the continent. The same is true at the country level. Some 62 percent of all freight in Brazil is carried by road; the total in Chile is 92 percent. Only 20 percent of Brazil's freight is shipped by rail and only five percent of Chile's. It is worth pointing out that a significant proportion of all freight is transported by rail in the developed countries. In the United States, for example, the rail sector, earlier considered depressed, has grown in the last 20 years to become one of the most competitive means of transport. Roughly 40 percent of all freight (tonnes/km) is now shipped by rail and only 35 percent by road. (ECLAC/UN, 2002a).

Thompson's 2001 analysis of the institutional development of Latin American transport in the last 25 years is summarized below.

- There has never been nor is there now state ownership in the road transport sector (trucking).
- Domestic freight transport in Latin America has at times depended on quotas, or the obligation to belong to an officially recognized union. However, state intervention in fleet establishment or in clearly commercial measures is not usual.
- The current situation with respect to road transport regulations has remained basically unchanged in the last 15 years. Short-term measures are taken in response to joint pressure from truckers' unions at times when economic performance fails to meet expectations, and has a depressive effect on trucking fleets. In 1999-2000 in Argentina, Brazil, Chile and Uruguay, unions asked for and obtained the adoption of specific measures to promote road transport. These included lower road tolls, lower prices for diesel fuel, and a freeze in the number of transport vehicles.
- Up to the mid-1960s, the public railways were all state-run (except for FCAB in Chile). This weighed fairly heavily on the budget of some public sectors. Almost all privatization of the railroads occurred in the early 1990s. By the year 2000, there were five privately run rail freight companies in Argentina, 10 in Brazil, and four in Chile.
- The privatization of rail freight has mostly been a positive experience. Private operators are not subsidized by the government, and in most cases traffic has increased compared to the final years of state administration. The negative aspects, however, are that some companies have not become profitable enough to ensure compliance with some of their contractual obligations *vis-à-vis* governments.

Argentina's road infrastructure consists of 38 484 km of national roads, 192 611 km of provincial roads and 280 000 km of municipal roads. Thirty percent of all national and provincial roads are paved, 21 percent are improved and 49 percent are dirt roads.

Road surfacing differs according to who has administrative jurisdiction over the roads. Only five percent of all national roads are dirt-surfaced, 14 percent are gravelled/improved and 81 percent are paved. The provincial network consists of

57 percent dirt roads, 23 percent improved, gravelled roads, and only 20 percent of paved roadway. Indeed, it emerged from the analysis of the data at hand, that long stretches of provincial roads are still unpaved. Most (65 percent) of Argentinean provinces fall into this category, accounting for over half of the total length of Argentina's dirt roads. There are provinces such as Chaco, Formosa, Jujuy, Santa Cruz, Santiago del Estero and Tierra del Fuego where over 80 percent of the network consist of dirt roads. In others, such as Córdoba, Corrientes, Entre Ríos, Neuquén and Santa Fe, over 70 percent of the network consist of dirt roads. Strikingly, these are almost always the northern and southern provinces of Argentina, where most small producers live and work.

Although the total length of paved national highway in Argentina rose from 73 percent in 1985 to 82 percent in the year 2000, the percentage of unpaved national roads is still significantly high in some northern provinces. Unpaved national roadway totals 47 percent in Formosa, 30 percent in Chaco province and 24 percent in Misiones.

The national road network has 21 031 km of paved roads not under concession management. Of this total, 59 percent are in good condition, 27 percent in fair condition, and 14 percent in poor condition. In provinces such as Chubut, Formosa, Neuquén and San Luis, the situation is worrying. Over half the length of the rural road network there is rated as only fair or poor. And in certain provinces such as Buenos Aires, Córdoba, Río Negro, Santa Cruz, Santa Fe and Salta, over 40 percent of the roads are deemed only fair or poor.

Corridor roads under concession management cover a total length of 8 877 km. Although these corridors have changed for the better since 1991, only seven out of a total of 19 were rated as good.

Investment by the National Highway Administration in Argentina dropped from 544 million US dollars in 1985 to 226 million US dollars in the year 2000. Meanwhile, the concession management of roads (which dates from 1991) increased, peaking at 311 million US dollars in 1999, at which point the figure began to decrease.

As emerges from the survey data, the road network on which food products are transported is comprised of 40 percent dirt roads, 35 percent improved roads, and 25 percent paved roads. These data underscore the importance of unpaved roads in the rural transportation system, even today. As

to the condition of the roads on which these goods are transported, 65 percent are in poor condition, 30 percent in fair condition and only five percent in good or excellent condition.

It can be concluded from the foregoing that Argentina's rural development potential in terms of trade and getting the rural producer's products to the big consumer centres is severely limited by the state of rural, local and provincial roads, the dearth of paved roads and/or the lack of road maintenance.

TRANSPORT MANAGEMENT AND LOGISTICS

Today, transporting food products involves much more than simply moving a load from origin to destination. It also includes shipping and distribution, with a major technology component. The traditional carrier needs to rethink his job in response to new demands. Nowadays freight is picked up at the production site and delivered anywhere in the world in an integrated, door to door, service package. Shipping companies pack the load, arrange for the transport vehicle and insurance papers, make the necessary freight transfers, stow the load in containers and remove it at the other end for delivery at the consumer's door. ALADI (2000b) identifies the main components of transport logistics and management.

- a. Logistics has become a strategic working concept, indeed a business concept, in the last fifty years. As a result, the traditional definition of logistics has altered considerably in content and scope.
- b. Modern logistics is not a tool for simply handling the flow of materials. It has become a regulatory instrument bringing order into the confusion brought by the evolution and transformation of the transportation sector in the last two decades.
- c. Logistics looks systematically at the full gamut of activities directly or indirectly linked to the flow of both materials and data.
- d. It comprises a series of material pre- and post-processing operations on merchandise, combined with the processing and transmission of the relevant data on these material operations, which include transport.
- e. The fundamental purpose of logistics is to enhance service performance, customer satisfaction, competitiveness and cost

cutting. To achieve this objective, logistical performance must combine technology, quality and maximum coordination of resources and activities to meet the new management challenges.

The 1989 FAO Agricultural Services Bulletin on post-harvest handling of fruits and vegetables indicates specific provisions for a good transport service. These are valid for any sort of transit or product:

- careful loading and unloading operations;
- shortest possible journey;
- protect products susceptible to physical damage;
- reduce shifting and jolting to a minimum;
- avoid overheating;
- restrict moisture losses;
- once good product preservation conditions have been met they must be constantly maintained, especially with respect to temperature, relative humidity and air circulation.

A well-stowed load will avoid breakage, excessive shifting about, and delays in loading and unloading the goods. There is a growing trend in domestic markets to transport fruit and vegetable products on platforms. This technique is now being adopted by small and medium productive enterprises. There are limitations to use of the technique by small farmers, however. These include the (small) scale of production and the scant supply at some links in the marketing chain of the complementary components needed to handle platforms, such as autolifts and appropriate transport (Buenos Aires Central Market, 1997).

The surveys produced the following findings:

- products were stowed in 60 percent of cases;
- in response to the question “Materials used to package the products” 45 percent of respondents reported that they used crates, five percent used platforms and 50 percent used other materials;
- to the question “When do you protect your product?”, 70 percent answered “from when goods are picked up at the farm” and 30 percent “during transit or transfer”;
- concerning the “time of day goods are shipped” 85 percent said in the morning; only 15 percent answered at dawn, in the late afternoon or at night;
- there was a great variety of answers to the question “type of packing materials used to transport products”: burlap sacks were used by 30 percent, wooden crates by 20 percent,

plastic sacks by 10 percent, plastic baskets by five percent, 5 percent wrapped their products in leaves, and 30 percent used some other kind of packing materials;

- in response to the question on how long it took to load the vehicle with the merchandise, 40 percent reported two hours for the loading operation and 60 percent said under one hour;
- to the question “How are your products loaded in the vehicle?” 95 percent answered “By hand”, and only 5 percent answered that the goods were loaded mechanically.

From these surveys may be concluded that a considerable proportion of small producers do not stow their products, and that the time of day and duration of loading and unloading operations are not always appropriate. Products are not always protected from the outset and the packing materials used may not be the most appropriate.

Interviews with technicians indicated room for improvement in loading and unloading operations. Aspects needing improvement included close packing or stowing, the use of packing materials compatible with the product, loading and unloading operations management, protection and ventilation of the load, load distribution, and use of space in the vehicle. Technicians also commented on the dearth of information on transport services, such as the cost of trucking fleets, and the necessary procedures and documentation required for food transport.

MARKETING CHANNELS

Production and marketing have become at once more complex and more specific. The following trends are characteristic:

- a. growing social and productive diversity with changing patterns of consumption;
- b. technological innovations in food production and processing;
- c. changes in the make up and structure of the food chains, with new markets for products differentiated in terms of quality, degree of processing, nutritional value, origin, presentation and other factors.

Agriculture, at the same time, was progressing toward new kinds of cooperation with the food production and processing stages, losing some of its original identity and coming to share attributes with other sectors in market insertion, diversification and becoming part of investment packages and business associations.

The emphasis on production supply was inverted in favour of market demand with a network of links between primary production, industry and marketing.

Food marketing and distribution were transformed. This was due to the development of the cold chains, of course, but also the sizeable expansion of the marketing sector through the creation of supermarkets and hypermarkets. The growing importance of supermarkets and their concentration in chain markets upped their bargaining power and the ability to impose increasingly demanding terms of trade at every link in the chain.

Small and medium farmers are poorly positioned to deal with the supermarkets. They can only compete if they organize, which would allow them to guarantee large volumes of quality goods and regular deliveries, boosting their bargaining power in the buying and selling of their products and by-products.

A tendency to upscale production is paralleled by a growing trend toward differentiated markets, sales channels, and market niches served by speciality items aimed at specific consumer segments, such as naturists, vegetarians, ecologists, and the like.

There is a backlog of regional experience among small and medium farmers' associations, which have developed productive and or marketing strategies to make the most of the growth trends in organic or ecological markets. Argentina, in particular, has recently experienced a boom in local markets and food fairs served by this producer segment.

GENERAL DESCRIPTION OF RURAL FOOD TRANSPORT: SWOT ANALYSIS

Road transport of food products in the MERCOSUR countries and Chile tends to be highly fragmented. Characteristically, it comprises a great many small, family-owned businesses and many independent truckers. ALADI (2000b) reports a marked and growing road transport trend in the subregion towards market segmentation into three major categories.

- a. Simple carriers, whose functions are limited to hauling. Their services may occasionally include loading and unloading the truck. The marketing services they offer are quite precarious and they may offer the goods they carry to either final consumers or other transport firms contracting their services on an *ad hoc* basis.

- b. Medium and large sectoral businesses which offer not only carrier services but also subcontract other firms for such accessory operations as warehouse reception of the load, and completing the necessary formalities. These firms normally maintain medium and long-term relationships with their clients, and either informal agreements or formal contracts. This category also includes companies that specialize in one particular product item. They tend to offer a product-oriented service in terms of transport, loading and unloading and storage equipment, as in the case of refrigerated products. The management and programming of their services, which are designed and periodically adapted with their habitual clients, are also product-oriented.
- c. Companies subcontracting for intermodal transport service. These are usually highly capitalized businesses under long-term contract to their clients. In addition to transport, they offer a full range of services, from packing, storing and processing the commodity to ensuring final distribution and delivery to the target market.

Ballast fleets are very common in the region, given the problem of access to return fleets. The yield and production of those shipping companies qualified for international transport are hampered by their characteristic features of non-standardized equipment, age, and inadequate weight to power ratio.

Highway networks in the region have deteriorated greatly due to a general lack of resources, a marked absence of maintenance policy planning and development, and major operational gaps throughout the network that caused huge bottlenecks.

The main problems of international road transport are bookings for transport space in different units that necessitate freight transfers, high costs and delays at boundary crossings, and asymmetric taxation or varying qualification requirements. Delays arise in international rail transport at boundary crossings due to rolling stock problems owing to the different track gauges in use in different countries.

There are major road capacity problems in the MERCOSUR corridor due to the juxtaposition of regional trade flows and increasing local traffic. In some sections of the corridor the mean daily transit per year has reached very high levels for these two-

lane roads, especially in southern Brazil. Crossing the Andean corridor is a serious problem when the winter snows close off the passes.

The border blockade imposed at one time by Argentinean truckers sent out a red alert on the fragility of the circulation of goods at times of economic tension. The grievances of the Argentinean truckers arose out of an economic crisis that prevented them from competing on an equal footing with their counterparts in other countries, given the inflexible economic model in force in Argentina at that time.

Another road safety problem is mentioned in the initial conclusions of a World Bank study that brought out the high cost to society of preventable deaths and damage which better road standards, road education and public education might have prevented.

Rural transport affects small and medium agricultural producers at the farm level in the subregion as follows:

- poor transport lowers the prices paid to farmers for all agricultural commodities. The effect is most keenly felt, however, on prices for perishable goods and goods from the most remote areas; high transport costs shrink the amount of planted and/or harvested area in certain remote zones, with the consequent underutilization of resources;
- cost is not the only factor affected where transport services are inappropriate for the type of product transported: increased damages and spoilage also reduce opportunities for selling the product and the seasonal nature of agricultural production also sparks a seasonal demand for transport services which affects price rises;
- in product reconversion, the competitive viability of a new product in consumer markets is largely dependent on transport services, infrastructure and costs;
- when middlemen or other traders are the sole providers of transport, as in many marginal areas where small farmers live, the effect on the rural market is to monopolize it;
- product differentiation, an increasingly popular strategy, is constrained by the lack of access to specialized transport services that allow a farmer to comply with specific quality standards.

A closer look at the case of Argentina for a more exhaustive review of the transport issue follows.

Argentina's transport infrastructure is limited, and highly dependent on road transport. This restricts domestic markets, limits export growth, and inhibits the development of regional trade and distribution centres in frontier areas. The remaining means of transport are only used for specific commodities and markets. The only food products shipped by rail, for example, are sugar, soybean and cereals.

World Bank studies show that the prevailing transit patterns in Argentina involve high-tonnage freight and a predominance of point to point transit. This type of goods could be more efficiently shipped in 1 500-ton boats or trains carrying 6 000 tons, or 15 000 tonnes when fully loaded. Despite this, the least efficient mode of transport is used to ship this kind of industrial and agricultural goods: trucks with a carrying capacity of only six to 20 tons. This is the predominant mode of transport in 90 percent of the freight market. Only seven percent of merchandise is shipped by rail, and river transport is the least used means of transport.

The trucking industry in Argentina does not mobilize huge capital resources, and persistent fragmentation continues to be reported. The historical non-existence of legal and technical barriers to entry in the sector has created a situation where trucking has become a refuge for independent workers with very little management training and expertise in the sector. Automotive freight transport comprises a fleet of 350 000 units spread among 150 000 companies, most owning just one or two trucks. There are only 51 companies with a fleet exceeding 100 trucks in the entire country. On the basis of the available information, it is fair to say that there are very few large-scale transport firms offering freight transport services by road (Pasteris and Giner, 2000).

The railway sector includes five private companies, which are subsidiaries of big export firms that are themselves the users of this rail network. The companies that obtained the concessions were not highly capitalized.

Border administration and customs regimes are hobbling the development of multimodal transport. One example is the obligation and responsibility of service providers to collect VAT for export.

Müller (1999) analysed the Argentinean transport sector, indicating the critical points.

The decisional and regulatory aspects of state management are inadequate. This has been a

frequent source of error in terms of regulation, investment and other sectors.

Road infrastructure, except for the toll corridors under management concession, is seriously lagging behind in terms of road maintenance and rehabilitation. Some 46 percent of the road network is only fair or in poor condition. Toll concessions have been very onerous for road users, and at the same time a huge state debt has built up for subsidized payments based on toll charges. Lastly, the possibility of expanding the capacity of some 800 km of sections of the national network should be evaluated.

The deepest restructuring in rail transport concerns the privatization of a whole set of state activities. As to freight, however, progress has gone no further than a recovery of the levels of the 1980s, despite vigorous growth in production and in bulk and container traffic. At the same time, the actual network has been reduced given the dubious current financial viability of most operators and this has been accompanied by considerable failure to comply with earlier agreed investment plans. Preliminary evidence suggests that the present situation is neither commercially nor economically sustainable. Meanwhile, a much higher share of the relevant freight would increase the viability of the rail sector with a greater scale to density ratio. As to the function of territorial accessibility, the set of services on offer is fairly small, and could perhaps be maintained with low-cost technologies.

According to INDEC (2000), the total number of registered freight companies in Argentina is 119 436, whose fleet totals 269 423 vehicles with an average age of 19 years.

The total number of authorized international freight shipping companies is 1 289. The number of vehicle permits (some for transit through more than one country) is 31 079, and the number of vehicles 15 207. The total freight capacity of this fleet is 196 030 tonnes.

Competition from foreign fleets has appeared since Argentina joined MERCOSUR, and fleets serving domestic and foreign markets have been separated, with the best equipped used for cross-boundary transit. The most modern vehicles in the Argentinean fleet are those working in the international markets. Some companies, despite uneven existing costs, manage to renew and increase the size of their fleets and retool their management systems. There was a very reduced investment rate, especially during the 1980s, during which the trucking fleet aged greatly. By 1992 the

average age of the vehicles in the fleet was 18 years. This hinders the efficiency of the service on offer and has a knock-on effect on competitiveness in the sector (Pasteris and Giner, 2000).

With some highs and lows, the total number of registered commercial vehicles in Argentina was 1 459 862, peaking at 1 573 564 in 1992 and a low of 1 203 903 in 1995. By the end of the decade there were 1 507 339 commercial vehicles.

There is one estimated commercial vehicle for every 24 inhabitants. The figure is considerably less in provinces lying outside the pampas which have dense concentrations of smallholders. The ratio in Misiones is 1 to 33, in Río Negro 1 to 36, in Corrientes 1 to 37, in Tucumán 1 to 42, in La Rioja 1 to 44, in Formosa 1 to 49, in Santiago del Estero 1 to 63, and in Catamarca 1 to 73.

The demand for freight transport has risen steadily in recent years from 181 million tonnes in 1985 to 239 million tonnes in the year 2000. The share of automotive transport grew from 91.73 percent to 93.53 percent. Meanwhile, rail transport declined from 8.27 percent to 6.99 percent (INDEC, 2000)

Prices are extremely flexible and very much open to negotiation. Each trucking fleet contracts on an individual basis, and there is quite frequently a range of prices for the same service. One special situation is domestic transport. Service in this sector is highly fragmented and there is significant differentiation in the prices charged, which depend on the weight, volume and type of commodity shipped, in addition to the chosen route; and also the characteristics of the company offering the service.

It should be stressed here that price-setting policies have never been applied to overland transport, and that this is the one sector that has never been publicly owned. Nor has the sector been subsidized. It has faced competition from subsidized rail transport under general economic conditions that have a significant impact on transport. These include the high cost of fuel due to the behaviour of the distribution market and the burden of specific fees, the regulation of the labour market, which also drives up costs, and the heavy tax burden on the sector (Pasteris and Giner, 2000).

The main farm-level problems of small producers emerging from the interviews and surveys included the following.

- a. Most small farmers and their organizations do not own their own vehicles. They produce

small volumes (though production is regular and sustained). They have no chance of acquiring and maintaining a vehicle scaled to their own needs, such as a van, pick-up truck, car with trailer, jeep, or some such. Only 25 percent of those farmers in the survey owned some means of transport for moving goods.

- b. The lack of proper, accessible transport is currently a major problem, and often a barrier for the implementation of any activity, or marketing goods through certain specific channels.
- c. The poor state of the roads and lack of regular carrier services – such as the rail network that once covered the entire country – drives up the price of transport and is a factor that needs to be weighed in opting to adopt a productive or commercial activity.

In answer to a question about the state of the roads on which their goods travel, 65 percent of survey respondents qualified them as poor, 30 percent as fair, and only five percent as good or excellent.

Transport problems affect the quality, quantity and profitability of sale products. They result in damage to the products shipped, and losses at the central markets as goods are discarded or confiscated. And they complicate the processes of product reconversion and quality upgrading that could lead to the development of more profitable alternatives.

In response to the question on damaged goods, about 45 percent of survey respondents reported some damage during the move to the collection and/or marketing sites. Most of those who reported damaged products reported that 55 percent of this was physical damage and 45 percent biological damage.

Commonly reported damage was due to jolts (butternut squash, for example), high temperatures, or poor ventilation of packed goods.

The further these farms are from urban centres or main roads, the lower the prices to the farmer; in some cases prices were less than half the normal price.

One of the main reasons producers sell their output to the collection agents or middlemen who regularly swing by their farms is that they lack their own transportation. This is true of small walnut farmers in Catamarca, onion growers south of Buenos Aires or pepper growers in Salta, for example.

As to the supply of transport vehicles for moving their products, 65 percent rated the supply as adequate and 35 percent as scarce. No one reported an oversupply of transport.

The availability of transport also depended on how long an area had been producing the good in question. Where there was a long history of production the problems had been solved, whether through sale to the farmers' customary middlemen, or because farmers had organized to contract for transport services as a group with their neighbours. Where products are new to an area and there is still no established marketing chain, the situation of product placement is even more critical. This is true, for example, of summer lettuce in the hinterland of Catamarca province.

Transport is even more of a problem in the mountainous areas of northeastern Argentina. In Molinos, in the province of Salta, a trip to the provincial capital means covering 160 km of gravelled road. Buyers of traditional products normally serve the area only when they can get a good price for the product. Otherwise producers are forced to come to some agreement with carriers in nearby villages. These carriers are the larger-scale farmers or warehouse owners who have capitalized and bought trucks. In Purmamarca in the province of Jujuy, small farmers use the extraurban buses. In the hill country of Zenta, 60 km east of Humahuaca, the 150 local families have no regular bus service, and are forced to hire some passing pick-up truck to move their goods.

For the Mohair Project underway in the southern provinces of Chubut, Neuquén and Río Negro, smallholders have no independent transport for their products, and no way to reach the farmers meetings they wish to attend. They are dependent on the vehicles of the project technicians or those of some local cooperative or association. They pay the fuel costs and contribute to repair costs. Governments normally assign a vehicle in such cases but do not pay for maintenance. Or they may have recourse to an official truck belonging to the province or municipality. The public bus lines offer service only on the main roads. Anyone living many miles away needs to move around on horseback or by some other means.

In the Cuyo area, the Chepes Sur cooperative, located in the southern part of los Llanos de la Ríoja, has no access to adequate local transport for the live or slaughtered kids they sell.

The transport problems faced by cooperatives or smallholder associations for marketing their goods

in regional, national and international markets are described in detail below.

PRODUCTION-RELATED PROBLEMS

The prices charged by carriers are usually quite high compared to what small farmers are paid for their products, and also because of the distance between production zones and markets.

In answer to the survey question concerning the biggest problems with rural transport for their products, 100 percent of all respondents replied that transport costs were very high.

One decisive factor has been the rising cost of fuel and lubricants (oil, regular gas, premium gas and diesel). This is made very clear by comparing the inflation index for last year (2002) with the general price index, and contrasting this with the 340 percent rise in the cost of diesel compared to annual inflation.

The fuel cost hike – 0.40 pesos/litre in December 2001 to 1.53 pesos/litre in December 2002, drove up the production costs of raw materials and processed goods purchased by consumers at the various points of sale – stores, markets, hypermarkets. Another factor is the constant rise in the superhighway tolls paid by the various means of transport, and which are based on the number of truck axles.

Transport costs also increase with auxiliary operations such as loading and unloading. In answer to the survey question on cost for loading your product, 95 percent replied that they did the loading themselves to avoid paying this cost. On the other hand, 60 percent reported paying for unloading operations at destination. In no case had respondents received any form of transport subsidy.

Further should be remembered that easy access to transport demands a certain volume of output and this is not usually an option for smallholders. Loads usually have to be made up by a group of farmers, and are assembled by the carrier. These small volumes translate into a lack of bargaining power for smallholders vis-à-vis buyers and carriers. Shipping very small volumes means problems with finding transport and paying a very high price for the service.

In the case of onions exported to Brazil, for example, during a journey that begins south of Buenos Aires and ends in Brazil, the temperature of the product rises, and the onions may well sprout. So the price of onions, originally quite competitive, becomes much less so due to the distance. Often

enough, the cost of transport and the value of the product are more or less equal.

There are also safety problems, given the antiquated condition of the trucking fleet serving certain areas.

ORGANIZATION-RELATED PROBLEMS (PRODUCERS' GROUPS OR ASSOCIATIONS, COOPERATIVES)

In general, producers have not banded together to market their products, and face serious problems getting their products to market. This task is greatly facilitated where farmers have organized. The bonds of organization encourage them to act as one – to defend their land, devise sales strategies, or pool their tools and equipment. And they also enjoy the social benefits available locally, not to mention the trust and affection that ease the burden of work.

SOCIOECONOMIC PROBLEMS

There is widespread discrimination among truckers against the smallest of the smallholders, who lack equitable access to markets. This only adds to the management problems small farmers have with market supply and product placement, and their lack of working capital to cover marketing costs.

The economic crisis in Argentina has also reduced the purchasing power of almost everyone, and this has dampened the prospects for selling certain differentiated or value added products.

LEGAL/REGULATORY PROBLEMS

Small producers are rarely in a position to comply with the prevailing norms, and thus sell their output at lower cost. Sometimes their products suffer delays in transit due to the lack of proper certification.

This is the case of slaughtered kids that have to be shipped in refrigerated trucks for federal transit, and onions for export which require a certificate of origin issued by SENASA, and which must be packed in an authorized, registered warehouse, which drives up the costs.

ENVIRONMENTAL PROBLEMS

Because most rural roads are dirt-surfaced, transitability depends on how often it rains and whether or not road consortia are available for road maintenance. In some areas such as Valles Calchaquíes in Salta, the roads are cut off in the summer due to heavy rainfall; rivers are harder to cross, and transit becomes risky.

PROBLEMS WITH ROAD INFRASTRUCTURE AND PHYSICAL ACCESS

Road infrastructure is minimal in rural areas, and roads are poorly maintained. These are dirt or, at best, gravelled roads, and may be inaccessible when it rains.

Road consortia run by the producers themselves are found in some areas. Such consortia take responsibility for rural road maintenance in their own area, but lack of funds make this a critical point.

Many roads deteriorate with the passage of heavy trucks, especially at times of heavy rainfall. The absence of a conservationist sentiment is also a problem here.

Excessive rainfall was cited by 70 percent of the survey respondents. The possibility of finding themselves isolated because the roads have been cut off is a very real one for them, as are all the attendant risks.

Problems concerning the availability, quality and cost of transport services are listed below.

- Transport service quality ranges from fair to poor, with high costs for small volumes of output, which is why certain products are not competitive.
- No local service is available in many of the areas where small farmers live. As specified earlier, 35 percent of our survey respondents rated the available supply of rural transport as poor.
- Taking the example of onions in the southern part of Buenos Aires province, for example, producers are often forced to sell their goods urgently because it is the rainy season or the onions are beginning to sprout. It is very complicated for them to access adequate transport. The technicians working in the project may have to supply their own vehicle to move the product to market or to some point providing access to a long-haul truck from another city.

SWOT ANALYSIS

The following SWOT analysis was prepared from primary information from interviews and surveys, and secondary information from a bibliographical review.

Strengths

- The agroecological approach of small farmer productive strategies demonstrated considerable economic and ecological potential.

- Producers are now receiving technical assistance and training through specific programmes for small farmers. These programmes could incorporate rural transport-related activities.
- Productive and commercial small farmer organizations have recently been promoted by almost all specific programmes, and there are now a great many such at various levels of association.
- Some farmers' associations and cooperatives have a sufficiently sturdy organizational base to assume responsibility for rural road maintenance.

Opportunities

- Rising volume of agricultural trade in MERCOSUR, even outpacing production growth.
- Considerable increase in intraregional trade of agricultural and livestock commodities.
- Diversification of exports in MERCOSUR bloc countries, with a greater variety of products and increased value added.
- Positive trends in differentiated marketing and market niches, together with the growth in ecomarkets now offering potential new commercial opportunities for small producers.
- Favourable development of various initiatives to improve road infrastructure (concessions, maintenance paid through tax contributions, establishment of road funds, maintenance agreements per level of standards, training for road maintenance microbusinesses) in several countries.
- Certain current projects aim at increasing the share of freight carried by rail.
- The growth in trade through MERCOSUR is putting pressure on countries and international agencies to implement action to solve problems related to infrastructure and transport.
- A number of transport-linked events have been carried out and progress has been made in sub-regional policy-making, legislation and standard-setting.
- A number of institutions share the commitment to undertake action in the subregion with a common vision of the transport sector.
- A number of initiatives for institution-building and development are taking shape in the region.

- Planning currently embraces a broader vision of sustainable development and a more participatory approach.
- Some countries have made progress in funding road maintenance efforts, with the approval of laws establishing specific contributions.

Weaknesses

- Transformations in the food marketing and distribution sectors have put small and medium-scale producers at a disadvantage.
- Very intense competition in the domestic agroindustrial sector; the disappearance of small and medium food suppliers; small subsistence farmers already hovering on the verge of bankruptcy.
- Few small farmers and their organizations own their own vehicles.
- The price of hauling goods is usually quite high compared to the prices small producers are paid for their output, and because production zones are so distant from markets.
- In many of the areas where small producers live and work, there are no local transport services.
- High transport costs shrink the area planted and/or harvested in some remote zones.
- Poor transport lowers the producer prices of all agricultural and livestock products, but the greatest impact is on output from the most remote areas, and on perishables. The further the farm lies from urban centres or main roads, the lower the price paid to the producer – in some such cases they are more than halved.
- Where the transport vehicle is inappropriate for the type of product, cost is not the only item affected. Products are also more likely to suffer damage and spoilage, dampening the prospects for sale.
- The lack of proper, accessible transport is a problem (and often an obstacle) to any activity whatsoever, and for marketing products through specific channels.
- Poor road conditions and the lack of regular trucking services drive up the cost of transport. This is a factor that needs to be reckoned into any decision to undertake a productive or commercial activity.
- There is a dearth of accessible, specialized transport services that would allow producers to meet specific quality standards.
- Transport problems affect the quantity, quality and cost-effectiveness of the products marketed. They cause damages that may cause a product to be discarded or confiscated upon arrival at the central markets. They also complicate the process of product reconversion and quality improvement that would make it possible to develop more profitable alternatives.
- One of the main reasons why producers sell their output to middlemen or others who regularly swing by the farms and take responsibility for hauling farm produce, is that the former lack their own transportation.
- Easy access to transport services demands a certain volume of freight, and this is not usually an option for a small producer on his own.
- There is a lack of producers' associations for marketing, which usually entails major problems in getting a product ready for transport to market.
- Small producers have management problems with supplying markets and product placement. They also lack the working capital to cover marketing costs.
- There is a lack of farm-level training in the logistics and management of transport.
- Small producers are often unable to comply with prevailing norms, and therefore sell their products at lower prices. They may well suffer delays in transit due to a lack of proper certification.
- The dirt or (at best) gravel-surfaced roads common in rural areas are often impassable in the rainy season.
- Trucking consortia administered by producers operate in some areas. They are responsible for rural road maintenance but a critical point here is their lack of resources.
- Many roads deteriorate with the continued passage of heavy trucks, especially at times of abundant rainfall. A lack of awareness of the importance of road maintenance makes itself felt here.

Threats

- Tariff and non-tariff barriers to trade are a constraint to exports.
- Very intense concentration and competition in the domestic agro sector, with the disappearance of small and medium food businesses.

- Negative environmental impacts due to the intensification of production.
- General lack of appropriate technologies for family farming, and technology for the subsistence sector in very short supply.
- Grave deficiencies in the infrastructure services. The growth of intrazonal trade as of 1990 began to exert pressure on the physical infrastructure in general and the transport infrastructure in particular.
- Lack of common standards and guidelines for a sustainable development model.
- Not enough funding to implement road infrastructure projects.
- Transport sector decision-making and discussion is scattered among various different bodies, agencies and negotiating fora. This is as true at country level as within subregional integration processes.
- Lack of state encouragement for the development of services offering a combination of road, rail and river transport.
- Lack of state supervisory and advisory services for transport, maintenance and infrastructure expansion.
- Lack of state promotion and strengthening of bodies enjoying the active participation of representatives of local communities, users and the private sector with reference to financing, construction and operation of transport projects.
- MERCOSUR countries have expanded the length of their road networks in recent decades, but investments have been earmarked mainly for the most heavily trafficked highways, and not enough attention has been paid to roads connecting countries.
- Only a small percentage of the total length of roads is paved. Priority is given to paving the main roads in each national road network, to the detriment of provincial and rural roads.
- Scant resources and a lack of maintenance policy planning and development have conspired to bring about a deterioration of road networks.
- There are severe problems of road capacity in the MERCOSUR countries, with regional trade superimposed on local traffic.
- The main problems of international transit by highway are:
 - Abundance of ballast fleets given the difficulty of securing loads on the return trip, and the fact that the characteristics of the international transport fleet conditions their yield.
 - Delays and high costs at cross-boundary crossings.
 - Bookings for transport space in different transport units that make transshipment necessary.
 - Asymmetric taxation or varying qualification requirements.
- In the case of shipping by rail, delays may occur at boundary crossings with difficulties arising in the exchange of rolling stock.
- The demand for intrazonal and international transport in the MERCOSUR countries is neither sustained nor regular, and the traffic is both heavy and undocumented.
- Certain sections of the network are very hard to transit at certain times of the year, as in the case of snow or flooding.

Strategies for improving rural food transport

DESIRABLE CHARACTERISTICS OF TRANSPORT SYSTEMS

The desirable features of an efficient, satisfactory food commodity transport system can be summarized as follows below.

Basic access: can be defined as road infrastructure accessible year-round to motor vehicles. Rural road improvement and maintenance ensure non-stop transit of agricultural commodities from the farm-gate to market or processing plant.

Accessible services: refers to the presence of a local transport service; i.e. timely access to transport for moving products.

Low costs: those that are amply covered by income from the sale of the product.

Quality: referring to the type and times of transport services, with a guarantee of the physical integrity and sanitary and organoleptic properties of the product, and ensuring the packing materials also arrive at destination intact.

Safe service: refers to accidents on the road and theft of merchandise.

ANALYSIS OF JOINT INTERVENTIONS TO ADDRESS FOOD TRANSPORT PROBLEMS

The following ongoing initiatives intended to enhance road infrastructure deserve mention.

- a. Road concessions are apparently regaining interest. A relatively lethargic performance in recent years was followed by signs of new life in the issue of road concessions starting in 2001. On the one hand, the concession process showed a certain continuity in Chile and Uruguay. Chile has a well-structured system that has gradually extended its coverage under a clearly defined and dynamic medium-term-bidding programme. Uruguay has also followed a systematic approach to road concessions, with its profitable routes under concession and deriving income from road tolls. Two concessions were granted in 2001. One covers nearly 1 300 km of roads with insufficient transit to recover all

costs, and thus with road maintenance costs subsidized by the National Development Corporation, an autonomous state body. In Brazil, the first wave of concessions, initiated in 1995, was over by 1998. The basic principles for awarding concessions were reviewed in 2000, and preference given to a system whereby the State invests – normally through resources from multinational banks – in infrastructural improvements, the management of which is subsequently awarded as a concession (ECLAC/UN, 2002a).

- b. Significant (though as yet incomplete) progress has been made in Chile and Uruguay in covering road maintenance with tax contributions. The two countries are exceptional in the region in this respect.
- c. In Brazil the federal Constitution was modified to include a law stipulating a fuel tax. Part will be earmarked for transport infrastructure programmes, including road maintenance. The State of Goiás also set up a road fund, a type of financial body found in four Brazilian states. In the State of Mato Grosso do Sul, the laws creating this fund were passed in 1999, with subsequent legislation approved to set up the Mato Grosso and Paraná funds. The funds are partly financed by fuel taxes, meaning that road users are paying for road maintenance. An innovative measure in Mato Grosso do Sul was the concept of rounding out the income from fuel taxes with taxes on just a few profitable livestock and agricultural items. Unlike pre-existing funds, the three Brazilian funds receive their resources directly from the tax-holders (ECLAC/UN, 2001).
- d. In Uruguay, an interesting innovation was introduced when the National Highway Authority signed two agreements with two internal road maintenance units, each of

whom undertook to maintain some 730 kms of highway under contracts per level of standards. With this experiment, over 60 percent of the national road network of about 8 600 km is now being maintained up to standard (ECLAC/UN, 2002a).

- e. Uruguay's national Highway Authority contracted directly with companies set up by former officials who opted for voluntary retirement. Thus, workers who used to perform maintenance tasks in an administrative capacity have formed micro-enterprises specializing in routine maintenance of roads, traffic signalling and street lighting. Although small firms may seem to be precarious in business terms, their performance in this area has been excellent and they have been effective in organizing road maintenance operations. The evaluation shows that users have better roads at their disposal than in the past, since contracts lay down strict conditions, and these are being respected. The National Highway Authority pays less for routine maintenance than it did previously for administration. The new contractors have seen a substantial increase in their income.
- f. Current World Bank assistance to the transport sector in Argentina covers three aspects of development and administration. The first concerns a sustainable approach to federal and provincial road rehabilitation and maintenance. Under the new approach, these jobs will be contracted out to the private sector, with a goal of achieving acceptable road quality for the federal network of paved roads by 2004. Total congestion is increasing, however. Nearly 4 000 km of paved roads need an extra lane and a number of bridges must be replaced. The second aspect concerns Bank approval of the Provincial Roads Project, which is helping several provinces modernize their road systems. The third aspect is to reform and consolidate sectoral regulation, especially the regulation of multimodal transport. The problem of multimodal transport is held to be the next major policy topic for the transport sector in Argentina, after privatization of the railroads, ports and main highways. This is particularly important in terms of making Argentina more competitive and enhancing integration with its MERCOSUR partners.

With respect to rail transport-related projects, the following deserve mention (ECLAC/UN 2002a).

- The most viable railways have already been leased, so few activities of interest for the private sector remain. At present there are a number of plans to increase freight shipping by rail.
- In 2001 the reopening of the Trans-Andean Railway via the central corridor from Argentina to Chile was proposed. An advisory firm did a pre-feasibility study with two 1 500 hp locomotives pulling trains of 600 net tonnes (the equivalent of 850 gross tonnes) over the high mountains. If this solution were to prove viable, it could offer a yearly shipping capacity of three million tonnes.
- There is an existing project to connect the wide-gauge rail networks of Argentina and Chile in the south between Neuquén and Victoria.
- Another of the new plans emerging in 2001 was the idea of connecting Brazil and the northern coast of Peru via a Trans-Andean railway.
- A feasibility study was done in 2001 on privatization of Paraguay's railway, but no progress has been made on this. There is a chance that some of the railways now under concession might be returned to the State.

An analysis based on the ongoing initiatives mentioned above revealed several positive experiences in various countries, as summarized below:

- contracting for the services of micro-enterprises of road companies and workers, especially to improve routine road maintenance;
- setting up road maintenance funds appears to be the most valid means of solving infrastructure problems. In several cases these funds are partially derived from fuel taxes. In other instances the funds are bolstered by taxes on specific, profitable, agricultural and livestock commodities. The most favourable situation would seem to be road funds financed directly by tax-holders, as the most effective collection method;
- road maintenance contracts per level of service or standards, where the criterion for payment is the good condition of the roadways, based on objective parameters, rather than the volume of work executed. Past experience

- has shown that this is a viable way of keeping roads in good condition, reducing operational costs and providing genuine job creation;
- some countries have a carefully structured system of concessions with a medium-term-bidding programme or else systematic approximations of concession plans;
 - supervision is one aspect of concession programmes that needs improvement, since in some countries controls are weak and do not guarantee full compliance by contractors; quality assurance, which generally leaves much to be desired, could be improved by the application of ISO 9000 standards; although complex to set up, this method is effective for systematizing and improving procedures and the results of maintenance, and for introducing self-regulation mechanisms for firms;
 - the introduction of concession contracts in the provision of road infrastructure has also changed conditions for transport operators, who have become the clients of these enterprises and not simply users of their services, introducing a significant element of interaction. It also affords an opportunity for clients to participate systematically in the evaluation of these services;
 - in other experiences, the state invests in infrastructure improvement through financing provided by multinational banks; the World Bank carries out programmes embracing a sustainable approach to federal and provincial road rehabilitation and maintenance, through the introduction of a new system to outsource these jobs to firms working in the private sector and actions to regulate multimodal transport are also underway;
 - as for shipping freight by rail, there are several projects in the pipeline to rehabilitate national and bi-national rail networks.

OPPORTUNITIES FOR HOLISTIC SOLUTIONS, PROMOTING THE IMPROVEMENT OF FOOD TRANSPORT SYSTEMS AND SOCIOECONOMIC DEVELOPMENT

The growth of trade among the Latin American and Caribbean countries, and especially the MERCOSUR countries, has spurred states and international agencies to implement action for development, and address infrastructure and transport problems.

Many events have been held with the participation of officials working in the field of

transport, with some progress in establishing policy, legislation and standards for the subregion. Several institutions share the commitment to undertake action, with a common vision of the transport system embracing the subregion as a unit. Some of the main institutions providing technical and/or financial support for these activities are ALADI, the World Bank, IDB, ECLAC, and, specifically, Sub-Group 5 of MERCOSUR.

The Conference of Ministries of Transport, Communications and Public Works was set up to promote economic and social development in the countries of South America, encouraging greater integration through common policies and strategies.

In the year 2000 the Heads of State of 12 countries of the subcontinent met in Brasilia to launch an action plan for the physical integration of South America in the fields of transport infrastructure, energy and telecommunications. Several financing mechanisms of the IDB, the Andean Development Corporation (ADC), and the Financial Fund for the Development of the River Plate Basin (FONPLATA) would participate in the programme for implementation of this plan. It revolved, in the short term, on the undertaking of detailed feasibility studies. This would be followed by the immediate execution of projects and international transport services embracing infrastructure along six corridors or major intracontinental trade routes and their links between the subregion and the rest of the world.

Institutional changes are, undoubtedly, the most complex to promote. For this reason it is encouraging to note that various initiatives are materializing in Latin America in this area. At the Second Provincial Seminar of the Americas, the Board of Directors for Highways of Iberia and Ibero-America showed interest in promoting the use of indicators of institutional performance and the road condition. These values would make it possible to appreciate the development of service provided by road agencies and would help authorities and the general public to assess the quality of the work carried out. Some institutions are already starting this practice.

The new state role fundamentally has to do with regulation, planning and financing infrastructure and infrastructure services. This constitutes a challenge that can also represent an opportunity. Planning now embraces a broader vision of sustainable development, using a more participatory approach. This new paradigm can

steer investments toward more effective results by favouring integration among countries through the corridors linking them, and at the same time promoting community development in the individual countries.

Some progress is being made in financing maintenance through road maintenance funds, as and when laws are approved to establish taxes on fuel or on certain agricultural outputs. Funds set up in three Brazilian states will collect resources directly from the tax-holders, who are required to deposit them in the relevant bank accounts. In other words, the money does not go through the tax system, thus reducing the time involved and ensuring that it is received.

Interesting innovations in road maintenance agreements are being introduced in some countries. Road maintenance contracts per level of service or standard are now very widespread in Latin America and the Caribbean. Although the process is lagging somewhat in some of the nine countries using such contracts, by 2001 over 40 000 km of roadways were thus serviced, though with significant variations from one country to the next. Contracts covering a further 25 000 km were in various phases of preparation. With the experience of Uruguay, this is the first time in Latin America that the concept of a contract per level of service has been applied to work done by administration.

User participation is a theme that has received great emphasis in recent years. Users are the recipients of action, and at the same time they finance action with their contributions. Users, and the public in general are no longer the passive recipients who accept with resignation what others do, but, on the contrary, have become actors who demand to be taken into account in a special way. The Provia Seminar mentioned above established that an effective road system demands the participation of users as third parties with well-defined rights and who interact harmoniously with other actors.

Likewise the creation of micro-enterprises for routine road maintenance has generated very satisfactory results for all parties concerned.

Another potentially favourable aspect for infrastructure development is increased direct foreign investment. This assumes the state is complying with its function as a regulator and planner. While such investments have not received much response from the overland transport sector or produced many new projects, the MERCOSUR

countries have made efforts in this sense to attract investments backed by regional agreements.

COLD CHAINS: AN ALTERNATIVE FOR THE RURAL SECTOR

The development of cold chains including controlled temperature transport and containers has helped to transform food marketing and distribution.

According to FAO (1989), the *cold chain* concept includes the rapid post-harvest cooling of products at the lowest possible temperature to avoid damage to the product. The temperature is then maintained constant at every stage of post-harvest management, from packing, storage, transport and marketing, to final display in retail markets.

The use of cold chains for marketing products is feasible with the participation of large, integrated organizations that can control every aspect of post-harvest management, and for large volumes of products.

It is unlikely that progress will be achieved in this field in the next few years, especially for small and medium producers. On the one hand there is a general lack of marketing and transport infrastructure for small-scale productive systems. On the other, the volume and value of the output of small producers is too low to cover the investment costs. The use of refrigerated vehicles is feasible for certain highly perishable products where justified by sale prices.

Refrigerating equipment installed on trucks varies with the cooling capacity of the system used. Most are just used to maintain the temperature of products pre-cooled by other means. They have low-capacity ventilators to cool the air warmed by the slow respiration of the cooled product. Some form of ventilation may be necessary on long trips to avoid losses of oxygen and the build-up of carbon dioxide. Some refrigerated vehicles, such as trailer trucks equipped with refrigerated containers, can rapidly cool a warm product by forced air circulation – normally an exceptional technique due to its high cost. Using refrigerated trucks with relatively low cooling capacity to pre-cool products for export is not usually recommended.

In any case, producers require a certain amount of experience and training to make good use of a refrigerated transport service and profit from its potential advantages. Fruit shipped in a refrigerated truck can reach market insufficiently cooled because it has not been properly stowed

– or it may have contracted *Botrytis* rot because an ethylene absorber was not used as a complement to refrigeration.

The need for refrigerated transport is clearer at certain seasons and for specific products that arrive at the Buenos Aires Central Market in very degraded condition. Sweet maize ears, for example, deteriorate rapidly and easily. This is why sweet maize is now beginning to be shipped in pallets rather than in bulk (NEA/IFAD/IDB GOA Programme, 1997).

Interviews in Argentina revealed that refrigerated transport is used mainly by larger producers for marketing high-value fruits such as apple and pear, and certain early vegetables in northeastern Argentina, such as tomato and peppers, which fetch good prices in the big city markets.

The interviews showed that most small producers lack access to refrigerated equipment for economic reasons, even though this would be an appropriate solution to the problem of damage to highly perishable products, or products susceptible to sprouting or certain diseases.

This lack of access is linked to the scarcity of services in most areas, and to the very high cost of such services for small production volumes, and low producer prices. There are also problems with the working capital needed to finance this type of fleet.

The surveys showed that while an important proportion of respondents (45 percent) recognize that their product suffers damage – mostly physiological damage – during transport, 100 percent of those interviewed reported that they do not use refrigerated vehicles.

PROBLEM PRIORITIZATION

A detailed description of issues linked to agrofood transport was presented earlier under the heading “*General description of rural transport of agrofood products – SWOT analysis*”

The priority macroeconomic, political and social problems of small and medium producers supplying mainly local or domestic markets are summarized below.

- Very intense concentration and competition in the domestic agricultural sector.
- Intraregional cross-boundary delays and costs.
- Tariff and non-tariff barriers to trade that limit exports.
- Lack of financing for road infrastructure.
- Failure to expand the length of paved roadway – the main roads in national road networks

take precedence over provincial and rural roads.

- Poor road conditions due to lack of road maintenance.
- Failure to promote microenterprises and consortia for road maintenance.
- Timely, adequate transport services unavailable in some areas.
- High cost of fuel and tolls compared to producer prices.

At the local and farm level, the priority problems are as follows.

- Most people lack their own means of transportation.
- High cost of transport compared to scale and value of production.
- Producers insufficiently organized to upscale production and marketing, and/or initiate road maintenance consortia.
- Lack of training and resources for the application of good agricultural practices linked to transport.
- Lack of financial resources for marketing expenses in general and transport in particular.
- General unavailability of adequate transport services.
- Lack of information on transport services and regulations.

STRATEGIC PLANNING TO ADDRESS FOOD TRANSPORT NEEDS

Key transport factors to ensure adequate food availability

As indicated by ECLAC (2000), the goal of a strategic vision should be an economically and socially stable South America, committed to poverty reduction and enhanced educational and employment opportunities, with environmentally sustainable economic and social growth.

Summarized below are the basic principles of strategic planning for the solution of transport needs, based on our analysis of the bibliography and primary survey data.

- Planning organized at country and subregional level, based on the identification of regional development and integration thrusts for more efficient investments.
- Harmonization of regulatory and institutional frameworks, policies and plans amongst the countries of the subregion, with the development of common criteria for project design and technical, economic and environmental project evaluation.

- Enhanced national level integration and accessibility for relatively less developed regions, to promote the competitiveness of regional economies.
- Reform and modernization of regulatory and institutional systems governing the use of national infrastructure to permit the development of new investments and maximize existing ones.
- Establishment of a policy framework to ensure financial sustainability with a new vision for the definition and financing of infrastructure projects and road network maintenance.
- Policy definitions to direct and encourage long-term investment such as freight transfer stations, to encourage and foster complementarity of highway and rail transport.
- Enhancement of the environmental and social components of projects from the planning stages onwards, based on a holistic, enriching approach to projects, as opposed to simply mitigating harmful environmental impacts.
- Incorporation of mechanisms to promote the active participation and consensus of target rural communities and of the private sector, with respect to project financing, construction, operation and maintenance.
- Development of interaction among all sectors involved in the transport of agrofood products, and identification of effective, feasible public measures to reconcile the needs of small and medium producers (comprising the majority in all countries of the subregion) with the need for long-term, sustainable, economic growth.
- Guaranteed availability of the food produced by small and medium producers (whose products often fail to reach market for lack of access to transport) demands policies, programmes and projects with sufficient technical and financial support and coverage to ensure:
 - product development tailored to market demand;
 - institution-building of farmer's organizations to upscale production and enable them to compete in a range of markets;
 - linking inaccessible areas with regional economic centres;
 - rehabilitating and maintaining rural and secondary connecting roads;
 - increasing road access to broaden the market for agricultural and livestock products;

- reducing transport costs, including service costs and those from damages and losses in transit;
- strengthening consortia and other rural road maintenance and upgrading organizations.

POLITICAL AND SOCIAL ASPECTS OF THE PROPOSED SOLUTIONS: TAKING DECISIONS AND EARMARKING RESOURCES

Institutional arrangements and capacity – a common response

As indicated by ALADI (2000a), the subregional road network issue is linked to the absence of three basic elements of efficient coordination:

- common standards and guidelines for a sustainable development model;
- consolidation of elements favouring the development of intermodality, maximizing the advantages of each mode for a more economical transport system;
- the necessary financing for project implementation by international or regional credit agencies, including attracting private investors.

There is a lack of specific guidelines favouring dual integration of the modes of transport and of the networks for a sound, efficient infrastructure.

Discussion and decision-making stages of the transport system and its infrastructure currently involve a whole series of bodies, agencies and negotiating fora. This situation obtains at the country level as within the subregional integration process. There is an urgent need for institution-building in the sector so as to foster continuity in the application of general policies, and spark regional technical coordination.

There is a history of insufficient resources to cover the demand for road maintenance and reconstruction, with resources frequently squandered on road expansion works of questionable usefulness. Paving the main routes of each national road network has taken priority over the rural and provincial roads.

There is a long tradition of public funding of transport investment projects. Recently, however, the emphasis has shifted to include greater private sector participation in the targeting of resources. The presence of the public sector in the economy has altered substantially with its declining role in the provision of infrastructural services.

Admittedly, governments have been fairly effective in regulating markets where deregulation might easily have produced excessive costs for externalities such as competitive bidding for

infrastructure works subject to monopolistic tendencies, with subsequent regulation of the chosen concessionaire. However, they have sometimes failed to meet the challenge of identifying anticompetitive tendencies in deregulated transport service markets, or in taking the necessary steps to correct these tendencies. In some cases, deregulation of a subsector has been taken to imply the withdrawal of government concern for that subsector. In others, the government has ceded to pressure from influential marketing entities, and taken decisions that offered short-term solutions but created other problems in the medium or long-term (Thompson, 2001).

On the other hand, there is a need for increased State supervision and evaluation of both the transport services and the work of maintenance and expansion of the infrastructure.

Concerning state supervision, decision-making, and the earmarking of funds: governments need to promote and strengthen bodies enjoying the active participation of representative organizations from the target communities, users and the private sector involved in transport project financing, construction and operations.

The failure to maintain rural roads can almost always be traced to inappropriate institutional organization, financing and responsibilities. Road consortia or microenterprises responsible for road maintenance can play a fundamental role here. Financing, technical assistance and training should be earmarked for these entities.

The long-term participation of rail freight is crying out for definition. ECLAC/UN (2002a) points out that the announced plans and projects including rail transport as a link in the international transport chain are proliferating faster than real action on the ground to implement them.

As for transport logistics ALADI (2002a) finds that with very few exception, the structure of the logistics chain in the subregion falls far short of the habitual parameters for international trade and transport among industrialized countries.

Market realignment due to the development of MERCOSUR increasingly demands transport intermodality, combining the services of road, rail and river transport. This situation is now changing, however, with the introduction of concessions in the provision of road infrastructure services. Freight truckers have become the clients of road concessionaires. There are now negotiations underway between service providers and their clients. In other words, if the big rigs want to

travel on roads not designed to bear their weight, the concessionaire will evaluate the alternative of upgrading the standard, perhaps by resurfacing the road in question, and offering this service via payment of a toll corresponding to the investment. A whole series of aspects stand in the way of a level playing field for competition between rail and road transport modes. The State should perform and perfect its regulatory and institutional role here, and correct these distortions. As explained, there are unquestionable advantages to road *vs.* rail transport and *vice versa*, depending on the type of freight and the characteristics of the market. Hence the urgent need for enhanced complementarity of the two modes, which would maximize all variables involved. Crucial here is the establishment of state policies offering clear and constant incentives to the private sector to invest in and provide efficient intermodal services.

Environmental issues have not yet had much impact on policy, but their growing importance in infrastructural planning is bound to produce changes in transport scenarios. This is especially true of the choice of transport mode, and here railways offer distinct advantages. It must be remembered, however, that rail freight alone is mostly unable to satisfy demand, and needs to be combined with the other modes of transport.

Problems such as the excessive offer of trucking services that arose as a result of redundancy, and the series of sectoral problems that spawned these issues, also urgently demand attention in light of their high social cost.

DESIRABLE BENEFITS OF VIABLE SOLUTIONS TO FOOD TRANSPORT PROBLEMS

An efficient transport system favours and facilitates economic growth by promoting domestic and international trade through geographic integration.

Transport provides a *horizontal* service. This means a service that can either benefit or harm the economy as a whole. It is a secondary activity of the production process. Its cycles follow those of the economy in general, and at the same time amplify them, because rising GDP in a country will always precipitate disproportionate growth in the demand for transport (ALADI, 2000b).

Investments to eliminate transport bottlenecks can have major cost benefits, plus the added benefit of reducing environmental pollution. Considering the externalities (accidents, noise, pollution and CO₂ emissions), the costs of shipping cargo by

road are much higher than for rail freight. Rail transport CO₂ emissions are tiny compared to those from shipping by road, and energy efficiency is three times as high. In Brazil, highway transport accounts for 90 percent of CO₂ emissions from all modes of transport. Rail transport is responsible for only 0.4 percent, even though the railways move 21 percent of all cargo compared to the 64 percent shipped by road. The energy needed to ship one tonne of cargo by rail is one-third that of shipping by road.

At the local and farm level, improved transport systems can make the following contributions:

- cost benefits in the form of lower fees and shorter trips, or higher net prices for harvest products at the farm-gate;
- expanded markets and the development of new marketing channels;
- opportunities for selling new products, e.g. more perishable commodities or goods for which there are no intermediaries available for collection at the farm-gate;
- reduced spoilage due to transport inadequacies or delays in transit;
- enhanced income provided some of the aforementioned conditions are met, and also, as a consequence of overall transport cost reduction; gains in terms of money, time, energy and efforts, reliability, safety.

According to Gannon and Liu (2001), improved transport directly and indirectly improves the well being of less privileged segments of the population, depending on the type of activity thus enhanced. The direct effect arises when transport is a complement to other specific interventions: such as the provision of clinics, schools and extension services, for example. The indirect effects concern transport interventions designed to enhance the efficiency of both producer and consumer as a contribution to economic growth. The key to defining rural-poverty-linked benefits is to grasp how outputs in the transport sector are tied to the four major dimensions of poverty: *creating economic opportunities and capacities, facilitating empowerment, and enhancing security as a buffer to economic reverses and natural disasters.*

Economic opportunities and capacities concern basic access to markets, information, employment (e.g., unskilled labour, seasonal work, off-farm employment, and even employment outside the area), extension services, education and health. The capacity of an individual to generate income is decisive here.

Infrastructural improvements that extend basic access will put economic opportunities within the grasp of less-favoured rural people. Improved transport not only benefits the rural population through viable, low-cost access to a wide range of socioeconomic opportunities; it also indirectly benefits consumers and producers by lowering the cost of the goods and services delivered.

Enhanced security takes the form of a transport network that provides basic access roads, traversable year-round, enabling a country to respond to economic adversity and natural calamities, and correct geographic imbalances in basic needs (e.g. food and medicine), especially in emergencies. The impact of adversities, that affect the poor most, can be reduced where a country or region has the capacity to move food from surplus areas to food-deficit areas.

Empowerment has to do with the improvement of rural roads and tracks that can favour the capacity of rural communities to express themselves and voice their opinions, enhancing their access to governmental offices and social assemblies. Geographical isolation prevents poor communities from participating in social and political processes, barring access to more equitable treatment and political representation.

Another direct benefit is the impact on employment generation. Basic road maintenance and construction imply labour-intensive techniques mobilizing large numbers of workers, offering income-earning opportunities for the rural poor.

STRATEGIES AND POLICIES TO IMPROVE THE TRANSPORT OF AGROFOOD PRODUCTS

Decision tree for the viability of efficient, sustainable options for the rural sector

Road and transport policies need to embrace a vision of future development, with a strategic plan for achieving the objectives set. This is the key to the improvement and uninterrupted maintenance of food transport systems.

National and international territorial integration policies should constitute the framework for evaluating transport system improvement. Promoting adequate retention and replenishment of active existing policies, and expanding segments representing bottlenecks or delays in replenishment, should be part of this framework.

Increased institutional effectiveness and better management of the agencies responsible for the transport system is a top priority. The national transport policy framework needs to clearly set

out the functions of the public and private sectors, delegate responsibility to the corresponding official agencies, and design a regulatory structure to cover economic, safety and environmental issues.

It is essential to coordinate agriculture and infrastructure sectoral policies to maximize resource use, and provide a regulatory framework to substantially improve rural food transport.

Adequate guidelines for private sector participation are also very important. Care must be taken to ensure concessions do not entail windfall profits or unnecessary risks.

Road maintenance policies need to be carefully defined, avoiding the consequences of deficit policies that can mean road damage and the subsequent need for road rehabilitation, increasing vehicular operating costs and heightening the risk of accidents.

Roads in poor condition drive up the operating costs of motor vehicles by 30 to 50 percent or more. An effective road maintenance programme can avert this at significantly lower cost. Estimates in various countries point out that direct losses from defective roads can be as high as two percent of GDP (ECLAC/UN, 1997).

Intermodality is an effective criterion for evaluating transport policy decisions, especially with reference to the role of rail transport. Railways, which have oriented their transport services to accommodate large volumes of cargo, offer significant advantages over shipping by road. Including externalities, their cost is way below that of road transport, their emissions much smaller, and their energy efficiency much greater.

The development of a multimodal system is highly important for enhancing the operating efficiency of domestic markets and guaranteeing the competitiveness of primary exports. The World Bank refers to *seamless multimodal transport*, defined as contract transport services including two or more modes whose runs, delivery times and number of lots per load are especially designed to lower delivery costs per unit of product. The promotion of intermodal transport services should also embrace integrated production and distribution, advances in transport technology, and information systems designed to monitor operations.

A built-in policy for financing the transport system needs to be defined. Adequate, timely and sufficient resources must be earmarked to ensure efficient action.

Cost-reduction operations also need to be made more efficient. There are many forms of intervention

that can be considered low-cost, of course. They include contracting services to the private sector, boosting the capacity of public-sector agencies and local private sector concessionaires, and giving user groups more control over the use of funds derived from fees (e.g., through road councils).

Sustainable road improvement should be the common goal of all transport interventions. To achieve this goal will require action and commitment on the part of users, enterprises and governments as concerns the institutional, operational and legal issues. Sustainability will also require setting up a financing mechanism for rural road maintenance that is immune to political influences, such as a road fund administered by an independent road council.

Every transport project has some environmental impact, and this must be borne in mind in the design of sectoral policies. Transport infrastructures generate spatial segregation, have a visual impact, and modify land use. Operations have an impact on the quality of life of the local population in that they produce noise, vibrations, accidents, and air and water pollution. Projections also show that oil consumption will continue to increase in the transport sector.

Local-level institutional, technical and administrative capacity needs to be bolstered through the development of small and medium enterprises to administer and carry out minor improvements and maintenance on rural roads. To ensure the equity of transport policies and the development of the sector, local bodies need to provide an efficient response to the demand, ensuring that groups at every income-level have basic access, and choosing transport services that operate efficiently, and, if possible, competitively.

SURVEY RESULTS

Objectives

The study on rural transport based on surveys and interviews (Figure 2) had three specific objectives:

- collect information from officers in charge of smallholder-targeted projects, and get their views, based on the surveys and interviews, on the issue of rural transport;
- supply qualitative information on the subject of transport;
- collect quantitative information reflecting the current state of affairs.

As already mentioned, Argentina currently has about 400 000 production units, of which about

300 000 in the smallholder and mediumholder sector. Of this subtotal, just about half are considered smallholders (Figure 3).

Rural poverty in Argentina, as in the other MERCOSUR countries, is linked to the high incidence of smallholdings and to small-scale production in this agrarian sector (see Tables 17, 18 and 19).

This production system is typical of over half of all agricultural establishments in the regional economies. Figures 2 and 3 show the distribution and concentration of the smallholder sector and smallholders in Argentina. Each red dot represents 10 farm families.

The defining conditions of these production units are:

- scarcity of natural and economic resources;
- small parcels compared to family size;
- precarious land tenure;
- very little remuneration for family labour;
- lack of adequate professional advice and technology;
- inadequate access to credit;
- scant bargaining power in markets;
- weak farmer organization.

Qualified informants

The aim of the study was to collect basic information underlying the issue of rural transport, based on surveys and interviews with qualified informants, along the following lines, in accordance with:

- the limited time available;
- the geographical coverage of the study;
- the possibility of quickly and effectively reaching the most remote zones in the countries allowing a more representative sampling of the sector and of the problems in question.

Given the large number of official and NGO smallholder-targeted development projects, active interaction was established with project officers in every province. The principal criteria for eligibility as a *qualified informant* were ability to respond responsibly and knowledgeably to the questionnaire, and in follow-up interviews, where applicable.

These criteria were:

- responsibility for an ongoing development and/or productive project;
- minimum five years experience in the field;
- background in technical assistance and marketing activities;

- aptitude for the participatory solution of collective problems.

Personal knowledge through employment background of government structures and programmes, and of private and provincial bodies, favoured the selection of *qualified informants* among the teams and groups of colleagues scattered throughout the country.

The set of tools and criteria utilized ensured:

- a thorough x-ray of the national situation with respect to territorial expansion;
- a broad diversity of production conditions and meaningful representativeness due to the great many smallholders represented in the survey on rural transport.

METHODOLOGY

The first methodology used for the study was the *survey* and the second the *interview*.

The surveys

From the outset an appropriate survey model prepared for another region of Latin America was used, adjusted as appropriate for the examined country.

The objective of the survey was made clearly explicit at the time the surveys were sent to respondents. The questionnaire was sent to over 50 *qualified informants*, with the request that they return the completed forms within 25 days. This was later extended by 15 days.

A total of 25 responses were received, of which three were eliminated as incomplete. The information from 20 surveys was processed and the data systematized for later analysis.

The interviews

Once the surveys had been received and processed, five cases from different *qualified informants* and project officers were selected for field visits. This was to check the answers for veracity and exactitude through interviews with the project officers and with heads of the organizations involved.

Throughout the interview, every effort was made to ensure an amenable and cordial exchange with the interviewees. This dialogue was facilitated by the clearly stated objectives of the interview and of the agency responsible for conducting it. There was no reluctance to divulge information, and, importantly, those interviewed were assured that the data thus obtained were confidential, and not to be disclosed to media sources.

This technique was chosen for data collection because:

- an open interview makes it possible to gather a great wealth of intensive, holistic and contextual information, in the interviewees' own words and with their own approaches;
- it smoothes the way to new directions in research, clarification and follow-up on the questions and answers, within a more direct, personalized and flexible framework;
- it is ideal for the initial phase of a study, revealing new hypotheses and guiding the search for new documental information;
- it offers contrasts and nuances that can be compared with numerical data;
- more than other qualitative techniques, it can access information most easily obtainable through the intervention of an interviewer or the dynamics of group interaction;
- use of these kinds of qualitative interviews allows a topic to be explored in greater depth and be compared to other sources, reveals a greater wealth of data, and includes nuances, new hypotheses, reconstruction of past action, oral histories, and other valuable element.

The *text or script followed for the interviews* can be compared to the survey questionnaire. Generally speaking, all in-depth interviews follow a text. This contains topic and subtopics to guide the interview, but at the same time neither formulates the questions nor suggests answers.

In this particular case there was an outline with the items to be covered, in no exact order, the idea being to generate a flow of information peculiar to the individual being interviewed, so as to capture unscripted answers. The goal was to confirm and/or expand the results of the surveys. Topics were thus established on which to proceed during the course of the interview. Once the five case histories had been selected, the interview was agreed upon.

Various tactics were employed in the interviews to maximize the outcome of interpersonal communication. Silences, for example, are useful to allow the interviewee time to remember or to elaborate on some fact. This is especially true for rural smallholders, smoothing any anxiety arising between the question and the answer, in accordance with the rhythm of rural life.

Interview tactics such as drawing out the interviewee, comments, nodding the head, waiting, or asking for a more detailed answer, allow the interviewee greater liberty of expression,

being attuned to his or her personal manner of expression. Reaffirming or repeating what the interviewee expressed in his or her own words, without asking for further clarification, is a way of showing interest in what is being said.

Results

Data were received from 23 qualified informants heading development and/or production projects. Of this number 20 were selected for the study, and three were rejected as incomplete (not containing the minimum required information).

This analysis does not claim to be conclusive or to have exhausted all possible explanations. However, it is of value from several standpoints, and can be seen as a preliminary proof that data and indications can be obtained on how the problems of rural transport relate to smallholders.

Table 19 covers the specific responsibility of the technician responding to the survey, geographical location, province, productive systems, number of producers involved, and the overall volume of production. The last column contains economic information derived from the data supplied, indicating the gross value of production in global terms and suggesting the true potential of small-scale production.

PRODUCTION CHARACTERISTICS, VOLUME AND ESTIMATED VALUE

Analysis of the results

A number of observations concerning the universe studied emerge from the analysis of the survey findings.

Small producers

A brief description of small producers follows. Though not specifically targeted by the survey, they deserve mention due to their number.

The 20 surveys analysed embrace a sizeable portion of the country. It is important to note here that the responses refer to farmers' associations with fairly large memberships: the sample covers 7 744 families.

Figure 4 shows the percentage-wise geographical distribution of smallholders in the five main regions of the country covered by the study.

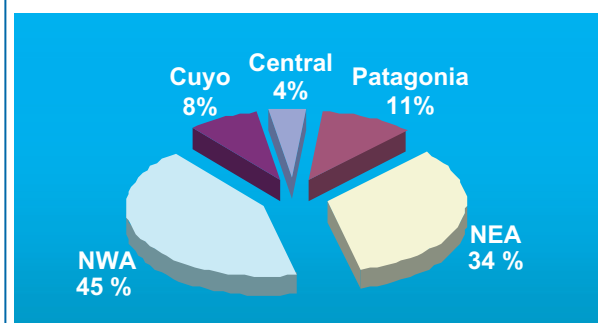
The map of the provinces participating in the study together with the map showing the distribution of smallholders indicate the high incidence of smallholdings in the country, the location of ongoing projects, and the number of families involved.

TABLE 19
Case studies in detail

N° cases	Title	Site	Province	N° of producers	Product type	Product volume	Estimated value (in pesos)
1	Coordinator	Aimogasta	La Rioja	264	Olives	2 400 t olives	1 440 000
2	Tech.Asst.	Goya/ Corrientes	Corrientes	1 350	Cotton/vegetables	60 t cotton, 100 t vegetables	181 000
3	Coordinator	San Juan	San Juan	160	Honey/preserves	30 t	180 000
4	Tech.Asst.	JJ. Castelli	Chaco	860	Cotton/vegetables/ honey	10 t cotton, 2 t honey- 20 t cassava	32 500
5	Tech.Asst.	Seclantas	Salta	150	Horticulture	10 t onions, 10 t tomato, 200 t peppers	339 700
6	Tech.Asst.	H. Ascasubi	Bs. Aires	150	Horticulture / apiculture	6 000 t onion, 50 t butternut squash, 10 t honey	2 545 000
7	Coordinator	Bariloche	Neuquén/ Río Negro/ Chubut	690	Goats/horticulture	50 000 kids, 80 t vegetables	1 330 000
8	Coordinator	Ancasti/ Andalgalá	Catamarca	600	Goats / honey	5 060 kids, 10 t honey	186 500
9	Tech.Asst.	Pomán	Catamarca	400	Walnuts	675 t nuts	4 050 000
10	Adviser	Quebrada H.	Jujuy	150	Horticulture/ flowers	90 000 flowers, 150 t vegetables	1 635 000
11	Technician	Chepes	La Rioja	80	Goats	9 600 kids	240 000
12	Coordinator	San Juan	San Juan	400	Seeds, Vegetables	300 t seeds, 50 000 jam fruits	7 200 000
13	Coordinator	Cafayate	Salta	150	Horticulture	200 t peppers	320 000
14	Adviser	Perico	Jujuy	40	Strawberry	100 t strawberry, 40 t tomatoes, 90 000 passion fruit	
15	Adviser	Tilcara	Jujuy	200	Horticulture	200 t vegetables	2 000 000
16	Adviser	Cerro Azul	Misiones	400	Fruticulture	700 t mandarins, 500 t peaches, 300 t oranges	1 255 000
17	Adviser	Gral. Alvear	Mendoza	90	Jam	100 000 flaks/year	350 000
18	Adviser	Los Juries	Santiago	1 300	Cotton/goats/ maize	10 000 t cotton , 4 000 kids, 3 000 t maize	14 800 000
19	Coordinator	Los Antiguos	Sta. Cruz	150	Cherries/peaches/ jam	235 t cherries, 90 t peaches/jam fruits 50 000 flaks/year	1 227 500
20	Adviser	Puelen	La Pampa	200	Goats	19 800 kids	495 000
				7 784	Equivalent to	US\$	40 231 000 12 572 187

Note:(*) title of interviewee, location of organization, number of smallholders involved (Information supplied by INTA)

FIGURE 4
Geographical distribution of smallholders surveyed



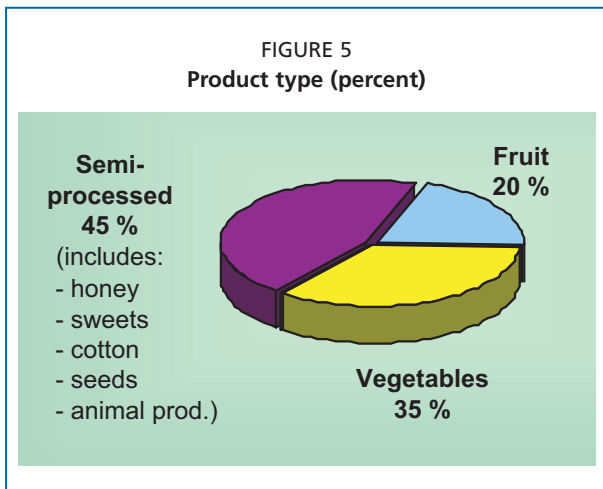
The products

Figure 5 shows the assessment of the different types of products obtained by smallholders in Argentina.

These products are grouped as follows:

- fruit
- vegetables
- pulses
- cereals, and
- semi-processed goods.

This last category includes all products with some degree of value added due to processing. A total of 45 percent of smallholders fall into this category and prominent among them are the producers



of honey (18 percent), the sweets agroindustry (9 percent), seeds (9 percent), industrial crops such as cotton (18 percent), and a major group of goat producers, accounting for 46 percent of the category of semi-processed goods.

Product-related information

The answers to the four questions contained in this section were virtually uniform.

Firstly, all survey respondents reported that *they transport their own goods, produce volumes greater than 150 quintals, and do not purchase merchandise for resale.*

Secondly, in answer to the question on *product quality*, all respondents rated the quality of their output as very good.

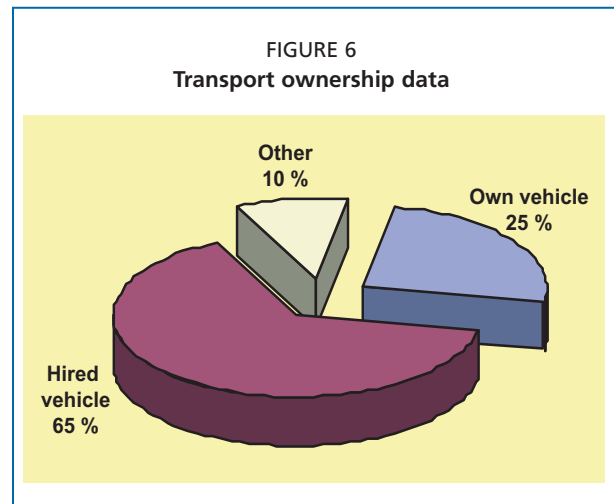
Transport-related information

This section sought data on *ownership vs. leasing of the means of transportation.*

As Figure 6 shows, 25 percent of those surveyed own some means of transportation for hauling goods.

A further 65 percent hire transport, and the remaining 10 percent use some other means such as extraurban or local buses.

With reference to the large majority hiring some means of transport, the arrangements are made with an intermediary. In other words, the trader who buys the goods at the farm or ranch picks up the merchandise with his own transport and then sells it. This intermediary is the same person who supplies the producer with goods not produced on the farm, such as clothing, utensils and other inputs. The producer later pays for these goods with a portion of the harvest



Vehicle types

This question was designed to determine what *kinds of vehicles* are used to move goods to market. As Figure 7 shows, about 60 percent of the vehicles used are pick up trucks.

Refrigerated trucks

This question was designed to determine what percentage, if any, of smallholder products is shipped by *refrigerated transport*. Everyone in the survey answered this question in the negative.

Condition of the transport utilized

Concerning the *condition of the transport* utilized, a high percentage (65 percent) rated it as good, and about 30 percent as fair or poor (Figure 8).

Transport costs

About 60 percent of the survey population found the *cost of transport* high, compared to 40 percent who felt it was adequate (Figure 9).

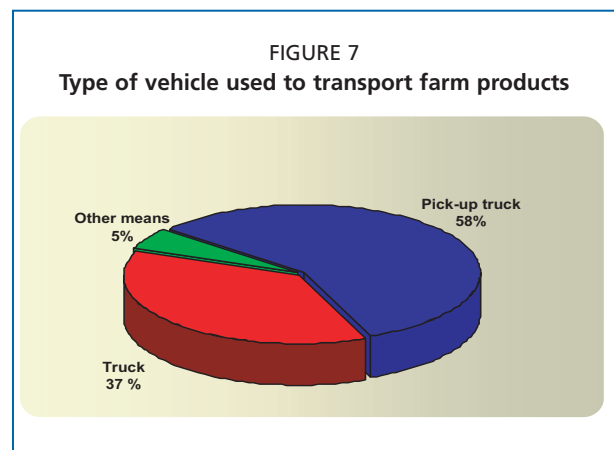


FIGURE 8
Condition of transport utilized

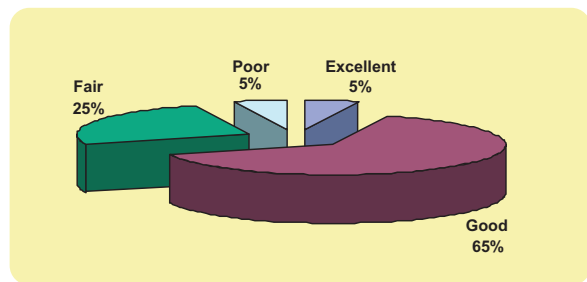


FIGURE 9
Cost of transport utilized

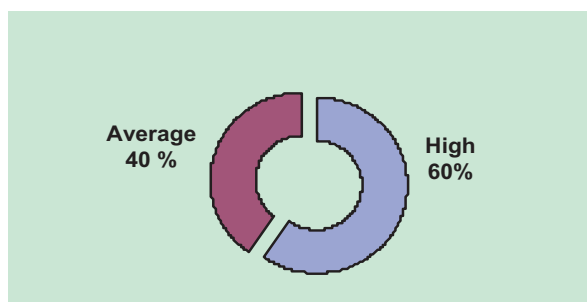
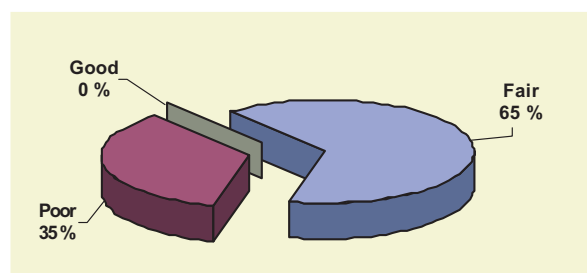


FIGURE 10
Transportation supply



Transport supply

There were three possible answers for the question on *transport supply*. The answers showed that 65 percent of the survey respondents found the supply of transport adequate, compared to 35 percent who did not (Figure 10).

Marketing channels

Important considerations with reference to marketing channels (buyers and markets) are summarized under the following subheadings:

Who buys the product?

Of all those covered in the survey, fully 90 percent sell their output to intermediaries, and only 10 percent have access to the end consumer. In other words, both those with their own means of transportation and non-owners sell mostly to local traders.

Product destination

The findings in Figure 11 do reflect the answers of the survey respondents, but the questionnaire did not cover every type of situation. This is because most of the people interviewed sent their goods to different places, thus diversifying the sale destination, which ranged from local, to zonal, to provincial to regional and/or national.

Transport management and logistics

The data on logistics and management emerging from the surveys included the following details.

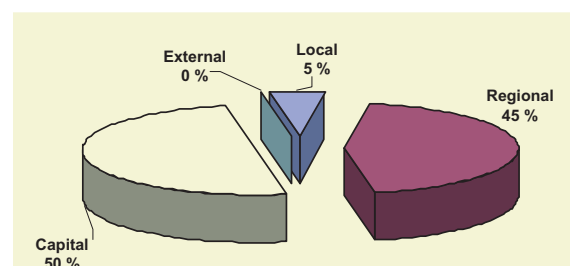
In answer to the question “*Is the product stowed?*” about 60 percent of respondents answered in the affirmative, and the remaining 40 percent in the negative.

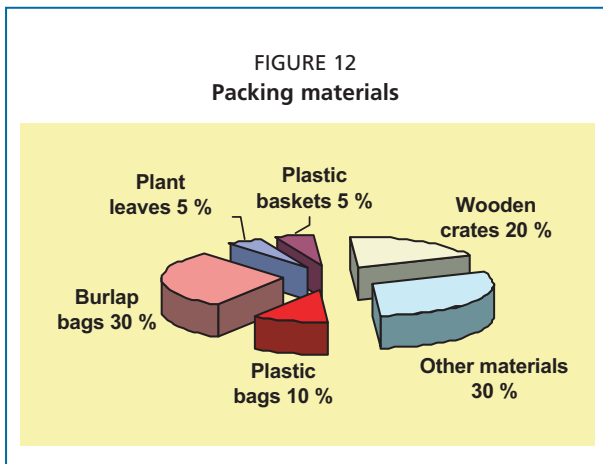
In answer to the question on *materials used to pack the products*, 45 percent reported that they used crates, five percent platforms, and the remaining 50 percent baskets, leaf wrappings, and plastic or burlap bags (Figure 12).

In answer to the question “*How is the product protected?*” 70 percent replied that the product was protected from the outset of transport when the product was picked up at the farm, and the remaining 30 percent referred to protection during the journey and/or transfer.

In reply to the question on the *time of day goods were transported*, 85 percent reported that the goods were transported in the morning. Only 15 percent replied that the move took place at dawn, and in the late afternoon and/or at night.

FIGURE 11
Product destination – markets





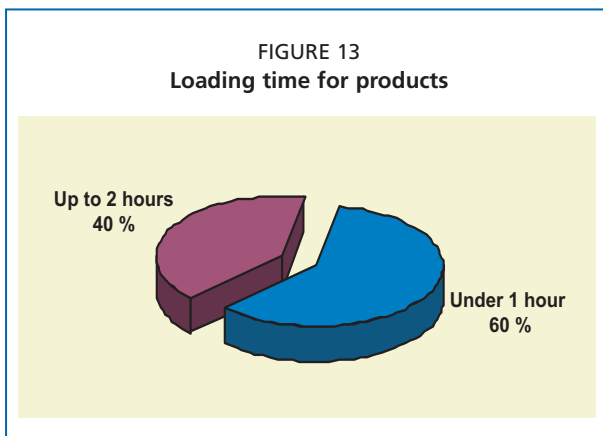
Concerning *the type of packing used for shipping the goods*, a great variety of packing materials were reported.

Concerning the question on *how long it took to load the vehicle* most replied between one and two hours (Figure 13).

Lastly, in reply to the question “*How are the products loaded into the vehicle?*” 95 percent replied that the products were loaded manually, and five percent reported mechanical loading processes.

Principal problems during transport

Concerning *transport costs*, all respondents agreed that transport costs were high. Costs ranged from 0.60 to 0.70 pesos per km of travel. The exchange rate at the time of the survey was 2.9 pesos/one US dollar, whereas by the time these data were processed, the rate had gone up to 3.2 pesos/one US dollar, and so the current cost of transport is considerably higher. Highway tolls have also risen substantially, further driving up the cost of transport.



Concerning the *cost of loading the product*, nearly 95 percent reported that they avoided payment for this service by loading their products themselves. However, 60 percent reported that they had to *pay for unloading the products*.

Lastly, on the question of *transport subsidies*, every single respondent reported that they received no transport subsidies whatsoever.

Road infrastructure

There were several questions on road infrastructure, as follows:

Type of road

The information supplied by the farmers’ associations indicate that the road network in rural areas is inadequate, with nearly 75 percent of the network consisting of dirt and/or improved roads (Figure 14).

Road condition

It was concluded local and provincial roads in rural areas are in no condition to support the development potential of rural people for marketing and access to the big consumer centres (Figure 15).

Distance and travel time from production zone to market.

A large percentage of farm output is transported more than 100 km from the point of origin (Figure 16).

Impact of weather conditions on transport

Some 70 percent of respondents reported that excessive rainfall did affect transport. There was a very concrete possibility of road washouts isolating the affected population, with all that implied in terms of risk (Figure 17).

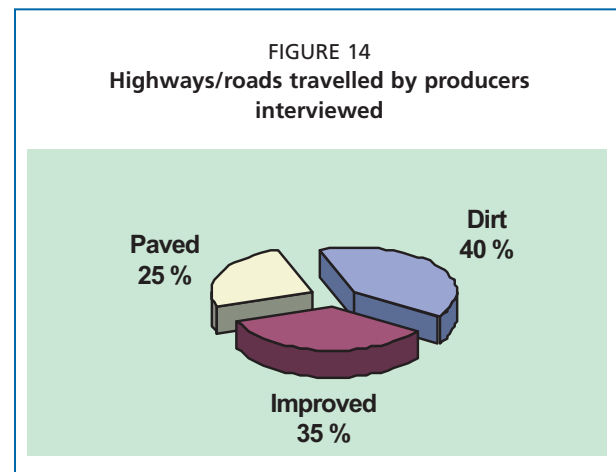


FIGURE 15
Road conditions in the opinion of producers interviewed

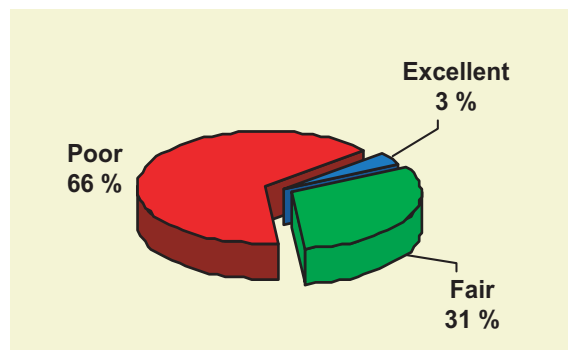
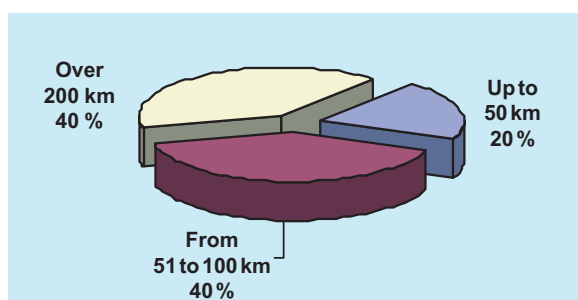


FIGURE 16
Distance from production zones to market

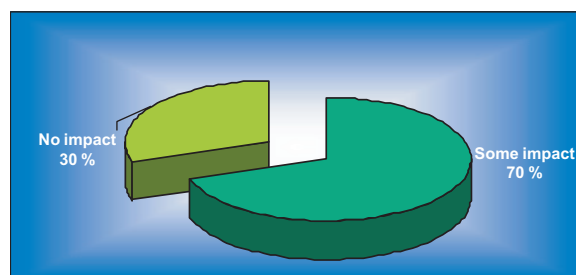


Damage during transport

About 45 percent of respondents reported that some damage occurred during the shipment of their products to the collection or marketing centres.

Of this 45 percent, 55 percent reported that the damage was physical (products packed in bags were not well protected, and physical damage to

FIGURE 17
Impact of excessive rainfall

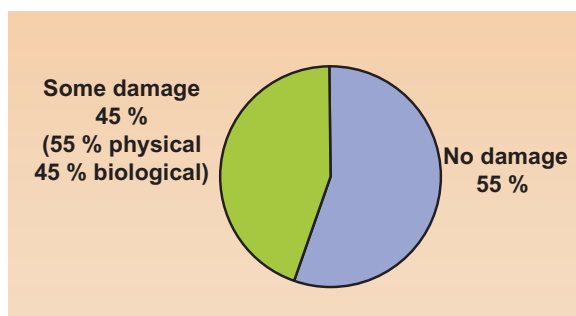


produce occurred as the contents shifted during transport). Biological damage rates of 45 percent were reported (Figure 18).

In conclusion, an estimate was made of the value of physical production declared by the organized farmers represented in the survey (Table 1).

The 7 784 families produced output valued at 40 231 million pesos (roughly US\$ 12 572 187 at the exchange rate of 3.2 pesos/one US dollar. This means an annual income of US\$ 1 615 per family.

FIGURE 18
Damage occurring in transit



Conclusions and recommendations

There has been a certain amount of development in the rural transport sector with respect to agrofood products, and there have been several innovative features, especially systems for operating and maintaining the main trade and travel routes. But in view of the complexity, variability and diversity of the situations encountered in the subregion, most reflecting problems of climate, geography and logistics, there is ample room for improvement throughout the system. This applies to connections within the subregion, as, eventually, with the rest of the hemisphere.

The strategies outlined in the previous chapters should become part of national development plans and policies in the Expanded MERCOSUR context, thus establishing a uniform set of standards to regulate and foster trade in products of agricultural and livestock origin. These food products are often highly perishable, and require special handling to ensure timely and satisfactory delivery of a quality product to the final consumer.

The following recommendations, emerging from our analysis of the various aspects of this topic, address various levels of participation.

FOR INTERNATIONAL, REGIONAL AND SUBREGIONAL AGENCIES

- Promote and organize subregional meetings to facilitate the trade and transport of products of agricultural and livestock origin.
- Formulate subregional cooperation projects to harmonize transport regulatory measures and juridical regimes, particularly with reference to customs problems.
- Encourage improvements in the conditions operating at boundary crossings, eliminating unjustified phytosanitary and customs delays.
- With international agencies, promote project formulation actions designed to develop transport for the least-favoured segments of the rural population.

FOR STATE GOVERNMENTS

- Re-tool public policies, including regulatory strategies and mechanisms, public and private

investment programmes, taxes, and financing incentives and policies for the construction and maintenance of roadways and other works.

- Introduce modifications in the regulatory, institutional, operational and labour-related aspects of transport systems so as to enhance the efficiency of operations, and tend to reduce costs.
- Promote institution-building. This does not necessarily imply establishing new bodies, but rather maximizing both the performance of existing bodies and the resources available to them.
- Promote adequate financing of road services by means of specific, sector-generated, resources, so as to ensure continuity within the road agencies. An investment fund might be established for the sector as a short-term measure, through State-subscribed canons.
- Divide concessionaire activities into: financing, building and maintaining/operating roads, so that these functions can be assigned to different agents through successive transfers. Alternatively, compulsory quality thresholds might be imposed on concessionaires. Non-compliance would incur economic sanctions, or else the early withdrawal of the concession.
- Create an adequate legal framework for the operation of multimodal transport, delineating the responsibilities of service providers. Likewise, ensure reciprocity among the various countries providing multimodal services, facilitating cross-boundary travel.
- Conduct interinstitutional action among the various programmes targeted at small farmers and their output for integrated development of activities linked with production, transport and marketing, especially in the least-favoured and most remote regions.
- Rehabilitate and strengthen the rail network in the light of its aptitude for transporting very large loads over medium and long distances. This should be a gradual but steady process.

- Conduct studies to define the optimum role of rail transport within the overall transport system, and the state position with respect to this role.
- Promote the modality of road maintenance contracts per level of service or standard. Experience shows that such contracts have been successful in maintaining roads in good condition, reducing operating costs and generating genuine employment.
- One possibility for improving the effectiveness of maintenance by administration is contract simulation. This technique consists in identifying the staff units that carry out such work and, using written documentation, in treating them as contractors in various areas such as work scheduling, achieving goals, compliance with specifications and deadlines, inspection and reception of work.

FOR PROVINCIAL AND/OR MUNICIPAL GOVERNMENTS

- Raise the investment in and technological level of infrastructure, incorporating intensive evaluation of projects designed to expand the system.
- Intensify the work of rehabilitation and maintenance of basic existing infrastructure.
- Expand the capacity of the high-traffic sections of the road network. This would involve creating new lanes, paving berms, and other similar work.
- Prioritize the construction or improvement of rural access roads in accordance with standards guaranteeing basic, year-round transitivity for motorized vehicles.
- Strengthen road consortia and other rural road improvement and maintenance organizations through specific programmes and resources.
- Build institutional capacity through the provision of funding and technical support for the promotion of micro-, small and medium enterprises providing rural road maintenance and improvement. Training should be offered in the administration, planning, construction and maintenance of rural roads.
- Provide incentives for private investments or co-investments, through an adequate micro-infrastructure of cargo storage and transfer. Moreover, re-organize the big-city multimodal terminals designed to improve costs, and transport services that transfer equipment.
- Collect and process data, and conduct sectoral studies, for decision-making purposes.
- Consolidate qualified human resources in the corresponding agencies.
- Provide incentives for private sector participation through construction or rehabilitation and maintenance contracts with clearly stated and where possible automatic stipulation of clauses and obligations, in line with the varying levels and make up of transit services and the quality of the service provided.
- Develop mechanisms to give real responsibility and expression to users and other interested parties, incorporating community participation and advisory mechanisms in decisions concerning investments in local transport and its maintenance.
- Offer advisory services and technical training to municipal agents in the development of rural community funds for road maintenance.
- Policies concerning forms of basic access should emphasise low-cost technical solutions, provided these ensure all-weather access to motorized vehicles rather than demanding excessively high performance standards. Basic access can be guaranteed in most rural areas by ensuring that drainage facilities – bridges and culverts – are designed to withstand heavy rainfall. Access can be made more efficient as a function of cost, thus extending its benefits to more households without exceeding available budget resources.
- Coordinate improvements in physical access with other rural interventions such as plans to build basic rural services, and agricultural extension programmes.
- Introduce micro-credit programmes to enable small and medium producers to purchase the necessary means of transportation.
- Implement development policies, programmes and projects providing technical and financial support, to ensure sufficient and adequate coverage to strengthen farmers' associations so that they can upscale operations to a point where they are productively and commercially competitive in a range of markets.
- Promote road safety through education, information and communications systems.

FOR RURAL DEVELOPMENT PROGRAMMES AND/OR SPECIFIC PROGRAMMES TO IMPROVE RURAL TRANSPORT

- The situation of the small producer in the context of economic globalisation necessitates an injection of resources through integrated projects designed to empower small producers to acquire local capacity for production, management and institution-building.
- Construct a favourable rural institutionalality – perhaps originating in the State but necessarily including the participation of rural families and their organizations – to execute policies that include the improvement of infrastructure and transport as part of a holistic approach to rural development.
- It is essential to promote the formation and development of rural enterprises or other forms of association for small producers, for production and/or marketing purposes, to improve their bargaining position *vis-à-vis* other stakeholders in the food chain, and overcome the inherent problems of small-scale production.
- Provide basic and specialized training in road management, rehabilitation and maintenance, leading to the formation of road consortia or micro-enterprises.
- Provide technical assistance to producers to identify the critical points at which their products are likely to suffer transport damage, and the measures needed to prevent such damage.
- Train producers and prepare technical manuals for proper handling of transport-related operations. The intent should be to reduce product losses and damage to a bare minimum. Training should include the use of compatible packing materials; management and supervision to ensure careful handling during loading and unloading operations; the use of loading areas with ramps (very useful for loading trucks); protection from sun and rain in loading and unloading areas; the use of carts, conveyor belts and lifts to reduce manual handling; optimum use of space to reduce shifting during transit; uniform distribution of weight; necessary ventilation; adequate stowing to ensure the product and its wrapping or packing remain intact; control of the condition of the vehicle and driver, and logistics planning.
- Establish information services at municipal and/or provincial level to include information on transport services, carrier costs, formalities and documentation required for agrofood transport, prices of products in different markets, market access conditions and marketing opportunities.

