Beef Cattle Futures Markets: Is it Possible in Uruguay ?

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Uruguayan Institutions referred in this document

ARU - Asociación Rural del Uruguay (*Rural Association of Uruguay*)
BVM - Bolsa de Valores de Montevideo (*Stock Exchange of Montevideo*)
COMISEC - Comisión Sectorial para el Mercosur (*Sectorial Committee for the Mercosur*)
FERU - Federación Rural (*Rural Federation*)
INAC - Instituto Nacional de Carnes (*National Meat Institute*)
INIA - Instituto Nacional de Investigación Agropecuaria (*National Agricultural Research Institute*)
MEC - Ministerio de Educación y Cultura (*Ministry of Education and Culture*)
MEF - Ministerio de Economía y Finanzas (*Ministry of Economy and Finances*)
MGAP - Ministerio de Ganadería, Agricultura y Pesca (*Ministry of Agriculture, Livestock and Fisheries*)
OPYPA - Oficina de Planificación y Política Agropecuaria (*Office of Agricultural Planning and Policy*)

Other Institutions

MERCOSUR - Mercado Común del Sur (*Southern Common Market*)
PROCISUR - Programa de Cooperación para el Cono Sur

BEEF CATTLE FUTURES MARKET: IS IT POSSIBLE IN URUGUAY?

In 1993 there was an attempt to develop a futures market for beef cattle in Uruguay. The experience did not fulfill the expectations created around this market and after six months of trading it closed its activities. The possible reasons that inhibited its development were examined in this paper. It is possible that all the necessary conditions for success can not be given at this moment. Perhaps the low volume traded in the futures market was derived from structural conditions that are inherent of small economies. Maybe there was a failure in creating the minimal conditions that could attract enough hedgers and speculators capable of supporting the market. Determining why the experience failed would be very to understand the underlying mechanisms of this instrument, in a country with a small economy and without any tradition in its use.

KEYS: futures market, live cattle

INTRODUCTION

In 1993 there was an attempt to develop a futures market for beef cattle in Uruguay. The experience did not fulfill the expectations created around this market and after six months of trading it closed its activities. Our interest is to find some answers about the reasons, if any, of why a futures market for beef cattle did not succeed in Uruguay.

Then, several questions widely discussed by previous literature are reexamined here: Are futures market an adequate and safe instrument for beef cattle producers to hedge their production? Are they attractive for speculators or do they lack incentives? Do futures markets actually accomplish their mission?

Since this is a new experience in a small country with a very small economy, new questions arise about this topic, when compared with the United States where commodity futures contracts have been traded for decades. Are future markets feasible in small economies? Are the economic conditions in Uruguay favorable for the development of futures market? Is it a problem scale of production or market size?

In order to study this problem it seems to be important first to present a brief characterization of beef cattle production in Uruguay relating its impact on to whole economy of the country, volume of production, methods of trading, characteristics of demand and supply and price formation. Facing a lack of local information and experiences about futures markets we considered making a review of the literature about live and feeder cattle in the United States whose experience was extensively studied, especially concerning its strengthens and weaknesses.

The available data on the operation of the futures markets in Uruguay is then presented in this paper. The lack of data inhibits any statistical analysis. For this reason the figures, tables and graphs only illustrate an experience. Considering that it is not possible to obtain more data because the market is not operating anymore, we can develop some hypothesis about the experience. This is the main objective of this study.

Some authors believe that the new technological and economic conditions under which the agricultural sector in Uruguay is performing today and the consolidation of some futures markets operating in the region (Buenos Aires in Argentina and São Paulo in Brazil) can offer risk management opportunities for

some agricultural commodities, which were unavailable until now (Paolino, 1997, in personal communication; Souto, 1997). The experience with live cattle futures markets in Uruguay may provide some insight about this instrument and the challenges and opportunities of using it.

BEEF CATTLE PRODUCTION IN URUGUAY

Available local (Vázquez Platero and Picerno, 1994; MGAP, 1997) and international (FAO, 1995; PROCISUR, 1997) sources of information illustrate with detail the importance of beef cattle production in Uruguay. Of its 16 million hectares[1] used in agriculture and animal production almost 90% is dedicated to livestock production. Livestock in Uruguay has historically been composed of 9 to 11 million head of beef cattle (80% Hereford) and 20-25 million of sheep (mainly for wool production). In general, farmers raise together bovines and ovines over natural pastures. Many farmers make a complete cycle, producing the calves that they breed and finish themselves. In other cases, breeders produce the calves and sell them as steers to other farmers that feed and finish them until they have weight for slaughter (1,000 to 1,100 pounds). The number of farms specializing in beef cattle production in the country is about 29,000.

Meat consumption in Uruguay is proportionally one of the highest in the world (about 160 pounds per inhabitant per year) and it takes about 50-60% of total production. Cattle slaughtered has averaged 750,000 US tons of live cattle in the last 10 years, having reached 1 million US tons the last years. The remaining 40% (165,000 US tons in average for a 10-year period) is exported. Uruguay is a net exporter of beef cattle, although a marginal presence in the international markets due to its small volume (about 3% of world beef cattle trade). The most important customers are Brazil, USA, Germany, United Kingdom and Israel. Thus, Uruguay is clearly a price-taker in the international market.

Setting aside the volume, one of the outstanding differences between beef production in the United States and in Uruguay is the way the cattle are finished for slaughter. Cattle slaughtered in the United States are fattened mainly in feedlots. Feedlot cattle account for more than three-quarters of all slaughtered cattle and for this reason, the inventory of cattle on feed is a critical determinant of intermediate supply (Gary, 1995). When cattle reach slaughter weight it becomes cost prohibitive to hold them back from slaughter for more than a few days, which emphasizes the characteristic of live cattle as a nonstorable commodity. In Uruguay feedlots represent a minimal proportion and most slaughtered cattle are fattened over natural pastures. In recent years, an increase in the use of cultivated pastures has been observed (Vázquez Platero and Picerno, 1994; MGAP, 1997).

Despite the differences mentioned, cycles over years and seasonal patterns in production, consumption and prices of cattle production seem to be similar among countries. Mundlak and Huang (1996), studying the role of technology in determining the dynamics of the cattle sector, compared data from Argentina, United States and Uruguay, finding that the three countries exhibit very similar cycles in spite of their different technologies and economic environments. Vázquez Platero and Picerno (1994) found similar results comparing Uruguay with Argentina and Brazil.

In recent, the Uruguayan economy and especially the agricultural sector has been involved in dynamic growth and important transformations. The creation of the Common Market for the Southern Cone (MERCOSUR), is gradually integrating not only the economies among its own four members (Argentina, Brazil, Paraguay and Uruguay), but also the economy of the region toward the rest of the world, offering an enormous range of possibilities and challenges. According to Buxedas and de los Campos (1997), in the first half of the 90's, agricultural product grew 34% experiencing at the same time a greater investment in fixed capital and use of inputs.
Estimations coming from different sources show a moderated optimism related with the belief that the agricultural sector will continue this growing trend in the following years, with beef cattle production playing an important role. When considering the basis over which a permanent growth should be sustainable, especially for agroindustry chains, Buxedas and de los Campos (1997) mentioned two points:

[1] Aprox. 40,000,000 acres (1 hectar = 2.4710 acres)

financing and risk management. Those expectations probably are responsible for the idea of creating a live cattle futures market in Uruguay.

CHARACTERISTICS OF A LIVE CATTLE FUTURES MARKETS

Following Edwards and Ma (1992), the development of futures markets followed the development of forward markets. Forward markets have existed and flourished because they provide a useful way to manage price uncertainty. Among other benefits, futures markets permit, through the standardization of futures contracts, a reduction in the transaction costs associated with trading a deferred delivery instrument. Trading in futures markets in the United States has increased dramatically since the 1960's and today, the Chicago Mercantile Exchange is the most important futures market in the world for beef cattle, trading in two types of contracts: live cattle and feeder cattle.

Edwards and Ma (1992), summarize the two important social benefits of futures markets, mentioned by the literature. One of them is *risk management*, where hedgers use futures to shift unwanted price risk to others, usually speculators, who willingly assume the risk in the hope of making profits. The second one is *price discovery*, where the centralization of trading makes the available information about fundamental supply and demand conditions for a commodity to be efficiently assimilated by the agents, allowing the determination of prices.

With respect to live cattle, many authors have cited strengths and weakness of using futures contracts and many studies have been conducted to examine if it has successfully accomplished its expected role as a tool for risk management and price discovery. The efficiency with which the forward pricing is performed in the case of futures markets for live beef cattle, was examined by Leuthold (1974). He noted the conclusions presented by several authors that futures prices reveal the market expectation about ultimate spot prices and that the price of distant futures is a useful forecast in inventory-hedging markets. Leuthold's own results showed that the closer to the maturity date, the more accurately the futures prices reflects the final closing price. Tomek and Gray (1970) suggested that the futures price of a commodity provides an estimate of the cash price of an upcoming month. They also indicated that the ability to generate futures prices without an inventory suggested new commodities for potential contracts from continuously produced nonstorable commodities like live animals, among others.

Weaver and Banerjee (1982) presented the theory of the role of futures trade in cash price formation, arguing that it provides a basis for understanding the behavior of individuals (agents) participating in a market. They emphasize that the forces, which establish prices in a market, are the result of a diversity of individual decisions and actions. These highly particular differences (specific risk preferences, cost factors, subjective beliefs) ensure that individuals will be willing to take different sides of the market, allowing the existence of futures markets and the tests they conducted. The results reported testing the model that establishes the existence of a direct effect of futures trading on cash price determination. They also assert that this effect reduces the random variation in cash prices, as were suggested by some other authors.

Some other authors have questioned the performance of live cattle futures markets. Studies have been conducted to examine the distribution of commodity futures price changes in order to test the efficient market hypothesis. According to the theory, in efficient markets prices fully reflect all available new information flows into the market. Price changes are expected to be random, having a normal distribution. Hudson, Leuthold and Sarassoro (1987) discuss some evidence found in the literature suggesting that the distribution of futures price changes is not normal.
Some empirical evidence suggests, however that distribution of futures price changes, is not normal. Other authors cited in this paper questioned the use of the central limit theorem in such analysis and the reason is that daily price change actually is a sum of a random number of independent events. According to that, price changes are normally distributed over transaction-to-transaction intervals and not over time intervals. The results obtained by Hudson, Leuthold and Sarassoro (1987) showed that commodity futures price changes have been moving toward normality and independence since the period prior to 1976. The authors

conclude that new data suggest that technical analysis schemes based on price trends and periodic price behavior will become less effective for trading.

Studies conducted by Martin and Garcia (1981) agree with the idea that live cattle market has not performed the forecasting function well and that its contribution in the price formation is at least suspect. On the other hand Kolb and Gay (1983) found no evidence of any significant bias in live cattle futures prices and no reason to doubt that that cattle futures prices fail in any regard in performing the function of price discovery. On the contrary, they found that performance of the market appeared to be exemplary in all respects analyzed. These findings contradict the conclusions arrived by Helmuth (1981) who argued that, based on the theory of efficient markets, the evidence of a predictable systematic downward bias in live cattle futures prices, provides strong evidence that the live cattle futures market was not operating as an efficient price discovery mechanism. He reported the discovery of a 100%-accurate mechanical trading technique, which clearly violates the concept of perfect competition underlying this theory. Helmuth's claims were severely criticized by Palme and Graham (1981) who considered those studies suffered from lack of methodology that invalidates the results and hence the conclusions arrived.

Pluhar, Shafer and Sporleder (1985) first, and Elam and Wayoopagtr (1992) subsequently, retested Helmuth's technique confirming in some way its predicting ability. Even though, the effect observed in their results with respect of those obtained by the mentioned author seems to confirm his assertion that disclosure of the technique would reduce and eventually eliminate its profitability. In recent years, Irwin, Gerlow and Liu (1994) found no meaningful difference between the forecasting performance of livestock futures and USDA expert predictions, which support the idea of the efficiency of livestock futures prices.

One important requirement for markets to operate efficiently is the availability of information for all the participants (agents). In the case of agricultural commodity markets in the United States, the USDA Crop and Livestock Information is designated to accomplish this function (Spilka, 1983). The Cattle on Feed report series released every month, provides the public with information about current inventories and cattle marketed. This allows an estimation of potential livestock slaughter and hence, beef supplies in the current and coming months (Spilka, 1983; Grunewald et al., 1993; Gary, 1995). It has been suggested that this information, combined with demand expectations lead to live cattle price expectations. Several studies were conducted to investigate the effect of USDA reports on live cattle futures prices, and in general, it was found that anticipated information has no effect in futures prices. According to Grunewald et al. (1993), futures prices react to unanticipated information the day immediately after the report is released, being rapidly absorbed by the market after that.

Some futures market contracts use cash delivery to liquidate futures positions at the expiration time, rather than physical delivery. Cash delivery is an device that addresses the high costs of delivery properties of some types of commodities (Garbade and Silber, 1983). It makes feasible futures contracts on commodities for which physical delivery would be virtually impossible. Paul (1985, 1987) and Kahl, Hudson and Ward (1989) among others, cited by Rich and Leuthhold (1993) sustained that for cash settlement to be effective, settlement price must be free of exploitation and accurately depict cash market prices. They also pointed out that for improving pricing accuracy, the settlement price have to be determined by cash market demand and supply conditions, representing current cash market commodity value.

Rich and Leuthhold (1993) indicated that the CME decided to change the feeder cattle futures contract to cash settlement in order to reduce basis risk, which was claimed as a principal factor causing the reduction of the effectiveness of the feeder cattle contract as a hedging mechanism, observed in the 1980's. Their own study, performed to ascertain how cash settlement issues have influenced hedging conditions at the individual market level and for the feeder cattle industry in general, showed a modest reduction in basis variability after cash settlement, noting that most of the improvement has come in closer convergence of cash and futures prices.

Other studies were concerned with the use of futures markets for managing risk. The activity of trading futures with the objective of reducing or controlling risk is called *hedging* (Edwards and Ma,. 1992). Hedgers seek to eliminate or control the risk derived from adverse change in prices (*price risk*). For this to be possible, on the other hand, there might exist some other people (agents) that are willing to assume the risk that hedgers want to avoid, with the hope of making profits from these price changes.

Koppenhaver (1983) asserts that there seems little doubt that net long speculation in the live cattle futures market is important in forming prices. Hence, it is probable that risk premiums are required to offset the observed tendency toward futures market imbalance. The research carried out by this author highlights the significance of risk premia and past price data in the formation of live cattle futures prices. Routine hedging by producers would result in the payment of risk premia to long speculators.

Hayenga et al. (1984) indicated that according to J.M.Keynes, it does seem likely that futures markets used extensively for short hedging might have some downward bias. In a risk-averse world, the difference between the futures price today and the futures price at the expiration of the contract represents the risk premium paid for those willing to accept that risk. Theoretically, one might expect that livestock futures market with a preponderance of short hedgers would have a tendency for deferred futures prices (in the contracts a producer-hedger would be selling) to be biased downward. This suggests that a producer routinely hedging in those contracts would end up with reduced profits because of hedging. It seems likely that speculators considering long positions in deferred futures contracts might require prices to be low enough to offer a "risk premium" before taking that position, in order to compensate them for the greater risks involved. (Hayenga et al., 1984)

Hayenga et al. (1984) focused their study on the profit opportunities available to livestock producers through futures markets and the risk premiums implicitly paid by hedgers. They found that livestock futures markets have offered frequent opportunities for profits or improved returns for producers although this opportunities were less frequent for cattle feeders, especially feeders of yearling steers, than for hog producers, where the results were more satisfactory.

Yun et al. (1995) concluded that actions by hedgers combined with arbitrage and profit motivated activity by speculators will eventually correct market imbalances. Further, the presence of large speculators is more important than hedgers in turning the market back toward equilibrium. These authors indicate that most of the available literature suggests that futures markets to be viable and effective, need a balance between hedging and speculation. In the live cattle futures, the continued absence of significant long hedgers is the basis of much criticism. It is argued that the market will be biased downward if the long speculator has to buy the short positions offered by the short hedger and that a risk premium will have to be present to entice the long speculator into the market.

This results have many policy implications for encouraging participation of large speculators. It is the large speculator that is active in recognizing a disequilibrium situation and turning the market back toward equilibrium, and their activities are especially important when the futures price being discovered is offering only large negative feeding margins (Yun et al. ,1995).

Edwards and Ma (1992) conclude their analysis of the social benefits of futures markets and the role of speculation by remarking that speculators play a vital role in futures markets. Without them futures markets could not exist. The more the speculative activity, the better futures markets perform their critical social functions of providing hedging and price discovery services.

Since hedging with futures contracts has become increasingly important as a risk management tool, which cattle feeders can use to stabilize prices and incomes, much research have been done to develop hedging strategies on fed cattle. In general, the problem with hedging in commodity futures markets is that usually, changes in futures and cash pries are not equal. This is known as basis risk. As Edwards and Ma (1992) indicate, unanticipated changes in the basis risk cause substantial variation in hedging results, for either long or short hedges

Leuthold and Peterson (1987) pointed out that in general, studies over hedging strategies were conducted under the assumption of fully-hedged and unhedged positions, which did not consider how much of the cash position should be hedged and how many futures contracts would be required to achieve some desired level of risk. Because of this reason they treated the hedging process as a special case of the general portfolio problem to develop an optimal hedging technique and concluded that due to changes in market conditions, optimal hedges may differ greatly from one period to the next for a given level of risk aversion.

Several studies were conducted to construct statistical models to forecast nearby cash-futures basis for live cattle. In general, authors have found it more difficult to model basis as the futures contract approaches maturity. Liu et al. (1994) suggested that short-term dynamics are at least as important as supply and demand considerations for predicting nearby basis.

It has been suggested that futures markets also provides hedging opportunities for firms or institutions that purchase large quantities of live cattle or meat, in the case of beef cattle industry. That is the case of slaughterhouses or food service institutions facing uncertain prices for their inputs. Slaughterhouses purchase live cattle so they can directly place hedging strategies taking long positions with live cattle futures contracts. For meat, things are different since futures for beef cattle meat presently do not exist, so they would have to cross-hedge, that is, hedging of a cash position in one commodity by using the futures market for a different but related commodity. In that sense, the literature shows some evidence that indicate the feasibility of cross hedging with live cattle futures contracts to forward-price wholesale meat. (Miller and Luke, 1982).

Finally, it may be important to emphasize that hedging with futures contracts markets should not have to be seen as an alternative to forward contracts. Forwards and futures do not substitute perfectly nor does clear dominance of one allows safe exclusion of the other, according to Nelson (1985). He conceptually and empirically evaluates the difference between forwards and futures as marketing instruments and that both can be taken in account in a marketing decision opportunity set.

THE URUGUAYAN EXPERIENCE

The Bolsa de Valores de Montevideo (BVM) is the only stock exchange operating in Uruguay. Until 1991, trading at the BVM was characterized by the almost exclusive trading public rather than private assets, a concentration of trades in the primary market, and the preference for assets priced in US dollars (BVM, 1994A). BVM reported that trades in Treasury bills and Treasury bonds of Uruguayan government averaged 90%, reaching 99% in some years.

Table 1 - Characteristics of the Live Cattle Futures Market in Uruguay

OPERATIONS	• Live cattle futures market takes place in the Bolsa de Valores de Montevideo (Stock Exchange), who performs all the functions of both *Exchange* and *Clearinghouse*. • Transactions are executed on a weekly pit, the third business day of each week, from 4:00 to 4:30 PM, on the floor of the exchange in an open outcry system. • Floor brokers execute trading orders.
CONTRACTS	• Each contract represents 4,000 kg [(2)] of fat live steers. • The contracts are traded for 6 months and they call for delivery on even months and September. • Last day trading is the third business day of the last week of the expiration month. • There is no physical delivery at expiration. Contracts are liquidated setting the price of the relevant futures equal to the cash price at that time (*cash settlement system*). • Spot prices used for all purposes are those reported by INAC every week. • All prices are posted in US dollars.
MARGINS	• Both buyers and sellers must deposit, before trading, an initial margin of US $240, plus or minus the initial difference in margin variation at the time the contract is entered. There is no difference in the margins required for hedgers and speculators. • Margin variations reflecting gains and losses, are estimated as the difference between the cash price and the price of the futures contract involved (Basis). • After the trading day, traders are called for paying or receiving margin variations originated by the basis evolution. • Traders must deposit their variation margins within 48 hours after the trade that originated the margin call and always before the next day of trade. • Remaining margins are returned to the traders when liquidating or settling their positions.
COSTS	• Each trader pays to the clearinghouse two fees: US $ 3.00 per contract when open the position and US $ 3.00 when liquidating the position. • Broker's commission, that is variable.

A fall in international interest rates changed the behavior of investors who were willing to accept riskier alternatives in order to maintain the levels of profitability given by the dollar in past years. In 1993, investments in private sector assets grew to 40% over the total amount operated, about 650 million dollars (BVM, 1994A). Additionally, new instruments were introduced, mainly in the secondary market, expanding the investment opportunities. It was in this context of innovation and growth that the exchange initiated the first experience in futures markets in Uruguay. The changes in the agricultural sector at the same time and its importance to the Uruguayan economy, discussed earlier in this paper, lead to the creation of the live cattle futures market.

The live beef cattle futures market in Uruguay began its operations on September 15th, 1993. The following information presented in Table 1 summarizes the characteristics of the market in its beginning (BVM, 1993B). On November 1993, some important modifications were introduced (BVM, 1993C). Meanwhile the development of futures markets for commodities was in general a natural consequence of the development of forwards markets (Edwards and Ma,. 1992). The live cattle futures contract in Uruguay was especially designed as an instrument for diminishing risk and uncertainty derived from the live cattle cash market. It was presented as a valuable tool allowing beef cattle producers and the industry, exposed to price fluctuations in the cash market, to reduce price risk. At the same time, it was presented as a good opportunity for investors (BVM, 1993A; Correa, 1993). For this reason the contract was designed for cash delivery, as the system for settling futures obligations at the expiration time.

[2] About 8,800 pounds (1 Kilogram = 2.2046 pounds). Slaughter weight of cattle varies according with breed and age. Estimating an average of 480 kg for a live 3-year Hereford steer, each contract represents roughly 18 animals.

The institution responsible of determining the spot price used as reference price in the futures market was the Instituto Nacional de Carnes, (INAC). This institution gathers the different cash prices directly from the slaughterhouses which have 24 hours to provide a complete information on all trades performed in a day (MGAP-MEF-MEC, 1992; MGAP, 1993). Each week, INAC published reference spot price for the futures market, which was estimated over roughly 90% of informed trades, which in turn represents between 92 to 99% of total trades in the cash market (INAC, 1993, 1994).

Table 2 - Contracts traded

Trades	FUTURES CONTRACTS						Total
Summary	Sep-93	Oct-93	Dec-93	Feb-94	Apr-94	Jun-94	Trading
Total Contracts	30	123	116	116	34	15	434
Contr./ Week	30	25	8	6	2	2	19
Volume (Kgs.)	120,000	492,000	464,000	464,000	136,000	60,000	1,736,000
Min. Price	0.740	0.680	0.624	0.612	0.616	0.630	0.650
Max. Price	0.740	0.732	0.682	0.636	0.628	0.650	0.678
Range	0.000	0.052	0.058	0.024	0.012	0.020	0.028
Average Price	0.740	0.708	0.647	0.623	0.621	0.640	0.663
Std. Deviation	0.000	0.019	0.017	0.007	0.004	0.010	0.010
Volume (US $)	88,800	348,312	300,232	288,760	84,392	38,400	1,148,896
Expiration Date	9/22/93	10/20/93	12/27/93	2/21/94	4/22/94	6/24/94	-
First Trade	9/15/93	9/15/93	9/15/93	9/29/93	10/27/93	12/29/93	9/15/93
Last Trade	9/22/23	10/20/93	12/15/93	1/31/94	1/16/94	2/7/94	2/7/94
Trade Period	7	35	103	145	117	54	159
Effect. Period	7	35	91	124	91	40	145

Important modifications were introduced both in the contracts and in the market operatives, after two month of operations. First, the market traded once a week and since the month of December, numbers of pits were increased to three times a week (Mondays, Wednesdays and Friday). Second, the initial margin was changed from a fixed to a percentage base. Originally stated at $240 per contract (¢6/kg) it was modified to a 10% of the value of the contracts traded (in dollars). This system didn't make any difference among hedgers and speculators, since traders were not obliged to declare their status. Third, the use of the basis for calculation of margin variations was substituted by the difference between the last settlement price in the futures market and the price at which the respective contract was traded. In addition, margin calls for negative variations are requested only when the margin deposited falls below a maintenance level of 7%. Once this occurred, the trader had to respond for the margin call to increase the account back to the initial 10% level. On the other hand, positive margin variations can be withdrawn each time the account exceeds the 13% of the value of contracts traded, always leaving the original 10%.

Six contracts were traded during the scarce 160 days in which the futures market was open for trades: *September 93*, *October 93*, *December 93*, *February 94*, *April 94* and *June 94*. Table 2 shows aggregated information of prices and volume traded for each contract. Available information is insufficient for statistical analysis. Data are presented for illustration purposes only although they permit some discussion. Also, we will try to infer some hypothesis about the reasons that could explain the failed experience, in the next section.

The first thing we can observe is the small quantity of contracts traded all over the period: 434. This volume represents 1,736,000 kilograms of live cattle, about 3,800,000 pounds or 1,900 US tons. Measured in US dollars it is about $ 1,150,000. These figures represented less than 2 % of trades in cash market, as can be observed in *Table 3*.

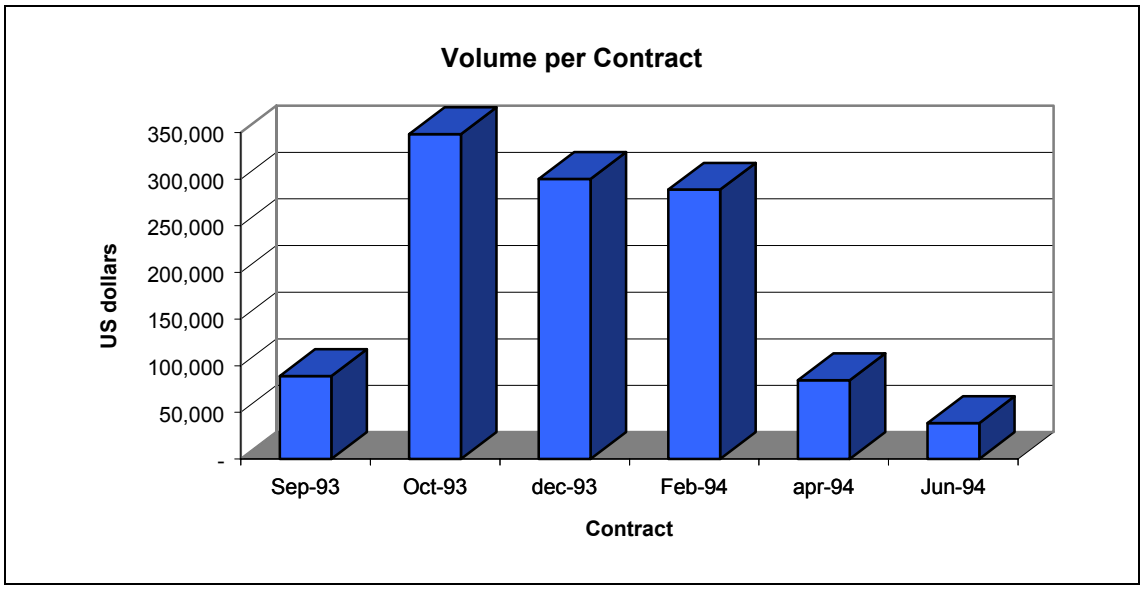
Table 3 compares volumes, measured in kilograms of live steers, traded in both futures and cash market. Figures for futures markets come from *Table 2* (# of contracts traded for each futures contract x 4000). Cash market volume represents the volume in kilograms of live steers slaughtered during the month each contract expired, assuming an average slaughter weight per steer of 480 kg. It takes in account cattle slaughtered only in qualified slaughterhouses, which represent about 77% of total slaughter.

Table 3 - Volumes of beef cattle (kilograms of live steers) traded in Futures and Cash Markets

Volume in Kg	Sep-93	Oct-93	Dec-93	Feb-94	Apr-94	Jun-94
Futures Market	120,000	492,000	464,000	464,000	136,000	60,000
Cash Market	12,192,000	14,832,000	24,288,000	25,104,000	26,736,000	29,184,000
FM/CM	0.98 %	3.32 %	1.91 %	1.85 %	0.51 %	0.21 %

The term of each contracts was 6 months, although no one completed the whole period, due to the ephemeral life of the market. The *February 94* contract had the longest life completing only 145 days. Since no more than 3 contracts were traded in the same day, this contracts began trading on the last week of September. The last trade in this contract occurred 20 days before the last day of trade (expiration date).

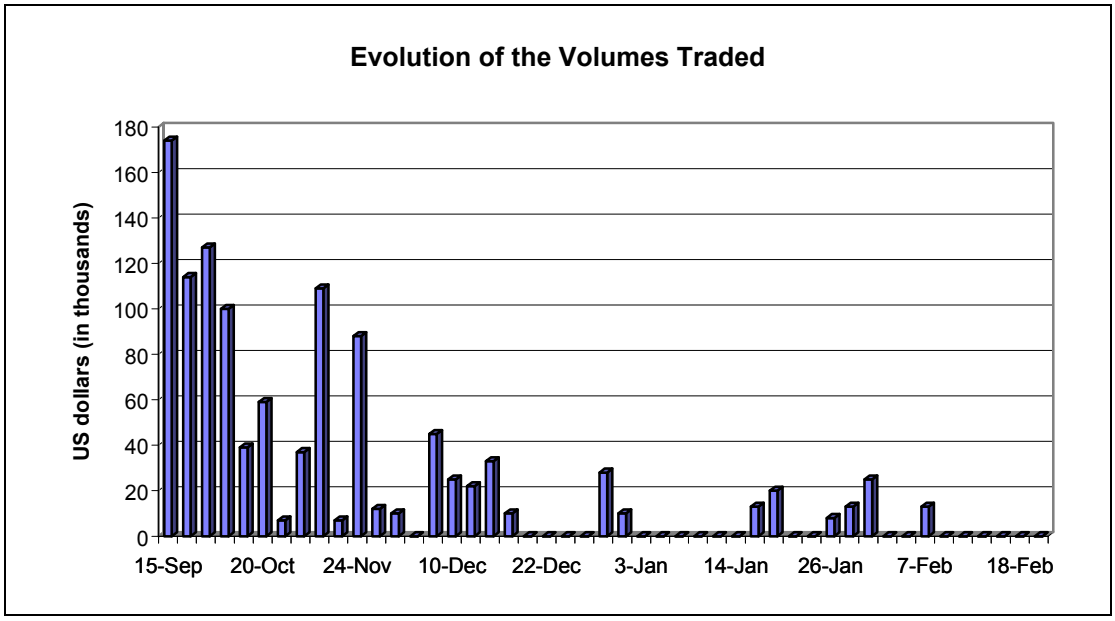
Both the *September 93* and *October 93* contracts were traded near the very end of their lives, one week and one month respectively, before the contracts expired. Nevertheless, these two contracts represent together 35% of the total volume traded in the market. They largely account for the greater number of contracts traded per week. Adding the *December 93* contract, which was the other contract traded at the beginning, increases the percentage to 62% of the total volume.



Graph 1 - Total volume traded on each contract in US dollars

Comparing the *December 93* and *April 94* contracts, both effectively traded about 91 days, we observe the big differences in volumes traded. The volume traded for *December 93* was about four times the volume of the *April 94* contracts. The last two contracts, *April 94* and *June 94* were poorly traded from the beginning and there never existed real interest from the agents. The market closed long before their expiration dates. The total volume traded on each contract, measured in US dollars is illustrated in *Graph 1*. Recalling that *September 93* contracts was only traded for one week, we can say that the market began trading with some expectative of success, but after that the participants were losing interest in the novel futures market.
This can be clearly seen in *Graph 2*, where the evolution of trades is presented, measured in US dollars, over time. The day of maximum volume traded in the whole period was precisely the day the market

opened. Operating once a week, the first month accumulated near 50 % of total volume traded. After the first four pits the market experienced a progressive fall in volume and probably in open interest. On November there were some "active-trading" days and on December there was some interest during the whole month, but it never reached the level of the first month. Judging from which is shown in the graph we can say that after December the live cattle futures market virtually disappeared, closing its doors definitively at the end of February.



Graph 2 - Evolution of trades in the live cattle futures market

Another characteristic that can be easily seen is the lack of volatility in the prices. The standard deviation was 1.9 and 1.7 cents for the *October* and *December 93* contracts respectively and no more than 1 cent in the rest of contracts traded. The difference between minimum and maximum prices in the *October 93* and *December 93* contracts was about 5 cents per kilogram. In the remaining contracts, the range never surpassed 2.8 cents per kilogram. This phenomenon is closely related with the lack of volume since as soon as volume decreased, the volatility of prices was down. Although we haven't recorded information about open interest, it seems obvious that it was very low after November and by this time that market was losing liquidity.

Data from *Table 4* shows the average price of tradings in the futures market on each date and for each contract. These figures are compared with current cash price of live steers, for slaughter. Prices are given in US dollars per kilogram of live cattle. Futures prices emphasized (bold fonts) represents real transactions. Otherwise, current futures price on a certain day is just the average price of last contract traded (last price in "bold"). This table intends to show the evolution of prices in the cash and futures market over time, during the period in which the market was in operation.

The live cattle futures market began its operation in September, which is the period of the year with highest prices in the cash market. The reason is it is also the month with the lowest level of slaughter. September marks the end of the Winter in the southern hemisphere and there is a lack of cattle ready for slaughter. The supply is at its minimum and thus, slaughterhouses pay high prices for the scarce fat cattle available.

Table 4 - Spot and Futures Price Evolution

Pit		Spot	Average Price of Contracts (US $/Kg)					
#	Date	Price	Sep-93	Oct-93	dec-93	Feb-94	apr-94	Jun-94
1	9/15/93	0.747	**0.740**	**0.726**	**0.677**			
2	9/22/93	0.749	**0.740**	**0.721**	0.677			
3	9/29/93	0.742	0.742	**0.710**	**0.650**	**0.628**		
4	10/6/93	0.731		**0.689**	**0.648**	**0.624**		
5	10/13/93	0.706		**0.690**	**0.630**	0.624		
6	10/20/93	0.691		**0.680**	**0.624**	0.624		
7	10/27/93	0.668		0.668	0.624	0.624	**0.616**	
8	11/4/93	0.656			**0.630**	**0.612**	0.616	
9	11/10/93	0.671			**0.643**	**0.626**	**0.620**	
10	11/17/93	0.678			0.643	0.626	**0.622**	
11	11/24/93	0.687			**0.638**	**0.620**	**0.620**	
12	12/1/93	0.678			0.638	0.620	**0.620**	
13	12/3/93	0.678			0.638	**0.616**	0.620	
14	12/6/93	0.664			0.638	0.616	0.620	
15	12/8/93	0.664			**0.640**	**0.613**	0.620	
16	12/10/93	0.664			**0.642**	**0.616**	0.620	
17	12/13/93	0.659			0.642	**0.619**	0.620	
18	12/15/93	0.659			**0.644**	**0.620**	0.620	
19	12/17/93	0.659			0.644	**0.620**	0.620	
20	12/20/93	0.653			0.644	0.620	0.620	
21	12/22/93	0.653			0.644	0.620	0.620	
22	12/24/93	0.653			0.644	0.620	0.620	
23	12/27/93	0.648			0.644	0.620	0.620	
24	12/29/93	0.648				**0.628**	0.620	**0.630**
25	12/31/93	0.648				**0.630**	0.620	0.630
26	1/3/94	0.654				0.630	0.620	0.630
27	1/5/94	0.654				0.630	0.620	0.630
28	1/7/94	0.654				0.630	0.620	0.630
29	1/10/94	0.664				0.630	0.620	0.630
30	1/12/94	0.664				0.630	0.620	0.630
31	1/14/94	0.664				0.630	0.620	0.630
32	1/17/94	0.667				0.630	0.620	**0.640**
33	1/19/94	0.667				**0.630**	0.620	0.640
34	1/21/94	0.667				0.630	0.620	0.640
35	1/24/94	0.661				0.630	0.620	0.640
36	1/26/94	0.661				0.630	**0.628**	0.640
37	1/28/94	0.661				**0.632**	0.628	0.640
38	1/31/94	0.656				**0.635**	0.628	0.640
39	2/2/94	0.656				0.635	0.628	0.640
40	2/4/94	0.656				0.635	0.628	0.640
41	2/7/94	0.645				0.635	0.628	**0.650**
42	2/9/94	0.645				0.635	0.628	0.650
43	2/11/94	0.645				0.635	0.628	0.650
44	2/14/94	0.641				0.635	0.628	0.650
45	2/16/94	0.641				0.635	0.628	0.650
46	2/18/94	0.641				0.635	0.628	0.650
47	2/21/94	0.633				0.635	0.628	0.650

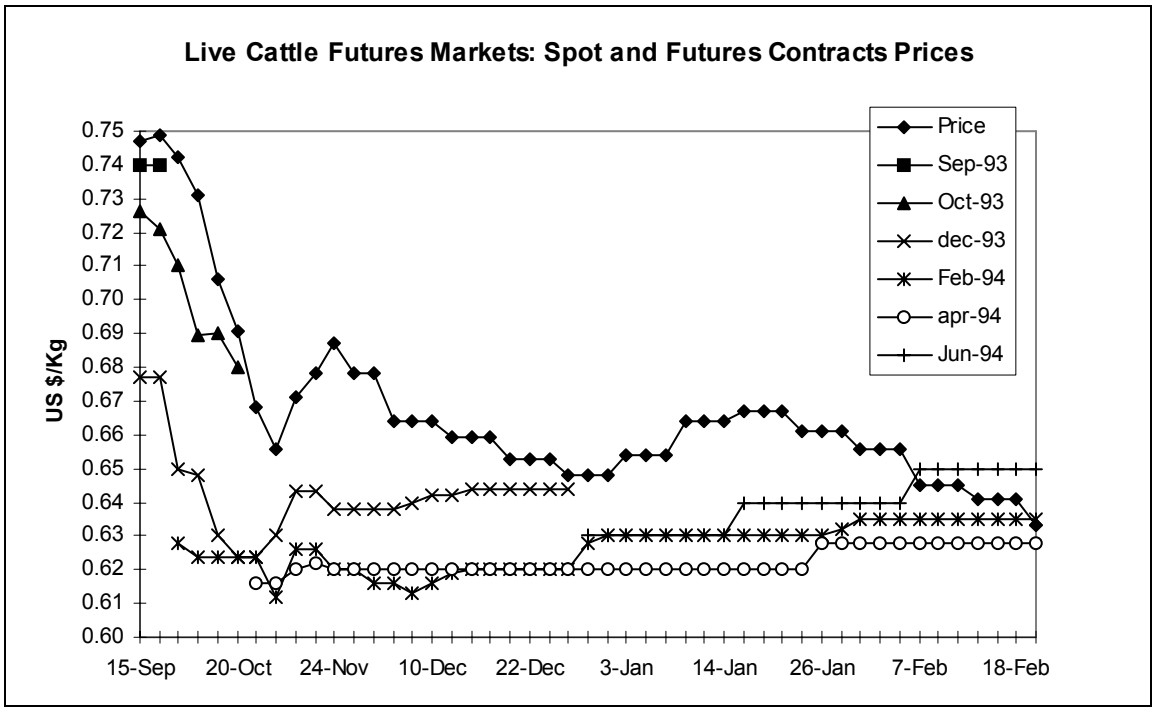
Information gathered by OPYPA (1997) from different sources, from 1996 to 1996, shows that effectively, the month of September averaged both the highest price and the lowest level of slaughter in steers. After the peak, the price falls progressively until the month of May of the next year, when usually reaches its minimum. In the same way, the number of cattle slaughtered increases as soon as the Spring and Summer arrive. The amount and the quality of food available for the cattle increase, following the upward trend of the pasture growth curve. In this way, the supply of fat cattle increases pushing down the prices. Vázquez Platero and Picerno (1994) studied yearly variations in cash price levels of slaughter, with the same findings, from the period 1984 - 1994.

As it can be observed in *Table 4*, cash price in the period September 1993-February 1994 performed according with this average (OPYPA, 1997). When futures market opened, the cash price was trading at nearly $ 0.75 /kg, dropping almost 10 cents in the period of one month. After a brief recovering during November it continued its downtrend until the end of the considered period. The level of slaughter also followed its well-known pattern during this period. *Graph 3* depicts the total volume of slaughter for steers, measured in number of heads. Concurrently with the high prices, September showed the lowest level in cattle slaughtered. The subsequent fall in prices, is explained by the observed increase in supply.

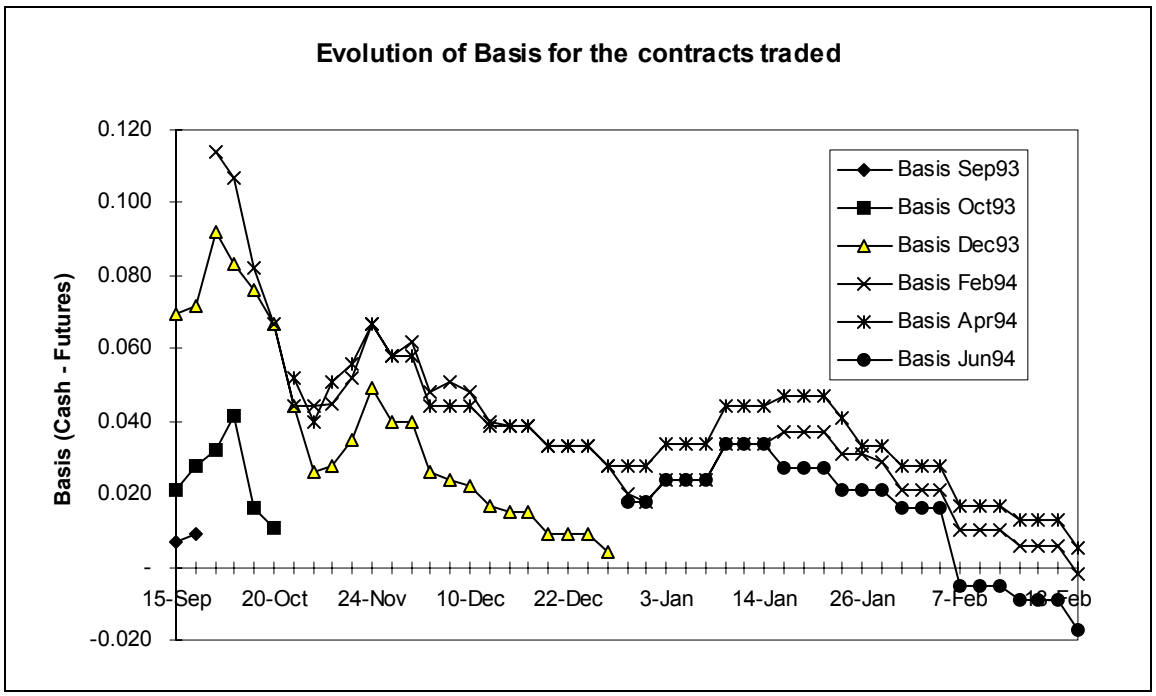
Graph 3 - Evolution of Slaughter

The immediate effect of this initial shortage on supply in the underlying commodity was a *backwardation* in the newborn futures market. The term backwardation is used, according to Edwards and Ma (1992), to describe some conditions often observed in a market. It is commonly used to refer to a market in which the futures price is less then the cash price. As it can be seen in *Graph 4*, this is precisely what happened in almost the entire period, in all the contracts. The evolution of both cash and futures prices for the six contracts traded, is depicted in this graph. Cash price is represented by the curve with "diamonds"(♦), that is the only one that goes over the whole period. *September 93* contract was traded only one week (■) so it appears as a very small segment. The other two contracts traded from the beginning, *October 93* and *December 93*, both followed the decreasing trend of cash price until November, when the latter contract began to rise, but always below the cash price. February 94, April 94 and June 94 contracts followed an slow upward trend, always with a negative basis respect to spot price, reaching its level at the very end of the futures market life.

Following the evolution of the basis for the six contracts traded and showed in *Graph 5*, we can see that the basis was almost always positive, narrowing progressively and decreasing its algebraic value. The basis became negative for the first time in the last period, for the *June 94* contract. At this time, the live cattle futures markets had virtually disappeared.



Graph 4 - Evolution of Cash and Futures Prices



Graph 5 - Evolution of the Basis

WHY THE LIVE CATTLE FUTURES MARKET FAILED

There have been several attempts to identify which are the necessary and sufficient conditions for futures markets to succeed. Black (1986) made a through analysis about the reasons for success and failure of futures contracts presenting theoretical and empirical evidence. She indicated that in general, literature focused attention in two different approaches: a "commodity characteristics" (storability, homogeneity, price fluctuation, cash market size, unrestrictions in supply and existence of related forward markets) and a "contracts characteristics" (availability of hedgers and speculators, market manipulation) point of view. This author argued that each vision, although important, is incomplete without the other. They still forgot some other important aspects that have incidence in the probability of success of new futures contracts.

According to Black (1986), it is the volume of trading that provides the best approach to measure the success/failure of a contract. The model proposed adds a new factor for success/failure estimation in futures contracts, given by the possibility of trading in closely related commodities for which there already exists a futures market. This is the "efficient cross hedge approach". Then, the average daily volume of trading of a contract is presented as a function of the size of the cash market for the underlying commodity, the price variability in this cash market, the relative residual risk of cross hedging using a related market rather than own hedging and the liquidity of the cross market (average daily volume traded at this market.

In the case of the Uruguayan experience with the live cattle futures, it seems clear that the market failed because of the low volume of trades. Although we have no records of daily open interest, we can infer that since the number of contracts traded was low, open interest was also low. Both low volume and open interest are reduced in a market without the necessary liquidity. There is no incentive for hedgers or speculators to trade in this market. The importance of hedgers and speculators in the futures market was widely discussed earlier in this paper and there is a consensus that without their participation the market cannot survive. Both are concerned about the liquidity of the market so that their orders can be executed without price concessions. For establishing the futures position at lowest cost, hedgers desire markets that are liquid and have a low bid-asked spread. Speculators, on the other hand, derive revenues from selling a position at a higher price then it cost to establish. Both the number of contracts and the price movement affect their earnings from trading (Black, 1986).

Then, the question that arises is: if the reduced volume of tradings in the beef cattle futures market was responsible of its failure, what was the cause of this low volume? Was it a problem with the quality of the potential participants in the market or is it structurally impossible to have successful futures markets in small countries with small economies? Since it is impossible to present statistical evidence confirming one hypothesis or the other, we can examine some ideas that could help to figure out what happened in this case.

Measuring volume as the average number of contracts traded in a certain period of time, different figures have been presented as the minimum required for a contract being successful: from 1,000 contracts per year to more than 5,000 per day (Black, 1986). Analyzing the volume of the beef cattle cash market in Uruguay for fat steers, the last 22-year average volume in kilograms of live steers slaughtered in September, the month of the year where slaughter is at its minimum level, is roughly 15,053,000. It represents 3,763 contracts per month (recall that contract size is 4,000 kilograms), or 125 per day, if the 100% of the volume were hedged in the futures market. Of course it certainly wouldn't happens but it can give an idea of the size of the cash market in order to study the feasibility of a potential futures market. On May, when the level of slaughter is at its peak, the volume increases to 45,222,000 kilograms, which represents 11,300 contracts per month or about 377 contracts per day.

For the same 22-year period (1974-1996) the average quantity of steers slaughtered by year was about 775,000 head. With an average of 480 kg per head it means 372 thousands tons of live cattle, representing 93,000 futures contracts per year. If the volume of cash market hedged in the futures market could reach 10%, about 9,300 contracts traded annually. On the other hand, we can suppose that in a futures market providing enough incentives, beef cattle producers could not only hedge their meat production from steers but also when selling fat female beef cattle. In this sense, average year slaughter of fat cows was about 669,000 heads, with about 400 kg per head (66,900 contracts). Assuming 5% of cross hedging cow production with the live steers contract, we have about 3,300 additional contracts. Finally, we could expect some volume derived from the sole activity of speculation so we can imagine that it would be possible to have a live cattle futures market trading more than 15,000 contracts per year. In 1990 in the United States, Mid-America Commodity Exchange traded 19,284 live cattle futures contracts (Edwards and Ma, 1992).

Thus, we can say that at least in theory, it could be possible to have a live cattle futures market in a small country like Uruguay. We have seen from this brief examination, that the volume traded in the futures market reached, in the best case, less than 3.5% of the volume traded in the cash market of the underlying commodity. So, there might be other problems that inhibit the possibility of getting a volume of trades that allow the market to perform minimally. We can try to elicit some ideas about the behavior of the different agents in the market since an adequate balance among hedgers and speculators in the market is a necessary condition for the market success.

In this case, we cannot distinguish the real proportion in which both speculators and hedgers participated. The exchange did not ask the different agents operating in the market to identify themselves as hedgers or speculators. In fact, the amount of the margin required for both positions was the same. Nevertheless, we can think that probably, this adequate balance was not achieved.

One hypothesis is that there was lack of speculation. The Bolsa de Valores de Montevideo (BVM) probably didn't have, at the time the market opened, the maturity observed in other exchanges, in the sense of being capable by itself to offer "investors", among the normal traders of the exchange, willing to play as "partners" of the beef cattle producers that came to the newborn futures market looking for transfer price risk.

As a result of many years of difficulties and uncertainties about the macro and microeconomics conditions that ruled not only in Uruguay but also in the region (Brazil and Argentina), investors in the stock exchange market developed, as the rest of the Uruguayan society, an special aversion to risk. The report published by the BVM (1984A) recognize that, although since 1991 the agents operating in the exchange increased their investments in the private sector using new instruments, they still preferred mostly low-risk alternatives like fixed-income securities guaranteed by the government. Without a solid tradition in futures markets, it is possible that this new experience made its appearance in a moment in which the adequate conditions were not given yet.

On the other hand, the meaning of speculation is commonly misunderstood and the use of this word is controversial. Edwards and Ma (1992) indicate that it has been attributed a pervasive role to speculation and to critics, futures market often look like wild speculative orgies. In all the available documentation about the live cattle futures market in Uruguay, it seems that the word speculation was been deliberately avoided. In the best case, futures market was presented as a good opportunity for investors although the principal effort was done in showing its benefits as a hedging instrument for cattle producers (Correa, 1993; BVM, 1993A). It is possible that "investors" never realized the futures market as a real opportunity to make money through speculative activity.

On the hedgers' side, we can assume with confidence that large potential hedgers, like slaughterhouses, were never involved in this experience, judging by the low number of contracts on single trades. Rather, the available data examined suggest that most of the traders holding short positions were cattle producers hedging against an expected fall in beef cattle prices. According with the seasonal pattern commonly followed by prices in the cash market, it was expected a decrease in price after the September peak. In

general, producers know about that and the initial observed movement in the futures market probably reflected this fact.

We can suppose a scenario where there weren't enough investors willing to assume the price risk the farmers wanted to transfer. This imbalance in the market caused by an excess in supply (short positions) pushing down the futures prices that were in this way below the cash price. Slaughterhouse managers and owners also know this seasonal behavior and expect decreasing cash prices. Therefore, it was unnecessary to hedge in the futures market.

Finally and despite of the big effort made by the organizers of the live cattle futures market, it is very likely that the participation of beef cattle producers in the new experience was highly overestimated. Although the two most important farmer's organizations were supporting the enterprise, it doesn't mean that most farmers were really involved and, which is more important, adequately informed about the existence and the operation of the futures market.

In this sense, the Instituto Nacional de Investigación Agropecuaria (INIA) conducted in 1991 a survey in the areas of beef cattle production in Uruguay. The survey revealed important information about the behavior of cattle producers. Only 16% of the producers defined themselves as businessmen. In other words they don't see "production" as a synonym for "business" and the "farm" as a synonym of "firm". When we reduce the scope to producers whose farm has more than 2,500 hectares [3] (about 6,299 acres), this proportion increases to 40%. Only about 48% of the farmers keep records of production in the farm and about 52% use accounting to record revenues and costs, although almost all of them hire a professional to help them calculate taxes. 31% asked for professional advice more than two times in the year in 1990 and only 7% receive permanent advice. When it occurred, it was mainly for advice on pastures and cattle management.

According to this survey, almost 50% of the farmers recognize that the most difficult decisions they have to deal with are those related with selling their products rather than with producing them. 80% of the farmers identify instability of prices as one of the problems they face and 18% mentioned the lack of information about markets as a problem. When asked about the three most important factors affecting them, 60% mentioned product prices, about 40% mentioned input prices and the instability of prices in general. Only 1 % identified lack of information about markets as one of the most three important factors.

All these data about the behavior of beef cattle producers suggest that it is unlikely that an important number of them would appreciate the use of futures markets as a complementary instrument for farm management. Before using so complex management policies like hedging price risk in futures market, they should attempt more understandable and accessible techniques.

[3] 1 hectare = 2.4710 acres.

CONCLUSIONS AND IMPLICATIONS FOR THE FUTURE

The recent years have been seen by important transformations in the Uruguayan economy. The effects can be observed in the agricultural sector, which is growing at higher rates than its own historical records (Buxedas and de los Campos, 1997). The elimination or reduction of domestic regulations and market opening have been some of the most outstanding characteristics and because of that, there is an increasing influence of the international market in the price formation (Vázquez Platero and Picerno, 1994; Souto, 1997; Paolino 1997 in personal communication). As one of the results, an additional source of risk is found in the prices of agricultural commodities, and in this context, futures market appears as one of the existing instruments for price risk management (Souto, 1997).

Uruguay had its first experience with the live cattle futures market that operated during the last months of 1993 and early 1994. The fact that the market didn't survive more that few months doesn't means that futures markets cannot succeed the next time. The possible reasons that inhibited its development were examined in this paper. It is possible that all the necessary conditions for the success could not be given at this moment. If the low volume traded in the futures market was derived from structural conditions that are inherent to small economies, impossible to modify, or if there was a failure in creating the minimal conditions that could attract enough hedgers and speculators capable of support the market is something that has at least to be considered. Determining why the experience failed would be very important in order to understand the underlying mechanisms that rule its performance, in a country with a small economy and without any tradition in its use.

Analyzing the possibilities of futures markets in Uruguay in the future, Souto (1997) remarked some points. First, it is necessary that prices in futures market adjust to the evolution of price in the underlying cash market. This condition probably requires a locally developed market. According to this author this alternative would not be feasible given the reduced size of the Uruguayan market and one would probably have to think in using futures markets developed in regional exchanges. Second, the mentioned condition operates as a restriction for the commodities or products that are able to use this instrument. In this sense the best opportunities seems to be for grains. Third, futures markets need to offer the necessary liquidity in order to perform its role efficiently. It seems to be the most important problem in small markets.

In North America, Carter and Loyns (1985) evaluated the potential and effectiveness of managing price risk on feedlot cattle in Canada using U.S. futures. Although, the origins of price variation for Canadian beef cattle seem to obey primarily market forces in the United States, their results indicate that undertaking hedging strategies through U.S. futures exchanges is more complex than previous literature suggest. They attributed this effect primarily due to basis risk, finding that hedging often reduced average returns and increased price risk. In the case of beef cattle in the southern cone of South America, the Bolsa de Mercadorias e Futuros de São Paulo, in Brazil (BM&F, 1997), trades in both futures contracts and options for live fat cattle and futures contracts for feeder cattle. It is not clear that this market can offer a good alternative for Uruguayan farmers to hedge their production. To determine that possibility it is necessary to carry out a specific research, which is beyond the scope of this study.

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