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AN ANALYSIS OF SAO PAULO STATE SALTED AND DRIED CATTLE MEAT SECTOR, "CHARQUE AND JERKED BEEF" PRODUCTS (BRAZIL)

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SUMMARY

In this document we analyze the case of Sao Paulo dehydrated beef sector, Brazil, which main product are *Charque* and *Jerked Beef*. Both products production processes, inputs service suppliers, goods distribution and commercialization and their final consumers are analyzed.

We identify constraints, sector's knowledge and technological opportunities, using a methodology specially constructed to be used in agri-food sector analysis, when time and secondary information are scarce and research resources limited.

Key words: Salted and dried meat, *Charque*, *Jerked Beef*, agribusiness system, agri-food sector analysis, Sao Paulo, Brazil.

RESUME

Dans ce document nous analysons le secteur de la viande de bœuf salée séchée produite dans l'état de Sao Paulo, Brésil. Les principaux produits sont le *Charque* et le *Jerked Beef*. Nous étudions toutes les facettes du secteur allant de la production de matière première, en passant par sa transformation, sa commercialisation ainsi que sa consommation.

Nous identifions les contraintes et les opportunités les plus pertinentes pour le futur développement du secteur en nous appuyant sur une méthodologie spécialement conçue pour les études de secteurs agroalimentaires lorsque le manque de temps, de données et de moyens opérationnels sont des facteurs limitants

Mot clés : Viande de bœuf salée et séchée, *Charque*, *Jerked Beef*, filière agroalimentaire, analyse sectorielle, Sao Paulo, Brésil.

RESUMEN

Este estudo analisa a cadeia produtiva da carne bovina dessecada no Estado de Sao Paulo, constituida principalmante pelo charque e pelo jerked beef. Sao analisados os differentes processos de producao, fornecedores de insumos e serviços, distribuicao e commercializacao de produtos respeitivos consumidores finais.

Procurou-se identificar as principais limitacoes e necessidades de conhecimento e tecnologias para melhorar a qualidade e a eficiência produtiva ao longo daquela cadeia produtiva e as oprtunidades mercadologicas para o setor, utilizando-se uma metodologia desenvolvida especialmente para a realizaçao de analises setoriais conduzidas em analises setoriais agro-alimentares, sob condiçoes de tempo e informaçoes secundarias escassos e de recursos materiais para a pesquisa limitados.

Palavras chaves: Carne bovina salgada e dessecada; *Charque*, *Jerked Beef*; cadeia produtiva, analises setoriais agro-alimentares, Sao Paulo, Brazil.

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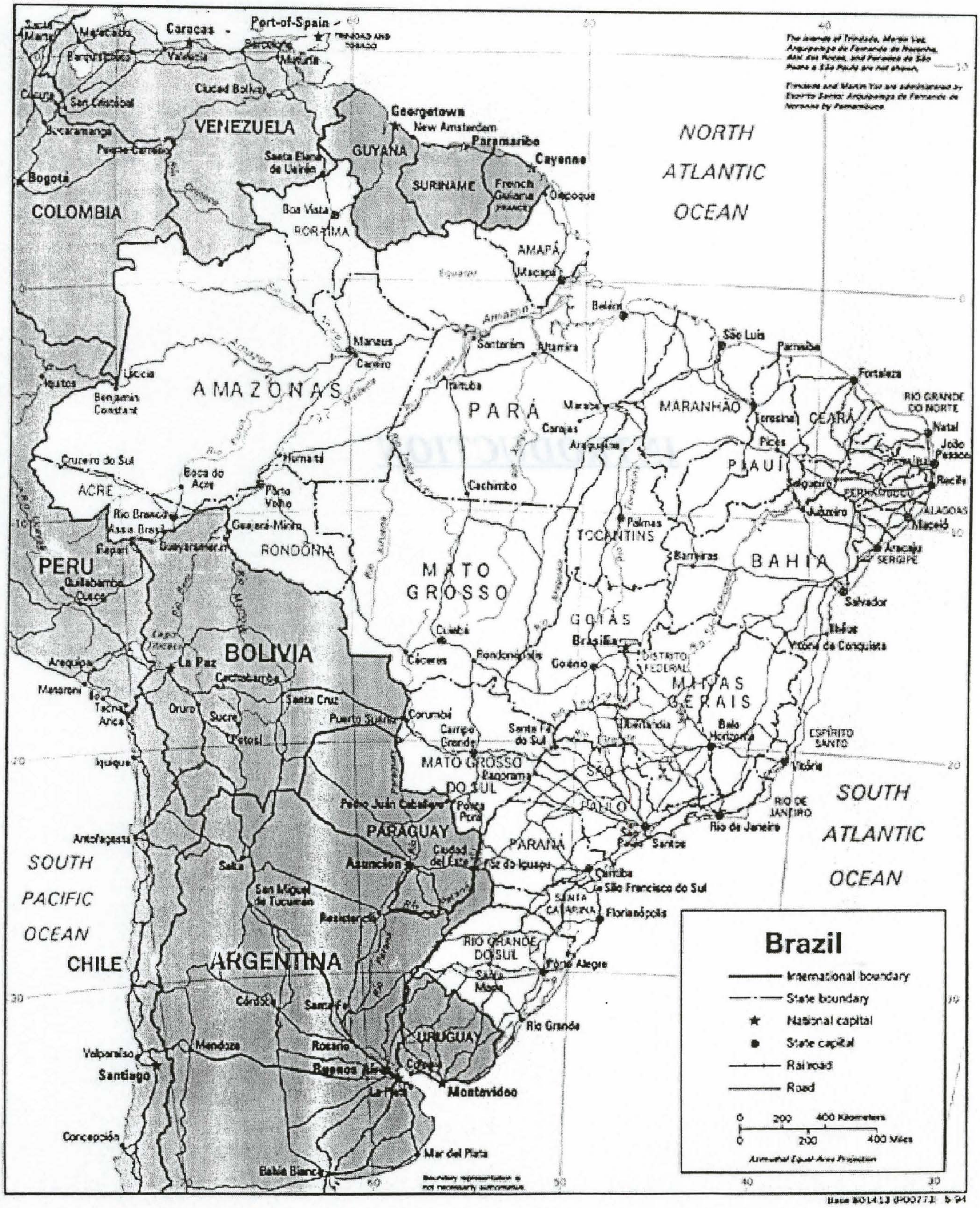
INTRODUCTION



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INTRODUCTION

Established in 1976, the Meat Technology Center (CTC) in **Campinas** (São Paulo State, BRAZIL) is a department of the Technological Alimentary Institute (ITAL), a federal institution of the department of Agriculture of Sao Paulo. The CTC is the first Brazilian infrastructure geared to multi-disciplinary technological research in meat processing. The center keeps its linkage to the meat industrial sector by designing slaughterhouses and processing plants, carrying out studies on pre and post slaughtering techniques, developing and improving new products, carrying out pilot plant tests, chemical and physical quality control analyses, giving short courses, symposia and seminars and other activities concerned with technological assistance. Apart from their in-house team of specialists, the center works with a significant number of thesis research students from various universities in the state.

CIRAD (Centre de Coopération International de Recherche en Agronomie pour le Développement) has been present in Brazil for over 20 years. This multidisciplinary French research institute works on agriculture and development topics. In São Paulo State the PROSPER Cono-Sur project conducted locally by two researchers develops scientific and economic cooperation in the agri-food sector between French and Brazilian research institutes and firms. The objective apart from having a Brazilian responsibility is to inscribe the projects in a regional dynamic (Mercosul), to accompany the southern cone agri-food sector development.

Both institutes, on a Brazilian-French cooperation basis, are interested in identifying pertinent opportunities towards developing the Brazilian dehydrated meat sector, about which very scarce information is available. In CTC researchers conduct R&D works on meat desiccation and preservation. CTC permanently develops their technological database on dehydrated products. One of CIRAD ProsPER Cone Sud's projects aims to develop, validate and diffuse rapid agri-sector analysis tools. Furthermore, CIRAD developed recently a new technology in desiccating meat products (De-watering by Immersion and Soaking).

This study is the outcome of 6 months' research targeted at the Sao Paulo state dehydrated meat sector, that markets two principal products *Charque* and *Jerked Beef*. This thesis research is proposed as a first phase to be followed in 2000, by a second phase concerning the implementation of appropriate technologies. This thesis includes three chapters accounting for:

- The economical context and geographical setting of the study. The statement of the problem and the methodologies chosen for carrying out the research (chapter 1).
- The sector analysis' (chapter two).
- A report on the major findings (chapter three).

CHAPTER 1

STUDY CONTEXT, SET OF QUESTIONS BROUGT UP AND METHODOLOGY

Figure 1: Brazilian dry and wet regions

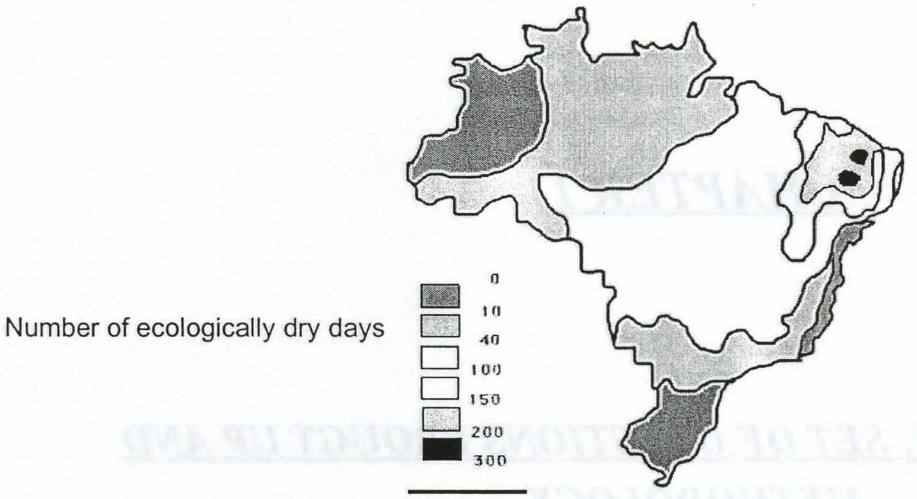


Figure 2: Brazilian Regions

Source: Rural density Atlas, 1988

CHAPTER 1: STUDY CONTEXT, SET OF QUESTIONS BROUGT UP AND METHODOLOGY

PART 1: Study context and set of questions raised by our investigation.

1. An emerging country in world economy.

1.1. General information

The Federal Republic of Brazil almost occupies half part of South America. It is the third biggest country in the world extending on continuous land, after the Soviet Union and Canada, with a total of 8.511.965 square kilometers. Its border faces Argentina, Uruguay, Paraguay, Bolivia, Peru, Colombia, Venezuela, and the Guyana. Its Atlantic Ocean coast is 7500 kilometers long.

Its 171 million multiethnic population is concentrated in the coastal areas (70%) and about 78% (total = 140.000.000) live in the cities. The birth rate is estimated in 1999 at 2, 42% annual growth. The three major metropolitan areas are São Paulo (17 million inhabitants estimated), Rio de Janeiro (8 million estimated) in the southeastern region and São Salvador de Bahia (5 million estimated) in the North East (US Central Intelligence Agency, 1999).

The climate is tropical and sub-tropical, with a large range of temperatures, and average annual rainfall variations due to countries' morphology (figure 1).

The main transportation means are terrestrial (roads) and aerial, then fluvial and rail, which are rather used for cargo.

❖ Brazil federation is divided into five regions and 26 States (figure 2).

➪ **Northern** states (Amazonas, Pará, Acre, Rondônia, Roraima, Amapá, and Tocantins) lie mostly within the Amazon basin. Lush, tropical, and rain forests largely cover it. The Amazon River crosses the middle of the region, from west to east, before flowing into the Atlantic Ocean. There are two main Amazonian cities, **Manaus** (1 million inhabitants), the capital of the state of Amazonas, and **Belém,** capital of the state of Pará on the coastline.

➪ **North Eastern** states (Maranhão, Piauí, Ceará, and Rio Grande do Norte, Paraíba, Pernambuco, Bahia, Alagoas and Sergipe) vast stretches, chronically subject to drought, contain nearly **30%** of Brazil's population. The North East region, especially the rural inland areas, is often considered as **Brazilian economically underdeveloped region**. Recently, however, a particular attention has been paid to this region economical potentialities, including sizable oil fields and rural development through large irrigated boundaries along the Rio San Francisco. In 1999, helped by federal and governmental incentives large scale industries are moving their activity to this region (Ford car industry for example). The North Eastern coast counts numerous tourist resorts, and the area benefits from a renewed interest from foreign and national tour operators.

coast counts numerous tourist resorts, and the area benefits from a renewed interest from foreign and national tour operators.

The states of Pernambuco and Bahia were the first major colonial centers in Brazil, and culturally speaking, much of what is **regarded today as characteristically Brazilian** has its origin in these areas. The two largest cities in the North East are **Recife** and **Salvador**.

➪ **The South East** and the states of Rio de Janeiro, São Paulo, Minas Gerais and Espírito Santo form the economic hub of Brazil. Most of the country's population is concentrated in this region. The area is rich in minerals, has diversified agriculture and it's manufacturing and agricultural industries are the most advanced in the country.

➪ **The South** (States Paraná, Santa Catarina, and Rio Grande do Sul states) is also highly developed. As they do in the South East, here rural and manufacturing sectors fairly balance. This region represents the largest production of grains and oilseeds in Brazil. The largest city in the south is Porto Alegre, capital of **Rio Grande do Sul**, Brazil's southern most remote state.

➪ **Central West** States of Mato Grosso, (Mato Grosso do Sul & Mato Grosso do Norte), and Goiás with the Federal District and the nation's capital, Brasília (founded in 1960) is located in this region. The West Central Region has recently known a rapid expansion of its rural production **(cattle and soybean)** and a new enterprises settlement. Most part of the region is covered with extensive savannas, dedicated to cattle breeding and tropical grasslands, and still the population remains sparse.

1.2. An economy based on agriculture, in search of stability.

1.2.1. Historical review.

Brazil's economic history is marked by a succession of cycles. Each of them is based on the exploitation of a **single export commodity**: timber (Pau BRAZIL, brazil wood) in the first years of colonization; sugarcane in the 16th and 17th centuries; precious metals (gold and silver) and gems (diamonds and emeralds) in the 18th century; and finally, after a series of inland expeditions, coffee in the 19th and beginning of the 20th century. Slave labor was used for production purposes, until the abolition of slavery in 1883. Throughout these cycles, small-scale agriculture and cattle raising were developed for local consumption. After the 1930s, Brazil's economy began to exhibit modern characteristics, actually expanding its industrial base to include steel, chemicals, and machinery.

Industry continued its expansion through the **1970's**. During the 1970's, however, Brazil, just as many other Latin-American countries, absorbed **excessive liquidity** from U.S., European, and Japanese banks. Huge capital inflows were directed to **infrastructure investments** and state enterprises were formed in areas that were not (seemingly) attractive for private investment. At the same time the food sector was modernized, since the country was looking forward to develop its food manufacturing industry for internal consumption and exporting purposes.

In the early **1980s** a sudden, substantial increase in interest rates in the world economy coinciding with **lower commodity prices** served as catalyst for Latin America's debt crisis. Brazil was forced into strict economic adjustments, which brought about negative growth rates. The unexpected suspension of capital inflows reduced Brazil's ability to invest. The burden of its debt affected public finances and contributed

Figure 3: Brazilian Industrial Concentration

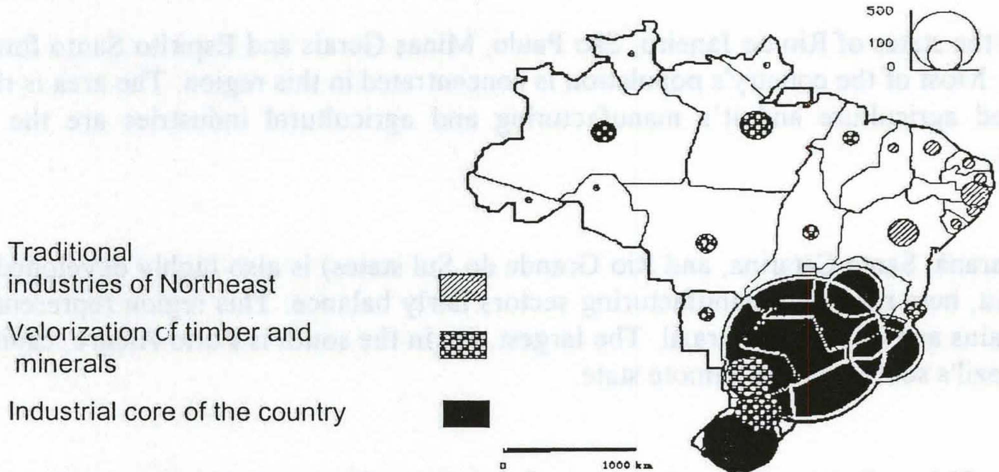
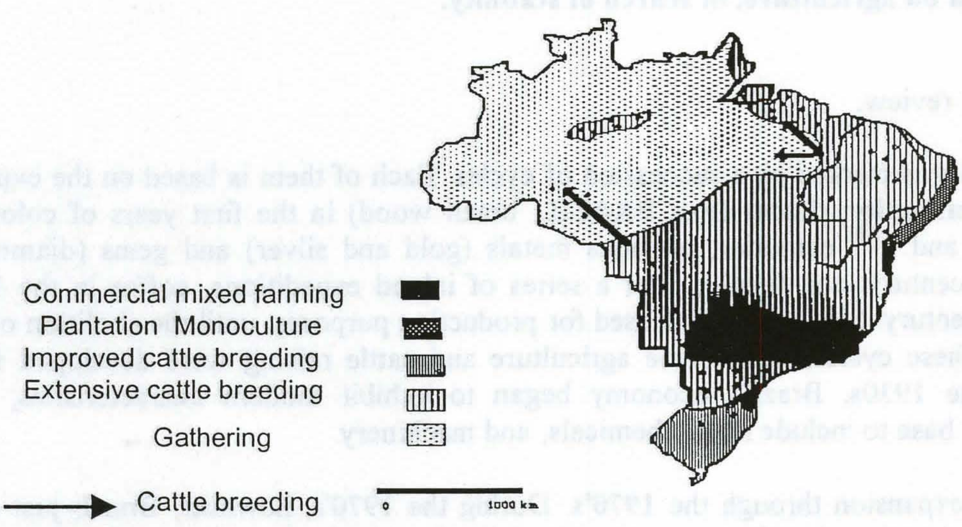


Figure 4: Brazilian Rural Land Use



Source: Rural density Atlas, 1988.

The 1980s signaled the **exhaustion** of Brazil's **"import-substitution model"**, in which protectionist measures discouraged imports, thus nurturing local industry. In the early **1990s**, Brazil's economic aims were threefold: 1) **economic stabilization**; 2) moving the country away from protectionism toward a **more open, market-driven economy**; and 3) **normalizing relations with the international financial community**. On the first point -economic stabilization- the country followed a strict fiscal discipline, adopted tax reforms and measures to enforce tax compliance, carried out deregulation and privatization programs, **reduced price controls in 1992** and, in order to establish a true market economy, eliminated them altogether in 1993.

In **July 1994**, Brazil's new currency, **the Real**, linked to the country's international reserves was adopted. Second point -trade reform- **import tariffs** were considerably **reduced**. All quantitative restrictions to trade were eliminated, making Brazil one of the very few countries in the world with no quantitative barriers to imports. Last point -external financial relationships- in 1992 Brazil reached agreements with both public and commercial creditors rescheduling debt payments and by exchanging the old debt for new bonds. With the implementation of these new agreements in 1994, Brazil recovered **access to international capital**.

1.2.2. Latest evolutions in the macro-economical environment

Since then, **tight monetary policy has brought inflation under control**—consumer prices increased by 2% in 1998 compared to more than 1,000% in 1994. At the same time, GDP (Gross Domestic Product) growth slowed from 5.7% in 1994 to about 3.0% in 1997 due to tighter credit. **The Real Plan** faced its strongest challenge in 1998, as the world financial crisis caused investors to pay closer attention to country's structural weaknesses. After Russia's debt default in August 1998 the most severe spillover for Brazil created unrelenting pressure on the currency, which forced the country to hike **annual interest rates to 50%.** Approximately $30 billion in capital left the country in August and September of 1998. After crafting **a fiscal adjustment program** and pledging progress on structural reform, Brazil received a $41.5 billion IMF (International Monetary Fund) -led in November 1998. Capital continued to leach out of the country, and investors, concerned about the rising mountain of debt and currency widely viewed as overvalued, stayed on the sidelines.

In January 1999, Brazil made an abrupt shift of course in exchange rate policy, abandoning the strong currency anti-inflation anchor of the Real Plan. On January 13th 1999, Central Bank officials announced a one-time **8% devaluation of the Real**, and on January 15th 1999, the currency was declared to be freely floating. President F.H. CARDOSO remains committed to **limiting inflation** and overcoming the financial crisis **through austerity and sacrifice** as the **country rides out recession** (US Central Intelligence Agency, 1999).

Hence, throughout the **1990s**, Brazil's economic policies emphasized **market liberalization**, **state enterprise privatization**, and careful monetary management. Inflation was kept at levels that have maintained the incomes of the lower classes, and throughout the decade Brazil launched policies that have kept its currency and markets strong, attracting austerity-minded investors from all over the world.

Today, possessing large and highly developed agricultural (8,1% GDP), mining (12,4% GDP), manufacturing (22,8% GDP), and service sectors (56,7% of Brazilian GDP), Brazil's economy outweighs that of all other South American countries and is growing its presence in world markets. Figures 3 and 4 give an idea of Brazilian industrial and rural density.

Table 1: Brazilian's economical evolution since 1995. Main indicators.

Economy in billions of dollar (except GDP/capita)				
	1995	1996	1997	1998
GDP	693,01	762,25	804,14	783,23
GDP per Capita	3690	4340	4790	4720
Growth/GDP	4,2	2,8	3,2	1,1
Aid	9,4	12,9	20,3	41,5
External Debt	114,2	127,5	157,6	180,6
Inflation rate	66%	15,8%	6,9%	3,2%
Interest rate	52,25%	26,45%	24,35%	28%
Unemployment rate	4,6%	5,4%	5,6%	8,2%
Tourist income	2,1	2,5	2,6	2,7
Foreign Investments	4,8	11,2	19,6	Not available
US$ rate	0,92	1,01	1,08	1,16*
Exp./Import balance	- 1,15	- 18,14	-23,6	-33,84

Source: ID OBS 2000
* in July 1999, 1$ = 1,85 R$. (Source: Folha de São Paulo)

2. Research area and statement of the problem.

2.1. Brazil's economic birthplace: São Paulo State.

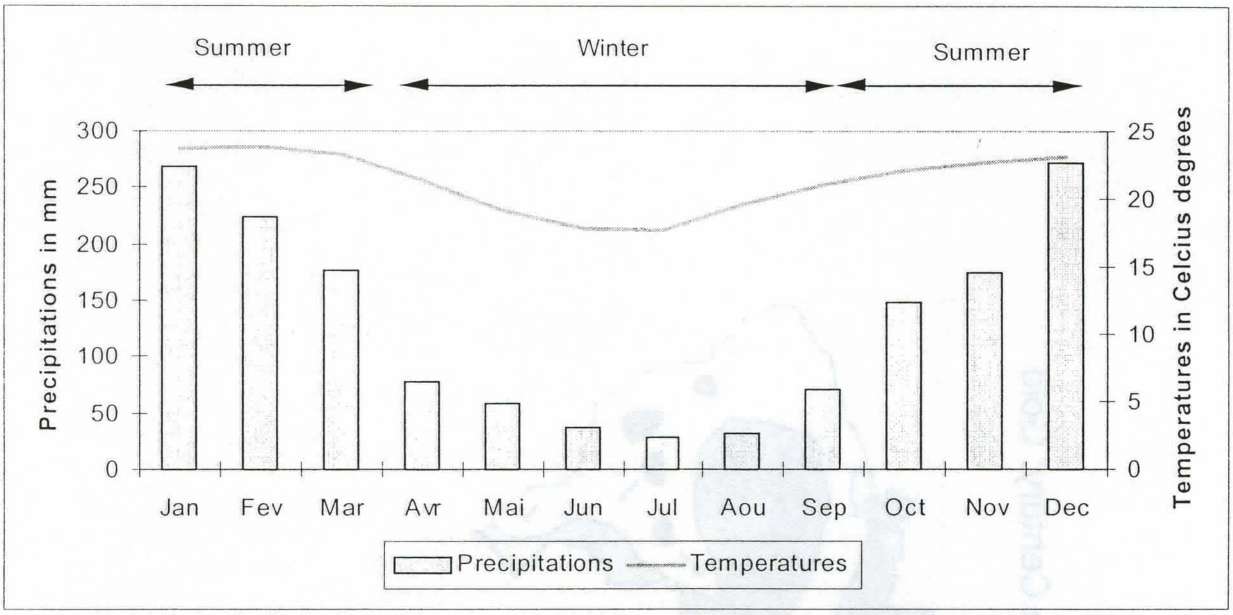
In Brazil's South East São Paulo State (figure 6), crossed by the Tropic of Capricorn, is the **first consumption area** and the biggest financial center of South America

São Paulo City is the business pole with the biggest economical potential in the country. The city, founded in 1554, heads Brazilian industrialization and modernization. It draws European and American investments and canalizes a huge immigration flow principally from the North East, which enlarges population and consolidates its economical power. At the present time, São Paulo State is responsible for more than **35% of the nation's Gross Domestic Product.**

Its area covers 248 810-sq.km namely 2.9% of the Brazilian territory. Its population (34 060 000) represents 21.2% of the Brazilian population and São Paulo the capital city and its surroundings count more than 17 million inhabitants. The State is divided in three topographical areas when east westwards map reading. The thin coastal area is separated with São Paulo plateau by the *Serra do Mar*. The Plateau slowly drops west forming the interior plains. Two major rivers irrigate the State: Rio Tiete and Rio Parnaiba. The climate is tropical to temperate. The western (plains) and northern regions are the driest. Simplistically there are two contrasting climatic seasons.

Figure 6: São Paulo State - Study launching site

Figure 5: São Paulo State seasons.



Source: Fundação Centro Tecnologico de Hidraulica, 1997.

Roads and highways are wide spread over the state from east to west and from north to south axes, making trucking the main means of transportation.

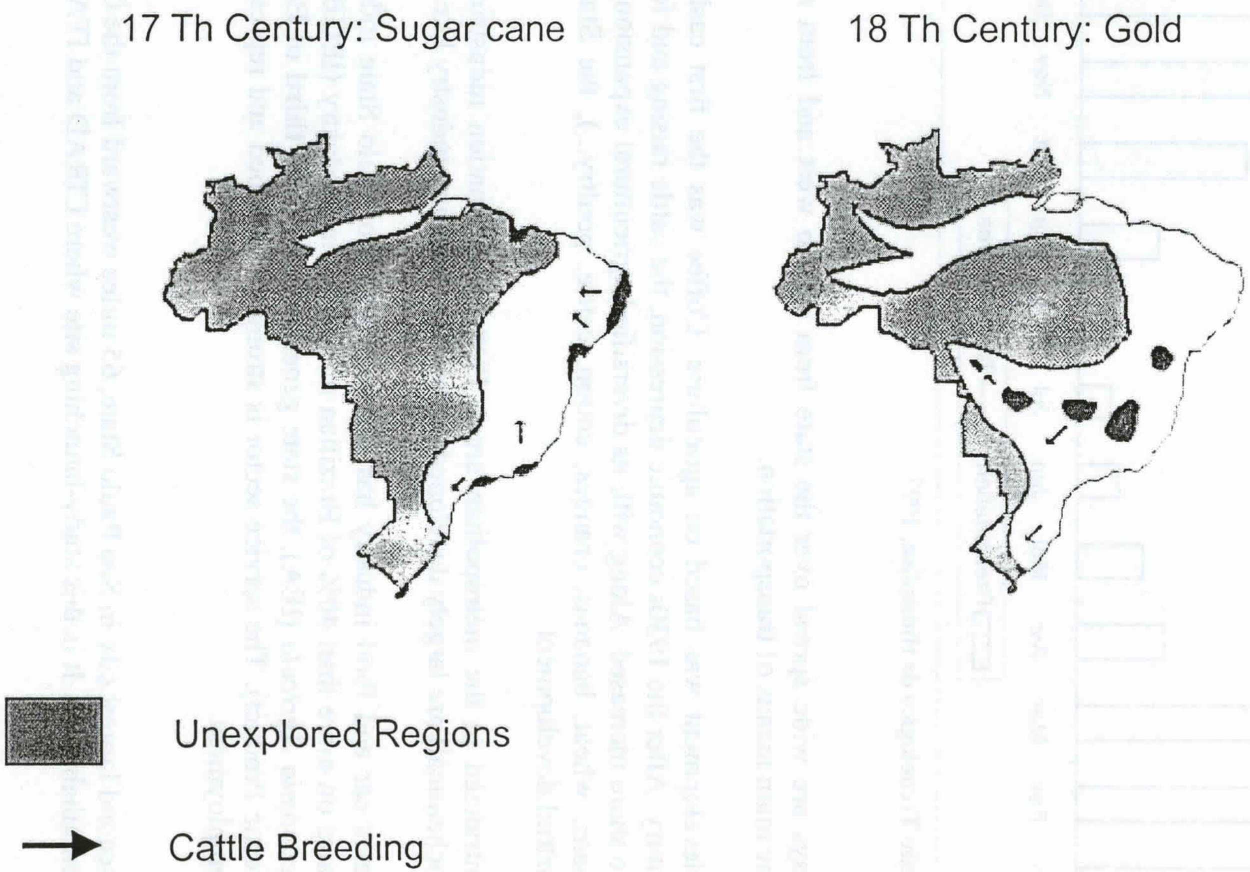
São Paulo State development was based on agriculture. Coffee was the first cash crop implemented during the 19^{th} century. After the 1930s economic depression, the cattle raising and food-producing crops agricultural surface share increased. Along with its diversified agricultural expansion (coffee, sugar cane, soybean, corn, beans, wheat, bananas, oranges, cotton, cattle, poultry...), the State went through an extraordinary industrial development.

Its industry is centralized in the metropolitan areas. First transformation industries (metallurgy, steel industry, and petrochemical) are largely developed as the manufacturing industry like textile.

For the last 30 years car and food industry has characterized São Paulo State industrial development. Today it concentrates on more than 40% of Brazilian manufacturing industry (IBGE-1997). Referring to the *Instituto de Economia Agricola* (IEA), the state generated in 1997,a **third** of Brazilian agribusiness GDP (Gross Domestic Product). The service sector is strongly developed and represents more than 65% of the state labor employment.

Campinas is the second largest city in Sao Paulo State, 65 miles westward from the Capital city. It counts more than 1 million inhabitants. It is this study-launching site where CIRAD and ITAL/CTC headquarters are settled.

Figure 7 : Brazilian territorial conquest



Source: Rural Density Atlas, 1988

2.2. Study background and targets.

2.2.1. A 300 years old industry in a mutated sector.

Cattle and meat production is an important item of Brazilian agricultural force. Brazil holds **world's second** place for **beef** and third place for **pork** production and has a very advanced **poultry** industry (7^{th}) (ID OBS, 2000).

At the beginning of the 90s market liberalization, and later the new currency settlement had a strong incidence on the food sector as a whole. Looking forward to gain competition on the food supply market, food industry went through morphological and structural mutation. The latter evolved through take-over and merging strategies. Industries became more competitive while others perished (FERRAZ *et al.*, 1999).

This last decade, food product offer increased in diversity, quality, and price. National and international distribution groups have opened new centers all over Brazil. The increasing presence (and competition) of these distribution channels eventually favored new products development to meet consumer's (new) requirements and evolving purchasing habits.

Within the Brazilian meat consumer basket, we find salted and dried products commonly named "*carne seca*" (dried meat). Within this portfolio we distinguish two major products, *Charque* the elder on the market and its younger cousin *Jerked Beef*[1].

A possible origin of the name *Charque* would be the Quíchua word "xarqui" which means "to dry meat". It is said that Inca civilization dried hunting fishing products by placing it in thin layers between two rocks to dehydrate. The technique was used on fish and lama meat in order to preserve the product from degradation when they supplied their empire advanced trading posts. Later on, salt was added to the process and the cuts dried on parallel rails. The first trace of the process in Brazil goes as far back as 1730 in the coastal city of Aracati in the Northern State of Ceará (PARDI, 1961- FAGUNDES, 1982).

Brazil's territorial conquest is due to the work of explorers and cattle breeders (Figure 7). To feed Brazilian territorial expansion meat was then probably preserved into *Charque*. History says that after a two-year draught (1777-1778) that killed most of the North Eastern cattle, José Pinto Martins, emigrated from the state of Ceará (North East) to the extreme south of Brazil, and settled in Pelotas (coastal city on the Uruguayan boarder) the first industrial processing unit for meat dehydration: called ***Charqueada***. At that time Rio Grande do Sul was the main Brazilian cattle breeding State. *Charque* has been produced on an industrial scale ever since 1780. Bovine meat could be transformed and preserved in large quantities. The first Brazilian meat industry was born (FAGUNDES, 1982).

The technique evolved during the 19^{th} century from a single dry salting operation to a combination of wet (brining) and dry salting process. The "*sistema platino*" technique was probably brought from Argentina by a French pioneer. Sun drying in the open air is still commonly practiced today (FAGUNDES, 1982).

During the XIX Th. century *Charque* turned out to be an important trading merchandize. It was shipped from Rio Grande do Sul to the northern ports of Rio de Janeiro, Salvador, Recife and Belém. Once dried, meat was a protein rich daily consumption product (FAGUNDES, 1982).

By the end of the fifties the southern State of Rio Grande do Sul lost his leadership in producing *Charque* in favor of Central and South Eastern Brazil, where the number of *charqueadas* increased, when these

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[1] In this document *Charque* and *Jerked Beef* written in italic refers to two different products. When talking about product family we use the following terms: salted and dried meat, desiccated meat products and dehydrated meat products.

regions became the main national cattle producers. Up to now São Paulo State has concentrated and still does most of the *Charqueadas* (PICCHI V. in *Revista Nacional da Carne*, 1998).

During the 60s São Paulo and Rio de Janeiro factories marketed a close product of the original *Charque,* which was legally referenced in 1978 as *Jerked Beef*[2]. The late history of this product is related to producer's economical aim to gain productivity in shortening the process duration (15 to 18 days traditionally), accelerating the capital turnover by reducing the product water loss (Charque half cured, "*Charque meia cura*"). In the beginning the product faced quality problems. The classical dark wine color turned to ash gray because of the oxidative power of salt at higher water content. Higher humidity rates also helped the bacterial development (vermelhao), and thereby, shortened product shelve life (PICCHI, 1998; SHIMOKOMAKI, *et al.*, 1987). The use of curing salts[3] and vacuum packaging happened to be proper technological ways out for both color and microbiological preservation. They have been gradually used (and still are used) in industrial production.

Table 2: Key dates of the Brazilian dehydrated meat industrialization.

Dates	***Events***
1730	First traces of charqueada in Aracati, North of Brazil.
1777-1778	Draught killed most of the North Eastern cattle.
1780	First Charqueada in Rio Grande do Sul in the city of Pelotas settled by José Pinto Martins. Pelotas became the larger processed meat-producing region and started exporting in other Brazilian States.
1786-1787	"Saladeiro", first Uruguayan charqueada.
1810	First curing meat industry in Argentina.
1800-1850	Wet salting was added to the process before dry salting. J.B Roux, supposedly French pioneer coming from Montevideo, introduced in Pelotas, the technique named "Sistema Platino" (Fagundes, 1982)
1960-1970	Charque " Meia Cura" (half cured). Curing salts were added to brine in order to prevent the product from degradation owing to higher water content. São Paulo concentrates most producers.
1978	The Ministry of agriculture and health legally references *Jerked Beef.*
1988	Law specifies Jerked Beef and Charque processing conditions.

Both products are today targeting consumption in most traditional dishes (feijoada and arroz carreiteiro for example). However, *Jerked Beef* is said to be more appreciated in the South Eastern regions, principally in São Paulo and Rio de Janeiro metropolitan areas. On the other hand the genuine product, *Charque*, seems to remain more popular in the north and North Eastern areas of Brazil.

Brazilian dehydrated meat production is often considered as a residual meat industry, probably working under marginal conditions, producing random quality products. In fact the manufacturing process has hardly evolved since they were produced on a large scale (PAVIA, 1997). The existence of official hard data on the sector is significantly lacking in quantity and quality. For example, national consumption according to sources could vary from 140 000 tons to 600 000 tons a year, the latter representing 11% of the Brazilian meat production (FAYRDIN, 1998 and ANNUALPEC 1999).

Preserving meat with salting, drying or smoking techniques is found worldwide. To name few, made out of beef cuts, we find South Africa's *Biltong*, Niger's *Kilishi*, Turkey's *Pastrima*, South America's

[2] *Jerked Beef* and *Charque* written in Italics refer to the two products. The terms dehydrated meat, desiccated meat, salted and dried meat refers to product family.

[3] Curing salts use was probably at first site an accident than a proper technological evolution. Producers noted than Saltpeter (nitric potassium), common salt impurity, presence gave to the final product a more attractive coloration (PICCHI, 1998).

Tassajo, Indonesia's *Sambal Daging*, Australian and American *Jerked Beef*, Switzerland *Viande des Grisons*, etc[4]. In many regions, and especially in the less developed areas, meat desiccation remains the only alternative for populations to preserve animal products. Salting and drying is still today a traditional, often homemade way of preserving meat in Brazilian rural areas (COLLIGNAN,1992). It is principally made of beef but pork and goat meat may also be used. Dehydrated products are either named *carne de sol, carne de vento* referring to a technique, *carne seca* referring to final product properties[5], *and carne* of *Sertão,* of *Ceará,* referring to North Eastern States, where from the technique emerged.

Today, São Paulo dehydrated beef sector is said to face a **crisis**. It seems that in 1999 the products (*Charque* and *Jerked Beef*) national demand has been stagnant; or has even been declining (along with already small volume exports) and that several processing plants have closed down...Its also said that the industry's technologies are outdated, producing sub-optimal and fluctuating product quality. We advance three hypothesis to explain these observations:

➪Are product specifics (price, quality, presentation...) still adapted to final consumer's (evolving) requirements?

➪ Is the sector sufficiently organized to meet the changes in its economical, political and sociological environment efficiently?

➪Has the sector crisis anything to do with technological issues? Maybe the current process and technology aren't adapted to produce dehydrated meat at a competitive price?

2.2.2. Study target.

The sector has already showed its adaptation ability, by developing and diffusing a new product (from *Charque* to *Jerked Beef*). Moreover today several opportunities (technological, organizational, political...) exist for a more competitive and efficient development of the sector, benefiting both consumers and processors. We also believe, looking at the Brazilian dehydrated meat history and nation's ethnical, climatic, regional and economic heterogeneity that consumption and production of dehydrated meat must be culturally and economically important enough to justify leading a study on this sector. Hence, the study primary goal will be to:

Characterize São Paulo *Jerked Beef* and *Charque* sector and identify its present limitations and opportunities for its development.

Given the absence of earlier relevant studies of the Brazilian dehydrated meat sector and appropriate secondary explicative data, and given the significant time (6 months), financial (2500 US$ operational budget) and human resources constraints, we built an alternative methodology for carrying out our study on São Paulo *Charque* and *Jerked Beef* agri-food sector.

[4] Australia and United States are the major exporters (FAO) of these types of products. In Europe these products are consumed as festive dishes. The main exporters are in 1999, the Netherlands and Switzerland.
[5] "*Seca*" means dry, *Sertão* is a dry and poor rural area covering a part of the North Eastern states of Céara and Piaui.

PART 2: An alternative methodology for agri-food sector analysis.

The following sections review the principal conventional approaches for agri-food sector analysis, and through the comparison of these, argue the need for a more flexible and faster approach. The principles and key operational elements of the proposed Rapid Agri-Sector Analysis model – RASA-, are discussed, and followed by its application to São Paulo dehydrated meat sector.

The principal methodological references on agri-food sector analysis in the literature will be divided into 3 groups:

1. Fundamental theories.

2. Agro-sector analysis approaches mostly used for primary (commodity) product sectors.

3. Applied methods used in the international development context (including those sectors comprising small & micro enterprises).

1. Methodological References

1.1. Fundamental theories.

Bain (1959) introduced one of the earlier schools of thought of the **Industrial Organization (IO) Paradigm**. The **Structure-Conduct-Performance (S.C.P)** methodology was developed for the economic analysis of markets. The principle on which the method is based is that the structure of an economy influences the conduct of its economic agents and that both determine the performance of the economy.

While in theory this approach was well received, criticism soon built up regarding the significant difficulties of its application to the industry caused by non-availability (secrecy of data, industries "black box") of indispensable data sets. Nonetheless, various methodological elements of the approach survived, through adoption and/or adaptation by other authors.

Williamson (1985, 1993) criticized the SCP approach (among others), who in time further developed the fundamental work by Coase (1937) on the Organization Theory (Industrial Organization, 1990), into the well-known Transaction Costs Economics (TCE). Zylbersztajn & Farina (1998) wrote a clear treatise on the evolution of this theory. In the last section of this chapter the principal elements of the TCE are introduced.

1.2. Agro-sector analysis applied on commodity products:

In the US, Goldberg and Davis (1957) and Goldberg (1968) can be credited with the transformation of the IO theory of traditional agricultural economics, towards a specific agricultural industry or **agribusiness focused approach**.

"An Agribusiness (Commodity) System (ACS) encompasses all the participants involved in the production, processing, and marketing of a single farm product. Such a system includes farm supply, farmers, storage operations, and processors, wholesalers and retailers involved in a commodity flow from initial inputs to the final consumer. It also includes all the institutions, which affect and coordinate

the successive stages of a commodity flow such as the government, future-markets, and trade associations" (Goldberg, 1968).

While still couched in SCP terms, Goldberg introduced the concept of Commodity Systems Approach, which, among others, worked with an input-output matrix and introduced some coordination elements. This became the so-called Harvard School approach.

Although maybe not at the same level as the previous authors, but still generating a substantial following, regards the French school of *"filière"* (LAURET, 1978; LABONNE, 1985). This school uses a similar Commodity Systems approach with particular emphasis on technological, managerial and distribution functions.

In Holland, somewhat later, another school emerged, emphasizing the management concept of the agri-system, with very interesting applications on the Dutch dairy sector. Several useful references can be found in Trienekens & Zuurbier (1996).

In Brazil, agro-industrial sector analyses have been mainly focusing on two basic aspects: **competitivity** and **demand prospecting**. Zylbersztajn (1995), following the same lines of thought as Williamson (1993), considers the Economics of Transaction Costs (ETC), or the New Institutional Economics (NIE), as the analytical basis for studies on **organizational forms of production, searching to link typical attributes of transaction with organizational forms that are more efficient in terms of transaction and production costs**. The same author argues that the ECT approach can be used as an important theoretical support for analyses of agribusiness systems. For this, it should be considered that transactions take place, between all agents involved in the systems from the input industry to the final consumer.

With respect to competitiveness, Farina & Zilbersztajn (1993) divide this aspect in two main groups:

<u>Productivity/technology</u>: with relations to production costs, productivity differences and logistical factors (quantifiable and measurable components).

<u>Coordination</u>: the capacity to receive, process, diffuse and utilize information, in such a way as to define and implement competitive strategies (product and process innovation, differentiation, segmentation, etc.), control implementation, and the ability to react to changes of the environmental conditions (qualitative variables that are not always measurable). In this second group, the capacity for coordination (governance structure), determines the success of companies, which also depends on institutional, organizational and technological conditions (FARINA *et al.*, 1997).

A recent application of their approach, analyzing the **competitiveness** of Brazil's rice sector (FARINA & ZYLBERSZTAJN, 1998), shows an interesting (and useful) combination of different tools and approaches, including SWOT (Strengths-Weaknesses-Opportunities-Threats) analysis, coordination and transaction cost analysis, whereby the agro-industrial system is divided in three domains (environments): institutional, organizational and technical. A further application of the former author's work with some additional innovations is by Vilpoux (1998) on the sour cassava starch sector in southern Brazil.

Regarding the National System for Agricultural Research, several sector analyses and assessments of production systems, natural systems and knowledge channels in the agribusiness context, have been conducted. In general, these studies have had a prospective aim, system focus and segmented markets, creating conditions for establishing links between the R&D supply and demand. The commonly used method has consisted of:

Diagnostic analysis, with the objective of identifying the principal limitations of its components, and the needs for knowledge and technologies (current demands), that could reduce the impact of those limitations, and improve quality, production efficiency and equity along the channel;

Prognostic analysis using the Delphi method, which consists of the application of iterative questionnaires until a consensus within its audience of specialists, has been reached (CASTRO *et al.*, 1995).

Prospecting studies for production channels are important regarding the directing of agriculture research, technical assistance and other government interventions targeting agribusiness. This technique has also been applied to various public institutes, like Embrapa, Sebrae, Petrobras and institutes under São Paulo's Secretary of Agriculture. A concrete recent application of this approach can be read in De Mello De Mello BLISKA et al. (1998). In addition, there is the more regional application by Ghezan et al. (1999).

1.3. Applied methods used in an international agricultural development context

Within this group of applied methods, a large variety of examples can be identified. Private consultant firms, international and national R&D institutes, universities and government finance and development agencies have developed the majority of these. Mostly are characterized by an empirical (non-academic) approach, using mixtures of formal and informal tools (questionnaires, key informant interviews, checklists, focus groups, etc.). Several of these clearly include adapted Rapid Rural Appraisal tools and elements. A sample of these are:

Kleih et al. (1994) of NRI, UK, analyzing post-harvest needs in Uganda, state that their methodological framework is based on ".... Informal survey techniques such as Participatory Rural Appraisal and Rapid Market Assessment..." (p.5). These techniques were applied at each level of the sector. While quite simple and straightforward, the study concludes with a set of concrete recommendations. The work took 9 months time.

Henry and Howeler (1996) of CIAT, Colombia undertook a similar study in Southern China, characterizing and identifying principal needs & opportunities of the cassava sub-sector. The methodological framework was similarly couched on RRA and rapid market assessment, generating a useful characterization, and a prioritized list of needs & opportunities by region. The total activities took +/- 2 months at an operational cost of US$ 8-10,000.

An "*Etude des filières de manioc et fonio*" in Guinea, evaluated by Mendez de Villar (1999) of CIRAD, France, is based on the *filière* approach, executed by applying formal structured questionnaires at all levels of the sector, with calculated sample sizes for optimal representitiveness. This "traditional" approach generates quite isolated (by level) input-output type detailed information. Little information on organizational structures and institutional environments was generated. The study was highly labor/time intensive.

A GEMINI project approach to a sector needs assessment (and action plan) written up by Lusby (1995) of Development Alternatives Inc. (US), proposes the "sub-sector/trade group (SS/TG) approach", which includes a sector analysis. The latter is conducted, using specific GEMINI techniques, consisting of assessing sets of key variables. Furthermore they work with Intervention Matrices, making the link between sector analysis and program implementation. While very strong on client relations and participation (hands-on), and very output oriented, there may be some aspects lacking regarding the organizational environment.

An approach, that seems to get very close to our desired objective, was developed by SEBRAE (1997), assisted by a team of UFV, Viçosa-MG. The method and its application to the dairy sector of Minas Gerais, seems highly applied, well structured, hands-on and based on SCP principles. However, one would like to see this method to be more rapid (unlike the +/- 1 year needed) and more participatory regarding the sector's agents.

2. An applied set of tools: Rapid Agri-Sector Analysis, RASA

In the foregoing section, a sample of the leading sector analysis approaches and some additional applications were reviewed. A rich variety of models, methods and elements resulted. It seems useful to analyze some of the more applied approaches discussed in 2 and 3 by comparing key elements, including robustness of theoretical framework, objectives, data needs and levels of client participation and estimated cost level.

Although, somewhat simplistically, table 3 attempts to show key characteristics of these approaches without judging their values. Some approaches are well founded on economic theory, while others are hardly mentioning this. Some approaches rely heavily on secondary data analysis, while others are principally targeting primary data collection and analysis (with different levels of formality and structure). Some are highly client participatory; others are desk-type studies, etc. In addition, table 1, identifies 2 basic sets of objectives:

- Competitive Analysis
- Needs assessment and technology demand analysis

__Table 3__ Qualitative comparison of key factors from selected approaches within groups' (2) and (3).

Type of analytical approach used	Economic Theory Basis	Type of objective	Secondary data analysis	Participat. + primary data needs	Rapid	Resource needs
Farina & Zylbersztajn, 1998	***	Competit.	***	*	*	**
SEBRAE-MG, 1997	**	Competit.	**	**	*	***
Castro et al., 1996 De Mello BLISKA et al., 1998	**	Technology demand	**	**	*	**
Kleih et al., 1995 Henry & Howeler, 1996	*	Needs Assessment	*	***	**	*
Mendez de Villar, 1999 Fabre , 1996	*	Needs Assessment	*	***	*	***
GEMINI approach (Lusby, 1995)	*	Needs Assessment	**	***	**	**

Note: *** high; ** medium; * low

Other objectives obviously do exist, but for the purpose of our study, we limit the discussion to the aforementioned two sets.

We believe that independent of the two aforementioned main objectives, the economic theory framework and "most" of the generic principles of our desired approach, should remain the same. The specific objective influences at most; the level of detail for key variable.

One characteristic, which deserves further attention, is the level of sector's stakeholder/client participation. In the reviewed approaches there seems to exist a wide range of participatory intensity, from the full participatory approaches (GEMINI, HENRY & HOWELER, KLEIH...) to lesser participatory levels (FARINA & ZYLBERSZTAJN...). The former can be considered as bottom-up, while the latter are more top-down approaches. The level of participation in agri-food sector analysis may have repercussions on the level of **co-ownership** of the study's results by the sector's clients, and subsequent adoption of the recommendations, etc. The level of client participation is heavily linked to RRA principles, as pioneered by Chambers (1995) and practiced by great many followers. In Table 1, the approaches used by Kleih et al., Henry & Howeler, and GEMINI, rely heavily on RRA principles.

Especially in the less developed countries and/or targeting agriculture sub-sectors for which hardly any earlier work has been conducted nor secondary data exists, facing a major time limit and having access to very limited resources, "academically sound models requiring luxury data sets and highly specialized teams" may not be an option. In the aforementioned countries, certain national data sets will exists. However, the reliability, completeness and date of these data often are quite questionable (HENRY & GOTTRET, 1998; HENRY, 1996; HANAK-FREUD & FREUD, 1993). An additional, not often mentioned but real nonetheless, constraint that oftentimes is encountered, especially in less developed countries, is the occurrence of **(semi) legal circuits** within sector systems. Almost by their definition, no official public data exists on this. Not taking this into account (in the case of desk studies) may imply distorted results.

Hence, given the aforementioned, and given our objective of developing a "coat rack" approach, called RASA, we argue that:

- Too often, rigid models need "luxury" data sets, that in real life are difficult (costly) to generate.
- A single all-encompassing model is not and should not be most appropriate, given different objectives and varying levels of resources and timeliness,
- It seems necessary to have a similar set of basic and sound underlying socio-economic principals for the different models,
- That the model should benefit from a theoretical economic analytical framework, but implemented following the principles of RRA,
- That given the reigning conditions, the optimal choice of the selected model (or the minimally necessary elements) can be generated as through multiple objective linear programming, like:

<u>Maximize</u>: *Quantity & quality of results (pertinence of their explanatory power)*

<u>Subject to</u>:
- resources constraint
- Time constraint
- Set of multiple specific objectives (expected outputs)
- Available relevant secondary data and earlier analyses

The outcome will be an optimal set of (minimally necessary) methodological elements.

If this seems acceptable, the next step would be to lie out a set of sound socio-economic underpinnings, integrated with additional more executives or operational (RRA) principals that should shape our RASA approach. The following set is being proposed:

- The target research area encompasses the **whole channel**, from input supply to final product consumption.
- Analyzing the key factors of the **institutional, organizational, technical and competitive environments** of the sector system, using analytical elements of SCP, TCE, SWOT...
- Specific (detailed) objective/outputs oriented,
- **Client oriented**, whereby the clients are the full set of principal actors of each level of the sector.
- Execution of the analysis by a **multi-disciplinary research team**.
- Primary data collection from **key informants** through interviews with **checklists**, complements existing pertinent secondary information.
- Rather than attempting to quantify information (mostly non-representative), the approach seeks **explanatory information** (why's?).
- Integrating results from the two major sources: (a) **client opinion**; and (b) **expert opinion** (primary & secondary information).
- **Validation** of information/results, **prioritization & consensus seeking** with stakeholders through meetings, group discussions and/or workshops (+ feedback component)

Optional (depending on the study's objectives and expected products):

- Workshop(s) with all stakeholders to **present, discuss and pre-select the technology / organizational offer** (or opportunities) vis-à-vis the sector's "needs and/or limitations".

One of the crucial issues that arise regards the extent and robustness of the economic theoretical underpinnings of the approach. While the theoretical framework needs to be sufficiently sound to force the analysis to focus on the appropriate environments, domains, inter-relationships (and their subsequent explanatory variables) of the sector; however, at the same time, this theoretical conditioning should not "overly" constrain the approach, by negatively effecting its rapid, applied, participatory and cost-effective character. It may be necessary to apply the already identified set of leading principals to additional case studies, and through an ex-post evaluation of their results, vis-à-vis their ex-ante rigidity of economic theory imposition, arrive at the minimally required level of economic theory.

The following sections lay out the various RASA activities applied to our case study and a presentation of two analytical models the study partly relied on.

3. The different steps of *RASA* applied to Sao Paulo *Charque* and *Jerked Beef* sector.

In the section below the different steps of the RASA activities applied to São Paulo *Charque* and *Jerked Beef* sector are proposed. After that the analytical elements (tools) that are used (ex post) to analyze the sector are presented.

3.1. The different operational steps:

1 **Organization** of the R&D team: ITAL-CTC, CIRAD and CNEARC.

Two researchers in each of the fields of socio-economy and food processing technology participated to this study. After organizing the team we decided to study Sao Paulo *Charque* and *Jerked Beef* sector, from raw material supply to final product consumption. **Both products** were considered simultaneously because they appeared hard to study separately, as they are very close products, commonly know as "*carne seca*".

The objective was to identify the sector's main limitations and opportunities, in order to prospect future sector needs, particularly in technological improvements.

In this study a complete and better understanding of the sector is needed, whereby the **emphasis will be placed on the cluster formed by processors** for two reasons: First the study partners are looking forward in developing their linkage with processors, on **production** and **technological** aspects. Second it is obvious that processors, comprised between raw material supply and product distribution are in a strategic (privileged) position for sector comprehension (because of backward and forward linkages and information flows).

2 **Inventory** of all existing secondary information on the dry meat sector and pre-diagnostic sector overview

We made an inventory of all existing information on producers, technologies, markets, products, channels, policies, organizations and institutional partners. This was done through literature review (magazines, technological handbooks...), databases consulting. Then we made a pre-diagnostic sector overview complementing this information with key informants during a seminar on cured and dried meat products ("*Seminario sobre Produtos Carneos Secos e Curados" (ITAL-CTC*, Campinas 25/05/1999).

⇒ The result was the development of the *info gap* matrix (annex 1). In the form of a table filled with the collected information (qualitative and quantitative, sources). By visualizing the gaps we can identify the missing information that needs to be collected and/or clarified/improved.

3 Next step consisted in **selecting key stakeholders** (producers, distributors...) along the chain to be investigated for primary data collection.

4 Developments of **interview checklists** according to the nature of information required for the study.

⇒ Meeting with R&D team (CTC, CIRAD and CNEARC) to validate the methodology and tools for primary data collection (Annex 2 to 5). The checklists were then tested with an industry, and subsequent modifications were made.

5 **Contacting** and subsequent visits of urban sales points and traders.

6 Contacting and **subsequent visits** of the processors on site.

7 Complete **information collection** from additional key informants (processors, distributors and researchers) along the *filiere*.

⇒ Preliminary results' analysis and discussions with research team for feedback purposes.

8 **Clarification** of controversial and/or contradictory information (mostly by telephone).

9 **Workshop** with principal stakeholders to validate the results and prioritize their needs & opportunities for further development of the sector. Program and participant's list are presented in annex 6.

The team held a workshop, at CTC, on October 19th 1999. The objectives were:

- To present to principal sector stakeholders, the main preliminary results of the research, and to validate the correctness of this information.
- To prioritize the main sector's limitations & opportunities (solicited by stakeholder sub-group), that can serve as key themes for future action.
- To solicit concrete interest from stakeholders to participate in the formulation and implementation of a future action plan.
- (underlying overall objective is to increase co-ownership of sector stakeholders of the research – to better future participation…)

The methodology was:

- Assemble major stakeholders in a half/one day workshop
- Executive presentations of objectives & results
- Knowledgeable facilitator to manage discussions and generate optimal results from the group
- Hand-out of principal results as tangible feedback during the workshop
- Ex-post workshop feedback on major conclusions.

...and subsequent meetings with stakeholders for developing an action plan...(not being part of this thesis research, constituting Phase II for CIRAD, CTC and UNICAMP + industrialists).

In the following sections we present the theoretical backgrounds and tools we will use to analyze the results.

3.2. Introducing analytical elements of SCP, TCE and SWOT.

The main idea of this section is to present analytical frameworks that are used for characterizing the agribusiness system formed by the *Charque* and *Jerked Beef* sector.

We draw our inspiration from the Industrial Organization paradigm (Structure Conduct Performance) re-centered by the Transaction Cost Economics approach developed by Williamson O. applied to the agribusiness system analysis in question.

After presenting the main definitions and introducing the TCE approach we briefly present the Strengths Weaknesses Opportunities and Threats (SWOT) matrix used in industrial strategy, that is also used in our analysis for complementing information.

3.2.1. SCP definitions and TCE approach.

O Definitions of Structure Conduct Performance terms.

BAIN defines the term **Industry**, as a horizontal accumulation of firms, which offer **products with a close substitution** relationship in a common market. In our case the products to be considered are *Charque* and *Jerked Beef* and their manufacturers form the Industry.

Concerning the term **market structure**, BAIN explains: *"Market structure for practical purposes means those characteristics of the organization of a market that seem to exercise a strategic influence on the nature of competition and pricing within the market".* As most significant aspects (parameters) of the market structure he names:

1) The degree of concentration of suppliers.
2) The degree of buyer concentration (customers).
3) The degree of product differentiation.
4) The conditions of entry (threshold) to the market.

Concerning the term **market conduct**, BAIN refers to the patterns of behavior that enterprises follow in adapting or adjusting to the markets in which they sell or buy.

Finally concerning the term **performance** BAIN writes: *"Market performance refers to the composite of end results which firms in any market arrive at pursuing whatever lines of conduct they espouse end result in the dimensions of price, output, production and selling cost, product design, and so forth"* (HÔRMANN. D.M, 1993).

O Introduction to Transaction Cost Analysis:

To analyze the coordination of vertical production systems, like the dehydrated meat agribusiness system, and assess their efficiency we can rely on the Transaction Costs Economics approach developed by Oliver E. Williamson. This approach focuses on the transactions between the different clusters (sub sector) forming the agribusiness system. On the opposite page, figure 8; showing the simplified *Charque* and *Jerked Beef* system.

Transactions within the industrial system can be multiplied admitting that different stages of transformations exist and may be done by distinctive structures.

We divide our system in 4 segments:

1. **Raw material** supply system = cattle production & raw meat production (slaughterhouses)

2. Meat processors = ***Charque* and *Jerked Beef* producers** (presuming that they can be independent structures).

3. **Distribution** segment. Includes the Wholesale distribution (meat shops, regional wholesalers, central buying service) & retail distribution (supermarkets, hypermarkets, groceries), and restaurants.

The distribution segment is in strategic position in the system as it is placed between the producer and the consumer.

4. **Consumer** segment.

The agribusiness system, where transactions occur is embedded in an organizational and institutional environment, according to Zylbersztajn D. (1996) they are defined as:

The **Organizational environment**, evolve within institutions, reflecting the players strategy that create political, social, economic and educational bodies, bounded by rules and searching for opportunities.

Practically, organizations as private R&D institutes, banking body, syndicates, firms (...) form this environment.

The **Institutional environment** can be defined as the political, social and legal rules that establish the basis for production, exchange, and distribution, that is, the **rules of the game.**

For Williamson, the institutional environment (rules of the game) defines the (agribusiness) system **governance structure** where **transactions take place** between different clusters. Basically three forms of governance structures exist:

1. The **market mode,** where autonomous agents don't look forward establishing long-term specific contracts.

2. The **hierarchical mode** where two stages of production are united in a single firm. **Vertically** integrated systems have a high adaptability power. Production items being concentrated in a single firm. Firm internal organization is more alike to control the disturbances and changes in its institutional, technical and competitive environment.

3. The **hybrid mode** is a mix between the market mode and hierarchical mode of governance: Two different firms, with high production incentives, develop a **contractual relation** in order to guarantee (control) some aspects of their activity (supply, production, and distribution...)

Basic features of TCE hold that efficient governance structures are the result of the alignment of transaction cost attributes with governance structures, under given behavioral assumptions (ZYLBERSZTAJN, 1996).

The basic attributes of transactions are:

∃ **ASSET SPECIFICITY**: the number of characteristics attached to the product (traded asset). They can be of different kinds like physical (ex: specific quality of a product), a trademark (brand), temporal (ex: perishable product), geographical...

∃ **FREQUENCY** characterizes the transaction recurrence. How often does the transaction take place?

∃ **UNCERTAINTY** is the potential risk that the transaction doesn't occur as expected. Depending of the asset specificity, safeguards can be settled before (*ex ante*) the transaction takes place (*ex post*). [6]

⇒ *Theory holds that the appraisal of these key variables inscribes the most appropriate governance mode for firms to minimize transaction costs and maximize profits in a given institutional and organizational framework.*

The theoretical model proposed by Williamson (1991) shows the response of governance costs to changes in the level of asset specificity related to three different governance modes.

i) At **low levels** of asset specificity the **market mode** of governance is the one associated with the lowest governance cost.

ii) At **increasing level** of specificity the **hybrid mode** (a mix between market and hierarchical governance mode) is a good answer to economical environment disturbances restriction (*franchising, subcontracting...*).

iii) At **high level** of asset **specificity** the inability of markets to deal with adaptation becomes reflected in the rate of cost increase, the demand for more direct controls can only be supplied through internal organization or the **hierarchical mode**.

Asset specificity is a fundamental variable for characterizing the transactions and asses the governance modes chosen by firms. In order to use conclusions of the TCE approach it will be important evaluating the level of asset specificity at each transaction in the dehydrated agribusiness system.

It is conceivable that the asset specificity (number of qualitative characteristics attached to the product) varies with the technical characteristics of the exchanged product, when dealing with food products. We can consider two types of products: *commodities* and *differentiated* products. Both have particular characteristics, which commonly influence factories market conduct and strategy.

Table 4: Market structure characteristics of commodities and more specified products.

6 Oliver Williamson refers to the **bounded rationality** and the possible **opportunistic behavior** of the economic agents. The impossibility of building complete contracts is a result of the limited capacity of agents to anticipate all the possible outcomes r the future alternative status of complex systems. On the other hand, **asymmetric information** *ex ante*, can stimulate opportunistic actions, having unexpected prejudicial consequences on governance costs, *ex post*.

Characteristics	*Commodities*	*Specified products*
Price control	None	Major
Necessity of Standardizing	High	Low
Margin on the product	Low	High
Selling turnover	High	Low
Entry barriers	Small (scale diseconomies)	High (differentiation)
Firm marketing strategy	On prices	Product differentiation
Success factors commonly noticed	Scale diseconomies, process rationalization, logistics efficiency,	Brand specificity exploration, Market segment positioning, Quality seals specification, Regional, historical, custom exploration of the product...

Source: PENSA (LAZZARINI, S.G. 1997) in Zylbersztajn, 1998.

3.2.2 Second set of tools: Industrial strategy and management tools.

To be able to answer the question of limitations and opportunities and punctually propose development option for the sector and the industry, other tools, borrowed from management and industrial strategy can be used.

The strategic model developed by Andrews (1987) consists of identifying and analyzing industry firm's internal strengths and weaknesses, confronted to the opportunities and threats in its environment. The (SWOT) model can be applied to distinct characteristics of an industry (product, technology, and market). The combination of forces and opportunities of each item should allow the industry to visualize potential strategic options for the development of their activity.

Table 5: SWOT Matrix.

INTERNAL DIAGNOSIS Firms	EXTERNAL DIAGNOSIS Environment
STRENGHTS	OPPORTUNITIES
WEAKNESSES	THREATS

São Paulo state's *Charque & Jerked Beef* agribusiness system will be analyzed applying elements of the TCE analytical framework. We characterize the different clusters forming the system. We concentrate on the group formed by the ***Charque* and *Jerked Beef* producers**, as they are our point of **entry** for the sector's comprehension. We assess their production tools and their products. Following a classical presentation of the *filière*, from cattle production to the final consumer, we characterize the transactions and constraints actors encounter in the system. We analyze the agribusiness functioning and evaluate its efficiency and highlight its current evolution.

The **institutional** and **organizational** environments encompassing the system and their influence on the *filiere* will be treated simultaneously when their presence is noted.

CHAPTER 2: THE DIFFERENT SEGMENTS FORMING THE CHARQUE AND JERKED BEEF AGRIBUSINESS SYSTEM.

CHAPTER 2

THE DIFFERENT SEGMENTS FORMING THE CHARQUE AND JERKED BEEF AGRIBUSINESS SYSTEM.

PART 1: Cattle and Meat production.

Information collected on Brazilian cattle and meat production comes from secondary data. In this chapter we characterize the actors producing raw material for *Charque* and *Jerked Beef*: cattle production sub-sector and the slaughter industry sub-sector.

Brazil is world's second largest beef producer. Its slaughtering industry is well developed. Internal market swallows 95,5% of its production. Next table gives an idea of the Brazilian livestock balance in 1998.

Table 6: Brazilian Livestock Balance Sheet.

Item	1998
Cattle	
Million of heads	150,3
Calf production in Million of heads	32,2
Breed	85% of «Zebu».
% of intensive breeding	3,8% (concentrated in the South)
Production/ Slaughter	
MM of heads	30,9
MM Tons of meat (MM T Equiv.Carc.)	6,422
Cows	41%
Slaughter rate	20,6%
Consumption	
Quantity (MM Ton Equiv.Carc.)	6,131
Per Capita (kg/Ina/year)	38
Brazilian population MM Inhabit.	161,2
% of production	95,5%

Source: FNP Consulting in ANUALPEC 1999.

1. Cattle Production

Over 75% of cattle is raised for meat production, 20% for diary and 5% for dual purpose. Brazil counts more than 1 790 300 establishments dealing with cattle breeding. The activity occupies 221 982 144 hectares . Cattle breeding activity counts for more than 3,4 % of Brazilian GDP, near 14,2 U$ billions. Over 80 % cattle breeders have another activity in São Paulo State (BLISKA, 1998).

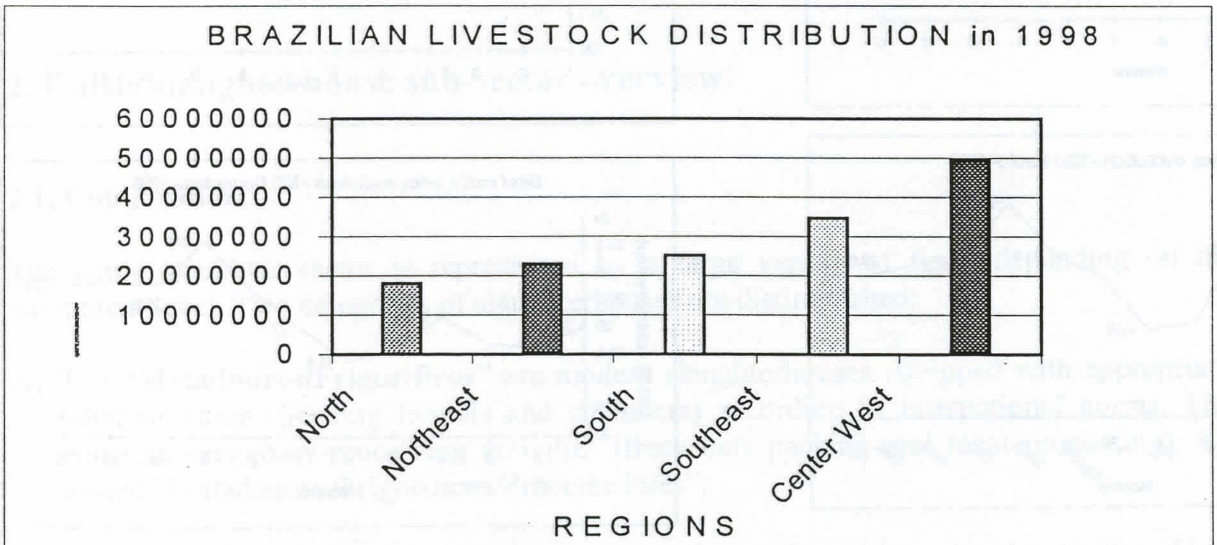
- Production location

Over 50% of Brazilian cattle production is concentrated in the South Eastern States of São Paulo (SP) and Minas Gerais (MG) (principally dairy) and the central-western States of Mato Grosso, Mato Grosso do Sul and Goias (GO).

- Breeds

In the southern region European breeds predominate (Hereford, Angus, Devon, Aberdeen Angus, Ibagé and others). In other regions Zebu cattle prevail, mainly the Nelore breed (WEDEKIN & PINAZZA, 1990 *in* BLISKA, 1998).

Figure 9: Livestock regional distribution in 1998.

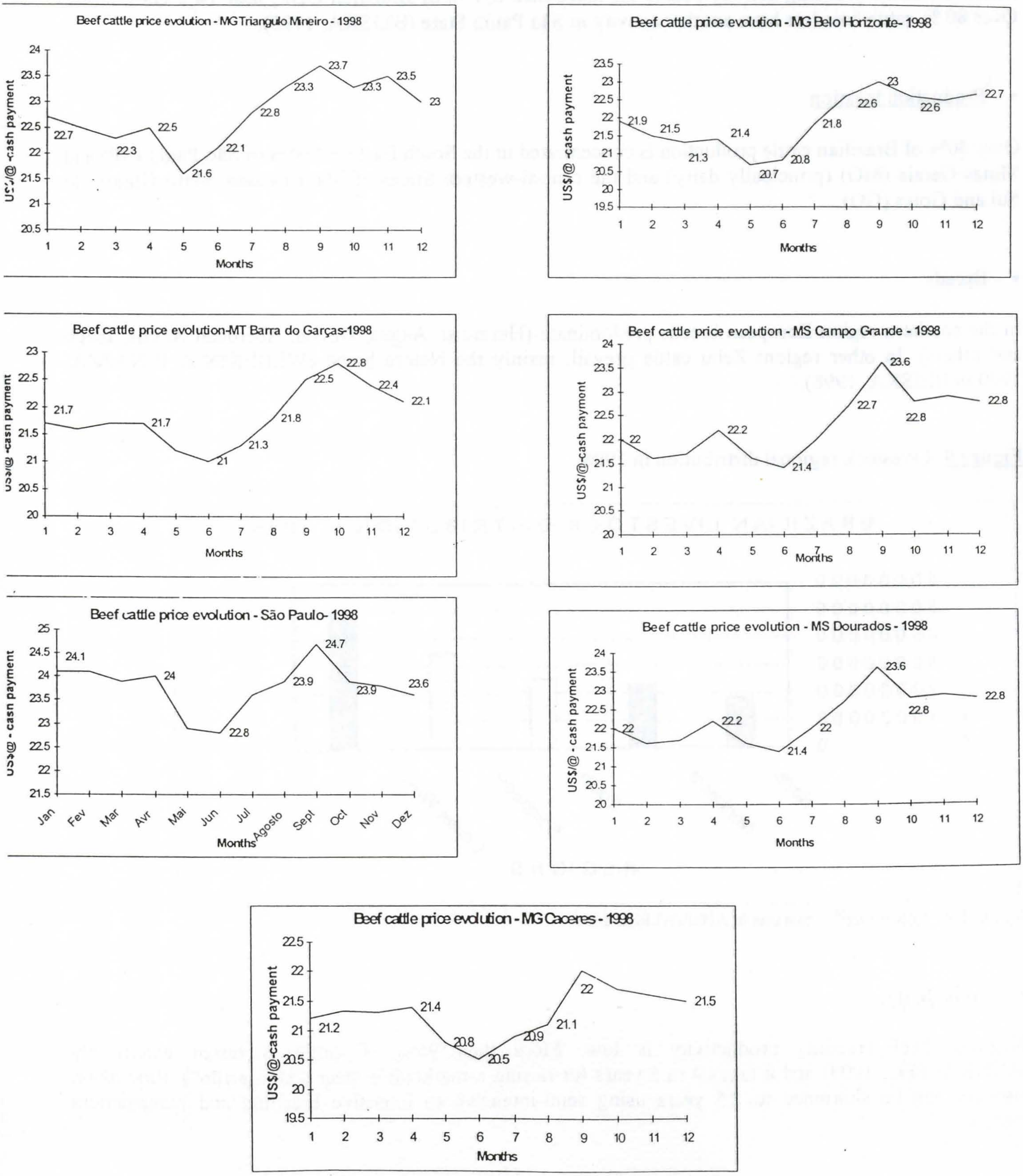


Source: FNP Consulting Estimations in ANNUALPEC 1999.

- Productivity.

Brazilian beef breeding productivity is low. More than 95% of cattle is raised extensively (ANNUALPEC, 1999) and it takes 4 to 5 years for raising a marketable steer ("Boi gordo"). Production turnover can be shortened to 2,5 years using semi-intensive to intensive breeding and management practices.

Figure 10: BEEF CATTLE PRICE annual fluctuation in 1998 (ANNUALPEC 1999).



- <u>Sanitary aspects</u>.

Brazilian cattle suffers from various endemic diseases like foot and mouth disease, cistisercosis, tuberculosis, brucelosis and rage... Control of endemic diseases that severely affects cattle in some areas is improved constantly. However its systematic implementation is hard to master looking at the geographical extension of the activity. Eighty percent of cattle condemnations in São Paulo State are due to cisticercosis and tuberculosis infections (DE MELLO BLISKA, 1998).

- <u>Annual production fluctuation</u>

Brazilian annual beef market offer is connected to seasonal parameters. In fact grass availability in quality and quantity (*safra* and *intrasafra* dichotomy) regulates the cattle supply cycle. (WILKINSON, 1993). Indeed, approaching the dry season cattle producers market a maximum of heads, which makes the price per Aroba (@=30 kg) drop gradually between January and July. From July-August to October-November (depending of the regions) prices climb because cattle supply is limited, time for animals to gain weight (Figure 10).

- <u>Producers organizations</u>

Finally, cattle producers are organized in various **syndicates**. To name three we have *Associação Brasileira dos Criadores (ABC); Associação Brasileira de Criadores de Zebu (ABCZ); Sindicato Nacional de Pecuaristas (SINDIPEC).*

2. Cattle slaughterhouse sub-sector overview.

2.1. Composition.

The cattle slaughter sector is represented by a large variety of firms depending on their size and equipment level. Two categories of slaughterhouses are distinguished:

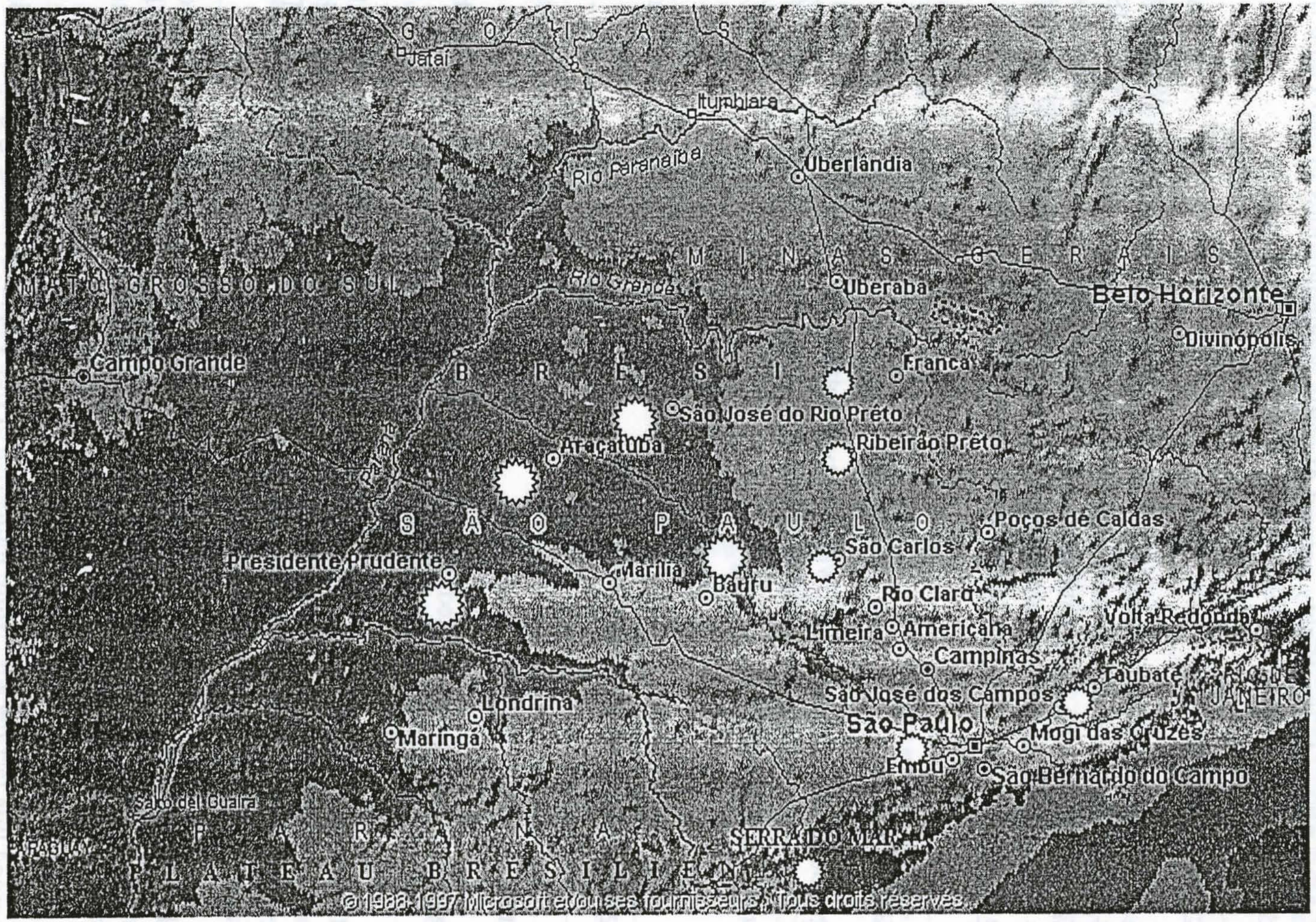
A) The **"Matadouros/Frigorificos"** are modern slaughterhouses equipped with appropriate technology (abattoir chain, freezing tunnels and chambers) according to international norms. They also may integrate secondary-processing activities (fresh cuts packing and meat processing). They are then named "Matadouros /Frigorificos/Processadores".

A 1996 study showed that São Paulo State counted over 50 modern slaughterhouses. The slaughtering capacity is around 22.300 heads/day or 582.500 heads/month or 7MM heads/year. The SP (Sao Paulo) slaughtering industry represents over 30% of the South Eastern and central western total slaughter activity.

A new trend emerged this last decade. More industries of São Paulo are moving closer to the major cattle breeding states. This slaughterhouse de-localization was favored with credit facilities for technological investments at the Real plan launching (*Revista Nacional da Carne*, 1998), but also by States financial incentives to attract new industries.

B) **"Matadouros"** is the second kind of slaughterhouse. They process at a small scale and have no freezing facilities. They supply the neighbor retail markets in cooled half carcasses (hindquarter and forequarter), or cuts «*in natura*». They are submitted to neither veterinarian nor fiscal control (DE

Figure 11:São Paulo Meat Slaughtering concentration



Meat production concentration

Source: BLISKA et al,1998

MELLO BLISKA, 1998). They are diffused all over São Paulo State (around 400[7]). They are municipal and private slaughterhouses. Very little information is available on this actor. Clandestine slaughter is of importance and often helps compensate for the inefficiency of some slaughterhouses (PEETZ *et al*, 1996 in DE MELLO BLISKA *et al*, 1998).[8]

The slaughtering industry is concentrated in the major cattle breeding States. Map on the opposite page can give an idea of the slaughtering concentration in São Paulo State.

Basically, they process cattle into half-carcasses divided in forequarter and hindquarter (primary cuts). The Pistol is obtained removing Flank and Plate from the Hindquarter. Next table illustrates in detail products of slaughtering (in Brazil).

<u>Table 7</u>: Products of slaughtering.

	Beef cattle (Boi gordo)	*100%*	*468 kg*
	Looses before slaughter.	21%	98,28 kg
Meat	***Half carcass (2x)***	54,5%	255,06 kg
	Hindquarter	*47%*	60 kg
	Forequarter	*37%*	47,50 kg
	Flank and Plate	*13,7%*	17,5 kg
	Industrial meat	1.6%	7,51 kg
Sub products	***Glands***	2,8%	13,10kg
	Bones and sebum	6,20 %	29 kg
	Diverse	13,9%	65,05 kg (leather 33 kg)

<u>Source:</u> De Mello De Mello BLISKA, 1998.

Average weight of a steer is 468 kg (15,6@). The animal looses 10% of its weight before slaughtering (7% during transport + 3% in the waiting enclosure), and 11% after slaughter (mainly blood).

In Brazil cattle meat is mostly intending consumption *in natura* (85%). The residual 15% are industrialized (DE MELLO BLISKA, 1998).

Brazilian leather is of low quality. On a quality scale of 1 (best) to 7, 50 % of Brazilian product ranks 5. This is explained by the lack of care to cattle in the field and during transport and subsequent slaughter and skinning (DE MELLO BISKA, 1998).

---

[7] Number communicated by the former president of SINDicato INDustria FRIgOrifica de São Paulo.

[8] Clandestine and informal slaughtering is mentioned in various studies dealing with the meat industry, which argue that taxes (ICMS, Imposto sobre a Circulação das Mercadorias e Serviços, corresponds to the Value Added Tax) increase is the main stimulator for these practices. During the eighties undeclared slaughter was estimated at 40% of the total meat offer (Wilkinson, 1993).

2.2. Slaughterhouse industry opportunities and current limitations.

2.2.1. A specified market.

Supermarket and *fast food* chains development in the eighties and in the nineties offered a new market opportunity for slaughterhouses. Slaughterhouses started complementing their activity with precut meat packaging and developing various standardized processed products.

The *Associação Brasileira da Industria Frigorifica* affiliates' boned meat sales increased by 60 % between 1997 and 1998 (ABIF, *Termometro dos Frigorificos*, 1998-1999, 1999). The relationship (contractual integration) between meat producers and the distribution industry and *fast food* restoration requirements likely has positive repercussions on the profession in terms of production efficiency and final product quality control; both attributable to process management improvement.

Recent laws, Portaria 304 and 145 voted in august 1996, also favored boneless meat production. The first law was tested in the metropolitan towns of São Paulo, Curitiba and Rio Grande do Sul. One aim is to simplify meat flow requiring boneless meat in the large urban centers. The second was implemented to have a better quality control on meat flow between states. Application of these laws have had positive impacts on transport cost (space savings in the trucks was estimated at 30%) and cold chain control (*Revista Nacional da Carne*, no 243, pp. 6-10,1997).

2.2.2. An over sized industry in debt.

In São Paulo the slaughterhouse sector is weakened by an average 60% over capacity (PEETZ *et al*, 1996 in DE MELLO BLISKA *et al*, 1998). It was more recently illustrated in a survey made by a slaughterhouse trade union (ABIF). The latter showed that between January and November 1998, 40 % of the industries worked at less than 70 % of their installed capacity (ABIF, *Termometro dos Frigorificos*, 1998-1999, 1999). One explanation for this over capacity is the uncontrolled multiplication of oversized slaughterhouses during the eighties and the nineties. From this increasing competition resulted a drop in the factories' beneficial margin (DE MELLO BLISKA, 1998).

ABIF's main limitations for development in 1998 were:

1. Taxes and social security burden.
2. Beneficial margin reduction.
3. High market interest rates, lack of credit facilities
4. Recovery of money from clients.
5. Clandestine slaughter.
6. Consumers lowering purchasing power.

Quoting ABIF's former president:

"The slaughterhouse industry's earnings is weakened by the increasing burden of federal taxes...to reduce the fresh meat price, the government has to reduce tax rates..."
(ABIF former president in Panorama Setorial, "A Industria da Carne", 01/1999).

In fact the cattle meat sector as a whole suffers from a drop in beef consumption due to Brazilians consumers' tendency of substituting cattle meat with poultry (IBGE-Pesquisa agro-industrial mensal, December 1998).

We can summarize in a SWOT matrix the points characterizing the first type of slaughterhouse.

Table 8: Slaughterhouse Industry SWOT matrix.

SWOT	***Slaughterhouse Industry***
Strengths	Well equipped. Syndicated.
Weaknesses	Over capacity.
Opportunities	Development of new markets for fresh meat packing.
Threats	Consumer purchasing power, and changing habits; competing animal proteins. Taxes and contributions. Insolvent clients. High interest rates in the market.

3. Key characteristics summary of cattle and meat production.

Cattle production.

- São Paulo State and Central Western States produce 50% of Brazilian beef cattle.
- Cattle, mostly Zebu (Nelore) breed, are raised extensively and the productivity is low.
- Cattle market availability (quantity and prices) varies according to seasonal factors.
- Cattle face endemic diseases because of sub-optimal management practices.

The slaughterhouse sub-sector

- The slaughterhouse sub-sector is divided in two main categories: Large and modern structures/small under equipped units.
- The slaughterhouse sector production is evolving towards meat packing for adding value on fresh meat.
- The sub-sector suffers from an over capacity, and a drop of their beneficial margins resulting of a rough competition.
- Taxes, high interest rates, clandestine slaughter...are some of their major threats.
- Cattle meat consumption is on a downtrend and suffers from cheaper protein competition, of more vertically integrated industries (poultry) and changes in Brazilian consumption and food preparation habits.

After characterizing the segments in charge of producing raw meat we now concentrate on the segment formed by the *Charque* and *Jerked Beef* manufacturers.

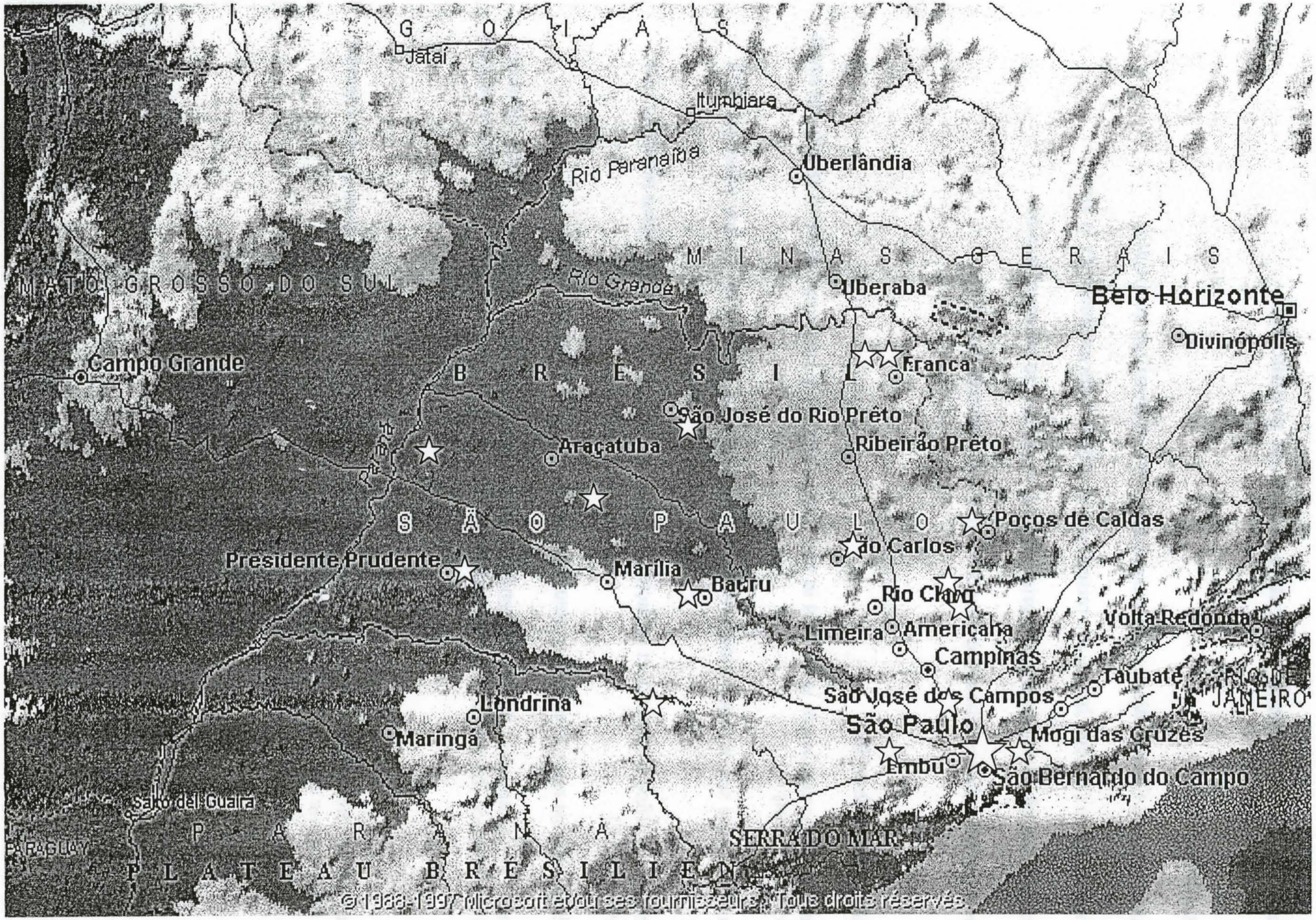


Figure 12: São Paulo State localized Charqueada

PART 2: São Paulo Charque and Jerked Beef industry.

Collected information level is unequal from one processor to another. This depends how directly (live interview, phone or magazine), information was obtained. When the factory was contacted the correspondent's hierarchical status and disposability of communicating influenced the quality of information. It was often hard to schedule an appointment with a producer. Information like prices, supplier and distributors names where kept secret. There seems to be certain reticence of the industry regarding institutional studies. This last point was further confirmed during the final workshop with key actors.

Table 9: Quality of information/sources.

Levels	*Quality of information.*	*Sources.*	*Factories.*
Level IV	Complete	Visit on site.	12
Level III	Good information. Technological aspects missing.	Phone communication & discussions with key informant persons out of the factory.	6
Level II	One aspect more detailed than another.	Phone + articles in meat magazines.	7
Level I	Low	Indirect.	6
		TOTAL	32

We collected information next to **manufacturers in activity**, producers that **stopped** or **interrupted** their production, and also from other meat industries, which don't produce but have a brand name in the sector.

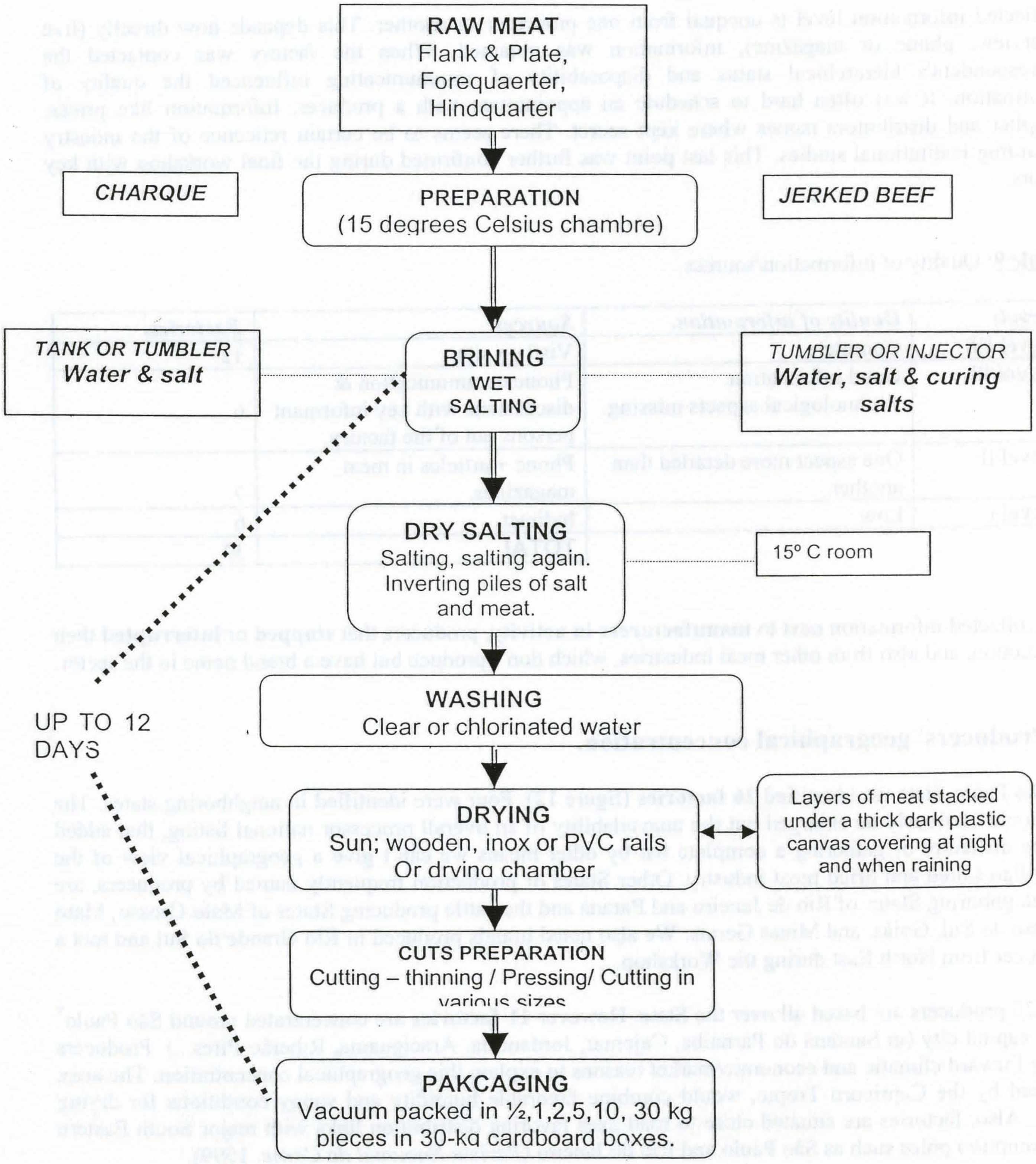
1. Producers' geographical concentration.

In São Paulo State we identified **26 factories** (figure 12). Four were identified in neighboring states. The list could obviously be enlarged but the unavailability of an overall processor national listing, that added to the difficulty of gathering a complete list by other means we can't give a geographical view of the Brazilian salted and dried meat industry. Other States of production frequently named by producers, are the neighboring States of Rio de Janeiro and Paraná and the cattle producing States of Mato Grosso, Mato Grosso do Sul, Goiás, and Minas Gerais. We also noted brands produced in Rio Grande do Sul and met a producer from North East during the Workshop...

The 26 producers are based all over the State. However **11 factories** are concentrated around São Paulo[9] state capital city (in Santana do Parnaiba, Cajamar, Jordanesia, Araciguama, Riberão Pires...). Producers bring forward climatic and economic/market reasons to explain this geographical concentration. The area, crossed by the Capricorn Tropic, would combine favorable humidity and sunny conditions for drying meat. Also, factories are situated close to road axes favoring distribution links with major South Eastern consumption poles such as São Paulo and Rio de Janeiro (*Revista Nacional de Carne*, 1999).

[9] The Borelli family settled one of the first Charqueadas in São Paulo surroundings. Since then the plant served as at a "training site" for few, today famous, *Jerked Beef* producers. The plant owner already changed three times (communication with current owner).

Figure 13: *Flow Chart:* Charque & Jerked Beef Process.



2. Products manufacturing.

In the following sections we describe the technological process for producing *Jerked Beef* and *Charque*, determine products and their differences and point out manufacturer constraints for their fabrication. Information was obtained through literature review and 10 plant visits.

2.1. Process description [10]

By processing boned meat through a double salting and a single drying operation we obtain salted and dehydrated products: *Charque* and *Jerked Beef* (figure 13).

- Circular nº 018/DICAR of 10.04.78 and nº 109/DICAR of 29/08/1988 of the Ministry of Agriculture establishes the technical, hygienic and qualitative norms to be respected for manufacturing *Jerked Beef* and *Charque*.

- Veterinarian control bodies:

- The *Serviço de Inspeção Federal* (**SIF**) is the federal (national) veterinarian control body. They are civil servants of the Secretary of Agriculture. They are present in each factory that exports abroad or in other states.

- The *Serviço de Inspeção Sanitária Paulista* is a state institution. Factories benefiting of the **SISP** control can only market their products in São Paulo State.

The federal norms, present in the *Regulamento da Inspeção Industrial dos Produtos de Origem Animal* (RIISPOA), SIF and SIF bodies are in charge of controlling the correct application are described in the following paragraphs.

According to different but not official sources by March 2000 all food factories must be able to answer the **HACCP (Hazard Analysis and Critical Control Point)** process quality control system procedures.

[10] The entire process is illustrated in Annex.

Table 10: Technological inventory of 12 producers.

Firm	Capa T/month	Outpt /month	Prod	CUT			Brining tool			Dry Salting days	Drying days	Total Number of days	
				F&P	F	H	Tank	Tumb	Inj.			*min*	*max*
1	300	200	JB	**	***	*	X		X	5-6	2-3	7	9
2	600	500	JB	**	***	*		X	X	6	2-3	8	9
3	?	180	JB	0	***	0			X	6-7	2-3	8	10
4	700	700	JB	**	***	*			X	6-7	1-2	7	9
5	700	700	JB& CH	*	****	0			X	6-7	2-3	8	10
6	1000	1000	CH	****	*	0		X		7-8	2-3	9	11
7	15	10	CH	**	***	0		X		7-8	1-2	8	10
8	15	2-10	CH	*	***	0				6-7	2-3	8	10
9	30	30	CH	***	*	0		X		6-7	2-3	8	10
10	2	2	CH	*	***	0	X			6	2*	7	8
11	800	650	CH	****	*	0		X		6-7	4-5	10	12
12	400	250	CH& JB	***	***	*		X	X	6-7	2-3	8	10

Automatic injector : 30 or 90 needles

Tumbler: 300, 600 to 900 liters capacity.

Manual injector : 1 or 2 needles

* Uses a glasshouse.

F&P= Flank and plate, F= Forequarter, H= Hindquarter

A. Raw material preparation

Raw material choice

Charque is mainly made with *flank and plate* cuts. They are fatty cuts. Forequarter pieces are also used for making *Charque*, though they are principally used in *Jerked Beef* production. Producers also use hindquarter pieces for making *Jerked Beef*.[11].

Table 11: Cut's relative prices at the slaughterhouse level in São Paulo STATE.

CUTS	PRICES
Flank & Plate	1,6 R$
Forequarter	1,65 R$
Hindquarter	2,65 R$

Source: IEA Preço ao atacadista, Cooled Bovine meat prices in SP, Folha de São Paulo 25/08/1999)
1 US$ = 1.94 R$ (on the 25/08/1999)

Producers work preferentially with Zebu Nelore beef cattle. For producers European and hybrid breeds aren't good for jerking, *"the yield is lower and the fat can oxidize during the drying step ought to the lower fusion limit temperature* [12]*"*. Cow meat is cheaper and sometimes used but is said to be less productive. For producers cow meat has a higher weight loss during process.

Processors say that raw meat is transformed in *Charque* or *Jerked Beef* because it has no commercial value (has no outlet) on the regular fresh meat market ought to cutting defects, weight insufficiency, age of the animal, and consumers' acceptance for the cut. It is an opportunity of valorizing non-marketable cuts.

Meat to jerk ought to be submitted to veterinarian control, and must comply with the same hygiene criteria as the cuts send to the fresh market. Meat preserved at a temperature exceeding 10° C cannot serve for jerking. However, inappropriate meat for consumption *in natura* can be used under strict conditions (BRASIL, RIISPOA. Art 175, 1997)[13].

Meat preparation:

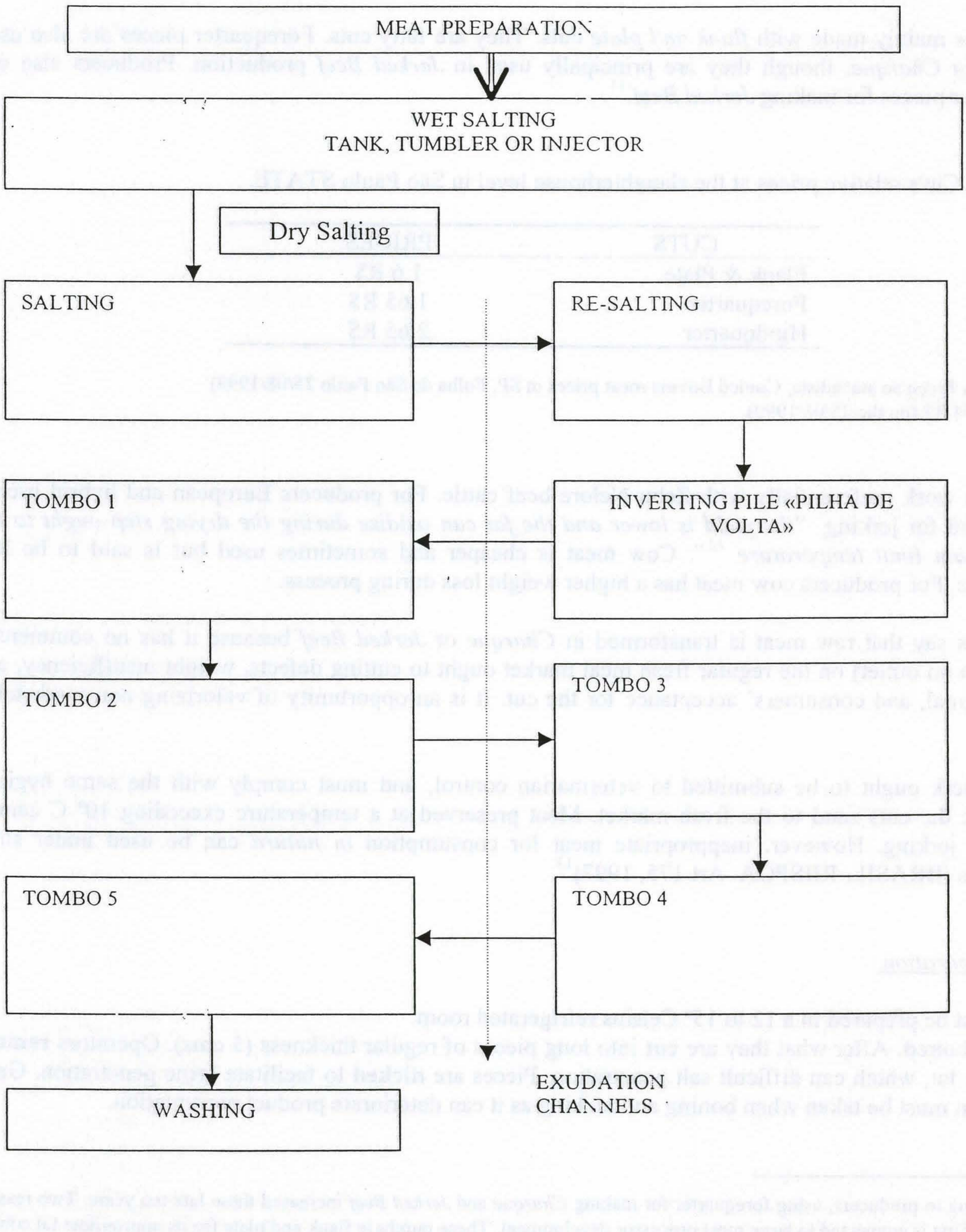
Meat must be prepared in a 12 to 15° Celsius refrigerated room.
Cuts are **boned**. After what they are **cut** into long pieces of regular thickness (5 cms). Operators **remove** excessive fat, which can difficult salt penetration. Pieces are **nicked** to facilitate brine penetration. Great precaution must be taken when boning and nicking as it can deteriorate product presentation.

[11] According to producers, using forequarter for making *Charque* and *Jerked Beef* increased these late ten years. Two reasons are given. First is connected to large meat processor development. These purchase flank and plate for its appropriate fat content to make standardized processed meat products like corned beef and hamburgers (Sadia, Mc Donald's). Secondly since Real Plan, Brazilian meat consumption rose especially for hindquarter cuts; forequarter cuts turned out to be less demanded on the fresh retail market.

[12] One particularity of European cattle (Limousine for example) is that fat is marbled in the muscle, which isn't the case for traditional Brazilian cattle, which fat wraps meat.

[13] In the case of a cistercosis infection for example, pieces must remain in tanks filled with brine for 21 days previously to dry salting After curing the meat can be submitted to desiccation.

Figure 14: Dry salting management.



Meat is then processed through a wet salting operation (BRASIL, 1988).

B. Wet salting

Initially meat was dipped for an hour in a tank filled of brine. One small-scale (2-tons/month) processor still uses a concrete tank for producing *Charque* «the traditional way». Today industries use *tumblers* (30 to 40 minutes) for both products. Manual (1 or 2 needles) or automatic (40 or 90 needles) *injectors* (instantaneous) are used for *Jerked Beef*.

Both techniques, which appeared in the early 70's, allow a faster distribution of brine into the product. The use of injection permits processing thicker pieces, which don't need to be previously nicked. Brine solution is always saturated in salt; concentration is of 335g/ kg of water at 15° C.

Though the injection technique has advantages, processors to avoid irregular brine distributions may double the brining step with a tank or a tumbler (1, 2). For specialists it's useless if the next step (dry salting) is correctly conducted.

At this stage, curing salts are added to brine for the preparation of ***Jerked Beef*. Conservatives agents** used are mostly curing salts (Nitrate and Nitric Acid of sodium or potassium, PVII and PVIII in Brazilian denomination), but the operator can also use stabilizers (Polyphosphates), and specific anti oxidative agents (Citric Acid and Sodium Eritorbate). Curing agents' quantity addition depends of each processor recipe.

Operator may add manually in the solution up to 2% (of total salt) of lactic acid. This helps keeping brine solution pH low. Brine reinforcement is done automatically with a pump system and brine is renewed daily or weekly depending on processor.

Equipment brining capacity, age and quality is highly variable from one plant to another. However, we must note that both *Charque* and *Jerked Beef* processors **recently complemented their units** respectively with new tumblers and automatic injectors to widen their manufacturing capacity (10, 3).

Meat may be left or not to "rest" to exude brine on the tile-paved floor 24 hours before entering the dry salting step.

C. Dry salting step

Dry salting consists in raising piles (1.60 m tall recommended) with meat and thick salt (3 mm □) alternated layers, on a slightly inclined slab of 15-mm height to allow exudation flow in a channel. Pile height may differ from one processor to another.

The processing chamber must be at a temperature of 15° Celsius for *Jerked Beef* whereas for *Charque* no temperature criteria are required (BRASIL, 1988). Processing room must be lengthwise (figure 14). It's not always so (in **L** instead of **I**) and production management may be bothered.

The first layer of meat following the wet salting step is laid on a stratum of thick salt. After 24 hours the first pile (*salga*) is turned upside down in order to add salt (*ressalga*). Pile inversion is done manually by employees with hooks to grab meat and shelves for salt distribution. Next day, if necessary, the last salting operation takes place (*pilha de volta*). Piles are then inverted (*tombos*) every 24 hours. Reversing piles (*tombagem)* is meant to distribute pressure equally, allowing meat homogenous salting and dehydration (by osmotic pressure). This procedure favors salt penetration into the muscles and allows the operator controlling process evolution. While reversing layers, operators can identify whether any bacteria colonies are developing.

As a mater of fact the *tombagem* permits to restrain the *Micrococus roseus* (anaerobic bacteria) proliferation at the first stages of the dry salting process when conditions are most favorable: Water Activity between 0.90 & 0.93 and a low salt concentration (5%) (PICCHI, 1998).

Leaving meat in anaerobic conditions before reverting it limits meat degradation due to a bacteria of the *hàlobacterium* family (*Halobacterium Salinarium*). A strictly aerobic bacterium, development of which is optimized at 15 % salt concentration. It procures to the product a red-orangish color (*vermelhão*) and oxidative smell, turning it improper for human consumption (PICCHI, 1998).

Contamination can happen with ***Charque*** and have can have severe economical repercussions. Bacteria transported with marine salt (all producers work with salt produced in Mossoró, North East) can affect the whole plant and totally deteriorate production in two days. Solution passes through production site disinfecting with chlorine and infected meat destruction. For *Jerked Beef* the risk of contamination is avoided by the use of curing agents in the brine solution which inhibits bacterial development.

The processing room's general cleanness is unequal from one processor to another.

During the salting process meat weight loss for making *Charque* is comprised between 18 and 20% (CANHOS, 1983). The information is unavailable for *Jerked Beef.*

The dry salting step lasts **up to 7 days**. However duration (3 to 5 *tombos* after salting and re salting operations) varies from one processor to another depending on wanted dehydration level.

D. Washing

After salting, cuts are washed with clear or chlorinated water (0.5 mg CL/l of water) to remove excessive salt and prevent further bacterial development. When the excess of salt at the meat surface crystallizes it can stimulate *halobacterium* development on *Charque.* Salt having a hygroscope power (retains water). Excess of salt may also limit cuts uniform dehydration at the sun drying stage, burning the meat superficies, creating a crust, preventing water evaporation. It is recommended, but not always practiced, to pile meat that it exudes its excessive water before sun drying (CANHOS, 1983).

E. Drying

The drying process takes 2 to 5 days depending on climate, pieces' thickness, fat content and desired final product: *Charque* or *Jerked Beef.* Cuts are laid in the sun for 6-8 hours a day ("sois[14]"), on north south oriented rails. Pieces might be reverted during the day. Rails are mostly made of wood, but processor may also use PVC tubes or steel cables. Equipment is hosed down daily with a high-pressure spray.

When outside day temperatures start decreasing (or when raining) employees collect meat, stack and cover it with a dark plastic sheet in order to reduce heat losses and accelerate dehydration. A slight fermentation occurs favoring the *Charque* specific aroma development. This technique used to be applied for long periods (up to 4 months) to store meat during the rainfall season, but none of the processors said to use this alternative anymore for hygienic reasons. One processor uses a glasshouse as a drying chamber. It's for him time and labor saving.

[14] The number of days was expressed in "sois", understand days of sun.

Picture 1: Different types of small packs for *Charque* and *Jerked Beef*

«Meat is dry when there is no more exudation under the layer»

F. Packaging

When dry, pieces are cut, weighed manually and **pressed** into blocks of 5,10 and 30 kg. Blocks can be cut in 2,1 and ½ kg cuts. They are packed in plastic (polyethylene nylon) by wrapping with manual and/or automatic vacuum packers (for small cuts). Scraps are saved and pressed together.

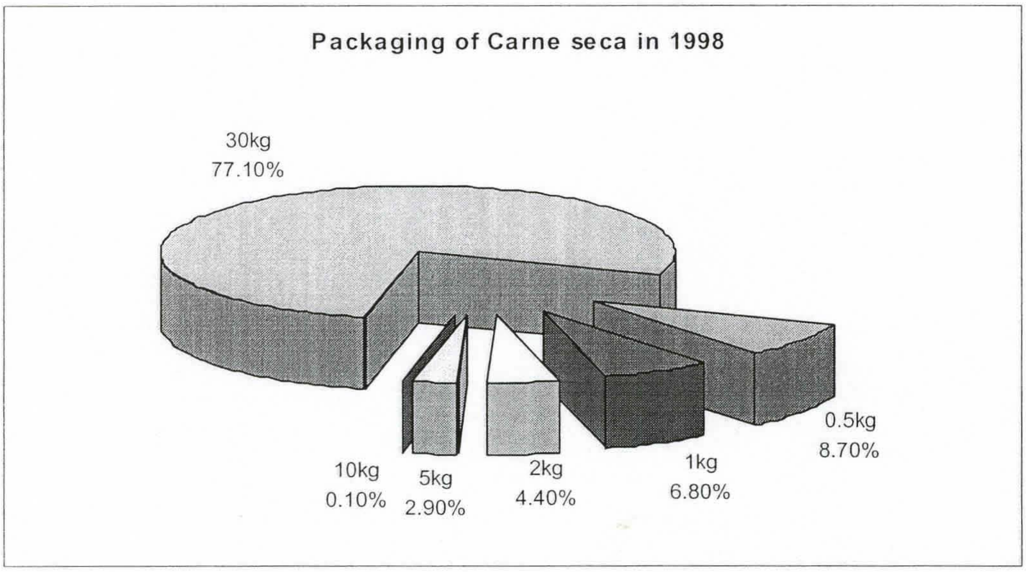
Packs can be divided in two categories of size: the **small pieces** of ½, 1 and 2 kg and the **larger pieces**, to be sold in bulk, of 5, 10, and 30 kg.

For small packs two types of wrapping are used:

1 One is fully transparent, brand name and legal obligatory references indicated.

2 The other kind, of more recent use in the market (3-4 years according to processors) has a aluminum-type cover, which presents producers' brand, product name (*Jerked Beef* or *Charque*) and cut name (forequarter or hindquarter). It may present a picture of a traditional or new dish and its recipe. Packaging transparent bottom allows product visualization.

Figure 15: Packaging of dehydrated meat in Brazil.



Source: DATAMARK, 1998 on a sample of 5,1%.

Between raw meat preparation and packaging **10 to 12** days pass by. Meat weight loss is comprised between **30 and 40%** depending on cut and drying degree. Process can even last longer when rain prevents product drying.

2.2. Major limitation for processors connected to the process.

FOR PROCESSORS PROCESS **MAIN LIMITATION** IS THE **PROCESS DURATION** BECAUSE IT IMPLIES A NECESSARY HIGH OPERATIONAL CAPITAL

- According to processors you need at least **40 days of financial liquidity** for producing dehydrated meat.

- Some processors don't optimize their production capacity because of a **lack of funds** availability **and credit facilities**. Price of credit, today being too high for some producers.

After describing the fabrication of *Charque* and *Jerked Beef* at the industrial level, we tried to define the product price and quality according to producers and literature review.

2.3. Price and quality of the final product

A. Final product pricing.

Labor seems to be a costly resource but processors hardly estimate its weight in the final product price per kilo. This depends also on the firm's structure (point detailed in next sections). However, contribution of material inputs to product price can be roughly estimated, as appears in table 13.

Table 12: Inputs share in final products price formation (not considering labor).

Item	*Relative % in product cost*
Meat	80-90%
Package wrapping.	Up to 10% for small sizes
Additives (salt, water and curing agents)	10%

Source: Producers.

- Final product price is principally and directly **connected to raw meat** price[15].

- Small packs are more expensive to produce not only for the more specific package but also for the **use of a specific machine.**

[15] Some producers simply double the price of raw material to estimate the price of *Charque* or *Jerked Beef.*

B. Final product characteristics according to legislation

Table 13: Final product qualitative characteristics.

Charque	*Jerked Beef*
Legal denomination "Carne Bovina salgada seca" Salted and dehydrated cattle meat.	*Legal denomination* "Carne Bovina salgada curada seca" Cured, salted and dehydrated cattle meat.
Chemical characteristics 45 % humidity (+/-5% tolerance) 15 % NaCl (+/- 5% tolerance).	*Chemical characteristics* Up to 55% humidity* 15 % NaCl (+/- 5% tolerance). Up to 200 PPM of nitric residuals.
Physical characteristics Ash-gray exterior aspect. Red wine flesh. Harder because drier meat.	*Physical characteristics* Pinky-red flesh. Cured aroma Tender meat
Water Activity: 0,70<WA<0,75***	*Water Activity*: 0,74<WA<0,78
Shelf life vacuum packed - 60 days	*Shelf life vacuum packed* - 90 days.

** It is admitted by the veterinarian control body (SIF) but isn't referenced in any official text.
***(SHIMOKOMAKI et al, 1987, TORRES et al, 1994, PICCHI, 1998)

- Current law (Circular n. º 109/DICAR of 1988) stipulates that both products final water contents after process mustn't exceed 45% within a 5% tolerance rate[16]. In actual practice, after answering processors request, the S.I.F authorized a maximum 55% final humidity content in *Jerked Beef.* This point will be recorded in next law, in current elaboration (PICCHI, 1998).

- Both food products show a **high concentration in salt**. It reaches **15%** of product final weigh. *Charque* as a drier product is more protein concentrated than *Jerked Beef.*

- Both products are **intermediate moisture products**: 0,6<Water Activity<0,86

- The addition of curing agents (nitrate and nitrite) in the brine solution for preparing *Jerked Beef* is the main criteria to differentiate it from *Charque.* Indeed the nitrite produced from nitrate or added directly to meat products reacts immediately in the weakly acid milieu of meat products to form nitric oxide (NO). Nitric oxide, a very reactive chemical compound, causes four reactions on meat products (WIRTH, 1985):
    1. Color development («cured red»).
    2. Aroma development («cured aroma»).
    3. Preservative effect («microbiological inhibition»).
    4. Anti-oxidative effect («protecting fats from oxidation»).

[16] Producers advance the fact that law isn't clear enough. In fact +/- 5% tolerance for water and ash content can be interpreted as 5% of 45% H giving 47,5%, which is right or 5% more than the limit which gives 50%. (INMETRO in *Revista Nacional De Carne*, 1998).

The first two reactions can be considered as «**esthetical**», because they give the product its sensorial and visual attributes. When nitrite acts on meat typical odor and flavor results, quite different from meat products only treated with common salt (DIETRICH MULLER, 1991).

The next two effects are essential for the producers because they limit product degradation during and after processing, allowing greater water content into the final product.

Finally, one may conclude that the use of curing salts is of real economical interest for producers because it **shortens the process**, **shortens the cash flow** turnover, and **increases profitability**.

- Because curing salts are added to ***Jerked Beef***, the product enters in the **canned food category.**

C. Sources influencing product quality.

Brine use is never total during wet salting. The rest, contaminated by meat (blood) may be used again. Then, brine bacterial content increases and can be a source of infestation. Even if most bacteria's don't resist to the high salt concentration, it is recommended to renew brine regularly to limit the risks of contamination (PICCHI, V. 1998).

Private and federal laboratories analyzed *Charque* and *Jerked Beef* samples sent by producers for physic-chemical and bacteriological analysis. Their results revealed that final ash and water content can exceed legal limit (ITAL/CTC, 1999). None of the tested samples were infested by «vermelhão». For the laboratories this unconformity can be owed mainly to a **lack of control during processing**.

Pack perforation happens and presents a risk of infestation, by *Listeria*, *salmonella* and *staphylococcus* among others, due to package fragility (PICCHI, V. at the *Seminário Produtos Cárneos Curados* ITAL/CTC, 1999).

D. Quality management at the industrial level.

At the industrial level the management of "a quality", a part from the quality control connected to sanitary aspects, is based on production management and sometimes choice of a regular raw material. The aim is to obtain a steady quality product.

For example two producers said to work in batch, every share made with the same cuts, numbered and packed together. Another processor is attentive to the weigh of the animal that was slaughtered and only works with Flank and Plate cuts coming from 18@ beef cattle.

Team management is for two processors an important factor in the construction of the quality. Chief operator behavior can influence the quality of the work and subsequently the quality of the final product.

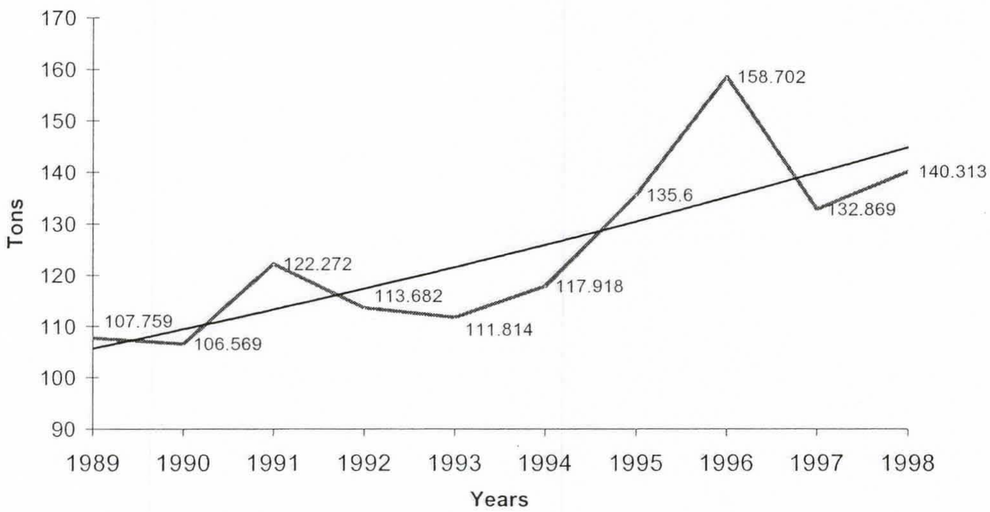
Though salted and dried meat producers are spread all over Brazil, São Paulo State production is an important share in Brazilian total output. But what is the share of *Charque* and *Jerked Beef* within this production? This question will be discussed in the following section.

3. National and Sao Paulo State production.

3.1. National production, an average growth over ten years.

The Brazilian industrial dehydrated beef production shows a permanent average growth in ten years (figure 16). This may be explained by an increase in internal consumption of food and especially meat products after the Real plan setting up in 1994 (DATAMARK, 1998). According to latter source, today over 140 000 tons of dehydrated meat is produced.

Figure 16: *Jerked Beef* and *Charque* production between 1989 and 1998.



Source : DATAMARK 1998

***NB*: Controversial production numbers.**

We noted that national data production numbers are very heterogeneous depending on calculations and sources of information.

Based on literature review: Some interviewed producers in specialized magazines state that the national production exceeds 600 000 tons...(FAYRDIN in *Revista Nacional da Carne*, 1999).

Other sources, *based on national consumption data,* calculated on a per capita consumption basis (Pesquisa de Orçamento Familiar, IBGE 1997), we can estimate that 270 000 tons of dehydrated meat are produced in Brazil.

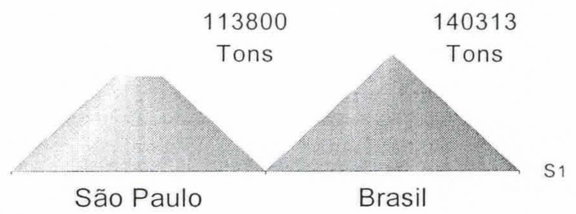
Based on the flank and plate production: Flank and plate represents 13% of carcass meat. Brazilian meat production reaches 6,3 millions tons in 1998 (ANNUALPEC, 1999). The flank and plate production (13% of 6,3 millions) 756 000 tons. During its process meat losses approximately 40% of its weight (*Charque*). Hence production of *Charque* from flank and plate could be around 450 000 tons. Of course this is approximate. All of flank and plate is not processed into *Charque* or *Jerked Beef*. An unknown part of it being used by large meat industries for making corned beef and standardized beef products like hamburgers (*Revista Nacional de Carne*, 1998) and another part, though insignificant according to producers is consumed in the south (Workshop result). But this calculation doesn't consider the part of forequarter and hindquarter that are processed into desiccated meat, part that could increase the upper stated number.

This calculation reveals the fragility of national data and confirms somehow the presence of an important informal production. Anyway all these calculations underline the importance of Brazilian dehydrated meat production. Relying on DATAMARK numbers **production grew 20%** in ten years, or an **average annual growth of 2%.**

3.2. São Paulo Sector production.

Relying on DATAMARK and Federal Animal Production Inspection body SIPA (Serviço da Inspeção da Produção Animal) sources, in 1998 São Paulo processors were responsible for 80%, of the total national registered output (figure 17). However, according to sector stakeholders their share in national total output wouldn't exceed 10 to 15%...

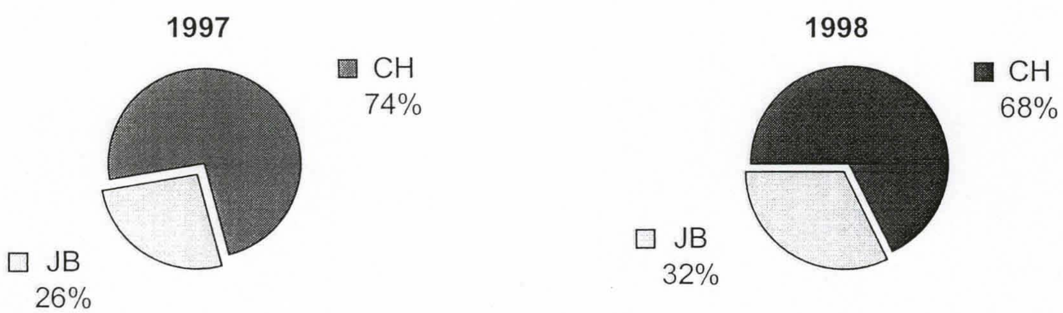
Figure 17: São Paulo State production shares in the national production.



Source: DATAMARK and SIPA-1998.

Producers for which we have the average monthly output we can estimate an annual 120 000 tons produced. This gap between different numbers reinforces the difficulty of gathering reliable production data.

Figure 18: Production share of *Jerked Beef* and *Charque* between 1997 and 1998.



Source: SIPA-1998.

SIPA data shows that *Jerked Beef* increased by 6% in one year diminishing *Charque* share in the total dehydrated meat output (figure 17). It's to say that the industry produced 36,66 M tons of *Jerked Beef* and

77,19 M tons of *Charque*. This evolution of the production towards *Jerked Beef* was also noted next to interviewed processors. However, *Charque* still represents the largest part of São Paulo sector production.

Table 14: Processors production.

Products	Number of factories
Charque	12
Jerked Beef	10
Charque and Jerked Beef	4
Total	26

Source: Producers

We noted that **producers are shifting** or intending to shift from *Charque* to *Jerked Beef*. Like producing *Jerked Beef* requires higher equipment investments than for *Charque* (air conditioners for example) one may believe that the production trend is rather *Jerked Beef* than *Charque* oriented.

4. Manufacturers.

As we have seen that technology for producing is quite homogeneous between processors, which produce *Charque* and/or *Jerked Beef*, we develop other criteria's to classify producers.

4.1. Different production capacity.

The average month production is a way to distinguish producers. In accordance with their given sizing criteria (estimation) they can be classified in large, medium, and small. These numbers are approximation.

Table 15: Classification per average output/final product/month of 26 producers.

Size	Tons of final product / month	Number of producers
LARGE	> 600 tons	7
MEDIUM	100 to 600	10
SMALL	< 100 tons	9
	Total	26

Source: Producers

Large producer's output can reach more than 1200 tons/ month and we identified small producers that only manufacture 2 tons per month. They produce either *Charque* or *Jerked Beef*.

4.2. Dehydrated meat production turnover and firm's structure.

Imagining that the dehydrating meat activity is of variable income importance for the different processors we characterized two groups.

Table 16: Dehydrated meat activity importance in the turnover of 26 processors.

> 90%	< 10%
12	14

Source: Producers

First category, (> 90%) dehydrated meat production is the main and often unique economic activity. One processor has a treating device for sebum and bones to make animal flour (11), but this is exceptional. In the other cases bones are sold to collectors. This group is made of all sizes of producers processing either *Jerked Beef* or *Charque*.

In the second category (<10%), big medium and small producers are represented. *Charque* or *Jerked Beef* isn't the leading production, and takes place in a larger product portfolio. These latter factories are meat industries that integrate or not the slaughtering activity.

4.3. Three different ways of conducting production.

Charque and *Jerked Beef* processing units can be **individual firms** or **integrated structures** in larger meat processing industry.

In table 17 appears the principal characteristics of the 12 visited meat industries.

Table 17: Characteristics of 12 desiccated meat producers.

Firm	Prod.	SIZE	Age.	Capacity T/month	Output /Tons /month	Integration. Level	k	Turn Over %	Sub Contracting %	Sub Contractor %
1	JB	MED	7	300	210	1	F	100		10
2	JB	MED	7	600	500	1	F	100		
3	JB	MED	0,4		180	3	D	5	100	
4	JB	LAR	13	700	700	1	F	100		20
5	JB&CH	LAR	20	700	700	2	F	10		10
6	CH	LAR	20	1000	1000	2	F	5		
7	CH	SMA	18	15	10	2	D	5		
8	CH	SMA	10	15	2-10	2	D	2	80	
9	CH	SMA	2	30	30	1	F	100		
10	CH	SMA	2		2	3	F	2	100	
11	CH	MED	23	800	650	1	F	100		
12	CH&JB	MED	2	400	250	2	F	2		

1: Charqueada.

2: Slaughterhouse- (meatpacker)-(meat processor)-Charqueada.

3: Subcontract the production.

K: capital, F: family, D: divided

Subcontracting: Subcontracting the production.

Subcontractor: produces for other names.

Within the meat industries with a brand name on the dehydrated meat market, we distinguished three main groups according to how they conducted their production.

1. **GROUP1**: Meat processors that only and exclusively produce *Charque* or *Jerked Beef*.

2. **GROUP2** Charqueada hierarchically integrated to a slaughterhouse.

3. **GROUP3** Slaughterhouses and meat processors that market *Jerked Beef* or *Charque* with their brand name but, don't have a processing unit, and partly or totally entrust the production of *Charque* or *Jerked Beef* to processors of group 1 or 2. They are the sleeping partners.

In the GROUP 3 industries ***partly subcontract*** the production when they take charge of raw meat and additives supply (3,10). They only pay the technological intervention. Product quality and quantity are previously negotiated. We noted in one case that the sleeping partner had his proper team to control process. A formal contract concludes the deal. When the sleeping partner ***totally subcontracts*** the activity it means that he buys the final product, with his name on it. He doesn't take charge of raw material and quality control procedures. He totally entrusts the production to the active partner. Quantity and quality may be previously negotiated.

For the sleeping partner *Jerked Beef* production aims at the firm's internal strategic purposes. We noticed industries that are willing to diversify their product portfolio (3) and others that want to keep their brand on the dry meat segment but cant assume the production anymore for financial or technical reasons, so they externalized production.

Active partners of GROUP 1 and 2 may act only as ***technical service providers*** (they only take charge of the technical aspect of production) or as ***total service provider*** (they take charge of all the aspects connected with the production). Quoting a *Jerked Beef* processor:

"Producing for others became the only viable alternative solution these last years to increase market shares".

4.4. Long lasting producers and new comers.

Following the same idea of trying to differentiate producers we noted that within the groups 1 and 2 we have experienced producers, which production started over 15 years ago and more recent producers for whom the production started during the nineties. This classification is arbitrary. Most factories are family run types.

Each factory wasn't brought to produce *Charque* and *Jerked Beef* for the same motivations.

Experienced producers:

If the processor is in the **group 2**, he may have started in the meat industry producing dehydrated meat and then integrated backwards in the slaughtering activity to become a major raw meat producer and meat packer (5,6). In fact according to PICCHI V. many charqueadas became through time slaughterhouses (matadouros-frigorificos). Today in both cases the reason they still manufacture *Jerked Beef* or *Charque,* besides taking advantage of the unmarketable cuts, may be because the activity is a ***"part of the firm's***

history". They say that it's also an opportunity through small pack designs to vehicle firms brand name and ***«built a link with the consumer».***[17].

In the experienced producers of **group 1**, we noticed factories that were slaughterhouses in the 70's. They switched to produce only dehydrated meat, because the new production and quality norms at that time forced to renew their equipment, which was financially impossible to assume (11). In this group we also encountered a manufacturer that build his plant and started a *Jerked Beef* production in the late eighties (4).

New producers:

Recent producers started their production during the nineties. In most cases producing *Charque* or *Jerked Beef* was, obviously, the *"opportunity of starting a new economical activity"*. More specifically the opportunity was motivated by the proximity of a slaughterhouse, the absence in the area of Charqueada, or connected to manager's personal challenge... *" I used to work in a Charqueada...and I wanted to have my own production ".*

While interviewing different processors in the *Charque* segment we noted that entries and exits occur steadily:

" Charqueadas open and close every 6 months "
(4 producers of Charque)

5. Producers' organization and intra-industry information flow.

São Paulo State *Charque* and *Jerked Beef* producers initiated a trade union in the nineties. São Paulo State and Rio de Janeiro factories were the main participants. In 1991, according to the former President, they obtained a 4% tax decrease on the product: from 18% down to 14% (FAYRDIN, 1991). But later the *«Associação Professional das Empresas Produtoras de Charque»* dissolved, because of internal misunderstandings, on the sector pricing policy to be adopted (ex-member) and because of the little participation of affiliated processors (result from the workshop).

Though the trade union, as an information exchange basis, ceased functioning, we noted that information flow between processors was efficient. In fact for many producers when the question was asked they would answer ***"that there is no secrecy in the sector"***. And they agreed that's why it's difficult ***"to do something different"***.

After characterizing the different processors and their production, the next section reveals where do they market their products and who are their distributors.

[17] The latter is quite impossible with fresh meat. A cut of beef has a name not a brand name.

6. Producers' markets and product distributors.

6.1. National distributors and market requests.

In table 18 appear products markets and distributors of 12 visited factories.

<u>**Table 18**</u>: Producers distribution markets.

Firm	Prod.	Firm Size.	Age Prod	Package / kg	MARKET% & Distributor	
					NE & N	*SE*
1	JB	MED	7	LARGE SMALL	50 W&S	50 S & R
2	JB	MED	7	L S	80 W&S	20 S
3	JB	MED	0,4	L S		100 R
4	JB	LAR	13	L S	5 W	95 W, S&R
5	JB&CH	LAR	20	L S	35 W&S	65 S&R
6	CH	LAR	20	L S	100 W&S	
7	CH	SMA	18	L S		100 R
8	CH	SMA	10	L S		100 S&R
9	CH	SMA	2	L (30 kg)	100 W	
10	CH	SMA	2	S		100 S&R
11	CH	LAR	23	L (30 kg)	100 W	
12	CH&JB	MED	2	L S	50 S	50 S&R

<u>Distributor</u>: **W**: wholesale level, Retail level: **S**: supermarket, **R**: small retailer
<u>Package</u>: Large and Small.

Most ***Charque*** producers that we contacted and visited (9,11) aim at the **North Eastern** and **northern** littoral markets. A producer even sells to Manaus in Amazon. Wholesalers are their principal buyers. Producers we met working with these markets never take charge of costs related to transport (FOB or EXW price). They sell large packs of 30 kg.

Three **small** *Charque* producers, only market in **São Paulo State inland** areas (7, 8, and 10). They distribute their products directly to the retail level near their area of influence. They work with small packs.

For *Jerked Beef* processors São Paulo and then Rio de Janeiro State urban areas are their preferential markets of influence. In the South East they work as wholesalers delivering directly to supermarkets and groceries when close to their distribution network. They also work with wholesalers. We can't give a precise idea of the weigh of each distributor for producers in terms of output, because of lackaing precise data.

Jerked Beef producers also sell on the **North Eastern and northern markets** from 5 to 80 % of their production through wholesalers and supermarkets.

6-2 Exports

The São Paulo sector exports abroad an insignificant quantity (838 tons in 1993) of its total production. The principal importer is Angola. Sporadic and insignificant exports to European countries, like Portugal, Netherlands happened. No information is available on the specificity of the product, whether it is *Charque* or *Jerked Beef*, official documents (SECEX data.) only specify "*carne seca*" (dry meat). São Paulo sector large producers are Brazilian main exporters.

According to European regulations for importing salted and dried products (European Veterinarian Body), Brazilian products are not officially importable since the process is considered anti-hygienic (ex: drying step in the open air).

7. Summary of principal aspects of products, technology and producers.

Process and products characteristics

- At each operation no specific measurement tool is used to check product salt and water content or water activity during and after process. Quality control is mainly based on chief operator's know-how.
- *Charque* is more prone to bacterial contamination than *Jerked Beef.*
- *Jerked Beef* is **different** from *Charque*. Making the calculation according to legislation the yield of *Jerked Beef* is higher than *Charque*.

Calculation:

Considering that boned cattle meat (muscle) contains 70% of humid matter and 30 % of dry matter. The objective is in the case of Charque is to obtain a product with final water content max of 47,5%. That is to reduce the total water content from 100% to 47,5 %, in other terms to have a dehydration degree of 100-47,5% = 52,5%. Applying this percentage to 70g of water in the muscle we obtain a loss of 70 x 52,5%= 36,75 g of water. At the end of the process we have 100-36,75 = 63,25 g of meat. The yield of meat is 63,25 % in the case of *Charque*. We apply the same calculation for obtaining the yield of meat in the JB process.

Yield of Jerked Beef: 68,5 % with final water content up to 55%
Yield of Charque: 63,25% with final water content of 47,5%.

- *Jerked Beef* has a longer (authorized) shelve life than *Charque* 90 and 60 days.
- Quality problems on final product may be connected to process control and hygiene.
- The whole process from wet salting to packaging is time and labor demanding.
- Product **price** is mainly formed by **raw material**.
- The process demands **high operational capital** and fund immobilization is long.
- Technology is rudimentary and quite homogeneous between processors.

Producers

- Many producers are concentrated around Sao Paulo City.
- *Charque* producers are shifting to *Jerked Beef.*
- There exist a large variety of producers according to their location; experience on the market (age of production), production capacity.
- Charqueadas are independent structures or vertically integrated to a larger meat industry.

- We have sleeping and active producers.

- Producer's trade union ceased, but intra-industry information flow seems to work.

- ***Charque*** producers mostly aim the **North East and North Eastern** markets and *Jerked Beef* is marketed on both.

- North and North Eastern distributors are the wholesalers and supermarkets.

- In the South East producers act as wholesalers.

After characterizing producers and their products, in the next section we will characterize the segments downstream: the distribution and consumption segments. In other words we intend to show who are the producers clients.

PART 3: Distribution and consumption.

As São Paulo State second Major City (1 million inhabitants), and therefor relatively representative of South Eastern **urban centers**, Campinas was the chosen site to identify and characterize dehydrated meat major (wholesale level) and minor (retail level) distributors.

The objective of visiting and interviewing the different retailers is to picture the different products, determine their quality and understand their price.

Information on product distribution was completed next with other wholesalers, outside Campinas, by phone. Rapid and informal supermarkets, hypermarkets and market visits in São Paulo City also helped understand the dehydrated meat market.

Because of time and material constraints, the team couldn't visit nor interview North Eastern market retailers. However little information was gathered on the North and North Eastern markets through a wholesaler of Salvador de Bahia who also furnished indications on products and consumers.

After that we identify and characterize the different dehydrated beef consumers and their geographical concentration. We rely on primary data sources, coming from interviews of producers, distributors but also restorers and secondary data information collected in magazines and next to national statistic bodies.

1. Distributors

1.1. Wholesale distributors characteristics.

Two types of wholesalers (a part from producers) in dehydrated meat products were identified and interviewed in Campinas: 2 regional wholesalers' and 3 «Casas de Carne». Information on a purchasing central service was gathered interviewing affiliated supermarket and hypermarket responsibles. Results figure in table 19.

1.2. Retailers' characteristics.

At the retail level we find groceries specialized in salted and dried meat products, supermarkets of different sizes, hypermarkets and butchers. Of 23 visited sales point in Campinas only one retailer sold ***Charque***. When interviewing retailers, both products were always in the discussion under various names **but never as *Jerked Beef*.**

Private communication with Campinas PROCON[18] former president revealed that, after acting for two years in the area, neither quality problems or illegal products were identified on Campinas dehydrated meat-retailing markets. Main Characteristics appear in table 20.

[18] PROCON: Consumers interest defense body settled in Campinas.

Table 19: Main characteristics of dehydrated meat wholesalers.

Type	Number of items	Product	N0. Brands	Clients	Monthly average output.	Observations
Regional (2)* (MAKRO & Vila Nova)	10 000 items, mostly food products.	*Jerked Beef* in ½, 1 and 5 kg pieces in 30-kg cardboard boxes.	2 to 3 brands	Supermarkets, groceries, industrial canteens, restaurants and individuals.	2 to 3 tons	70% in small packs for groceries and supermarkets.
Meat shop (3) (Casas de Carne)	Fresh meat	*Jerked Beef* in ½, 1 and 5 kg pieces in 30-kg cardboard boxes.	1 brand	Canteens, restaurants and individuals.	100 to 300 kg	Mostly restaurants and canteens. 1 **stopped** selling ***Charque*** 3 years ago.
Buying Central **	All products sold in affiliated structures	*Jerked Beef* in ½, 1 and 5 kg pieces in 30-kg cardboard boxes.	1= Carrefour 4= Grupo Pão De Azucar.	Affiliated structures	Unavailable information.	Affiliated. Never sold ***Charque***.
Wholesaler in Salvador de Bahia (1)	***Charque*** and maintenance products.	*Charque* in large pieces of Flank and Plate and Forequarter In 30 kg card board boxes.	Many brands	Supermarkets, groceries, canteens, restaurants and smaller wholesalers.	30 tons.	He is in the business for more than 20 years

* Contacted wholesalers in Campinas and surroundings stopped selling few years ago or never sold ***Charque*** because the product showed random ***quality problems***. For these distributors ***Jerked Beef*** entered strongly on the market at the **beginning of the nineties**.

** Information collected next to delicatessen department responsible.

Table 20: Retailers characteristics

Retailers	*Location in Campinas*	*Products*	*Number of Brands*	*Average monthly output*	*Clientele*[19]	*Observations*
Specialized Groceries. * "Mercearias"	Mercado Municipal (9) In the heart of Campinas	*Jerked Beef*** is mostly sold in bulk.	1 to 3 brands in the whole market	200-300 kg/month	All social classes.	70 % of the clients originate from North East.
	Mercado Campinieiro (3) In a richer district	*Jerked Beef* is mostly sold in bulk.	1-2 brands	150-200 kg/month	A, B consumers.	
Supermarkets	All districts (6)	*Jerked Beef* in small packs	1 to 4 brands	100 to 300 kg/month	A, B, C consumers	
Hypermarkets	Town outlets (4)	*Jerked Beef* in small packs and in bulk.	1 in *Carrefour* 2-4 in *Pão de Azucar*	2000 to 3000 kg	A, B consumers	50% of sales at the end of the week for *Carrefour*.

* Sausages and pig ears feet and tails, bacon, *Jerked Beef*, and herring are displayed in the stall. They also propose basic food products and ingredients like oil, rice, black beans, etc.

** **One** retailer proposed ***Charque*** made of Flank and Plate at a higher price. He argued that the product is hard to find and that he sells it to "purists".

[19] The letters determine consumers' social class. A rich class, B, C: middle class, D and E: poor social class according to the ABA/ABIPEME classification criteria in 1992.

Picture 2: Stall presentation

After presenting the distributors according to their structure, the products they sold and their clientele we describe and qualify products sold at the retail level in Campinas. How is the product presented to the consumer?

1.3. Product description and information on sales.

A. Product description

Product price and subsequent relative quality **is connected to the original processed piece** and its common market value. We distinguish up to three categories and relatively three quality levels (picture 2).

<u>**Table 21**</u>: Three categories of Jerked Beef sold in bulk.

Categories	CUT	Names	Characteristics
1 First category "Carne de primeira"	**Hindquarter** "Traseiro"	**Charque** or **Carne Seca** *de traseiro*, or *de coxão duro* or *de coxão mole.*	Lean and most expensive.
2 Second category "Carne de secunda"	**Forequarter**: "Dianteiro"	**Charque** or **Carne seca** de *Dianteiro*, *Acem*, *musculo*, *paleta*,	Fat content varies from one cut to the other.
3 Third category	**Flank and plate** "Ponta de Algulha"	**Charque**, **Jabá** de *Ponta de Algulha*	Cheapest and fattest cuts.

<u>Source</u>: designed by the author through market visits.

We can make few remarks on products and their presentation.

- Product designations **(when) indicated on the stalls are not identical from one grocery to another**.
- When *Jerked Beef* is sold in **bulk the brand name is not indicated** on the product.
- The product **isn't standardized**: Uniformity of color (gray stripes, presence of fat as the degree of desiccation (pieces exude and others don't) is variable within each category and from one cut to another.
- While trying to **define a "quality"** of *Jerked Beef* with retailers, the quasi-unique qualitative criterion for all of them is that the product *"must be dry enough and have a good price"*.
- *Jerked Beef* in **small packs** are made of **Forequarter** and **Hindquarter** cuts. No other precision is indicated on the packaging whether it's made with a particular piece. Fat distribution is variable from one piece to another.

Product prices vary according to the retailer, principally for loose cuts. Also we noted that *Jerked Beef* price varies relatively to the piece fat content (picture3). Next table shows the different categories/cuts and their relative fat content and prices in different sales points.

<u>Picture 3</u>: Three range of prices according to fat content.

Table 22: Relative prices differential of Jerked Beef according to cut market value.

The cuts	Fat Content	Indicative prices/kg (loose cuts)		Indicative prices/kg (individual packs)	
		M. Municipal Grocery	Hyper.	Super.	Hyper.
Flank & Plate	●	3,50 R$	/	/	/
Forequarter	●●	5,00 R$	6,00 R$	7,00R$	7,00R$
Hindquarter	●●●	6,50R$	7,00R$	8,00 R$	8,00 R$

Source: designed by the author through market visits. 1 US$=1,85 R$
● Relative degree of fat content

After qualifying distributors and products we wanted to understand which factors influenced their sales.

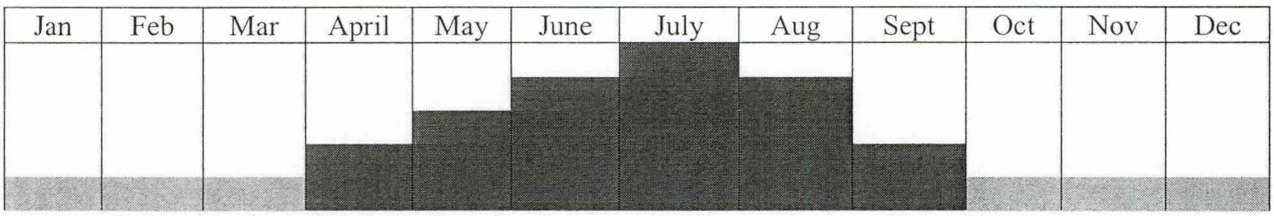
B. Information on Sales

➢ For all retailers sales **in bulk** are **higher** in volume than in small packs when both are proposed because: *" the client prefers to choose the cut" (Hypermarket stall retailer).*

➢ **Climate** influences the sales.

The output of each retailer is variable. Sales are higher the 20 first days of the months for the lower class retailers. The average quantity sold each month is connected to the season in São Paulo State. For retailers the best selling period is concentrated during the cold months from April to July. Sales start climbing at the end of March to reach a pick in July. In august sales start decreasing. We estimate **sales drop at 30 to 40 %**.

Figure 19: Sales fluctuation in São Paulo State according to distributors.



Source: designed by the author through market visits

Next table is designed to show what are the products sold by the different retailers according to their social class. We noted that margins on products are smaller for the lower social class retailers, like in the Mercado municipal, than in a supermarket or hypermarket, which clients are, in Brazil, of higher social class.

Table 23: Products mostly sold/retailer/social class clientele.

Sales points	*Small Packs of 0,5 & 1 kg*	*In bulk*	*Category* 1,2,3*	Social Class	*Relative Margins*
Covered market "Municipal"	x	xxxx	2,3,1,	C & D	35 to 60%
Covered market "Campiniero"	xx	xxxx	2 & 3	A & B	70 to 100%
Hypermarket.	xx	xxxx	1,2	A & B	70 to 100%
Supermarket	xxx	□	2,1	A,B,C	80 to 100%
Butcher	x	□	2,1	All **	80 to 100%

*X: sales weight, * refers to original processed cut. ** Depending on district.*
Source: designed by the author through retailer visit.

- *Carne seca* sales are relatively constant year round compared with the other salted products sold at the stall (pig ears, tails, and bacon...).

- Logically we noted that **price promotion** (up to 50% in supermarkets on the small packs) started after the cold season. We noted that product pricing followed closely the same cycle than fresh meat price fluctuation.

- For the stall retailer's **climatic changes** don't only have incidences on their sales but also on the **quality of *Jerked Beef* in bulk**. When the warm and humid period starts in October, it becomes difficult to present the product on the stalls. Product exudes, quickly deteriorates which is prejudicial to its presentation.

- According to retailers and wholesalers in Campinas *Jerked Beef* demand is stable and didn't evolve these last years.

The foregoing presentation revealed how the products where accessible to consumers in Campinas. We have an idea on the prices, the different qualities and presentations. Next part is dedicated to the last segment of the dehydrated meat channel. We try to understand how, when, where and who consumes *Charque* and *Jerked Beef* in Brazil.

3. Consumers' segment.

3.1 Information on Brazilian consumers.

We first furnish general information on the Brazilian consumer.

- Brazilian spends 25 to 35% of their salary for alimentation. Meat, milk and bread represent half of these expenditures (A CARNE, 1991 in DE MELLO BLISKA 1998).

- Brazilian population is divided in three markets:

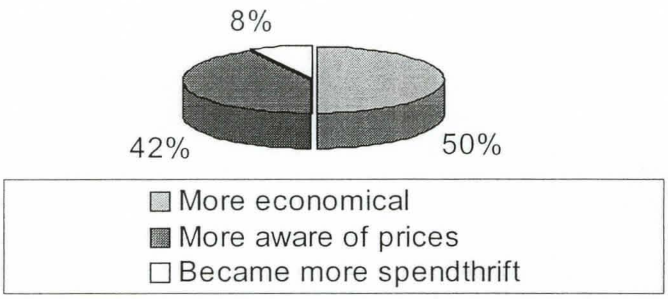
(a) The **mass market,** which represent namely **60%** of the population. They are more regarding to price than quality.

(b) The **middle class, 30 to 33%** of the population, with no major limitations to buy food products. Their preferences go to lean products.

(c) The **higher** social class, **7 to 10 %** of the Brazilians.

- After the Real Plan settlement, consumers buying behavior evolved. Price stabilization likely changed his vision of prices. Next chart gives an idea of the consumer's evolution after 1994.

Figure 20: Brazilian buying behavior after Real Plan settlement.



Source: FIPE 1998

"Before the Real consumers always had money, during inflation consumers could speculate and earn enough for a living...they weren't so attentive to prices".
(Specialized grocery retailer).

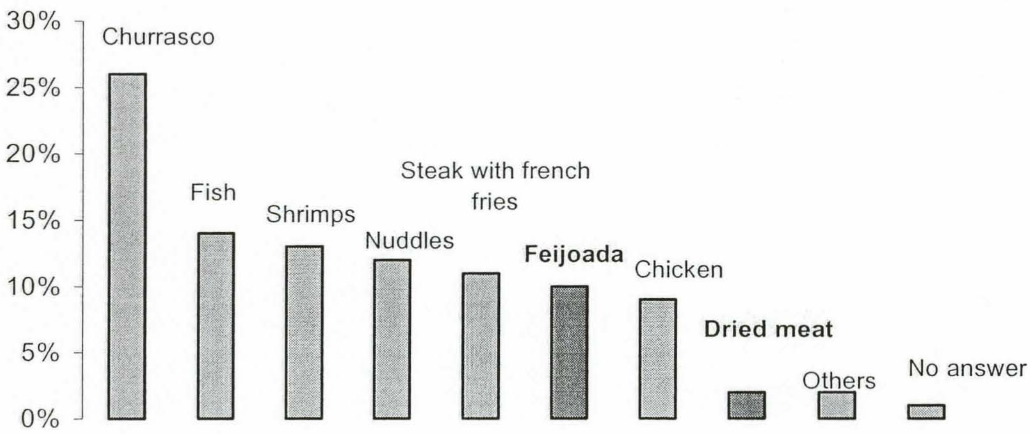
Although, retailers noticed neither significant fall nor notable rise in their sales of *Jerked Beef*, most retailers argue that today **consumers' lower purchasing power** is the main handicap to develop their activity. For retailers, the best way to significantly increase sales would be to **lower product price**.

This last point makes the transition with next sections, which consider dehydrated meat consumption at a national scale.

3.2. "Carne seca", an appreciated product.

As shown in figure 21, salted and dehydrated beef cuts, *carne seca* consumed alone or as component of *feijoada* are among the Brazilians ten preferred dishes.

Figure 21: Relative importance of dehydrated meat in the Brazilian consumption habits.



Source: FIPE-1998

Salted and dried meat is present in various regional dishes. The most famous ones are:

- ***«Feijoada»*** is a hot mixed black bean and meat dish. Meat is composed of salted pork ears, feet, tail, *Charque* and *Jerked Beef*, bacon and different type sausages. It is one of the most popular dishes in Brazil. It's a family dish. Long to prepare (a day to another) it is made in large quantities to be eaten in community. It is an energetic dish for labor (ex: cash crop plantation workers).

- ***«Arroz Carreitero»***, is a traditional dish from the Southern States of Brazil (Rio Grande do Sul and Santa Catarina). It's made of rice and dehydrated beef cuts, thinly sliced, and comes with cooked vegetables.

- ***«Carne Seca na Moranga»*** is "carne seca" with *Catupiry®*, a creamy cheese cooked in a pumpkin. It comes from Minais Gerais.

For these three preparations *Jerked Beef* or *Charque* must be previously desalted by soaking meat in water for several hours (10 to 12) changing water regularly. This allows meat desalting and re-hydration.

- ***«Paçoca de carne »*** is fried *Charque* or *Jerked Beef* mixed with cassava flour. It is very popular in the North East. It's eaten as an appetizer («tiro gosto»).

Dehydrated beef is also prepared on the barbecue in the *Churrasquarias* (specialized restaurants in grilled meat). In the North East they are prepared as steaks.

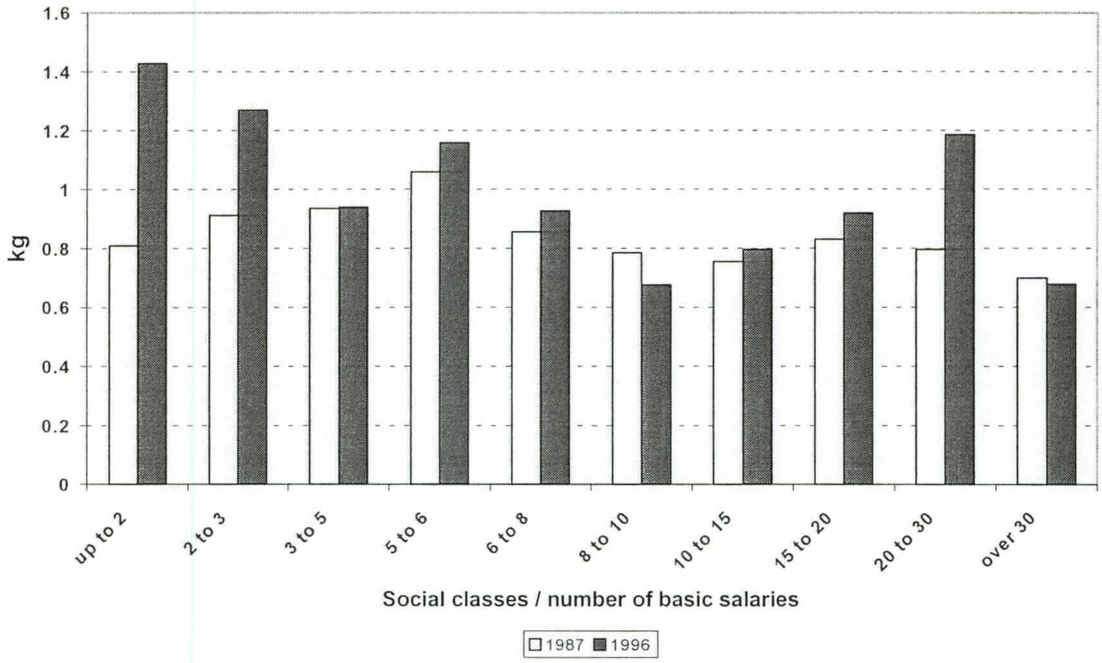
These are the most common utilization of dehydrated beef. Other recipes exist. Fine cooks from the southern regions even develop new dishes with dehydrated meat.

3.3. Consumption of "carne seca" is concentrated in the North East and North.

3.3.1. Consumption increased and is concentrated in low wage classes.[20]

We can point that global consumption *per capita* increased in most social classes in 1996 compared to 1987. This is attributable to Brazilian's general rise in meat product consumption since the Real Plan settlement in 1994 and especially in 1996 when it had its most beneficial impact on Brazilian purchasing power..

Figure 22: Average consumption kg/*per capita*/year of dehydrated meat by income scale (1987- 1996).



Source: IBGE, Pesquisa de Orçamento Familiar 1997.

Consumption of dehydrated meat is **concentrated in the low-income classes**[21] (figure 23). A possible reason, often stated by sector stakeholders, may be attributed to the little access to freezing facilities for the poorest social classes, especially in the North Eastern rural areas. Then, dehydrated meat becomes the most appropriate source of animal protein that can be kept in air ambient conditions.

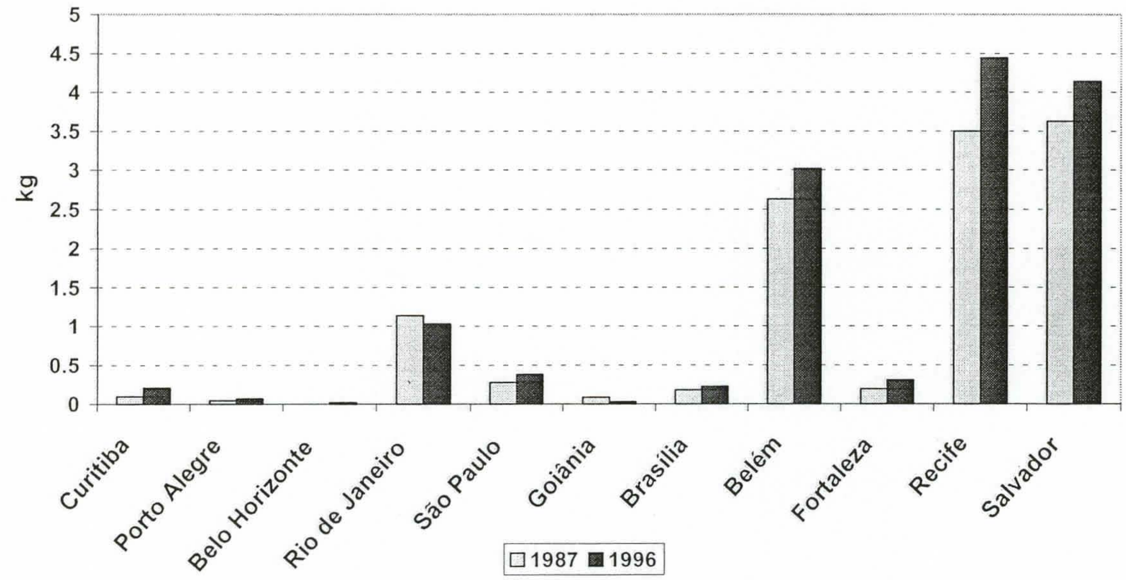
[20] On charts no distinction is made between the different dried meat products. The common name «*carne seca*» (dried meat) covers *Charque*, *Jerked Beef* and probably «*carne de sol*», Interpretation of these charts will consider dehydrated meat products in general.

[21] Basic salary in Brazil is of 130 R$. In 1996: 1 R$= 1,2 US$,

3.2.3. The main consumption poles and consumers characteristics.

"Brazilian littoral from Rio de Janeiro up to Belem is where dehydrated meat demand is the strongest".
(Wholesaler in Salvador de Bahia)

Figure 23: Dehydrated meat consumption kg/*per capita*, principal metropolitan area -1987 &1997.



Source: IBGE, Pesquisa de Orçamento Familiar 1997.

North and North East

"Carne seca" is *"anchored in North Eastern consumption habits"*
(Charque producer)

When looking at figure 24, the major Brazilian outlet for dried and salted meat products is the North Eastern and northern regions of Brazil with an annual consumption *per capita* of more than 4 kg for Recife (Pernambuco) and Salvador (Bahia) and 3 kg for Belem metropolitan areas in 1996. "*Carne seca*" is consumed in all the social classes. (IBGE, POF-1997).

According to producers, retailers and restaurant owners' declarations we can sketch the consumer characteristics as follows.

- They are **regular**, year around consumers.
- They like choosing the product by feeling it to appreciate its hardness, smelling it to check the ferment smell and even taste it to check its flavor.
- Dehydrated meat must be **fatty** to have taste and give flavor to the meal.

«Beans without fat aren't tasty».

In Campinas, consumers originating from North and North East may complain that *Jerked Beef*, «Charque with chemicals», is odorless, and less tasty than traditional *Charque*. The «Nordestinos» rarely buy carne seca in small packs.

❁ South East

Highest consumption per capita in the South East is attributed to Rio de Janeiro, likely for its cultural and transitional geographical positioning between the South East and North East making it a bigger consumer of dried and salted meat products than São Paulo State.

Increase in the São Paulo metropolitan area is attributed in a consensual way to *Jerked Beef* for its correspondence with the middle class urban meat consumer expectations (*Revista Nacional de Carne*, 1999). Lately, traditional regional Brazilian dishes (based on dehydrated meat) popularization in restaurants is said to have favored *Jerked Beef* consumption in São Paulo urban centers (result from workshop and restorers visits). Restaurants sell *Feijoada* on Wednesdays and Saturdays.

For distributors and restaurants the consumption of *Jerked Beef* is **occasional** for the urban and happens during wintertime where it's mainly bought for typical warm Brazilian dish preparation, like the *Feijoada* and the *Arroz Carreiteiro*.

The trend in São Paulo State urban areas is ***light***, fat free oriented. Some restaurants make a distinction between the traditional and light *feijoada*. [22] In fact this occasional consumer is seen as a «health care» consumer who pays attention to the healthy and hygienic aspect of the product. One argument often stated by producers, retailers and restorers are the close to fresh meat chair color and tenderness of *Jerked Beef*, which favors this consumer choice.

Both States as big urban concentrations that historically drained an important flow of immigrants from North East in search of employment, represent Brazilian South East dehydrated meat main consumption poles.

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[22] Interviewed restorers buy *jerked beef* because it's the client exigency. After cooking meat keeps a red color, close to fresh meat. Restorers prefer the taste of *feijoada* made with *Charque* for its fat content. But for the client it's too greasy. One restorer always used *Jerked Beef*, and the other one started few years ago.

4. Summary of principal aspects of products commercialization and consumption.

- State of São Paulo urban retailers mainly market *Jerked Beef*. *Charque* is absent of most markets.
- Products are never named as *Jerked Beef*, but are sold with traditional names, like *Charque*.
- Consumer can choose between three "qualities" and prices, index-linked to raw cut market value, and varying with the retailer regular clientele.
- *Jerked Beef* fame seems quite recent in the South Eastern market.
- Regular and high consumption is concentrated in the North and North Eastern regions of Brazil.
- In São Paulo State consumption and selling peak is during the coldest months of April to July.
- We distinguish two types of consumers with different selection criteria...

Table 24: Consumers characteristics and products requests.

Consumer characteristics	***North and North East***	***South East***
Trends of consumption	Traditional, popular and regular.	Occasional, seasonal, and high institutional consumption.
Requests on products	Beige exterior aspect Hard and grayish-red meat Smelly and tasty. Unpacked.	Chair color close to fresh meat. Leaner meat Tender texture
Choosing criteria	"Smells, grabs and tastes", feels the product.	"Healthy-aspect", product visualization.

Source: Workshop result

- Product price seems the main handicap for sales increase.

CHAPTER 3

ANALYSIS, DISCUSSION AND RECOMMENDATIONS.

CHAPTER 3: ANALYSIS, DISCUSSION AND RECOMMENDATIONS.

PART 1: Is Brazilian dehydrated beef product consumption in crisis?

First of all, the dehydrated beef market in general is **threatened by cheaper meat proteins** like poultry, with largely more competitive prices. To give the reader an opinion, a kilo of chicken is 3 to 4 times cheaper than *Charque* (1 R$ / 3 to 4R$,) on the retail market. In the North and North Eastern metropolitan areas total consumption of "*carne seca*" increased by 8% between 1987 and 1996 when poultry consumption passed the 23% increase (IBGE, POF, 1997). As cattle meat in general *Charque* and *Jerked Beef* suffers of consumers trend towards "safer" sources of proteins. However we mustn't compare on a same base both products as they have different specifics and aren't total substitutes for one another.

Jerked Beef and *Charque* seem to have preferential outlets. *Jerked Beef* seems the leader in the South Eastern urban areas, for what we noted; and *Charque* for all stakeholders dominates the North and North Eastern markets, where dehydrated meat consumption is the highest. However, we noted that *Jerked Beef* producers are also aiming this outlet, and that *Charque* is also sold in Sao Paulo State, though in the rural areas.

We have pictured the products, their markets and sketched consumers. Looking at IBGE charts we can partly refute the belief that consumption is on a downtrend, at least in the North and northeastern metropolitan areas and in Sao Paulo. We didn't obtain any reliable information to explain the decrease noted in Rio de Janeiro, between 1987 and 1996. However this "static" image of the market doesn't allow us to feel the future of this category of products. How are they evolving on their respective markets? What are their strengths/weaknesses, opportunities and constraints regarding their environment?

We rely mainly on stakeholders' perception of the current markets to try to have a better idea of their evolution.

1 In the North and North East

In the North and North East, precisions were given by processors on the market evolution. The demand increased for 15 years and seems to be on a downtrend since 1996. This opinion can be partly backed by the chart on production that shows a sudden drop in production in 1996 (DATAMARK, 1998).

The economical context evolution in the North East has its repercussions on the *Charque* market. In the urban centers consumers are purchasing cheap and quick to cook products.

«Housewife is now working and doesn't have time to prepare dishes based on dehydrated meat».

In Pernambuco State, since the Brazilian government decided to partly cut off the sugarcane production subsidies, instituted during the pro-alcohol policy in the seventies, the region economy suffers of unemployment and increasing poverty.

«The market dropped in Pernambuco State because sugarcane activity is disappearing».

This argument can be partly backed by a processor who said that the demand of dehydrated meat used to increase during sugarcane harvesting period (October and march).

Also, ***Jerked Beef*** as a close substitute of *Charque* is entering the metropolitan region of Salvador. Sector stakeholders estimate its market share between **10 and 20 %.** *Jerked Beef* seems to represents a threat for *Charque.* Communication with a wholesaler in Salvador de Bahia informed that *Jerked Beef* mainly consumed by the urban higher social classes is now penetrating the "traditional" *Jerked Beef*-reticent retailing markets. *Jerked Beef* was sold 30 cents (centavos) cheaper per kilo than *Charque.*

On the contrary there is a belief in the North Eastern market stability for *Charque*, and possibilities of expansion in the interior rural areas is still topical. They argue that ***Charque* is etched in the North Eastern consumers' habits**. As a product of regional identity, it is not a product consumed for a question of fashion.

Although the North Eastern urban consumer seems to be gradually accepting *Jerked Beef, Charque* defenders insists on the fact that the product has particular characteristics that doesn't fit with North Easterners requirements on product taste and color...

2 In the southeast.

Of more recent onset we try according to processors to explain the relative success of *Jerked Beef* in the Southeast. *Jerked Beef* popularization in this region started at the beginning of the eighties. The use of curing agents gave the product a healthier presentation than the traditional *Charque* for a «health care» urban consumer, closer in his habits to modern trends of consumption. The increasing presence of supermarket distribution and strong development these last two decades of the agribusiness industry around the "ready to take" products obviously favored the development of *Jerked Beef* consumption in the urban areas. The (necessary) use of vacuum packaging, for product preservation and presentation to match with consumers and supermarket requests, the steadier quality of the product marketed through small sizes turned out to be a good support to inform and visually attract the consumer. *Jerked Beef* producers, in a way, popularized dehydrated meat in the southeastern urban areas. *Charque* suffered of a bad image.

"Jerked Beef was seen as a modern and new product" Paulistas were biased against *"Charque for its quality and its connection with open-air retail markets in the Northeast..."* (processor).

Today, *Jerked Beef* is mainly made of forequarter cuts, and sold in small pre-packed quantities. However it seems that hindquarter, leaner and «noble» cuts are gaining popularity via supermarkets and hypermarkets distribution channels. Some *Jerked Beef* processors are looking forward in increasing the share of inside and bottom round cuts in their production. A more specified and differentiated market is developing, for a "richer" consumer. The *Jerked Beef* sector is adapting its production to new requests in the Southeast.

For producers *Jerked Beef* is the future of Brazilian dehydrated meat. It will supplant *Charque. Jerked Beef* technology already allows a certain "elasticity" on products quality. First, one can use various cuts for differentiated markets. Second a reasoned use of curing agents can give different attributes to the products according to specified requests (ex: more red, more pink, more wine-red color...). A processor already uses this shrewdness for selling *Jerked Beef* in the Northeast. Finally shorter to process, with higher final water content, from a processor's view, is the basis for the relative higher profitability of *Jerked Beef* production on *Charque.* Which also enables them to market a cheaper product than *Charque* and therefore increase their market share on the dehydrated meat segment.

However, *Charque* has, for processors selling in the South Eastern region an outlet opportunity with the "*ethnical*" market development in the cities. Then, *Charque* can be defensible as a traditional and natural (chemical free) product, and as a product of the Brazilian meat history. A producer is already developing through its packaging this market segmentation.

Table 25 summarizes sector products strengths, weaknesses, opportunities and threats on their markets.

Table 25: Charque and Jerked Beef Market SWOT matrix.

SWOT	North East "A Natural Market"		South East "An evolving Market"	
	Charque	*Jerked Beef*	*Charque*	*Jerked Beef*
Strengths	-Traditional product.	-Price/Charque -Relatively adaptable quality product.	-Supporters of the Charque taste...	-Price compared with Charque. -Various cut sizes and qualities.
Weaknesses	-Price/ poultry - Price / jerked beef	-Price/ poultry. -Doesn't corresponds with "natural" dry meat consumers.	-Price/ poultry	-Price/poultry
Opportunities	Rural areas.	-North Eastern urban markets. -Supermarket and hypermarket distribution.	- Exploration of the - Ethnical, traditional markets trend in the South East.	- Market segment on «noble cuts». - Development of new recipes.
Threats	- Jerked Beef market development in the North East. - Cheaper products of substitution - Consumers purchasing power. - Changing consumption habits.	- Consumers acceptance.	- Product quality variation... - Consumers expectations on products.	- Cheaper products of substitution. - Consumers purchasing power decrease. - Seasonal consumption habits.

3 The dehydrated meat market sounds weakened and Jerked Beef seems the most adapted in the urban areas.

Charque seems threatened on its natural outlet in the North Eastern **urban areas,** where changing life styles and conditions, favor the onset of its closer substitute. Though *Charque* probably still has a serious opportunity in the rural areas where modern distribution channels and conservation facilities are less accessible. In the South East, *Charque* development through a specific outlet seems difficult looking at the expanding presence of *Jerked Beef.* The latter combines various strengths: the product is adapted to the latest distribution systems (supermarkets and hypermarkets) and corresponds to modern trends of consumption.

But both products price relatively to other more common sources of proteins (eggs, sausages, chicken, pork meat), is the main limitation for increasing their market share. However there are mostly consumed by the poor social classes, which reinforces the idea that price isn't the only criteria, and that Brazilian dehydrated meat as a whole is a cultural and national product.

But products may have alternatives to find more outlets. The idea would be for producers to negotiate price premiums finding or other ways of valorizing their production. The following points are some "traditional" proposals/recommendations.

- Products could be diversified in other sizes, presentations (cuttings). Producers could develop a range of different tastes...via artificial (liquid smoking) through injectors for example. Or add different herbs during the dry salting step.

- The product can be long to prepare. The idea would be to develop a pre-desalted product, "ready to cook", "ready to eat" ...

- Continue developing and diffusing new recipes based on dehydrated meat to promote its utilization and show its various possibilities.

- Associate producers for a national campaign for product promotion that could be beneficial to product image...this campaign could be backed by SEBRAE, who makes TV spots for helping small agri-food (and others) industries to promote their products.

- In order to segment the market; widen artificially the range of products specifying muscle names (hump, brisket, bottom eye round...) on the small packs.

- Develop a standard quality identifiable by consumers. This can be the basis for further differentiation strategies.

- Develop a quality seal at the industry level. This could add value to the product and segment the market for producers. The idea is to create different levels of quality and enhance product image.

However, all these proposals must be assessed by consumer surveys in order to define its requirements on quality, prices, product presentation, and its consumption trends...

PART 2: A price oriented market, in a restructuring process.

In this section we characterize and analyze the transactions between each cluster of the *Charque* and *Jerked Beef* agribusiness system, illustrated in figure 24, according to the Transaction Cost Economics analysis framework. At each level we characterize how (on which bases) transaction takes place, assess transactions attributes (asset specificity, frequency, uncertainty and the information structure) and identify what **constraint** clusters meet in this transaction. This will allow us to understand how the agribusiness system is coordinated and what is his current evolution.

Cattle are transformed in various cuts at the slaughterhouse, with different attributes (price and cuts categories). Cuts are then processed in *Charque* and/or *Jerked Beef* in Charqueadas. Charqueadas can be either independent structures (group 1) or integrated vertically (group 2) to a larger meat industry. Also we noted that meat industries, with no processing installation, externalized the dehydrated meat production (group 3) to factories of both groups. Different wholesalers and retailers distribute *Charque* and *Jerked Beef* product for consumption on two different markets: the north and North East and in the South East.

In our study we consider the three following transactions:

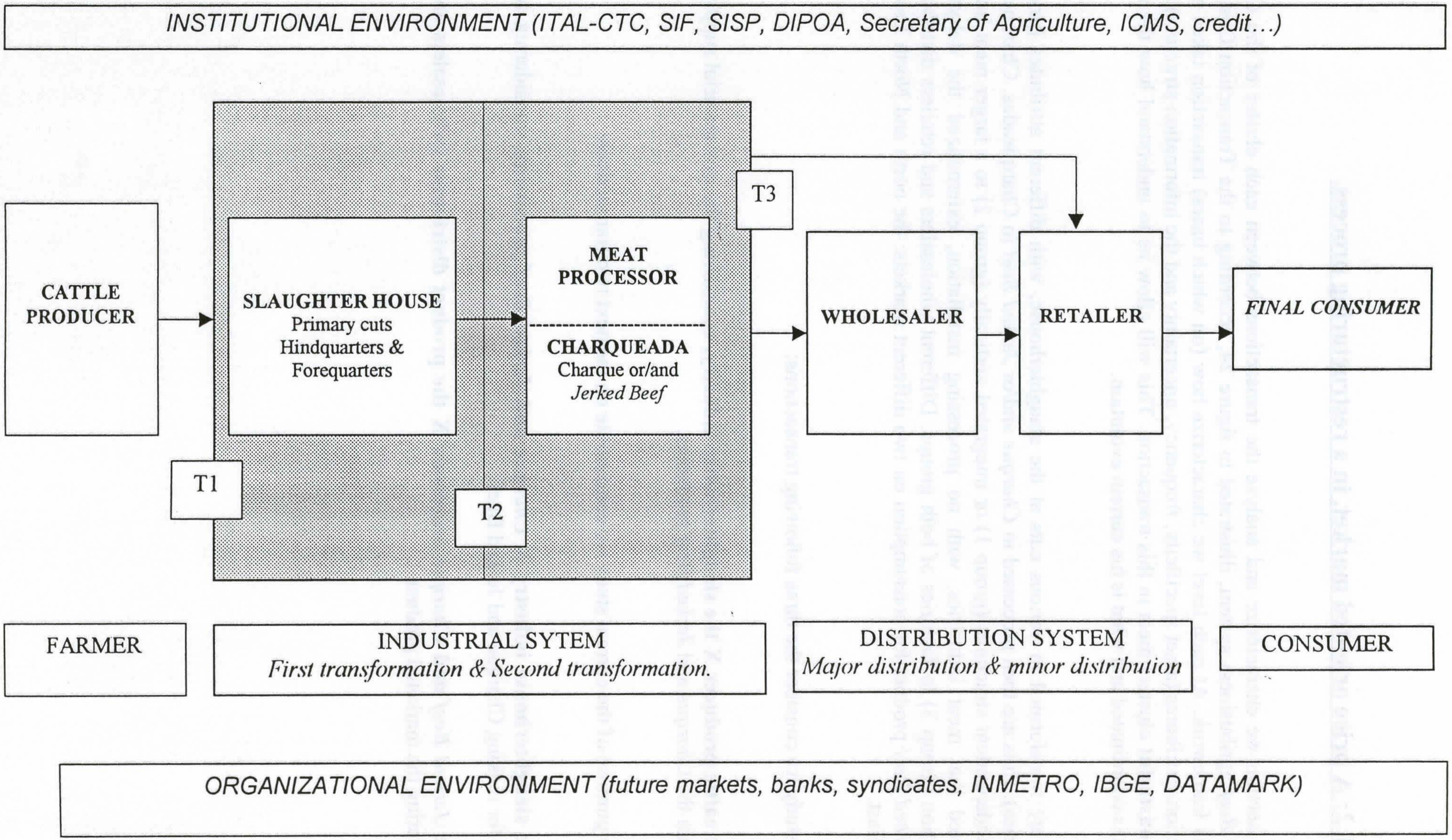
T1: the **cattle producer X the slaughterhouse industry,** considering the raw material supplying system upstream the *Charque* and *Jerked Beef* producers.

For the purpose of the current study we concentrate on the next two transactions:

T2: the **slaughterhouse industry X *Charque* and *Jerked Beef* processors,** considering raw material supply for making Charque and Jerked Beef.

T3: the ***Jerked Beef* and *Charque processors* X the product distributor** (wholesalers and retailers). Considering the marketed product.

Figure 24: Visualization of the dehydrated meat Agribusiness system.



1.Characterization of the transactions

1.1. Cattle breeders and slaughterhouses.

Cattle production and slaughtering industries are concentrated in the same geographical areas. **Information** on price and quantities in different Brazilian regions is **efficiently diffused** all over the country (ex: *Bandeirantes* TV program and *Folha de São Paulo* daily newspaper).

There are a large number of producers. Slaughterhouse preferentially work with 18@, beef cattle (more profitable as they make their benefits on the "fifth parts"), mostly Zebu. Premium paid to cattle producers by the slaughterhouses for a specific quality (leather or meat) is at their faltering steps. (WILKINSON, 1993). This because meat demand isn't enough differentiated (DE MELLO BLISKA, 1998). Also the large slaughterhouses may integrate partly or totally cattle production, through specific contracts with breeders or by integrating vertically cattle production. But this type of concentration is still exceptional. In general no long-term contracts; or even written contracts are settled. The slaughterhouses directly or through middlemen on the spot market buy cattle.

A cattle transformation at the slaughterhouse industry is basic (½ carcass in forequarter, hindquarters and flank and plate) and no specificity on final product is added via technological interventions. For both parts in the system the margins are small (DE MELLO BLISKA, 1998), two characteristics of commodity products. In this transaction **the asset specificity** is **low**.

Given the large number of cattle producers, supply **uncertainty** for a slaughterhouse is **low**. However, the slaughterhouses can face difficulties for buying cattle. Most of Brazilian cattle are raised extensively (ANNUALPEC, 1999). Cattle fattening is **connected to a seasonal** uncontrollable factor, rain, witch regulates fodder and consequently annual beef cattle availability. Subsequently it has incidences on cattle price. In Brazil, cattle is a speculative, "capital on feet" asset for many producers (80% live in São Paulo State cities and have other activity!). Prices and quantities are not controlled by government, which gives cattle producers, aiming maximum profit, a temporal bargain power in front of its clients [23]. Next chart shows on a 10-year time series how meat production in Brazil annually follows the cattle price evolution.

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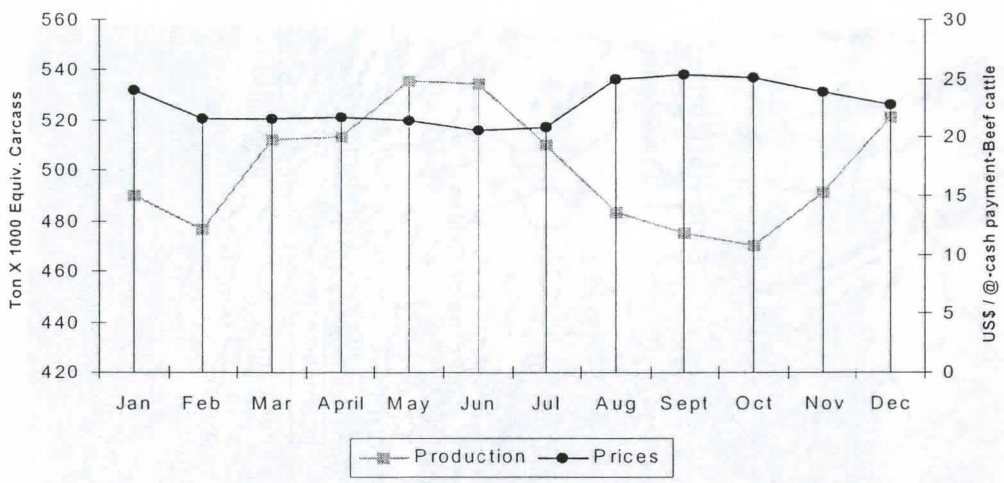
23 Historically, this bargain power, in 1986 cattle producers used it and paralyzed the Brazilian beef offer during several months because cattle price wasn't high enough.

Figure 25: Beef Cattle price and meat production annual mean evolution- 1989-1999.



Source: elaborated from ANNUALPEC 1999.

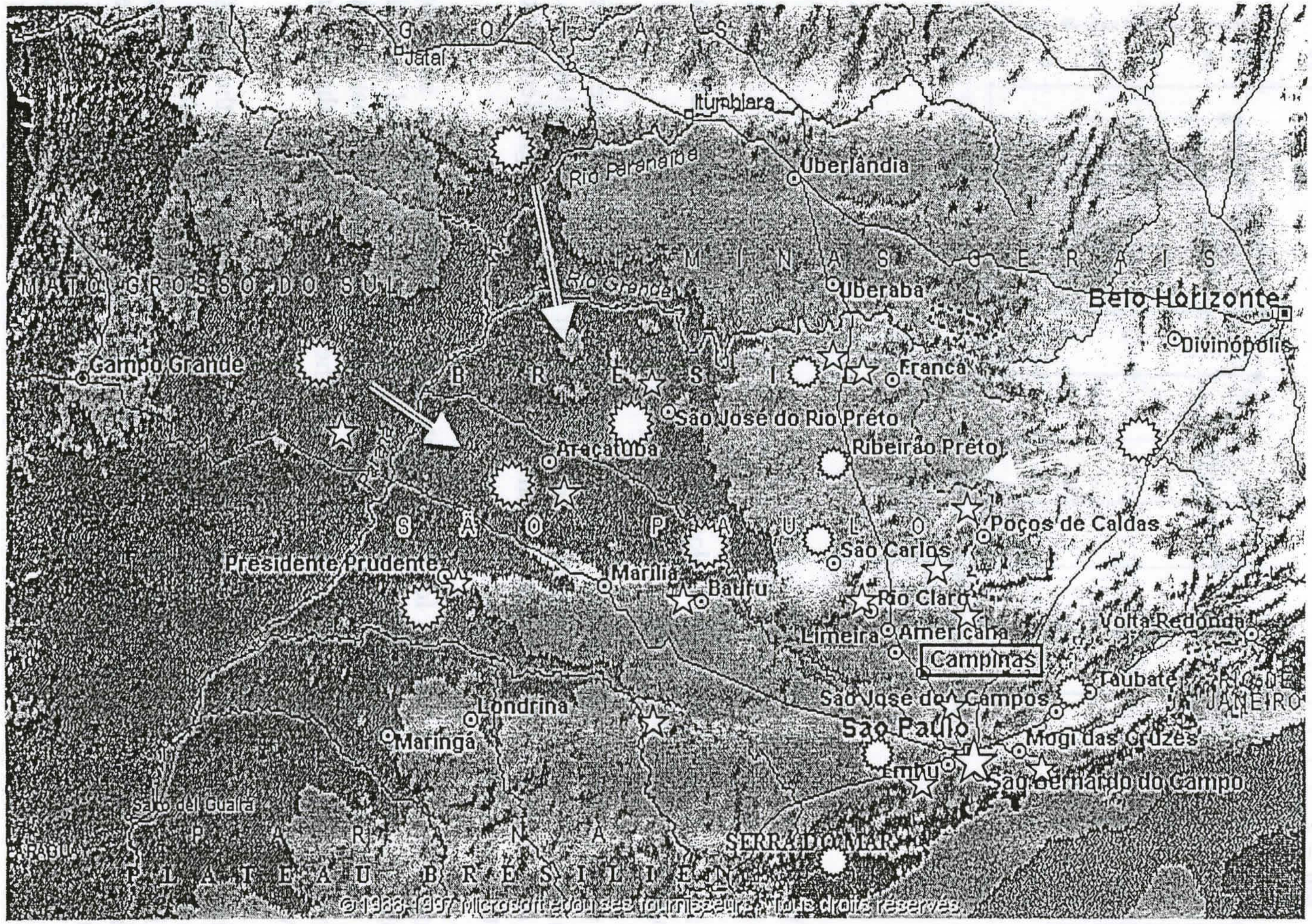
In this context slaughterhouses are brought to slow down their activity, increasing their production costs due to their temporal over capacity.

However, along the year the "organizational" answer for the slaughterhouse to hedge against the risks of price fluctuation is the future market (*mercado futuro*). Though it can be beneficial for the whole chain regulating cattle offer and meat price, this quite recent structure isn't used enough (Seminar on beef cattle in São Paulo State University, June 1999).

In this transaction, and because margins for the slaughterhouse are (traditionally) small **opportunistic behavior** can take place. In fact existence of confidence problems relative to real animal weight loss during transport (falsified weighing machine at the abattoir) and subsequent price paid to cattle producer can have negative repercussions on the relations between the two segments of the channel (personal communication with cattle breeder).

In order to maximize profits and minimize costs minimal storage is necessary for the slaughterhouse. In other words the tight-flow production is the best strategy to be adopted to reduce costs. When cattle availability is high at lower price transaction recurrence may increase. But in general as cattle meat demand in Brazil doesn't fluctuate the **frequency** of transaction between the cattle producer cluster and the slaughterhouse industry is **high**.

Figure 26: Cattle and meat production and Charqueadas concentration.



Meat production concentration

Charqueadas

Incoming cattle and meat flow

1.2 Transaction is uncertain for small charqueadas.

This transaction concerns charqueadas that are not hierarchically integrated to a slaughterhouse (GROUP1), and only work with *Charque* or *Jerked Beef*.

Nominal primary cuts/kg prices (flank and plate, forequarter and hindquarter) are available and diffused daily all over the country via TV, Internet, and newspaper. (Ex: *Folha de São Paulo)*. Also the proximity of slaughterhouses and charqueadas in São Paulo State reinforces the idea that **information** on products is **efficient**.

Though, producers may work preferentially with some "well-known" meat suppliers, negotiation is always made on **a price basis**, connected to primary cut relative market value and quantity. Price is the first criteria of the negotiation. They purchase raw material in cattle producing states slaughterhouses (MG, Ms, Go, To, Ro, Pa...), including São Paulo State (Figure 26). We remind that slaughterhouses are considered as meat wholesalers and raw meat as a **commodity** product. *Charque* or *Jerked Beef* producers never said to develop specific long-term contractual policy with any supplier. The deal between the slaughterhouse and the meat processor is often confirmed verbally by phone or by fax, on **"confidence basis"**...Meat might be paid cash or with a delayed payment of 15-25 days.

Transaction **frequency** is **high** as we consider that most charqueadas aim minimum storage since they rarely have any freezing facilities. For São Paulo producers the best buying opportunity, following the cattle offer cycle, would be during the months of April and May. This period corresponds with the beginning of the best processing period when rainfalls diminish in intensity and frequency and matches with demand increase for *Jerked Beef* in São Paulo State.

Looking at the slaughterhouse concentration in São Paulo State and raw meat offer in the surrounding States the **uncertainty** for a charqueada of not finding a supplier is **objectively low**.

"You always find a slaughterhouse that has meat to jerk"
(Processor in São Paulo State inland)

However, small and medium *Charque* and *Jerked Beef* processors identified in the group 1, today meet limitations for buying raw material. Here are some reasons.

- Transport costs increase today limits raw meat offer at a competitive price.

Transport cost growth in 1999 (gasoline and ICMS[24]) limited raw material offer at a competitive price for Charqueadas in São Paulo State. On the other hand it stimulated the creation of new processing units in the large cattle breeding states (MG, RO, GO.). In fact ex-São Paulo raw meat suppliers have there the opportunity of producing dehydrated meat at low cost (technical, labor and space), instead of sending raw material to São Paulo processors; which helps bettering slaughterhouses often fragile financial situation. Consequently, charqueadas in São Paulo face raw material shortage and reduce, interrupt or even stop their activity.

[24] ICMS: Imposto sobre Circulação de Mercadorias e Servicios is a tax paid on merchandize transport between States more or less the common VTA, Values Added Tax.

Also I believe that legislation evolution concerning raw material transport (boneless), and their positive repercussions on cold chain control and meat flow in São Paulo city probably worsen the situation of structures that use to take advantage of fresh meat distribution inefficiency.

- Slaughterhouse mistrust and Charqueadas lack of liquid assets.

"Slaughterhouses don't accept delayed payment anymore..."
(Charque producer)

We noted that processors are inclined to supplying difficulties likely because of slaughterhouse "skepticism" on their financial solvability, slaughterhouses being also weakened by a lack of funds. We also noted that the new Charqueada market insertion is jeopardized, as he needs «to built up his reputation». For factories, with no cash flow elasticity, the choice of suppliers is reduced. Slaughterhouses likely prefer working with larger producers.

- Charqueadas suffer of raw material price fluctuation.

When disturbances (quantity and price) occur in T1, as Charqueadas process a residual product of the first cattle transformation industry, they have direct repercussions on processor activity intensity and subsequent production cost increase due to a passing over capacity. A producer had to reduce 80% of its *Jerked Beef* production during the month of July (best selling period in São Paulo State) because slaughterhouses faced a lack of cattle offer.

As Charqueadas are not equipped with freezing facilities, they face impossibility for financial and final product pricing reasons of storing meat and compromise their chance of putting back the risks of meat price fluctuations. Some charqueadas are brought to use dumping policies to stay on the market when they can't reflect the rise on their product.

1.3 Distributors have a large choice of processors.

In this transaction we consider the North Eastern and South Eastern markets.

On an annual basis transactions between these clusters are higher reaching the "best-selling" period in the South East (April), while in the North East, as consumption is higher and regular **transactions** likely happen **steadily**. However this depends of each distributor storage capacity and sales turnover.

The number of characteristics attached to both products is few. The technology is quite homogeneous between producers. No additional value is joined to products with a specific technological intervention that could differentiate products; would it be *Charque* or *Jerked Beef*. Some products have more fame for their steadier quality. In these transaction **the asset specificity** connected to product is **low**.

1.3.1. In the North East distance makes the transaction uncertain with the wholesaler.

The *Charque* and *Jerked Beef* buyers are wholesalers and supermarkets. Producers and one wholesaler are the main sources for characterizing relations between these two clusters. We didn't obtain revealing information on supermarket and hypermarket though discussions with stakeholders furnished indications on this actor in the North East.

a) Charque producer x Wholesaler.

«We don't have a big negotiation power, they know our processing costs and the prices on the market»
(Small Charque processor in São Paulo State)

Commonly the product is first bought on **price/quality criteria** (hardness, fat and color, absence of *vermelhão*). Wholesalers work with different brands.

Classical market contracts set the deal. When the buyer receives the merchandize he is due to pay it, according to what was previously negotiated. Merchandize is paid within 30 to 60 days. Product market acceptance and processor reputation in the sector is an argument for the wholesaler to choose his partner. On the other hand processor will deal with a wholesaler that has a *prosperous business*.

On the North Eastern market, producers insisted on the fact that there are many **legal and illegal suppliers**. This rough competition makes the retailing market prices change every Monday (up to 10%!). Negotiation wholesaler-retailers are like a «stock exchange» market: Large offers VS large demand in a given day and time. Therefor **asymmetric information** due to distance and the absence of any information structure on prices in the North East for São Paulo producers gives the **wholesaler** more negotiation arguments and consequently a bigger **bargain power**.... With full information, the buyer is in a greater position to insure that it receives the most favorable prices offered to others and can counter suppliers' claims that their viability is threatened...

Distance between supply and demand can also favor buyer **opportunistic behaviour**. The presence of virtual and dishonest wholesalers in the North and North East is a problem for São Paulo processors. Charqueadas may suffer payback difficulties and even merchandize robbery...and justice is hard to apply on a ghostly buyer.

«You better know someone up there!»

For these reasons some processors abandoned the north and North Eastern market. It even happened that a wholesaler, forcing producer's bankruptcy bought up the Charqueada (information from producers and wholesaler). Here we note that buyer posed or still poses a credible threat of backward integration for some producers.

Because they produce small quantities some processors are unable to diversify their clients and work with a single distributor. The later has a tremendous power on processors' activity. Processor is incline to distributor opportunistic behavior, like changing of supplier. In this case the transaction **uncertainty** is **higher** for the small producer.

During the eighties because of processors "lack of professionalism", buyers could face delivery delay, product quality and quantity problems. To counter uncertainty wholesalers started working with a little hand of producers, for whom they became regular distributors on the North Eastern market.

b) *Producers x North Eastern Supermarkets*

For *Jerked Beef* processors working in the North and North East, the distribution strategy is aiming the urban consumer mainly through supermarket distribution. The later may be an independent structure or affiliated to a buying central service but we didn't obtain any readable information on this point.

However, there seems to be a growing competition between traditional wholesalers and supermarkets, which results in the diminishing of wholesaler's presence, and subsequent bargain power in this transaction (workshop result).

1.3.2. In the South East, market mode prevails in a structured distribution.

«Today, if you're 10 cents more expensive nobody will buy your product»
(Processor)

From March to July transactions **frequency** between producers and major and minor distributors are obviously **higher**.

We noted a large number of brands on São Paulo State market, and products aren't much differentiated (packaging, cut choice, price). All interviewed agents acting on the distribution of Jerked Beef first put forward the price criteria associated with quantity and a reasonable quality (no exudation, dry enough) for choosing one producer rather than the other. Distributors may work with a single brand or various at the same time. This to have a larger choice of products for their clients. From distributors no particular problem was pointed out in this transaction.

All processors from which we gathered information deliver the product as they often have their truck fleet (proper or affiliated) which helps their distribution efficiency (rapidity and elasticity). The punctuality of delivery is another discriminating criteria for choosing a producer. Contrary to the North Eastern market, producers in the South East have a **good information** on prices and competitors since they are close to their distribution network.

We admit that **asset specificity** is **low** because products are very similar - like in the North East, even if producers are aiming new outlets through more specific cuts (hindquarter) for a specific distributor, the supermarkets and hypermarkets.

More specifically three transactions are described.

a) *Producer x wholesaler*

Processors and regional wholesalers, renegotiate product price and volume to be delivered monthly. The deal is shut by a standard classical contract. Given the large number of products on the market, the wholesaler has the possibility of changing of supplier. Though the wholesaler has a strong bargain power, he isn't the only alternative for the supplier to flow its production.

b) *Producer x Central buying service*

"You have to pay to get in»

Hypermarkets central buying service quality quantity and delivery requirements are likely to imply producers' production management professionalism. Hence, large *Jerked Beef* producers with regular quality products are the most able to answer central buying service demand. The central buying service deals with 5 to 7 producers at the same time in the same room. The one, which has the **best price,** obtains the market. Producers, who tried to have their product referenced, argue that dealing with the central buying service is very tough.

For the producer the uncertainty that the transaction doesn't occur as planned is low (contract and delay of payment is respected).

c) *Producers x retailers*

The transaction recurrence will depend on each retailer sales turnover. All aiming minimal storage.since outside temperature is an important regulating factor of the demand. That's why small-scale retailers (small supermarkets and specialized grocers) buy directly their products from the producer who delivers weekly if necessary. Hypermarkets (which have higher outputs) an affiliated supermarkets, order through their central buying service.

The grocer, for example, deals by phone, directly with the producer. The high concentration of sales points in a restricted area like the Municipal covered market forces retailers having reasonable quality products with attractive prices, for a price sensitive buyer.

" We all sell the same brand, it's a question of price".

For **price reasons popular market retailers can be brought to change of supplier weekly**.

Some processors (Group 2 and 3), take advantage of pre-existing strongly established distribution channels built for their leading product to distribute *Jerked Beef.* As a by-product for the fresh meat producer *Jerked Beef* may be also offered as an extra, to prime a good client or help negotiation succeed.

Next table synthesizes the discussion of the aforementioned sections.

Table 26: Transaction attributes assessment.

	Transaction attributes

Transaction		*Asset Specificity*	*Information Structure*	*Frequency of transaction*	*Uncertainty of transaction(risk)*
T1		Low	Efficient	High	Low
T2		Low	Efficient	High	Low High for small and/or recent processors.
T3	South East	Low to medium (depending on distributor)	Efficient for SE	High (seasonal)	High (numerous products)
	North East	Low	Asymmetric NE	High	Medium (with wholesalers)

T1: Cattle producer x Slaughterhouse. **T2**: Slaughterhouse x Charqueada. **T3**: Charqueada x distributor (wholesale and retail levels).

2 A sector in a restructuring process.

At all the levels of transaction little value is added to the product via specific technological interventions. The agribusiness system is coordinated by product <u>price</u>, connected to <u>quantity</u> and <u>quality</u>. Relying on producer's declarations the agribusiness system is organized on the market mode.

All along the system the absence of governmental intervention to regulate prices and quantities, the increasing taxation and high interest rates, mixed with a lack of federal control, likely favors the development of an informal production at all the levels. This "unfair" competition is prejudicial to the development of the "legal" sector, the latter being less competitive...however some processors likely take advantage of the situation to stay in the run.

In **T1**, the development of long term contractual policies would be desirable for cattle and meat quality bettering and prices stability. A study on the beef agribusiness system in São Paulo State conducted by De Mello Bliska made various proposals to increase cattle productivity and quality and accelerate production turnover...but a large share of cattle meat consumers aren't ready to pay a higher price for a more specified quality. Nevertheless, vertically integrating cattle production is obviously a good strategy to control all aspects of production, but the activity can be hard and costly to dominate (WILKINSON, 1993).

It's obvious that as a secondary industry the *Charque* and *Jerked Beef* producers can't influence the supply market and depend of the issue of the transaction in T1. Hence, we concentrate on the transactions in T2 and T3 to appreciate the sector coordination.

In **T2**, market mode seems to prevail. In this transaction Charqueadas can face various difficulties that are mostly connected to financial issues. We have noted while characterizing our producers that other forms of conducting this transaction existed. First, for historical reasons Charqueadas may be hierarchically integrated to slaughterhouses. In this case the transaction cost is inner to the factory. Second, because charqueadas are geographically next to meat providers they are probably brought to work frequently with some "well known" ones. Perhaps certain interdependency is established between the two clusters, both finding this transaction beneficial; and these likely influences their way of considering the transaction, on other bases than price (Intra-sector based agreements).

Different forms of governance must exist. But we aren't able to say which governance structure dominates at this level as we don' t know Charqueadas concentration, integrated or not in Sao Paulo State.

In **T3**: Market mode prevails on both markets. The rough competition on both markets gives the distributor a higher bargain power. In the North East distance is the main limiting factor for producers. However like for T2 we don't have an idea of wholesalers concentration in this transaction, and their real weight as an unavoidable distributor. Preferences exist, and a wholesaler working more regularly with a supplier, can be considered on the long run like a long-term contract. Hybrid forms of governance probably exist, the market mode not being the unique way out.

In the South East no major problems of distribution are encountered. Forward integration with the distribution segment varies from one processor to another, and its efficiency is hard to quantify looking at the diversity of producers. However, the real opportunity for producers would be to work with buying central services, to benefit of their network and high outputs, but for the latter long term contracts with their supplier(s) are contrary to their competitive policy.

From a TCE analysis point of view the governance mode adopted by the system is the most efficient as it can answer in the most cost economizing way to disturbances in its environment. Firms, which can't, for financial or structural reasons, have access to raw material, interrupt their production or shut down. The system auto regulates its self.

On this basis, it seems that in the dehydrated meat sector it's everybody for himself, no one looking forward in developing long-term contractual relations, everybody looking for the best opportunity. In fact it is not in the actor's interest of fixing long-term contracts as product price can vary, while offer in terms of quality doesn't differ sufficiently from one producer to another to build safe guards. By developing long-term contracts they could limit their bargain power.

Hence, in the industry the **competition between firms** is based on their ability of purchasing raw meat, efficiently, economically and consistently, producing (scale economies and process rationalization) and distributing their products at the most **competitive price**.

It is also based on their ability of dealing in the most cost-economizing way with **constraints** noted in T2 and T3.

1. Operational capital needs and availability / slaughterhouse confidence.
2. Raw material price fluctuation.
3 Informal/parallel market competition.
4 Access to distribution channels in the North and North East.
5 Absence of an information system on market prices.

These **constraints** are more or less active according to producer's **governance structure** and time presence in the sector. The existence of these constraints probably influences the current dynamic of the sector on both markets. This is our interpretation of sectors current evolution from the industry.

(a) In the Charque market, in the North East.

Small *Charque* producers for raw material access difficulties are shutting down while in other states, because the technology isn't hard to dominate, their ex-suppliers take the opportunity of developing a new activity. These new competitors entering with scale economies resulting from a favorable location for raw material acquisition and selling on the north and North Eastern market can represent a threat for São Paulo processors. Though São Paulo experienced producers (GROUP 1 and 2) experience curve for producing ("Know-how) and distributing ("confidence bases") at a competitive price a steadier quality product are probably two strengths that limit the prejudice of these newcomers on the North Eastern market.

The market in the North East seems hard to dominate. The presence of a strong parallel market, the lack of an efficient information system on prices and market demand and the few alternative to master the distribution of their products make that São Paulo producers can meet limitations for developing their activity and take advantage of market opportunities.

(b) In the South Eastern market, Jerked Beef:

Though no major distribution limitations exist for any player, the latter will have to enter the industry with a required higher capital investment for mastering the production of *Jerked Beef* and produce in large quantities (scale diseconomies) to fight on a price deterring market. That's probably why today **ex-small producers** or even **new players** (GROUP 3) **subcontract** partly or totally the production of *Jerked Beef* to lower the costs existing for raw material acquisition and benefit of the learning curve (know-how) of larger and more experienced producers. The active partners find there an opportunity of diversifying their income sources, guaranteeing a part of their sales, increasing their market share and limiting competition.

We believe that the *Jerked Beef* industry is restructuring, in a production concentrating process around large and well-integrated producers. *Jerked Beef* segment is getting more professional, and improving its competitiveness.

Nevertheless the high competition existing on the South Eastern market, concentrated in a short period, likely limits the profitability of the business. That's why producers seem tempted by entering the North Eastern urban areas, where consumption is constant, to flow their production all year long. Another competitor is appearing for the traditional *Charque* producer...

PART 3: Technology and productivity, a fundamental issue.

We noted that for producers that process duration was a limitation. Processors need a high operational capital, funds being immobilized at least for 12 days.

Also, process regulation (norms) and conduct doesn't allow mastering and permanently controlling the elaboration of a standard even-quality product. The process is rudimentary and each processor has its own recipe. From here final product quality is difficult to define.

Also we have seen that the system coordination is based on price and at the retailer level that product price was the main limitation for sales to grow, consumer being much more price sensitive since the real plan settlement, and even more in 1999 with the monetary instability. All these points are **potential limitations** for product development and sales increase.

The use of a new technology by processors may be a good opportunity for accelerating funds turnover in the sector, as they already did using tumblers and injectors and developing *Jerked Beef*, 30 years ago. The adoption of such a technology could change the basis of competition in the sector.

Today, **locally, technologies** exist and are scarcely used in the sector for producing both products. These technologies are said to partly shorten the cost related to process and favor hygiene standards. The last point is important. South Eastern consumer awareness regarding food safety is most likely rising.

Local technologies:

1) A possible **innovation** for processors is using a **vacuum tumbler**. According to the technological supplier; it betters brine penetration and considerably shorten (deletes!) the dry salting step. Supplier says that a processor who produces ***Charque* in 4 days** already uses the technique...

2) The equipment provider also developed a **drying chamber**, with private researchers in dehydrated meat products. This chamber is a sophisticated glasshouse. It's a hot air flow drying process, which uses as the traditional technique sunrays heating power. The glasshouse is equipped with electric powered propellers. Hot air is blown on separated bunked meat layers. Air full of humidity is released at the other end of the glasshouse tunnel. Humidity, temperature, pressure are controlled and regulated with electronic devices. This technology **facilitates drying management**, is **less labor demanding** (no night stacking), is cleaner (limits air pollution and man interventions on the product) and takes up to 18 hours for a correct drying. This technology has been used for over ten years in a Charqueada of Santa Catarina State and a factory in Rondônia (Northwest) planned to equip its plant with it.

These two interventions are the closest to the process used in the sector today. Other techniques are available, but their use is more likely to radically change product characteristics. They're main advantage, a-part from accelerating and improving hygiene standards in the process would be to open a new category of dehydrated meat products.

Imported technologies

1) The use of an oven like for making the American and Australian Jerked Beef, is also an alternative to the open-air drying. However pieces must be thinner than the current cuts 3-5 cm and fat free. A

Brazilian industrialist brought back the technology and process from the United States and developed a three taste range of products, ready to eat and sold in the gas stations...

2) Finally, a revolutionary process and technology, which deletes the dry salting step and is fully automated, is the De-watering- Impregnation by Soaking developed by the CIRAD. In less than two ours the product is salted and can even be smoked. Brine is regenerated and treated automatically. However it demands processor higher skills to dominate the process than for the other three alternatives. This process could be applied for the development of "pre-desalted" products.

Local technology and products strengths and weaknesses in relation to the current process are summarized in table 27.

Table 27: Technological SWOT matrix.

SWOT	TECHNOLOGY	
	Charque	Jerked Beef
Strengths	Low technicality Know-how.	Low technicality (but higher capital input than Charque) Higher yield than Charque
Weaknesses	Random quality products. Bacterial infection risks. Labor cost. Process duration. Hygiene at the dying step.	Random quality products. Packaging cost for small sizes. Possible use of thicker cuts. Labor cost. Shorter Process duration. Hygiene at the drying step.
Opportunities	Drying chamber. Vacuum tumbler.	Drying chamber. Vacuum tumbler.
Threats	Systematic quality control procedure implementation (HACCP for ex).	Systematic quality control procedure implementation (HACCP for ex).

However, in general, today producers are quite **reluctant** for using new technologies, especially for drying. The latter argue that sun drying in the open air is an important factor for product taste elaboration. Also we can underline that the sector is mainly composed of family run type factories, often not inclined to radical changes in the management of their production. The adoption of a technological innovation may be easier with new and small players, who could find there the opportunity of segmenting at their advantage the current two-product oriented market.

Also, in current macro economical context a technology could represent a **risk** that processors aren't ready to take especially when access to credits is limited, and that no clear market sounding have been conducted on possible acceptance by consumers of a modified dehydrated meat product.

Anyhow, technologies represent a possible opportunity for bettering product profitability and widening the range of dehydrated meat products and studies by the R&D bodies should be conducted on these issues.

PART 4: Validation and prioritization of principal constraints and opportunities.

An essential element of the study has been the participatory nature and the integration of client opinion with expert analysis.

Though a representative group attended the workshop a minority of the interviewed ones were present. The principal under represented were product distributors. However with presents a consensus was obtained on most results but not all because of divided interests between guests.

The analyzed results, in this document doesn't reveal "so directly" the main constraints/limitations, as they were presented at the time of the workshop. However table 28 show that most actors agreed on the most obvious sector limitations (high costs, lack of an information system,..), that were underlined in the study.

During the workshop, lively discussions were had about how to renew the currently dormant association of producers. They acknowledge the longer-term need for meat fiscalization (efficient control of the clandestine market), however the current absence of its implementation generates short-term profits and from here expert opinion on these issues was/is hard to be adopted by the sector.

An important outcome of this workshop was the little concrete interest of industrialists to participate in a future action plan. Maybe due to a distrust with collaborating institutions?

Table 28: Aggregated prioritization of results on sector limitations.

Analyzed constraints/limitations	Factory	Distributor	R&D
Number of answers for each actor group.	**12**	**4**	**10**
1 High price of the product.	**H**	**H**	**H**
2 Lack of product quality & standardization.	**H**	**H**	**H**
3 Information system (absence on consumption, prices, market in general)	**H**	**H**	**H**
4 High capital flow cost.	**H**	**M**	
5 Raw material price fluctuation.	**H**		
6 High taxes.	**H**	**M**	**H**
7 Lack of contract systemization with providers and distributors.			**H**
8 Absence of a syndicate or association for the dry meat producers.			**H**
9 Absence of institutional assistance for sectors product via advertisement («national product»).			
10 Absence of national quality norms.			
11 Lack of clandestine market control?	**H**	**H**	
H= High, M=Medium, L=Low importance			

Source: Results from a workshop with the sector's principal actors, CTC, 19/10/99

A fundamental aspect of this type of meeting is that all actors participate. This enriches and widens the spectrum of discussion. Nevertheless in this case, for many stakeholders, it was a "premiere"; most never participated to any kind of meeting where their opinion/ideas were essential. The effectiveness of the meeting is then based on the capacity of the master of ceremony to conduct the debate. Perhaps here, the fact that the workshop was managed by an institutional director instead of a professional facilitator didn't allow to optimize the meeting.

CONCLUSION

CONCLUSION

Results:

In the previous sections, principal stakeholders have been identified. Products and technologies have been assessed. Markets have been identified and consumers sketched. The principal current constraints have been proposed and validated by stakeholders. Opportunities and potential research & development topics have been put forward.

Regarding the postulated hypotheses, it seems hard to doubt about the evolvement of the dehydrated meat product consumption in Brazil. One fails to get any clear indication that it is stagnant and even less declining. I'd rather argue that it's the reverse.

- One point that seems undeniable is that both products are anchored in Brazilian consumption habits, even though consumption remains either just occasional or remains at constant levels, depending on the specific regions. Hence future consumption levels (at a minimum) should not be below Brazilian population growth levels.
- All charts on production and consumption are positively oriented. One may argue about the absolute numbers, but it is the upward trend which is most relevant
- In the present macroeconomic conjuncture the product price is certainly a handicap for sales future increase, though apart from poultry, other competing meat protein prices may even increase slightly in the future. Our product is mainly consumed by the low income classes, for whom, significant future incomes increase are not to be expected...Furthermore, in Spain cured ham is consumed daily and is quite more expensive than cattle meat. Hence, a high quality product at the right price may boost further consumption, in higher income classes.

The São Paulo sector doesn't seem unorganized, and proves to be adaptable to changes. Effectively the São Paulo sector is evolving from *Charque* production to *Jerked Beef*. The latter seems to meet latest distribution and consumption requirements in Brazilian urban areas, which represent more than 75% of Brazil's population. Sao Paulo producers seem to be boosted by the *Jerked Beef* market. Having confidence in its development, meat industries are subcontracting manufacturing which is, I believe, restructuring and concentrating around large and experienced producers. Although, the South Eastern market seems the most favorable region to develop the dehydrated meat industry, more opportunities exist for further improvement of the sector. An effort in the field of marketing and widening its range of products may be another way forward.

However, one mustn't forget that *Charque* still represents the largest part of São Paulo Charqueadas' production and probably corresponds to a large extent to the widest dehydrated meat market share (North and North Eastern regions). We regret that the R&D team couldn't travel North East, to have a clearer opinion on products and markets. Nonetheless, it can be noted that , given that Brazil's largest share of the poorest households are in the Northeast, given that future economic development will not have major impact on theses households' purchasing power, and given that our two products are especially consumed by this consumer group, *charque's* future demand growth in the Northeast should not differ much from past trends.

The uncertain evolution of the macro economical context is unfavorable at the microeconomic level for industries to built long-term strategies, and obviously slows down factories ability to invest; diminishing by the same way technological innovations prospects in the sector. Current process and technology are mastered in a large extent. Though other opportunities exist for shortening process duration (which is a handicap for many processors) and for bettering product quality. The future development of the sector will be typically in hands of the larger integrated industries, which can have longer-term strategies and have relatively easier access to capital (for technology investments).

Besides conclusions on the technical results of the study, it seems appropriate to also distill some conclusions regarding methodological findings. The development and testing of the RASA approach as a coat rack for efficient tools applicable to sector studies under "marginal conditions" (secondary data, resources access...) has proved to be most useful. The participatory, multi-disciplinary and informal data gathering approach can be validated. The organizational and operational steps for the planned activities proved to be successful.? However, as will be further noted in the last section, the appropriate identification and subsequent integration of key economic theory parameters still poses a continuing challenge needing further research.

Shortcomings of the study:

As has been already alluded to, the available resources base for this study was very small. While these conditions were taken *ex-ante*, as a major challenge to adapt appropriate methodologies under such hard conditions, from an *ex-post* point of view, it is clear that operational resources proved to be insufficient. Additional study insights could have been gained if more travel and visits would have been possible... For example, a trip to the Northeast would have been very useful and could have significantly strengthened the analysis and its conclusions (regarding *Charque* demand and consumption issues).

Related to the study's resources is also the fact that the Sao Paulo state's *Charque/Jerked Beef* sector represents a worst case scenario for conducting a sector analysis, since it combines the absence of quality data, illegal product circuits, conflicting ideas and information, distrust and lack of interest with processors, lack of association etc. These conditions imply a major R&D challenge for any researcher and the subsequent holes of information and some conflicting results.

Furthermore, it should be noted that the author, together with its collaborators, embarked on experimenting with a non-validated method for sector analysis. Because of this, while certain elements of analysis and principles were successful, some other aspects (i.e. integration of economic theories and subsequent analytical tools) have hampered the study's analysis (and need subsequent further work).

Areas for further research:

While a very useful set of information has been collected and analyzed in this study, further research will be needed on two accounts: (a) regarding sector information to enable it to draw up a concrete plan of action for its development, and (b) regarding further refinement of the methodology especially concerning the integration of analytical tools.

More specifically, regarding the former, further research will be needed on consumer preferences, concerning current and possibly improved *carne seca* products (vis-à-vis competing animal proteins). In addition, far more detailed financial enterprise analysis is needed to get a more detailed picture of financial management etc. Perhaps some additional sector policy analysis could be useful.

Regarding additional methodological research that is needed, two areas seem most pertinent. First, there is a further need to identify the most efficient analytical parameters of the different economic theories (SCP, TCE, NIO, ...) which then need to be properly integrated. On the other hand, regarding the optimization of actor participation in sector analysis, a series of questions have been risen that all deal with participatory techniques and organization. Some of the remaining questions, related to this and aforementioned issues, include:

1. What are the minimum data requirements for cost analysis and other hard data (gauging market size....) in absence of relevant secondary data / earlier studies?

2. What are the minimum critical mass, practical links and best use of underlying economic theory (which ones, how much, translated into which parameters)?

3. What is the effective use of participatory methods under different conditions, both for obtaining information and particularly for achieving actors assessment of constraints, opportunities, scope for action, co-ownership?

4. The role of moderation techniques in the participatory process : which techniques, by whom, what possibilities for training are in this area?

5. How much multi-disciplinarity is needed ?

6. How to embed operational components in recommendations/follow-up in terms of business plans, sub-sector strategies (since for most R&D institutions the RASA activity, most often only represents a first phase of the total project)?

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List of Acronyms

ABIF: Associação Brasileira da Industria Frigorifica.

CIRAD: Centre International de Recherche en Agronomie pour le Développement.

CNEARC: Centre National des Etudes en Agronomie des Régions Chaudes.

CTC: Centro de Tecnologia de Carnes.

DATAMARK: Datamark.

DIPOA: Departamento de Inspeção dos Produtos de Origem Animal.

EMBRAPA: Empresa Brasileira de Pesquisa Agropecuária.

FAPESP: Fundação de Apoio a Pesquisa Econômica Cientifica Paulista.

FIPE: Fundação Pesquisa Econômica.

IBGE: Instituto Brasileiro de Geografia e Estatísticas.

IEA: Instituto de Economia Agrícola.

ITAL: Instituto de Tecnologia de Alimentos.

RIISPOA: Regulamento da Inspeção Industrial e Sanitária de Produtos de Origem Animal.

SEBRAE: Serviço Brasileiro de Apoio as Micro e Pequena Empresas.

SECEX: Secretaria do Comercio Exterior.

SIF: Serviço de Inspeção Federal.

SINDIFRIO: Sindicato da Industria do Frio no Estado de São Paulo.

SIPA: Serviço de Inspeção da Produção Animal.

SISP: Serviço de Inspeção Sanitária Paulista.

UNICAMP: Universidade de Campinas.

PROCON: Serviço de defesa do consumidor.

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Annex 1: INFO GAP MATRIX

Development of the Info Gap matrix.
By gradually filing the blanks of the matrix one is able to follow on a time-efficiency scale the rapidity and easiness of collecting information along the channel.

MATRIX for INFO GAP ANALYSIS CHARQUE/JB SECTOR

Chain stakeholders And the assessed parameters	Qualitative Information.	Quantitative information. (Time series)	Source. Key Informant along the channel	Remarks, comments.
1. Beef Breeder				
Production				
Prices				
Geographical distribution				
Governmental policies				
Integration with Slaughter House				
2.Slaughterhouse				
Structure and Concentration.				
Volumes				
Prices per type of Product				
Geographical distribution				
Governmental Policies				
Integration with charqueada				
3. Charqueada (CH/JB)				
Stratification				
Concentration				
Volume per product				
Prices per product				
Geographical Distribution				
Governmental policies				
Integration with distribution				

4. Distribution channels				
% per middle man				
Volume per type of product				
Prices per type of product				
Geographical distribution.				
Governmental policies				
Retailers integration				
5. Sales points				
% per point, per product				
Concentration				
Promotional level				
6. Consumption				
Prices per product				
Volumes				
Quality, packaging, etc.				
Consumption increase				
Type of consumer				
Governmental policies				
7. Exports				
% total output				
Products				
Concentration				
Destination				
Promotional				
Quality				
Policies				

Beef Breeders.
Slaughter House Industries.
Jerked Meat Processors.
Distributors.
Consumers.
INFO GAP MATRIX.

Annex 2: Distributor Interview Checklist

Distributor Checklist.

Products

- The different desiccated meat products: names and prices.
- Sales, volumes, late evolution, Charque or/and Jerked Beef?
- Prices evolution through time, year?
- Future of these products?
- Consumers requirements?
- How to increase sales? Product/consumers.

Suppliers

- Where?
- Who?
- How? (prices, delivery, state.)
- Why?
- When?
- Constraints, changes?

Centro de Tecnologia de Carne

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Para/To:

Empresa/Company:

Cidade-País/City-Country :

Fax:

Prezado Senhor,

O Centro de Tecnologia de carnes – CTC, do Instituto de Tecnologia de Alimentos, com o apoio dos principais atores da cadeia produtiva de carne seca bovina (*charque* e/ou *jerked beef*) do Estado de São Paulo, está estudando as limitações e oportunidades do setor produtivo, com o objetivo de construir um plano de trabalho para o desenvolvimento futuro do setor.

Dado que a informação disponível publicada sobre o setor é limitada, precisamos visitar e conversar com os Senhores para ternos uma melhor compreensão das dificuldades e possibilidades existentes no setor produtivo.

Todos resultados sensíveis obtidos durante as entrevistas serão conservados sob sigilo.

A equipe do CTC, composta de dois estagiários (da UNESP e do CIRAD, instituto de pesquisa francês) e de um pesquisador científico, se comprometem a enviar aos Senhores os principais resultados para que as recomendações finais para o desenvolvimento do setor possam ser discutidas e elaboradas conjuntamente durante um "Workshop" que se realizará em outubro.

O CTC espera contar com a participação de sua empresa nesse estudo e agradece, antecipadamente as informações que os senhores possam vir a oferecer.

Sem mais para o momento, subscrevemo-nos, atenciosamente.

Flávia Maria de Mello Bliska

Coordenadora do projeto "Caracterização e aprimoramento tecnológico do setor de charque e *jerked beef* no Estado de São Paulo"

Nelson José Beraquet

Coordenador do Centro de Tecnologia de Carnes

Instituto de Tecnologia de Alimentos

Annex 4: Processor Interview Checklist

General information of the factory and the products	over time (dynamic)

- Factory origin, dates, main changes trough time? **Why *Charque* or *Jerked Beef***?
- **Firm internal structure**: familial or associates?
- Number of workers and their repartition?
- **Year output, volume, turnover, $**? Did your production, sales increase these last years? How is the desiccated meat market in general?
- **What are the functions** you integrate backwards and forward?

Raw material reception	over time

- How does it get to the Charqueada, who are your suppliers? Do you buy on credit? Why?
- How do you choose your raw material for processing, which criteria? Why?
- Do you often change of supplier? Why?
- What type of contracts do you have with the supplier?
- What are your constraints to get raw material?
- What are your exigencies on the product?

Annex 4: Processor Interview Checklist

Industrial process (visual assessment)	over time

- Can you please describe your process for making Charque or Jerked Beef?
- **Processing time**, each step, **and constraints in respecting the schedule**?
- Where does the brining go? When is the brine solution changed? Why?
- Machinery? Changes? Why?
- Quality controls? Of what nature? At which steps of the process?

Products destination and market requests.	over time

- Each destination who is the distributor: wholesaler, supermarket, retailer, exporter, others?
- The markets? **% Product and distributor**?
- What are the markets request, quality, weight, cut, and packaging? It's always been the same way? What are the latest evolutions?
- **What does the final consumer think about your product, why does he like it?**
- How do you know, how do you get the information?

End

- Policies on the sector, what are the main limitations....
- Identify and prioritize with the manager the main constraints at all the levels of his business.
- What are his solutions? Work with some specific institution or partner ?
- **What are the coming challenges?**

Annex 5: Technical Assessment Checklist

Technical assessment	CH	JB	COMMENTS
Raw material			Frozen, cooled, fresh.
Flank and Plate			
Forequarter (cuts)			
Hindquarter (cuts)			
Brining			Processing time, capacity, constraints, brine regeneration.
Injector			
Tumbler			
Tank			
Dry salting			Processing time, number of workers, constraints, hygiene, cleaning.
Room temperature			
Salt (quality and quantity)			
Layers (thickness)			
Height			
Disposition			
Rest time, salting & re-salting			
Number of twists			

Washing	CH	JB	
Water			
Water with ads.			
Drying	**CH**	**JB**	Humidity constraints/hygiene/ wooden or PVC rails
Time			
Night Stacking			
Drier			
Area for drying			
Rails			
Storage			
Packaging			Machinery, daily output capacity, constraints, manpower...
Cuts and weight (% of the production)			
Quality			
Indications			

Total process duration:

Annex 6: Workshop Organization (Sector stakeholders and program).

" Oportunidades Tecnológicas no Setor de Carne Bovina Salgada e Dessecada"
Workshop
dia 19 de octoubre 1999
ITAL/CTC-CIRAD

❑ Foram convidados representantes dos segmentos da cadeia produtiva da carne dessecada sejam :

Fabricantes	Distribuidores		Ambiente organizacional	Ambiente institucional
- Abatedouros-frigoríficos - Frigoríficos processadores - Charqueadas	*Atacadistas* -Armazéns -Casas de carnes	*Varejos* -Supermercado -Hipermercados -Mercearia -Açougue	*Normas* SIF SISP Restaurantes	- Secretaria da Agricultura - Institutos de pesquisa - Apoio Financeiro

Faltam representantes específicos da pecuária bovina. Este segmento da cadeia e regularmente e amplamente estudado, no caso será parcialmente representado pôr umes frigoríficos.

↳Representantes de fabricantes de *Jerked Beef* e de *Charque*

Fabricantes	Contato	Fone / Fax
	Entrevistos	
Frigorifico Irmãos Reis	Sr Paulo Fonseca	011 498 11 50 / 498 11 57
Frigo Charque Serra Negra	Sr João Roberto da Silva	019 892 25 52
Frigorifico Independência	Sr.a Chritina Lombardi	011 78 97 52 52
Frigorifico Bom Charque	Sr Adair	011 39 71 22 81
Frigorifico Mondelli	Dr. Vasco Picchi	014 207 23 60 / 207 18 33
Frigocharque Paulista	Sr Luciano Passos de Arujo	011 78 98 11 10
Frigocharque Itapira	Sr Carlos Alberto	019 863 39 49
Matadouro Frigorifo Olhos D Água	Sr Harley	016 832 18 88
Frigorifico Grande ABC	Sr José Carlos	011 459 37 88 / 459 62 33
Frigorifico Marba	Sr.a Chistianne e Sr.a Silvia H.S Marola	011 43 61 44 58
Abatedouro Beira Rio + Charqueada	Sr Fernando e Sr Paulo Sérgio Buzolin	014 372 28 00
Ribeirão Ind. e Com de Carnes	Sr Luís	011 459 58 44 / 459 25 40
	Comunicação Telefônica	
Produtora de Charque Jundiai	Sr Humberto	011 739 79 017 /739 7 05 42
Produtora de Charque Rosarial	Sr Laerte	015 241 11 024 / 241 11 871
Produtora de Charque Cruzeiro	Sr Paulo	012 544 34 16
Produtora de Charque União	Sr Tolinho	011 424 31 16
Produtora de Charque Guaíra	Sr Marcelo	017 333 24 00 / 331 24 03
Frigorifico Bertin	Sr Pedro Bertin	014 520 20 96 / 520 21 08
Frigorifico Paneira	Sr Sérgio	011 78 97 44 21
Frigocharque Presidente	Sr Cláudio	011 72 87 00 39
Frigorifico Três Passos	Sr Antônio Carlos	011 78 97 55 44
José Albeiro Buoso	Sr Buoso	014 841 45 90
Frigo Master	Sr Fábio	017 236 72 66
Frigoboi	Sr Jucá	017 227 77 95
Allison Ind. e Com. Jaó Carnes	Sr Nelson	011 424 16 11
Fircarnes	Sr Daniel	014 460 15 88
Esplendor	Sr Ricardo	011 69 49 39 93

Annex 6: Workshop Organization (Sector stakeholders and program).

↳ Representantes dos distribuidores

Segmento da distribuição	Contato	Fone / fax
	Atacadistas	
Armazéns		
Atacado Vila Nova	Sr Paulo Rubens	019 746 14 44
Boi Fran Entreposto de Carnes e Derivados	Sr Eduardo	019 460 80 15
Empresa Ind. e Com. de Carnes	Sr Márcio Diretor das vendas	016 222 74 22
Atacado Makro	Sr João Carlos Responsável setor Carnes	019 246 32 77
Casas de Carne		
Comercio Piccoli e Piccoli Ind. e com	Sr Edgar Piccoli Dono	019 241 63 13
Ramalho Frangose Carnes	Sr José Roberto Gerente	019 256 41 67
Negociante		
	Sr Marcos Sobral	felipe@megeclink.br
	Varejos	
Supermercado e Hipermercado		
Carrefour Dom Pedro	Sr Sérgio Responsável setor Salsicharia	019 207 02 11 / 161
Extra Amoreiras	Sr Elias Responsável setor Salsicharia	019 729 80 73 / 227 69 76
Super Barão S.ta Isabel	Sr Marcelo Responsável das Compras	019 289 74 30
Mercado		
Açougue	Sr Carlos	xx
Mercearia	Sr Palmiro Sr Tony Sr Eduardo	xx xx xx

↳ Representantes do Ambiente Institucional

Ambiente Institucional	Representantes	Tel., fax, e-mail, ...
SIF	Veterinário de frigorifico - Dr.a Cristina Lombardi - Dr. Vasco Picchi	ver Frigorifico Independência
SISP	Dr. Ricardo e Dr. Valdacyr Vargas Castilho.	CATI : 019 241 39 00
Restaurante	Sr Sérgio.	XXX

✓ Temos representantes do SIF Sevicio de Inspeção Federal nos representantes dos fabricantes (dois capasetche).

Outros Processadores	*Nomes*	*Tel./fax*
	Sr Nelson Cavalcante	278 04 88 / 39 50
	Sr Azevedo	

Annex 6: Workshop Organization (Sector stakeholders and program).

↬Representantes do Ambiente Institucional

O Ambiente Institucional	Representantes
ITAL / CTC	*Teme de pesquisa CTC* Pr Flavia de Mello Bliska Pr Hana Arima Eduardo Alves Leal Gregory Fontaine *Pesquisadores em Tecnologia* Dr. Ana Lúcia da Silva Corrêa Lemos Pr Manuel Pinto Neto
CIRAD	*Pesquisadores em Economia e Tecnologia* Dr. Thierry Goli Dr. Dominique Pallet Dr. Guy Henry
UNICAMP	*Pesquisador em Tecnologia dos Alimentos.* Pr Bento da Costa Carvalho Jr.
USP	Pr Paulo Sobral
SEBRAE	Responsável Tecnologia

Annex 6: Workshop Organization (Sector stakeholders and program).

GOVERNO DO ESTADO DE SAO PAULO
SECRETARIA DE AGRICULTURA E ABASTECIMENTO
INSTITUTO DE TECNOLOGIA DE ALIMENTOS
Centro de Tecnologia de Carnes (CTC)
Centro Internacional de Pesquisa em Agronomia e Desenvolvimento (CIRAD)

" Oportunidades Tecnológicas no Setor de Carne Bovina Salgada e/ou curada e Dessecada"

Workshop

Programa Preliminar

1) 14:00 Analise da cadeia produtiva do Charque e do *Jerked Beef*: Limitações e perspectivas.

- Gregory Fontaine, apresentação dos resultados de estudo realizado no CTC. (CNEARC)
- Vasco Picchi.
- Bento da Costa Carvalho Jr. (UNICAMP)
- Validação dos resultados e discussão.
- Priorização das limitações e das oportunidades.

2) 15:45 Inovações tecnológicas e desenvolvimento de novos produtos.

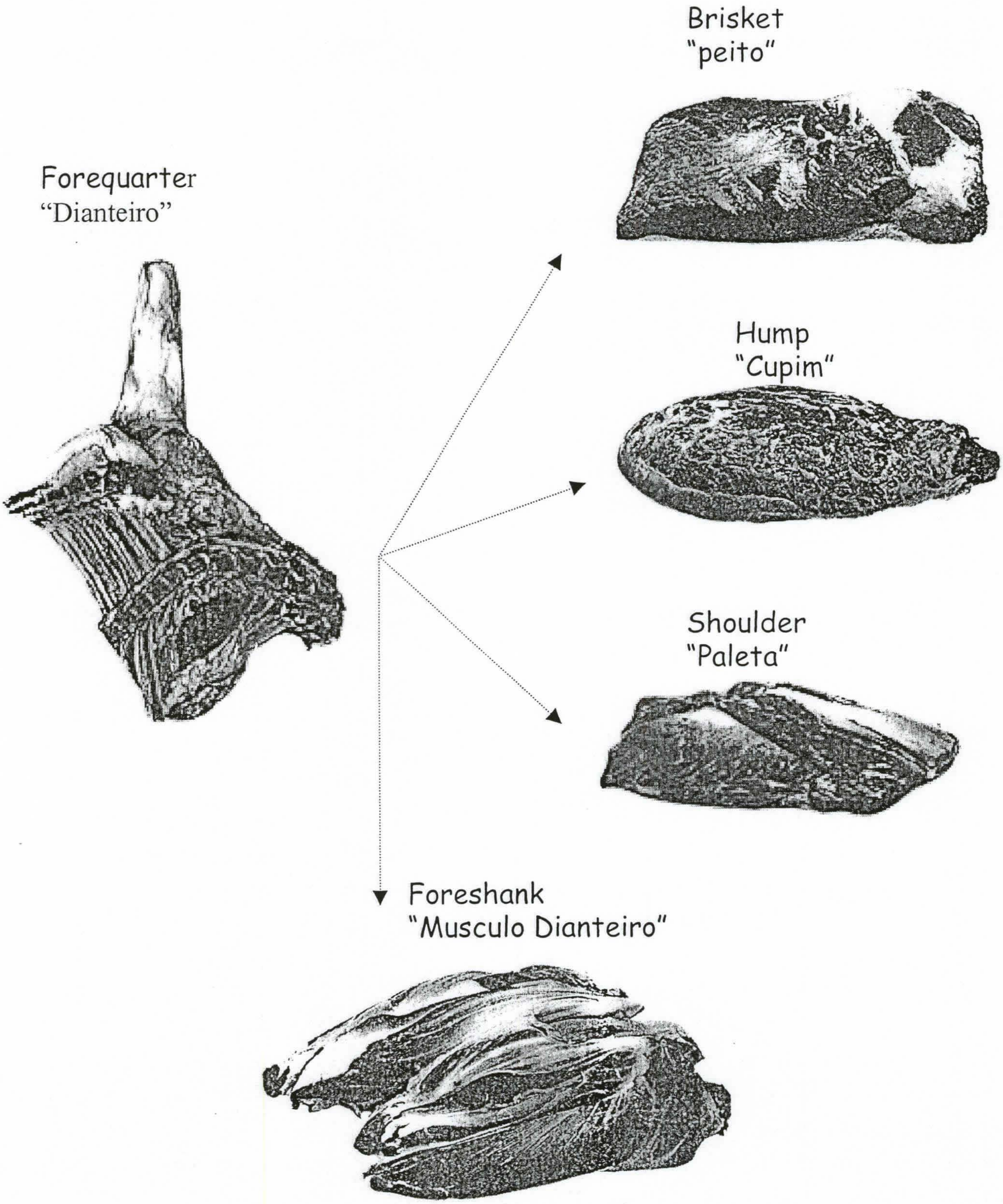
- Bento da Costa Carvalho Jr. (UNICAMP): Reflexão rápida sobre novos processos e produtos.
- Hana Arima (ITAL/CTC) : Inventario das tecnologia de preservação pôr salga e secagem dos produtos cárneos.
- Dominique Pallet & Thierry Goli (CIRAD) : Uma nova alternativa tecnológica.
- Discussão

3) 17:30 Discussão para formulação conjunta de oportunidades de desenvolvimento.

4) 18: 15 Enceramento

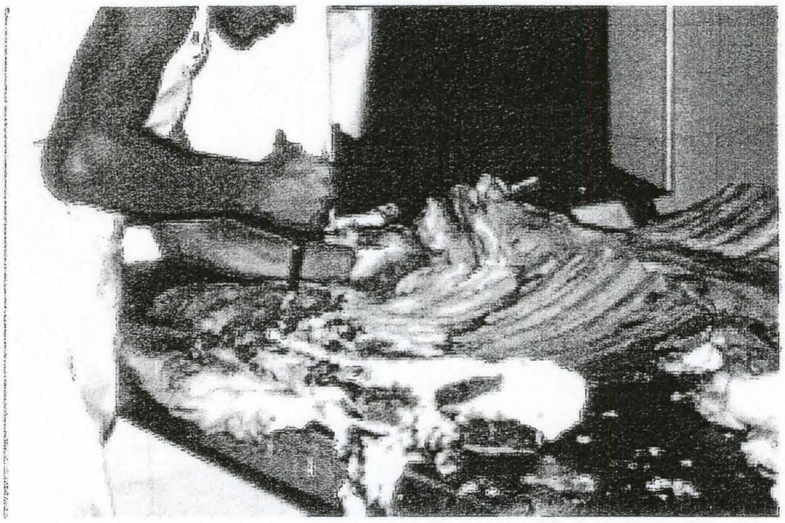
Coordenação : Flavia Maria de Mello Bliska
Hana Kiyoko Arima
Guy Henry

Annex 7: Forequarter cuts

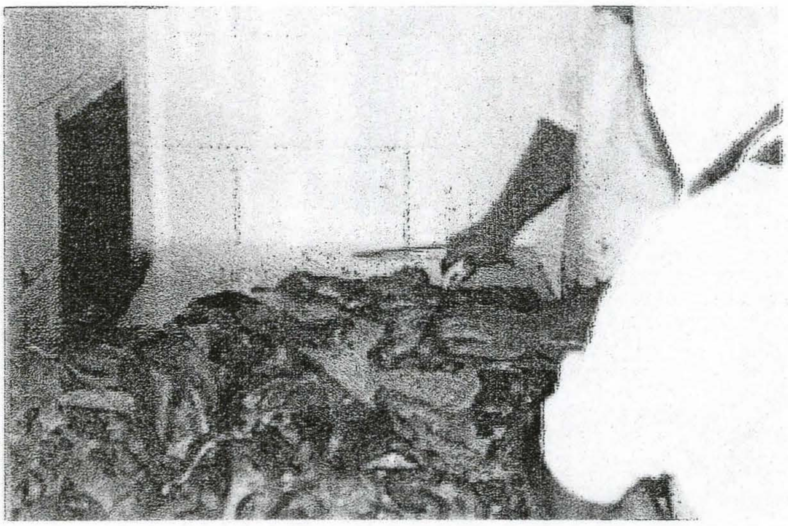


Annex 9: Meat preparation

Flank and plate boning

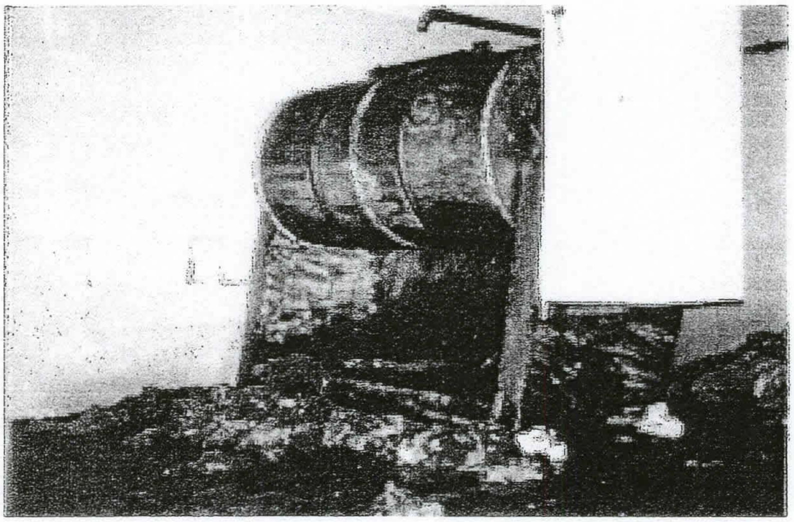


Notching boned meat before brining step

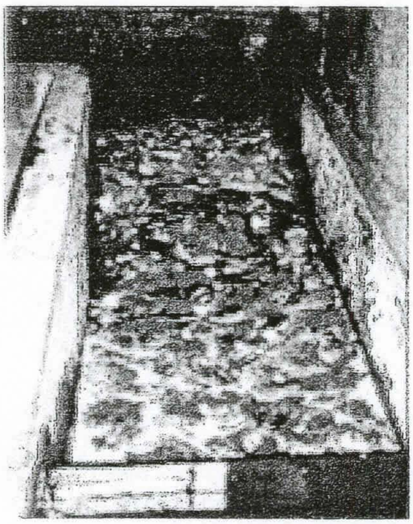


Annex 10: Wet SALTING

Tumbler technology



Brine tank



Annex 11: DRY SALTING

Piles of meat and salt (jerked beef)

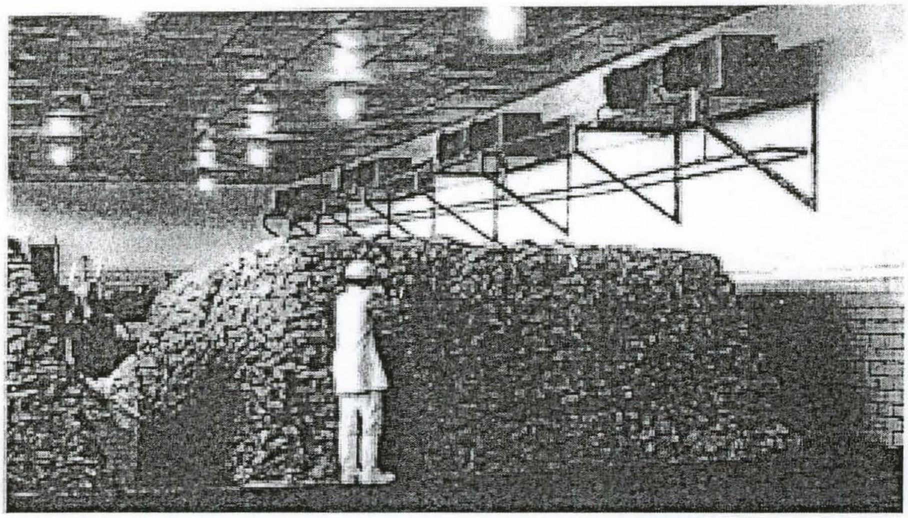


Photo by Dr Vasco Picchi

Piles formation

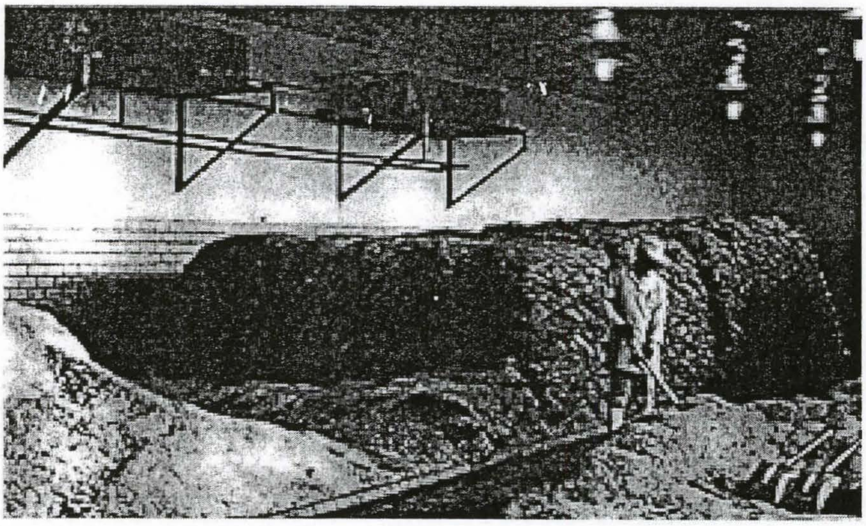
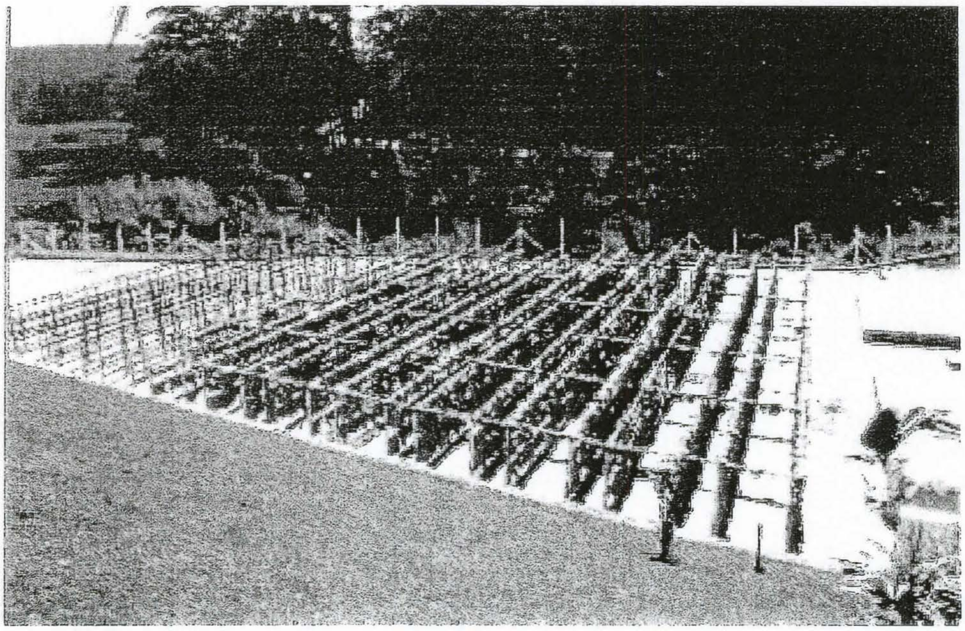


Photo by Dr Vasco Picchi

Annex 12: DRYING OPERATION

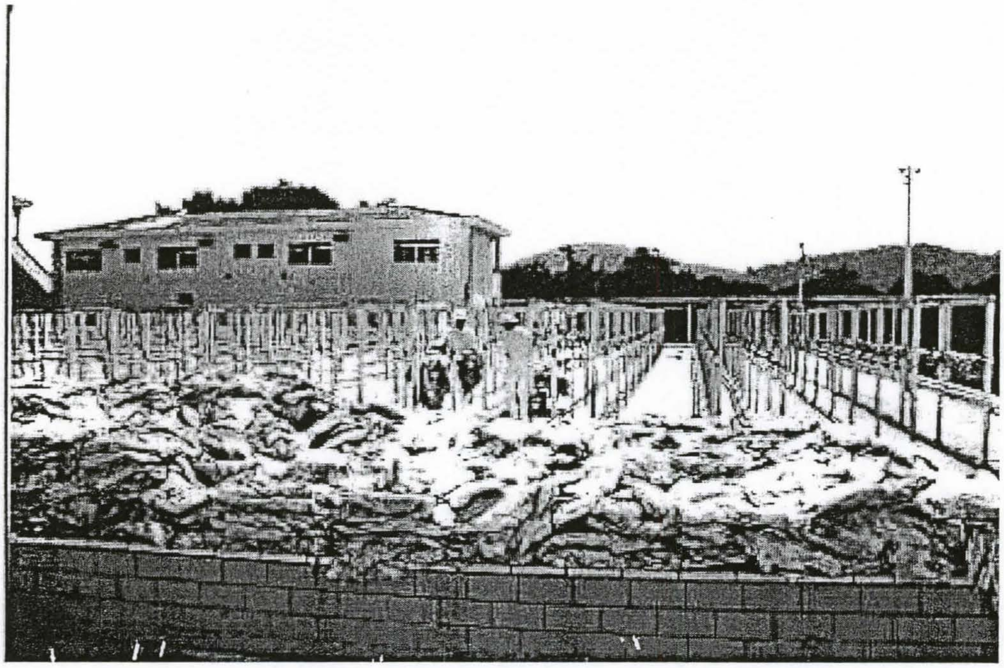
Drying surface 60 tons (approximately)



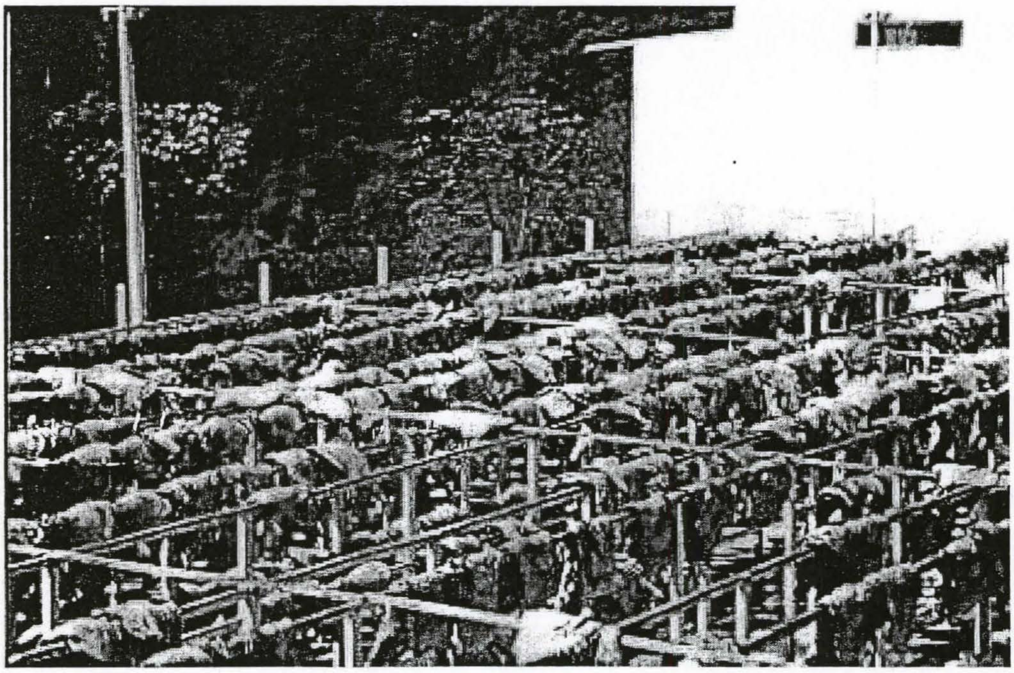
Pieces doubled on rails

Annex 12: DRYING OPERATION

Stacking

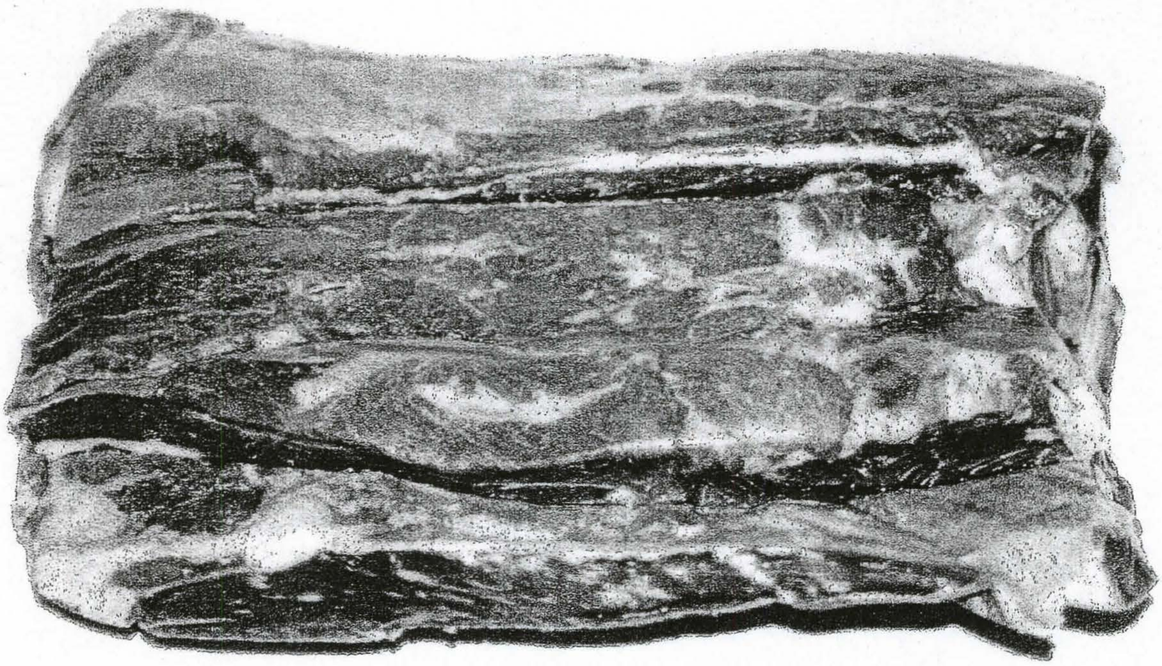


Drying on wooden rails



Annex 13: PRODUCTS

Charque (5 kg piece)



Annex 14: Brazilian Dried and Salted meat exports