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Slaughterhouse Study

Market and Feasibility study

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1. MARKET STUDY

1.1 INTRODUCTION

The Consultation and Research Institute (CRI) was requested to conduct a feasibility study for a new modern slaughterhouse in Tripoli by the Council for Development and Reconstruction (CDR). In order to undertake this feasibility study, much missing data is required. It is for this purpose that CRI suggested conducting a spot market study on the meat sector in Lebanon. This will allow CRI to estimate or gain greater understanding of the demand for meat in Lebanon as well as its supply; both important determinants in assessing the feasibility of the slaughterhouse.

In line with this, the below report will attempt to depict the current situation in Lebanon. In a first step the methodology will be outlined. Following this methodology the market study will be structured as follow: A general background on the primary sector and an attempt to estimate meat value and production in Lebanon will be presented. This should culminate in estimating the total supply of meat in Lebanon, including local production and imports

Following the presentation of the supply, will be a section outlining the demand of meat in Lebanon and in Tripoli in particular. This will attempt to estimate the monetary value of demand as well as the estimated consumption in weight.

Finally a presentation of slaughterhouses in Lebanon and their functioning will be presented. The purpose of this is to present different scenarios of how to operate the slaughterhouse leading to different outcomes in terms of revenues and costs as well as the institutional set up; important for the feasibility study.

1.2 METHODOLOGY

In order to undertake this market study, CRI conducted both an extensive desk review as well as undertook field work through some in-depth interviews and data collection throughout the months of July and August 2012. CRI has relied on already available statistics published by the Central Administration of Statistics, official international reports from the FAO and the IMF and other UN agencies, national and regional data in addition to in-depth interviews and data collection on the field.

The sources which CRI mostly relied on are: Household Budget 1997 and 2004 as well as the Household Living Conditions 2004. While this provided substantial data, it nevertheless was still dated information and did not provide in-depth detail regarding current meat supply and demand in Lebanon. The above sources gave more of an estimation for meat demand.

Additional sources which CRI relied upon are the National Accounts published by the Lebanese government, the latest being in 2010. As shall be seen however, there are some doubts over the accuracy of the data these provide, especially in terms of meat production in Lebanon. Further data was obtained from the Lebanese customs website. This was mainly in order to obtain data regarding imports and exports in Lebanon. In addition, reports published by the Ministry of Agriculture and UN agencies were reviewed and relied upon, the latest being the Agricultural Census of 2010. This census however mostly provided number of herds as well as description of herders and farmers rather than output values.

CRI also relied on several of its own studies and data the most important of which are the Urban Poverty Indicator (UPI) for Tripoli and the monthly Consumer Price Index it produces in order to mostly estimate inflation and meat price increases.

Nevertheless, the above mentioned sources did not provide sufficient information and were filled with gaps. In order to cover this gap, CRI obtained field data from the head veterinarian of the Beirut slaughterhouse and conducted a few in-depth interviews with the Ministry of Agriculture as well as with a representative from the Tripoli slaughterhouse- which were facilitated by the CDR.

1.2.1 OBSTACLES

Obstacles faced by CRI in order to accomplish and develop this report were mainly the lack of available data. There is no consistent, up to date data regarding red meat production and red meat consumption in Lebanon, as shall be seen. Moreover, CRI faced a problem of inconsistent use of definitions in the published data and variables.

In addition the available data from various sources do not always converge and as such CRI had to make certain cross-checking, assumptions and estimations. In order to fill in the data gaps and provide backing to the assumption made, CRI has conducted several additional in depth interviews with key informants in order to validate certain figures or assumptions. Interviews were conducted with representatives at the Ministry of Agriculture and private sector representatives. These have required a significant amount of time to undertake.

In addition, attempting to obtain meetings and data from certain sources was delayed due to the month of Ramadan which fell during the months of July and August.

1.3 DEFINITIONS AND CONCEPTS

As noted in the introduction, the market supply which will allow for the development of the feasibility report is constituted of two main sections, namely, the supply and the demand. It is important to estimate the size or potential size of each in order to determine the potential profitability of the new slaughterhouse.

Prior to undertaking this market study on the meat industry in Lebanon however, it is important to qualify and define certain concepts and terminologies which will serve as a guide in the estimations of supply and demand. In addition, this will allow for pointing out differences in concepts and understandings as well as identifying the variations in the methods of estimations. Many discrepancies in data were explained and clarified by the differences in definitions. CRI invested an important amount of time to define, clarify and explain the below definitions.

To begin it is important to define the economic sector at hand, namely the primary sector. What is understood by the primary sector is all economic activity pertaining to agriculture, forestry, mining etc. It includes the production of raw material and food stuffs. It excludes the agro-food industry. This may be summarized as mostly agriculture. The focus of this report will be a subsector of this agricultural sector.

Agriculture pertains to many sub-economic activities such as growing agricultural products (fruits and vegetables), to rearing animals for the production of dairy products and other such animal products. In addition fishing and fisheries are also considered a subsector of agriculture. For the purposes of this report, the focus will necessarily be on animal rearing and more specifically on animals reared for meat producing purposes.

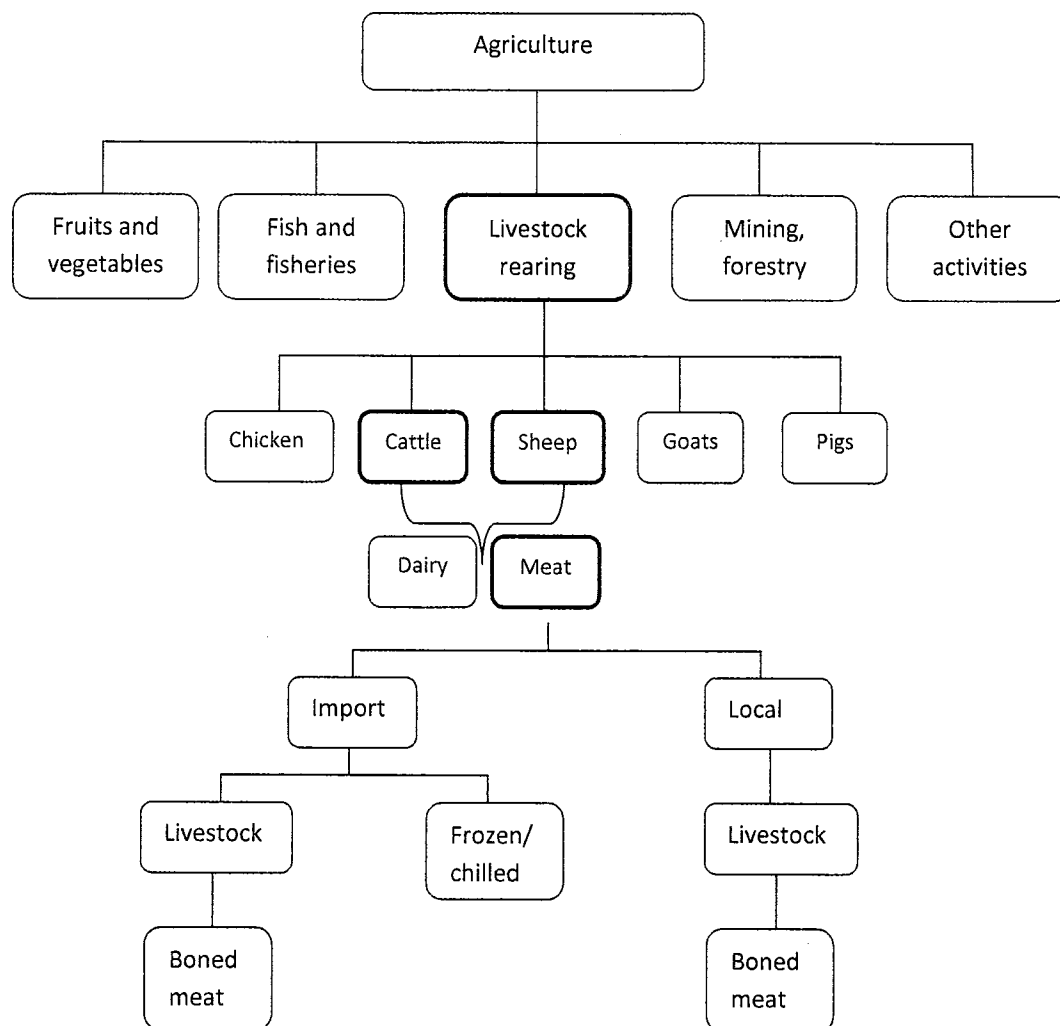
Within the agricultural or primary sector there is the meat sector as previously stated which includes cows, sheep, and goat rearing mostly in Lebanon. These herds are raised for two purposes, the production of dairy products and the production of meat.

The CRI report is concerned only by livestock which are intended for slaughter and shall not delve into those raised for production of milk and other such dairy products. Further than this, CRI will, whenever possible exclude goats and goat meat since the intended slaughterhouse for which this study is being undertaken will only slaughter cows and sheep. As such, it goes without saying, that chicken and poultry are also excluded from the study as the slaughterhouse is intended for the production of red meat.

Since the supply of meat in the country does not rely solely on local production, it is important to also look into trade data regarding the imports and exports of meat. Often when looking at the data, what is mostly available is data regarding the number of cattle and sheep head, i.e. the number of animals. In order to determine the meat supply it is important to transform this number into their meat output. The final required number is that of 'boned meat' which is the weight of the meat which has been deboned or when the bones and all other organs have been removed.

In addition there is a significant supply of frozen and chilled meat in Lebanon. Generally this meat is imported as most local production is for immediate consumption, i.e. not frozen. This however still counts towards the estimation of total meat supply in Lebanon. The available data provides the quantity of imported frozen and chilled meat.

Figure 1 Presentation of the sector



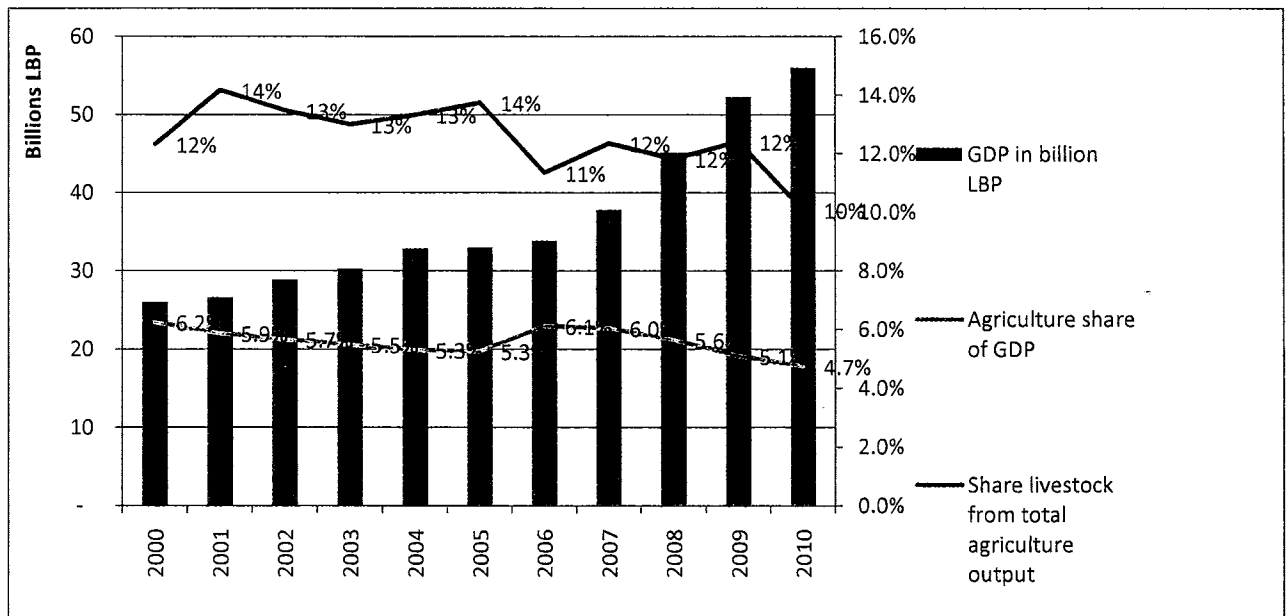
1.4 MARKET SUPPLY

1.4.1 OVERVIEW

Lebanon's GDP amounts to LBP 43,669 billion in 2011, following a 1.5% growth from 2010¹. On average, based on the trend represented in the below graph, over the last decade, the agriculture sector has not represented more than 6.2%² of GDP in Lebanon though it has been decreasing over the last few years. The share of agriculture has also significantly decreased since the 60s and 70s when it was estimated to represent 12% and 9% respectively of GDP.

Furthermore, based on the below graph, it is obvious that livestock products represent on average 12% of total agricultural output. This 12% does not only represent red meat output and production, but also contains poultry production, and other animal byproducts such as milk and eggs. It is apparent then, that red meat output in Lebanon constitutes an even smaller share of total agricultural production.

Figure 2 Lebanon GDP and Agriculture share 1997-2010³



In order to determine the supply of red meat in Lebanon- as is one of the aims of this report- it is important to look into both the local production of red meat as well as the trade of red meat. Since Lebanon is mostly a meat importer as shall be seen, it is important to assess the weight and value of these imports. First however, local production must be estimated.

¹ IMF, 2012, World Economic Outlook

² World Bank

³ Economic Accounts of Lebanon-Retrospective 1997-2007

1.4.2 LOCAL PRODUCTION

To estimate the local production, CRI relied mostly on data published in the National Economic Accounts and the Agricultural census of 2010 published by the Ministry of Agriculture, as well as a series of in-depth interviews. It must be noted that upon close inspection of the National Economic Accounts, CRI has noted some contradictions which required further investigation through in-depth interviews with both the head veterinary and the Head of the statistics department at the Ministry of Agriculture.

The main debate regarding the numbers published by the MoA pertains to the number of cows and sheep intended for slaughter in Lebanon. The numbers presented in the National Economic Accounts which are supplied by the Ministry are based on a field survey of a sample of nearly 4,500 agriculture plots or tenures in Lebanon. Farmers self-report the number of cattle and sheep they have and the number which is intended for slaughter. These numbers are then extrapolated to the whole of Lebanon. Between 2002 and 2007 it is estimated that Lebanon had no less than 40 thousand cows each year intended for slaughter as evidenced by table 1. This survey was not undertaken for the year 2008, 2009 and 2010.

Table 1 Cows and sheep intended for slaughter and their output in thousand tons⁴

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Cows # of heads in thousands	31.7	12	34	36	37	39.5	45	43.5	44.4	40.6	40.1
Beef (thousand tons)	12.1	12.4	13.1	13.4	13.8	14.3	16.4	16.2	16.5	15.1	14.9
Total Boned meat in thousand tons	6.7	6.8	7.2	7.4	7.6	7.9	9	8.9	9.1	8.3	8.2
Sheep # of heads in thousands	134.3	140	145	133	120	155	140	138	128.6	81.4	153.5
Sheep meat (thousand tons)	6.8	6.6	6.5	5.8	5.2	6.5	5.9	5.8	5.4	3.5	6.6
Boned meat share of total sheep	3.4	3.3	3.3	2.9	2.6	3.2	2.9	2.9	2.7	1.7	3.3

Nevertheless, the Ministry of Agriculture did undertake an Agriculture census for the year 2010 in which it provided the total number of cattle in Lebanon as well as the share intended for milk production and the share intended for slaughter. Based on the latest census report of the Ministry of Agriculture, there are 68,568 cattle heads in Lebanon, 60% of which are intended for dairy product and the remaining 40% for slaughter it is assumed. As such, the number of cows intended for slaughter in 2010 is 27,472 cows. This is a sharp decrease from the 40 thousand cows available for slaughter in 2010. Furthermore, it is apparent that there was a significant drop in the number of cattle between the years 1997 and 1998 which have no known explanation. In 1998, it is reported that there are 12,000 cows intended for slaughter in Lebanon, while in 1997 there were 32 thousand in 1999 there were 34 thousand; A statistical error may be a possible explanation.

⁴ Economic Accounts of Lebanon-Retrospective 1997-2007

As for the discrepancies between the National Economic Accounts and the latest Agricultural census, reasons for this may lie simply in the methodology of each report or in problems in the self-reporting and then extrapolating of data in 2007. Nevertheless, what is more important than estimating the number of heads intended for slaughter is to estimate the quantity of red meat produced on a yearly basis.

In order to estimate this supply, CRI has yet again relied upon the National Economic Accounts published by the government as well as the desk review and in-depth interviews. Based on the in-depth interviews there was a widespread agreement that the average weight of a cow intended for slaughter is around 450kg and the average share of boned meat⁵ from that cow is around 55%. Similarly, the average weight of a sheep intended for slaughter has been estimated at around 50 kg and the share of boned meat once it's been slaughtered at 45% of its original weight.

Through the national accounts, CRI was able to obtain specific numbers representing the development of beef and sheep meat output between 1997 and 2007. The above table summarizes the trend of beef and sheep meat production in Lebanon for these years. Data for 2008, 2009 and 2010 are unavailable in these accounts as aforementioned. Noteworthy however regarding the data presented by the Ministry of Agriculture in the National Accounts is that the beef and sheep meat output in the table represent the total cow weight and sheep weight rather than the share of beef obtained from a cow once it has been slaughtered.

In order to estimate the total beef and sheep meat output between 1997 and 2007 one must apply the rates obtained during the field work (55% and 45%) with the assumption that the average cow weighs 450kg and the average sheep for slaughter 50kg⁶. The results of meat output obtained are presented in the table below. It is estimated that in 2007, Lebanon produced a total of 8,200 tons of beef and 3,300 tons of sheep meat, amounting to a total local supply of 11,500 tons of red meat for that year.

The meat produced in Lebanon, or rather, the livestock slaughtered in Lebanon is usually distributed to surrounding rural areas rather than the big cities. In fact, based on the field work and interviews, it would seem that urban areas in Lebanon mostly rely on imported meat to cover their needs.

Though data is not available for the years following 2007, it is possible to estimate the meat output of cattle and sheep based on the 2010 Agriculture Census conducted by the Ministry of Agriculture and the ratios of boned meat adopted throughout the report. As previously mentioned, the total number of cattle intended for slaughter in Lebanon is estimated at 27,472. While the report does not provide the value of output of these cattle it is possible to estimate it. On average, a slaughtered cow weighs 450kg and its net meat output is estimated to represent 55% of its weight. Applying these rates to the cattle intended for slaughter in Lebanon entails a total production of 6,800 tons of beef in 2010 in comparison to 8,200 tons in 2007.

As for sheep, it is estimated, based on the census report that there are 265,345 sheep heads in Lebanon mostly concentrated in the Bekaa and Baalbeck-Hermel (72%). It must be noted that female sheep are mostly used for reproduction, while the males mostly for the production of meat. The gender distribution however of these herds is not available and thus estimating their value in meat output is problematic. Nevertheless, even if one is to assume that half these sheep are intended for slaughter, knowing that the average weight of a slaughtered sheep

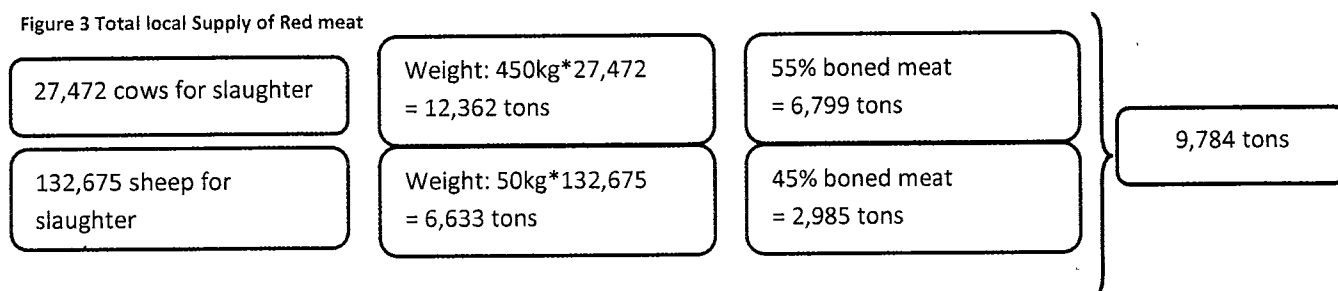
⁵ Boned meat refers to the meat obtained from the cow once all bones and organs have been removed.

⁶ These rates change according to total weight. The heavier the cattle or sheep the more boned meat is obtained and as such the bigger the ratio. The ratios and weights adopted here represent averages.

is 50kg, and the boned meat represents 45% of its weight, this amounts to a total of 2,900 tons of sheep meat, in comparison to 3,300 tons in 2007.

As such, the total production of beef and sheep meat in Lebanon does not exceed 9,800 tons in 2010.

Figure 3 Total local Supply of Red meat



This does not stray far from the estimates obtained during in-depth interviews which stated that total red meat production in Lebanon for the year 2011 amounted to nearly 20 thousand tons annually, including goat (beef: 8000 tons, sheep: 3000 tons, goat: 9000 tons). For the purposes of this report, CRI has not included goats except in the imports⁷ as Lebanon is considered to cover its needs in regards to this meat. As such, beef and sheep meat amount to 11,000 tons.

1.4.3 OVERLOOK OF LOCAL SUPPLY

- According to the National Economic accounts, in 2007 the total local production of red meat (excluding goat) was 11,500 tons divided as such: 8,299 tons of beef and 3,300 tons of sheep meat
- In 2010, based on estimations using the Ministry of Agriculture's latest agriculture census the total supply of red meat was 9,800 tons divided as such: 6800 tons of beef and 2900 sheep meat
- Due to the lack of more recent data, in order to estimate the local meat supply in 2011, CRI relied on information from in-depth interviews. In 2011, the total supply of red meat was estimated at 11,000 divided as such: 8,000 tons of beef and 3,000 tons of sheep meat.

After having evaluated each of these results and taking into account methodological difference (qualitative, quantitative approaches) and the differences in year (2007, 2010, 2011), CRI has opted for the 2010 estimations in order to assess total supply of meat in Lebanon. Finally, the rounded estimates below will be retained for the remainder of the market and feasibility study:

- Total supply of Beef in Lebanon: 7,000 Tons per year
- Total supply of Sheep meat in Lebanon: 3,000 Tons per year
- Total meat supply: 10,000 Tons per year

⁷ In the customs data regarding imports and exports, goats and sheep are lumped together, and it is thus not possible to exclude goats from those estimates.

Table 2 Live Bovine, Sheep and Goat in Thousands USD and net tons

	Value USD (000)	Value Tons	Value USD (000)	Value Tons
2008	166,195	68,896	0	0
2009	253,994	108,025	1,177	208
2010	320,196	114,128	1,360	323
2011	298,201	105,052	0	0

Table 3 Meat of Bovine animals, sheep, goats, chilled or frozen in Thousands USD and net tons

	Value USD (000)	Value Tons	Value USD (000)	Value Tons
2008	125,195	30,629	264	25
2009	155,358	42,380	288	36
2010	166,764	34,937	250	54
2011	160,341	28,341	286	23

1.4.5 TOTAL SUPPLY

It must be noted that the total supply of red meat estimated throughout this section does not take into consideration the loss of meat from unhealthy livestock. This livestock is considered unfit for slaughter and should not be included in the total supply. While the table below summarizes the supply side of the meat market, covering both local production and imports for the year 2010, it does not account for this loss which may be estimated at around 5%. In fact, 5% of livestock (both local and imported) boned meat may be subtracted from this total to represent the actual supply of meat in the country.

The total supply of boned meat from livestock both local and imported is 70,000 tons. A 5% loss on that amounts to around 3,500 tons, entailing that total supply diminishes to around 101,500 tons.

Table 4 Sum-up of total meat supply in Lebanon in 2010

	Local production	Imported	Total
Local production	7,000	3,000	10000
Loss of livestock	-5%		-500
Local Production	6,650	2,850	9,500
Total Imports	89,000	6,000	95000
Frozen	34,000	1,000	35000
Livestock	55,000	5,000	60000
Loss of livestock	-5%		-3,000
Total imported livestock	52,250	4,750	57,000
Grand Total	92,900	8,600	101,500
% imports	93%	67%	90%

1.5 MARKET DEMAND

Estimating the demand for red meat in Lebanon should take into consideration several sources of consumption. However, it must be noted that data regarding this topic is severely lacking in the country. Beyond consumption of the household in the home, there is no data regarding the consumption of meat in the services sector (restaurants and hotels) or the intermediary use of meat. The methodology used and obstacles encountered are outlined in the below section.

First however, it is important to note that total demand for red meat is composed of the following items:

- Household consumption in-house
- Household consumption outside house in hotels and restaurants
- Tourist consumption in hotel and restaurants
- Intermediate consumption: red meat inputs in remaining economic sectors
- Exports (negligible, it will not be estimated in this study)

1.5.1 COMPARISON OF HOUSEHOLD EXPENDITURE 1997 AND 2004

There are two official published sources upon which one can determine household expenditures on goods such as meat; and they are: Household Budget of 1997 and the Household Budget of 2004 both undertaken by the Central Administration for Statistics. It is important to perform a comparison of results between these two sources to highlight possible methodological differences or troubling issues which might not be explained by the time lapse (7 years).

Below is a general comparison of the share of household expenditure on the following major spending categories:

Table 5 Percentage distribution of the annual expenditure of household on products categories

	1997	2004
Food and Beverages	24.80	20.87
clothing and footwear	6.20	5.87
Housing	15.40	21.47
Furnishing household equipment maintenance	6.40	5.62
Health	7.10	7.94
Transport and Telecommunication	14.40	15.79
Education	11.20	7.39
Leisure	5.30	4.76
Other services	9.10	10.29
Total	100.00	100.00

First off, what is important to note in the above table is that the comparison is restricted to the Beirut governorate. The reason for this is that the 1997 survey was conducted for the Beirut area and its suburbs and not for the whole of Lebanon. Nevertheless, this comparison allows us to see that according to the Central Administration for Statistics, there has been a decrease in the share of expenditures on Food and Beverages from 24.8% to 20.87%, a decrease which cannot be explained by the 7 years gap in between. However, this decrease of the share may be explained by the significant increase of the Housing share (from 15.40% to 21.47%). The latter may be due to changes in definitions and inclusion of new items in 2004's household budget survey.

Nevertheless both years show similar results for meat consumption. Meat (which contains poultry) represents around 19% to 20% of food and beverages consumption in 1997 and 2004 respectively. Out of total expenditure, meat represents around 5% of household expenditures in 1997 and 4% in 2004. At this level, margins of fluctuation remain acceptable.

CRI will rely on the 2004 Household Expenditure survey, to gauge demand in the meat sector, since the 1997 data is outdated and in any case does not extend to all the different governorates of Lebanon.

1.5.2 EXPENDITURE AND POVERTY IN LEBANON AND TRIPOLI

According to a study conducted by UNDP, 28% of the Lebanese are considered poor while 8% are considered extremely poor⁹. In addition it is estimated that the majority of Lebanese households (61%) annually spend LBP 17,999 thousand or less¹⁰.

North Lebanon on the other hand is said to have the highest poverty rates in the country with 52% of its residents considered poor and 17% extremely poor¹¹. This poverty translates into the expenditures of households in the governorate with 66% of them spending less than LBP 14 million annually, averaging to LBP 13,859,999¹². In fact, the North Lebanon governorate has the lowest average expenditure in the country coupled with the biggest household size (4.74) as evidenced in table 6.

⁹ UNDP, 2005 "Poverty, Growth and Income Distribution in Lebanon.

¹⁰ CAS, 2004. Budgets des Menages

¹¹ UNDP, 2005 "Poverty, Growth and Income Distribution in Lebanon.

¹² CAS, 2004. Budgets des Menages

Table 6 Annual expenditure category of Households in thousands LBP

Region	Food	Non-Food	Health	Education	Transport	Communication	Recreation	Other	Total
Beirut	3.4	4.1	5.3	9.3	12.7	16.8	21.8	26.5	100
Mount Lebanon	6.4	8.0	11.5	13.5	15.1	18.2	14.9	12.5	100
Northern Lebanon	11.7	20.8	17.3	16.2	15.4	8.7	5.3	4.6	100
Bekaa	10.6	11.9	12.2	14.8	17.3	15.6	11.1	6.7	100
southern Lebanon	13.0	15.5	15.5	17.6	17.5	9.8	6.4	4.7	100
Nabatiyeh	7.4	8.2	13.9	13.0	17.3	16.2	17.4	6.7	100
Lebanon	8.2	11.1	12.5	14.0	15.5	15.0	12.8	10.8	100

Table 7 Average yearly Household expenditure by region

Region	Average yearly expenditure (LBP)	Average monthly expenditure (LBP)
Beirut	29,187,000	3.84
Mount Lebanon	20,811,000	4.04
Nabatieh	18,256,000	4.24
Bekaa	16,778,000	4.58
South Lebanon	14,671,000	4.49
North Lebanon	13,859,000	4.74
Lebanon	19,242,000	4.27

1.5.3 MEAT CONSUMPTION IN LBP (HOUSEHOLD CONSUMPTION IN-HOUSE)

In terms of value, it is estimated that a Lebanese household spends around 821 thousand LBP per year on meat (red meat, poultry and processed meats). With an estimated 879,855 households¹³ in Lebanon, this roughly entails a value of LBP 722 billion for the country.

For households which have on average lower total expenditures than the average Lebanese expenditure - such as those in the North Lebanon governorate - this amount diminishes to LBP 662 thousand annually. This is in effect the lowest expenditure on meat in the country. Considering the number of households in the North Governorate is 162,344, then expenditure on meat in the region may be estimated at LBP 107 billion.

Table 8 Expenditure on meat by governorate in 2004

Expenditure on meat by governorate in 2004 (in thousands of LBP)			
Beirut	1,158	101,695	117
Mount Lebanon	807	371,829	300
Nabatieth	971	52,306	50
South Lebanon	801	89,423	72
Bekaa	737	102,797	76
North Lebanon	662	162,344	107
Lebanon	821	879,855	722

For the purposes of this report however, it is important to focus on red meat, and estimate expenditure on red meat (excluding goat meat) rather than expenditure on all meat which includes poultry and is outside the scope of this study. Based on the Household Budget report of 1997, red meat represents 67% of meat expenditure. As such, this rate is applied to total meat expenditure to obtain expenditure on red meat in Lebanon. Due to the lack of more recent data, CRI will use this rate for current estimates. If one is to reapply this share to the current figure then it would entail a value of LBP 72 billion in North Lebanon and LBP 444 thousand at the level of the household annually. If all else is equal, it is possible to estimate this household expenditure for the year 2011 using both price inflation of red meat and elasticity parameters. Indeed, red meat elasticity varies between beef and sheep, the latter being more elastic than the former. More precisely, beef elasticity is 0.257 and sheep elasticity: 0.728¹⁶.

¹³ CAS, 2004. Household Living Conditions

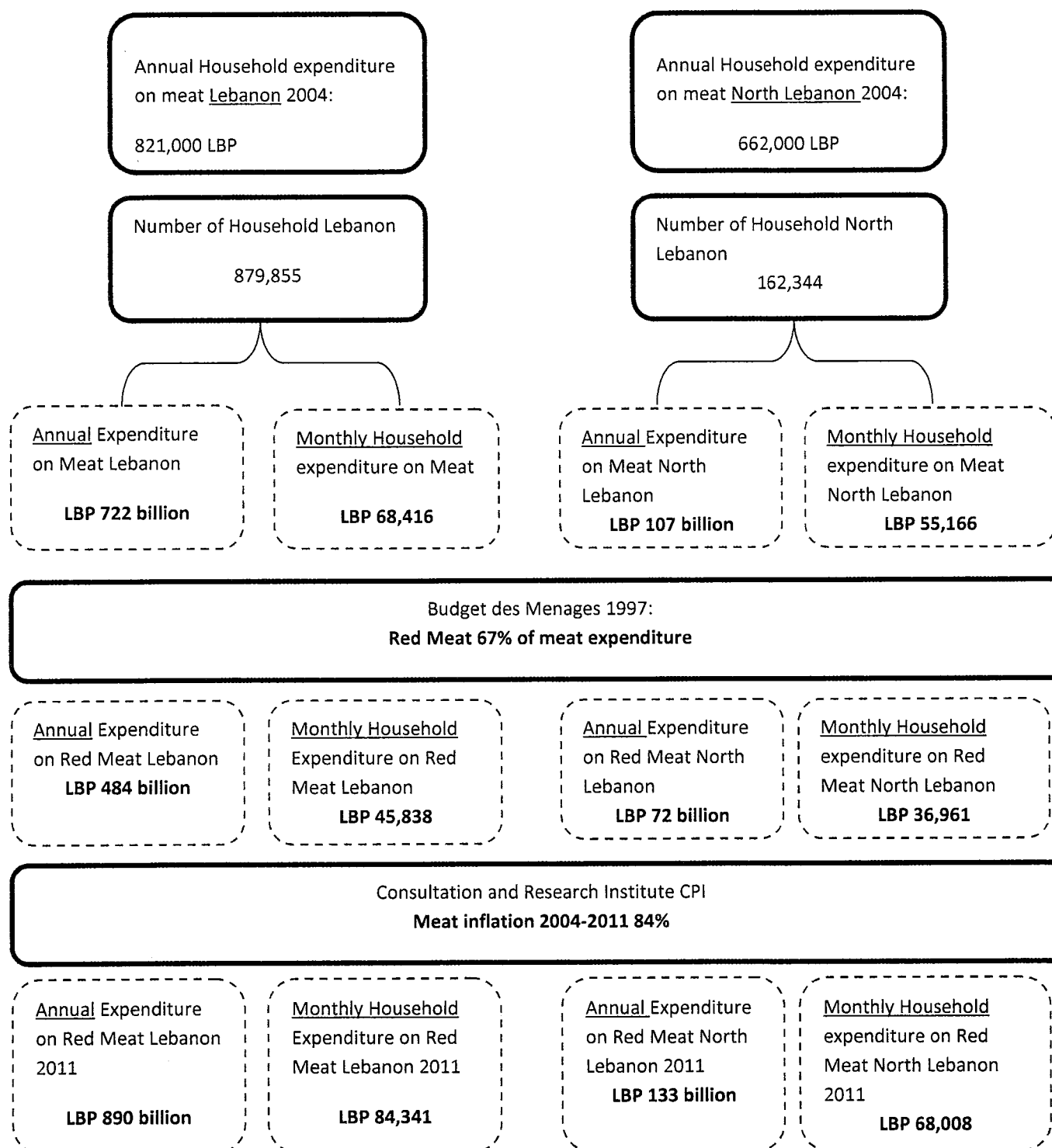
¹⁴ CAS, 2004. Budget des Menages

¹⁵ CAS, 2004. Household Living Conditions

¹⁶ ibid

meaning consumption or demand for sheep varies more than that for beef when considering income and inflation. In addition, it is noted that beef consumption may be considered as a substitute for sheep meat when the price of the latter increases. Based on the Consultation and Research Institute's CPI, red meat prices (beef and sheep) rose by 84% between 2004 and 2011 entailing that the monthly household expenditure on red meat is closer to LBP 66 thousand.

Figure 4 Outline of expenditure on Meat in Lebanon and North Lebanon



1.5.4 MEAT CONSUMPTION IN TONS

1.5.4.1 LEBANON (HOUSEHOLD CONSUMPTION IN HOUSE)

Having gone over the expenditure on meat in the country and in North Lebanon in particular, it is important to assess the meat consumption of the Lebanese in terms of quantity. According to the 1997 Household Budget, the per capita consumption of red meat of Beirut residents is 24kg annually. This data is not available in the 2004 Household Budget report published by CAS. It is however possible to estimate this consumption given that total expenditure on meat is provided in 2004, and since the price per kg of beef and sheep meat is available for that year from the CRI Consumer Price Index.

In 1997, residents of Beirut consumed about 20.4kg of beef per capita annually, with an individual annual expenditure of 179,300 LBP. This translates into beef costing 8,800LBP/kg. As for sheep meat, per capita annual consumption amounted to 2.7kg with a total expenditure of 39,900 LBP. As such, the price of sheep was 14,800LBP/kg in 1997. In total, residents of Beirut spent 219,200 LBP individually per year on red meat.

While the data available for 2004 is provided for the different governorate in Lebanon, it is not provided in as much detail as the data from 1997. Nevertheless, the below table summarizes the individual meat consumption estimations for each of Lebanon, North Lebanon and Beirut.

Table 9 Expenditure on red meat in Lebanon, North Lebanon and Beirut

	Lebanon	North Lebanon	Beirut
Per Capita expenditure on meat LBP	194,000	138,000	304,000
Expenditure on red meat, based on 1997 data		66.7%	
Per Capita expenditure red meat	129,451	92,084	202,852
Expenditure on beef LBP¹⁷	105,888	75,322	165,928
Expenditure on sheep LBP	23,563	16,762	36,924
2004 beef price/kg		8,539 ¹⁸	
Per Capita beef consumption kg	12.40	8.8	19.4
2004 Sheep price/kg		16,485	
Per Capita sheep consumption in kg	1.43	1.02	2.24
Total individual red meat consumption 2004	14	10	22

What is apparent from the above table is the stark difference in consumption quantity between North Lebanon and Beirut. In fact, Beirut's meat consumption is far above that of the Lebanese average. However what is also noteworthy is that the red meat consumption of Beirut residents in 2004 is nearly similar to that of Beirut residents in 1997. This is an indication of the validity of the estimation.

¹⁷ The share of beef and sheep meat from total red meat were estimated based on data from the 1997 Household Budget report.

¹⁸ Based on CRI's CPI for 2004 and based on research on the field, the price of red meat does not vary greatly between Beirut and Tripoli.

In order to assess these results, CRI has cross-checked the current consumption estimates with the expenditure on red meat in 2011 based on the previous subsection. The results are converging: since monthly household expenditure on red meat in Lebanon in 2011 reached 84,341 LBP, and assuming the average household size equal to 4.3, the per capita yearly expenditure is estimated at 237,000 LBP. The weight average price of meat (Beef, 90% and sheep 10%) is estimated at around 9,300 LBP in 2004 and reached 17,100 LBP in 2011¹⁹. Hence the average per capita annual consumption of red meat in 2011 is 14 Kg.

When comparing to other countries in the region Lebanon's per capita meat consumption (14kg) is more or less similar- if anything only slightly higher which could be due to the country's higher GDP per capita. Jordan's annual per capita meat consumption is estimated 11kg²⁰ and Syria's estimations amount to 12kg per capita in 1995.

This average consumption does not however take into consideration meat consumption outside the household. There is a margin which should be added to this per capita annual consumption which is related to the services sector (restaurants and hotels).

1.5.4.2 NORTH LEBANON (HOUSEHOLD CONSUMPTION IN HOUSE)

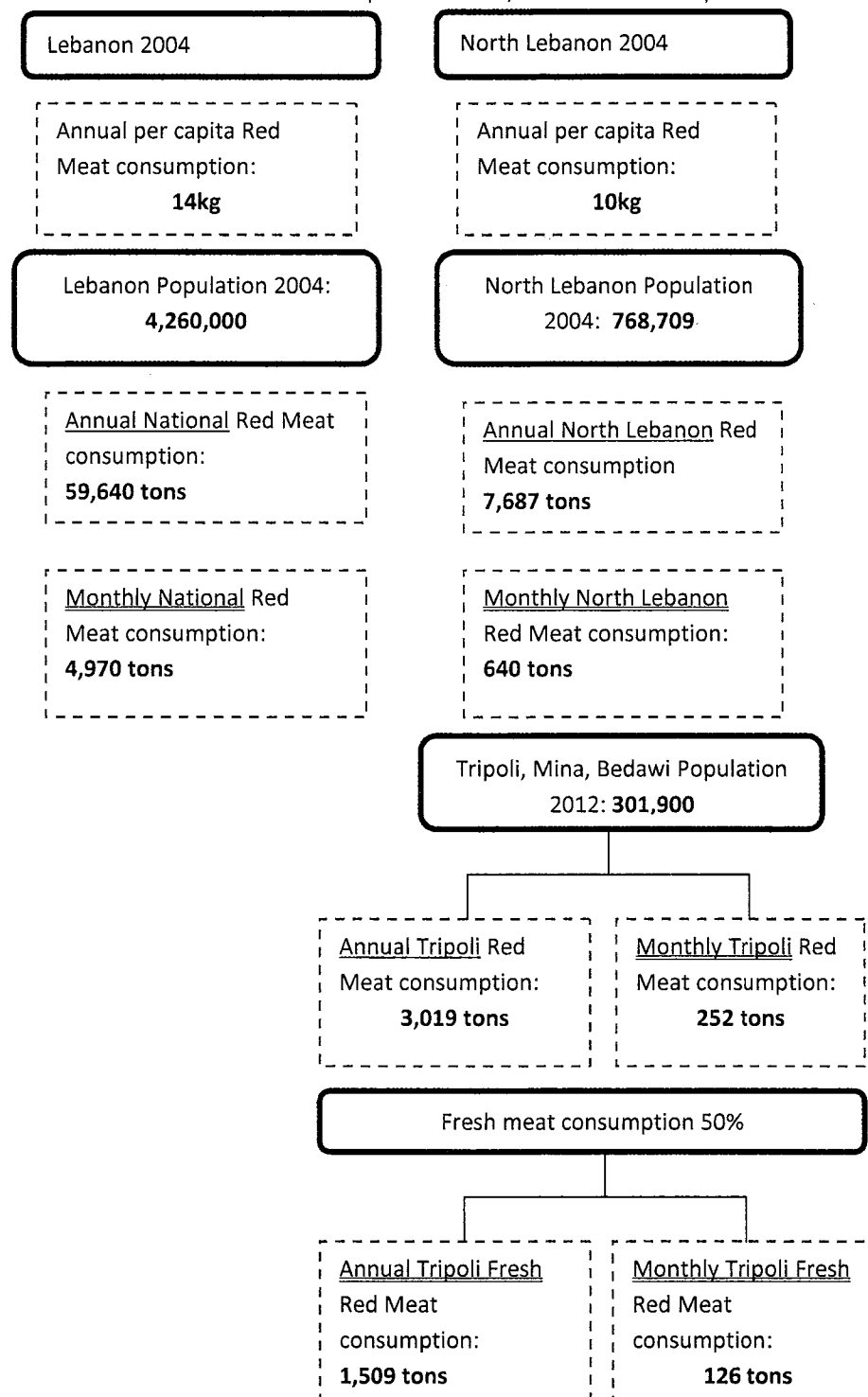
Since North Lebanon is considered the poorest region or governorate in Lebanon, and has the lowest total household expenditure in the country as well as the lowest expenditure on meat, it is no surprise that it has much lower per capita red meat consumption (10kg). Nevertheless, it is likely that red meat consumption in the city of Tripoli and its surroundings is slightly higher than this estimate. Due to the lack of up-to-date and specific data it is not possible to estimate this number. Moreover, and in order to remain in the safe margins in the feasibility study, CRI will adopt the 10Kg estimates.

Based on this number, it is then possible to estimate the total demand for red meat in Lebanon and in North Lebanon, as well as Tripoli and its surroundings. The figure below illustrates this estimation.

¹⁹ Based on CRI inflation estimates

²⁰ Jordan's competitiveness Report 2008-2009

Figure 5 Outline of Household in house red meat consumption in Lebanon, North Lebanon and Tripoli and its surroundings



Based on the above figure, the demand for red meat in the North Lebanon governorate may vary between 1,537 tons to 2,049 tons per month. If one is to break down this consumption by beef and sheep then the total annual fresh meat consumption in Tripoli of beef is 264 tons while that of sheep is 138 tons.

Table 10 Beef and Sheep consumption 2004 data

2004 meat consumption assumptions	Beef	Sheep
Annual per capita consumption Lebanon (kg)	12.4	1.4
Lebanon population 2004	4,260,000	
Total Lebanon consumption in tons	52,824	5,964
Annual per capital consumption North Lebanon (kg)	8.8	1
North Lebanon population 2004	768,709	
Annual meat consumption North Lebanon in tons	6,765	769
Tripoli, Mina, Beddawi population	301,900	
Tripoli, Mina, Beddawi Annual consumption in tons	2,657	302
Fresh meat consumption	50%	
Annual Fresh Meat consumption in tons	1,328	151

1.5.4.3 LEBANON (MEAT CONSUMPTION IN THE SERVICE INDUSTRY)

There is no official data regarding consumption of red meat outside the household in restaurants and hotels, snacks and cafes. As such, CRI has had to use several different sources in order to estimate this consumption in Lebanon.

CRI undertook a benchmarking exercise in order to attempt to gauge the range in which restaurant and hotel demand for red meat should be situated. In France, the restaurant demand for red meat (beef and sheep) accounts for 25% of the demand. Considering that France has a much higher number of tourists, and restaurants for that matter, in Lebanon, this share should be smaller. In fact, based on an interview conducted with the President of Imported Frozen and Chilled Meats in Lebanon, restaurants take about 15% of the imported frozen and chilled meat. Since the imports amounted to 35,000 ton, restaurants' share of this amounts to 5,250 tons. This does not take into consideration restaurants which actually consume or purchase fresh red meat which is minimal based on all accounts from in-depth interviews.

The third and final source which CRI made use of are the Household budget of 2004 and the CRI CPI. Based on the Household Budget report of 2004, the annual average household expenditure on households and hotels amounted to 500,000 LBP. It is possible to update this figure with the CPI increase between 2004 and 2010 which amounted to 38%. As such, the total annual household expenditure on hotel and restaurants amounted to 690,000 LBP in 2010.

The share of red meat expenditure out of total food expenditure in the household is estimated at around 22% both in 1997 and 2004. Based on this CRI assumes that the share of meat consumption from expenditure in restaurants outside the household is bigger than this. It is estimated that red meat expenditure in fact amounts to about 35% of household expenditure in restaurants which in turns amounts to LBP 241,500. To estimate this at the level of the country, it must be multiplied by the number of households which as previously noted is 879,855 in 2004. The total expenditure of households on red meat in restaurants and hotels amounts to around LBP 213 billion.

A further assumption is made regarding the price at which restaurants sell a kg of red meat. If the price of a kg of red meat at the butcher today is around LBP 17,000, then the restaurants sell this at a much higher rate to customers. It is assumed that a kg of meat in restaurants averages out to around LBP 45,000. Based on these numbers, it is possible to calculate the total red meat consumption in restaurants and hotels, which amounts to around 4,722 tons.

The above estimate however does not represent all of the red meat consumption in restaurants and hotels. To this one must add the consumption of non-residents (i.e. tourists) in restaurants. No data whatsoever exists on this and as such it is hard to accurately gage this estimate. CRI estimates that tourists' consumption in restaurants in Lebanon amounts to nearly half of that of residents of the country. As such it is estimated at 2,300 tons. This entails that total consumption in restaurants amounts to around 7,000 tons per year. This total amount is in the same range as the estimate given by Mr. Mabsoot. As such, CRI will rely on the data provided by him and estimate the demand from restaurants amounts to 5,250 tons per year.

1.5.4.4 LEBANON (INTERMEDIATE CONSUMPTION)

Part of the demand for red meat in Lebanon is generated by the manufacturing sector, or other such sectors of the economy. This is what is normally referred to as intermediate consumption. The use of red meat in an industry to transform it into another final good, destined for final consumption.

Based on the national account data, it appears that the agriculture and livestock sector provides around 2,400 billion LBP for other sectors as inputs (intermediate consumption) in 2010. The share of livestock value out of total agriculture value is estimated at around 12%. Due to the dearth of data on this issue in the country CRI will make use of this estimate and apply it to the intermediate input value of agriculture. Hence the Intermediate Consumption of red meat is LBP 2,400 billion*12%, amounting to LBP 291 billion. The selling price to the other sectors of the economy is thought to be only half of the selling price on the market. As such the average selling or buying price is around LBP 9,000 per kg. However, based on the field work and in-depth interview, it would appear that the selling price averages around LBP 7,250. These two estimates will be used to gage the total intermediate red meat consumption. The below outlines the intermediate consumption of red meat based on the two estimates:

- LBP 2,400 billion/LBP 9,000=around 32,427 tons per year.
- LBP 2,400 billion/LBP 7,500= 38,912 tons per year.

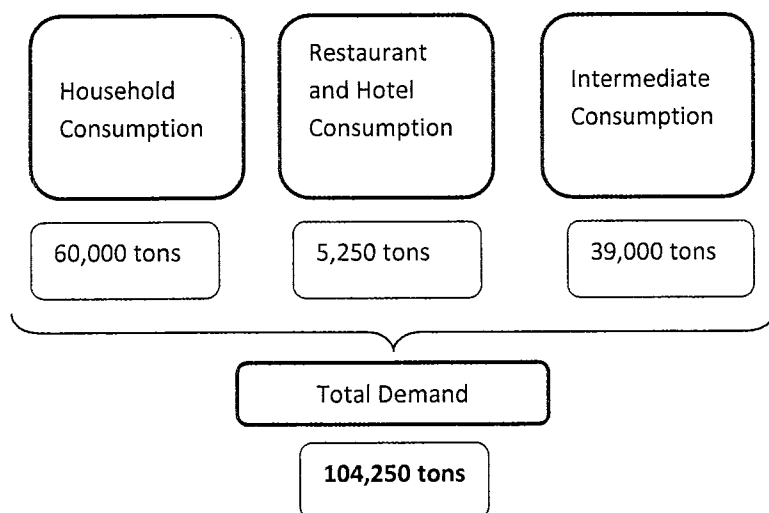
As such, intermediate red meat consumption varies between 32 thousand tons per year and 39 thousand tons per year.

1.5.4.5 TOTAL RED MEAT DEMAND IN LEBANON

Based on the above section it is possible to determine total red meat demand in Lebanon. It is the combination of the different sources of demand: Household consumption in household, household consumption outside of household, tourist consumption and finally intermediate consumption.

- Household Consumption at home: 60,000 tons
- Total Tourism sector consumption: 5,250 tons
- Intermediate Consumption: 39,000 tons
- **Total Red Meat consumption: 108,000 tons**

Figure 6 Total Red Meat Demand in Lebanon

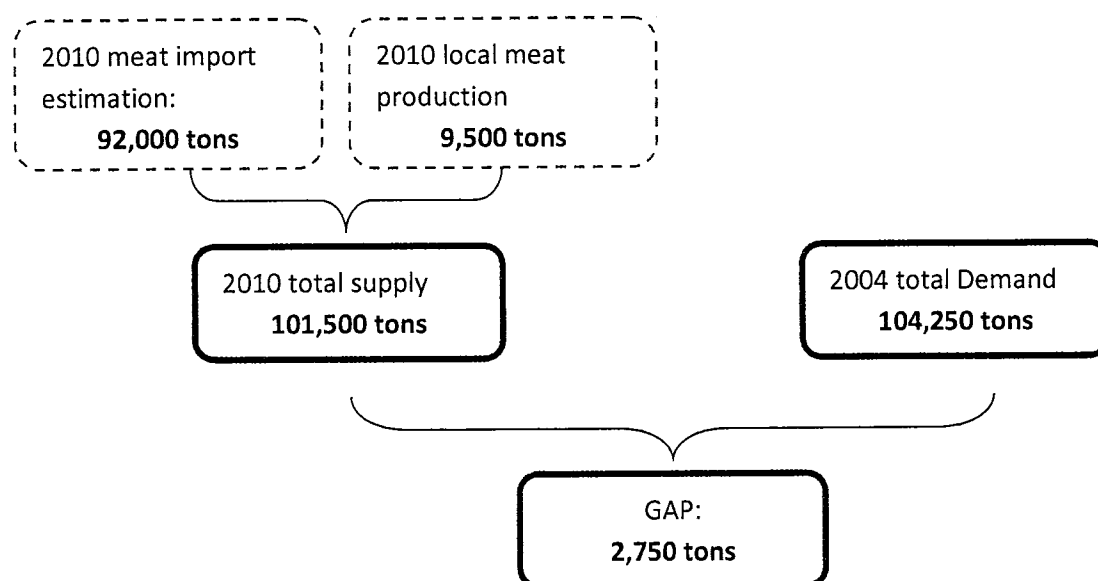


1.6 SUPPLY AND DEMAND IMBALANCE

Based on the above analysis and estimates, the results show a total annual supply of around 101,500 tons of red meat (beef and sheep), while the annual demand is estimated for Lebanon in is estimated at 104,250 tons. Despite the fact that some of the available data for demand is based on the year 2004, it is possible to assume that this household consumption has not changed for the year 2010-2011. Since the estimated consumption for Beirut in 2004 is similar to that presented in official sources in 1997 (7 year period), it is safe to assume that the consumption for Lebanon on the whole as well as North Lebanon has also not changed significantly (taking into account the substitution effect).

At a preliminary level, there is an obvious small gap between supply and demand of around 3,000 tons. This gap may be explained by the fact that there is much smuggled meat in Lebanon. Based on the in-depth interviews there is a significant amount of smuggled red meat in the country from neighboring Syria which is hard to estimate. This smuggling is usually in the form of livestock. This may explain this gap since there has never been an issue of insufficient or shortage of red meat in the country in recent history. Moreover, this gap may be also due to errors in some estimations or assumptions. Nevertheless it remains however within an acceptable margin of error since it is estimated at 3%. Given the scarcity of data, a margin of less than 10% seems to be more than acceptable

Figure 710 Supply and Demand Gap Lebanon



1.7 SLAUGHTERHOUSES IN LEBANON

There is a multitude of public and private slaughterhouses in Lebanon. The majority of these slaughterhouses are outdated and do not conform to modern standards of health, safety and hygiene- especially the public ones. Many slaughters, especially in rural areas occur at the butcher rather than in the vicinity of a proper slaughterhouse also. It is nevertheless important

There is one main slaughterhouse in Beirut and about 18 slaughterhouses in the Mount Lebanon governorate, 16 of which are private. There are 13 slaughterhouses in the South Lebanon governorate, 5 of which are public while the 8 remaining are private. There is also a slaughterhouse in Baalbeck, Tripoli, Batroun, Douma, Nabatieh, Halab, Beneini, Zgharta and 2 in Akkar.

While gathering data regarding the output and functioning of these slaughterhouses has proved difficult, some data has nevertheless been obtained.

1.7.1 BEIRUT

The Beirut slaughterhouse is has an area of 11,000 sqm and on average slaughters 20 cows per hour and 50 sheep. It has 3 shifts totaling 18 hours (6hours/shift). The table below summarizes the first six months of 2012 in terms of number of slaughters per month.

Table 11 Number of Bovine and Sheep slaughtered at Beirut slaughterhouse January to June 2012

Month	Sheep	Cow
January	3,652	880
February	4,002	913
March	3,337	962
April	3,816	914
May	3,885	979
June	4,262	907
Total	22,954	5,555

If one is to project these same estimates for the year, then the total annual slaughters of the Beirut slaughterhouse come out to 45,908 sheep and 11,110 cows. Based on these figures, one can apply a ratio to obtain the actual meat output of the Beirut slaughterhouse. This ratio is based on numbers presented in the Environment report for the new Tripoli slaughterhouse.

It is estimated that a cow weighs 450kg and its boned meat output is 55% of its weight, then the Beirut slaughterhouse has a beef output of 2,749 tons for the current year. As for sheep, if the average weight of the sheep is considered to be 50kg, and the carcass share of the weight is 45% then the total output of sheep meat by this slaughterhouse is 1,032 tons for the current year.

The fee per slaughter at this slaughterhouse is 11,000 per cow and 5,500 per sheep. Based on the above numbers this would amount to a total revenue of LBP 375 million (USD 250,802) annually. In fact, based on numbers obtained from the Beirut slaughterhouses the above figures are in line with the yearly revenue estimated at 450 million LBP for the year 2011.

While this slaughterhouse is public, the butchers are nevertheless expected to have their own staff who will use the facilities to slaughter the cattle rather than have public employees hired for this purpose. This is the reason for which the slaughterhouse only takes a fee for the use of its equipment and facilities. This fee however, and the total revenue it accrues, are not enough to cover the running or rather operational costs of the slaughterhouse which amount to LBP 624 million.

1.7.2 SAIDA

The Saida slaughterhouse is considered to be one of the most modern and best working ones in the country. It is a public slaughterhouse in which the municipality has its own employees who perform the slaughters. Butchers are not allowed to bring their own employees to undertake the slaughtering of the animals. It is for this purpose that the Saida slaughterhouse charges LBP 24,000 per cow and LBP 7,000 per sheep.

On average, the Saida slaughterhouse - which is 9,000 sqm- slaughters 30 cows and 30 sheep per day. The output of these slaughters is 7 tons of beef and 700 kg of lamb a day. On a yearly basis (assuming they work 25 days a month), this amounts to 2,227 tons of beef and 200 tons of sheep per year.

For the year 2011, this led to a total revenue of LBP 240 million, while the operational costs of the slaughterhouse amounted to LBP 300 million. Similarly to the case of Beirut, this slaughterhouse works at a deficit. The benefits obtained in many instances cannot be quantified as they pertain to public health and safety of the population.

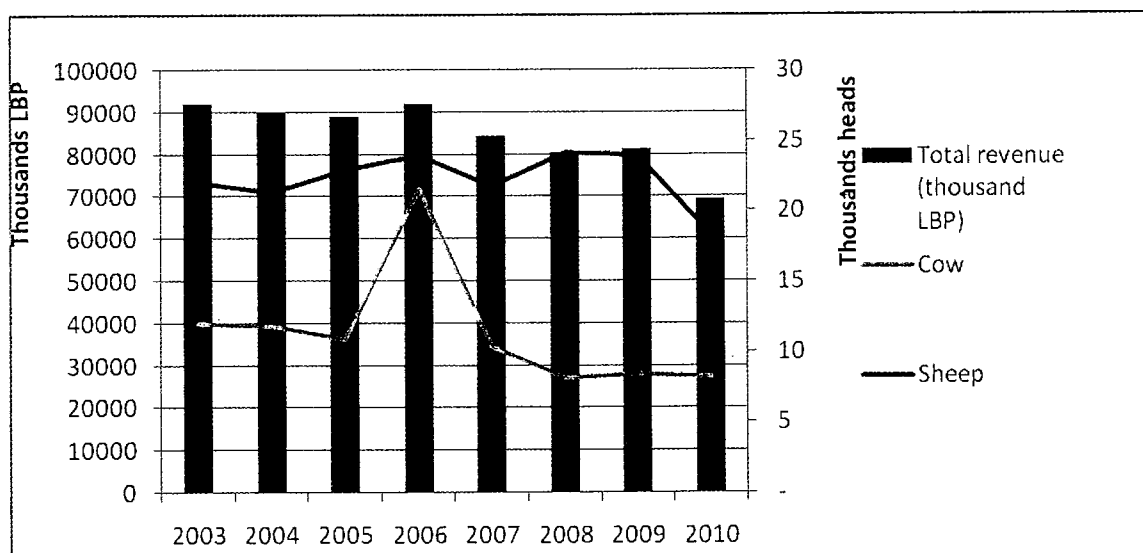
1.7.3 TRIPOLI

The current Tripoli slaughterhouse has a fee of 2,000 LBP per sheep slaughter and 4,000 LBP for cow slaughter, considerable less than the fees in Beirut. On a daily average, it slaughters about 20 cows and 40 sheep per day based on data obtained from field work and interviews.

The graph below illustrates the decreasing slaughters and revenues of this slaughterhouse since 2003 till 2010. In fact, there has been a 17% decrease in the number of slaughtered sheep and goat in the Tripoli slaughterhouse since 2003, and 31% decrease in the number of slaughtered cows. Nevertheless, it is possible to estimate the meat output of this slaughterhouse by using some ratios provided in the Environment Report of the new slaughterhouse.

It is estimated that a cow weighs 450kg on average, and that 55% of its weight amounts to the boned meat. For the year 2010, the Tripoli slaughterhouse in total slaughtered 8,212 cows which translate into 2,032 tons of beef for the year. As for sheep, if it is estimated that each sheep weighs on average 50kg, and the meat value is 45% of the sheep, then the total output of sheep meat for 2010 is 411 tons. The combined total amounts to 2,443 tons of beef and sheep. This total already seems to exceed the total household demand of red meat in the Tripoli, Minna and Beddawi region. In fact, it is just under covering the demand for the North governorate.

Figure 8 Slaughter of cows and sheep and revenues of Tripoli slaughterhouse 2003-2010



1.7.4 NEW TRIPOLI SLAUGHTERHOUSE

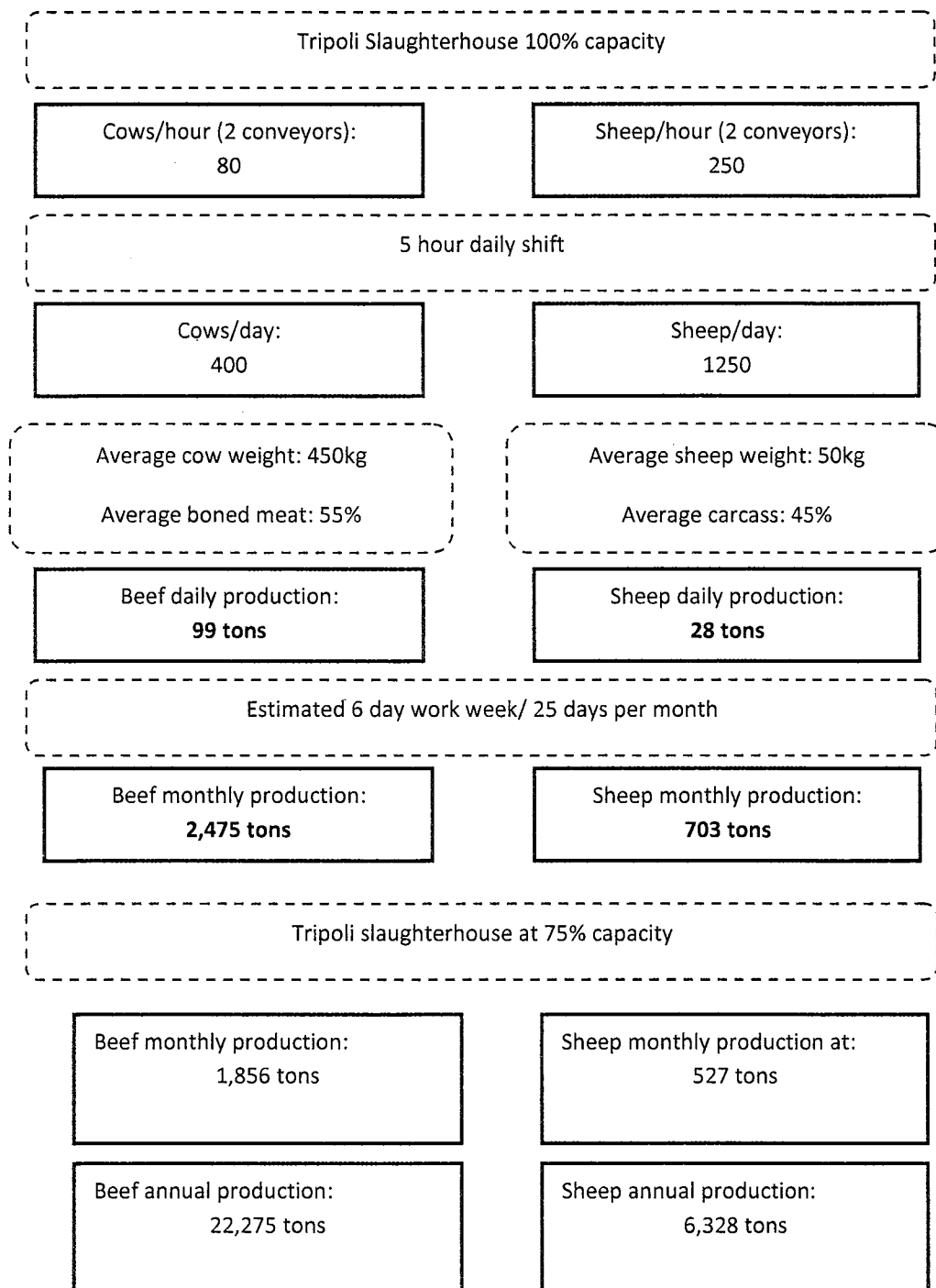
According to the Environment Report provided by the CDR however, the new Tripoli slaughterhouse is intended to slaughter 40 cows and 125 sheep per hour per conveyor at 100% capacity. The new slaughterhouse is intended to function on daily 5 hours shift. As such, the number of slaughtered cows amounts to 400 while that of sheep 1250.

The report also estimates that the average cow weighs 250kg, and the boned meat is 55% of this net weight. The daily output of beef is thus, 99 tons per day, i.e. 2,475 tons per month (for 6 days work weeks).

The average sheep weight is estimated at 50kg and the meat output is averaged at 45% of its net weight, i.e. 22.5kg per sheep which averages it out to 28 tons per day, or 703 tons per month.

At a 75% capacity the total monthly meat output is estimated at 1,856 tons of beef and 527 tons of sheep meat. The potential total output for the new slaughterhouse at 75% daily capacity and if it is to be operated 6 days a week far exceeds the demand in the region surrounding it. As such the slaughterhouse may have to function less days a week or reduce the number it slaughters per day.

Figure 911 New Tripoli Slaughterhouse Output



1.7.5 SLAUGHTERHOUSE COMPARISON

Based on the above data it is possible to compare the outputs of the different slaughterhouses. The table below summarizes this:

Table 12 Output and Revenue Comparison of different Slaughterhouses

	Libyan Slaughterhouse	Tripoli Slaughterhouse	Algeria Slaughterhouse	Algeria Slaughterhouse
Beef tons per year	2,749	2,227	2,032	22,275
Sheep tons per year	1,032	200	411	6,328
Total tons per year	3,781	2,427	2,443	28,603
Total Revenue (LBP)	450 million	300 million	70 million	NA

It is obvious from the above table that the new Tripoli slaughterhouse far exceeds the output of other slaughterhouses; and this at 75% capacity. It is important than to note or to take into consideration that this might not be a realistic output goal. This excess potential output of the new Tripoli slaughterhouse is mainly explained by the following parameters:

1. Two conveyors for each cattle and sheep
2. The number of working hours and days per month
3. The capacity level (i.e. 75%) of production

All these parameters might be reviewed during the feasibility.

2 FEASIBILITY STUDY

Having undertaken a market study regarding the red meat industry in Lebanon and determining the supply and demand in the country, it is now possible to develop a feasibility study based on the gathered data. To develop this feasibility study it is important to first off determine the institutional set-up of the proposed slaughterhouse as well as the geographical coverage. Second, the investment cost and working capital must be outlined, i.e. the CAPEX. Third, the operational costs (OPEX) which are composed of wages, social security benefits, energy bills etc. must be detailed. Following, the revenue from all sources of this new slaughterhouse must be estimated based on available data. Fourth, the financial statements (profit and loss, cash flow) will be calculated in order to assess the financial profitability of the project.

2.1 INSTITUTIONAL SET-UP AND TRADING ZONE

Based on the field work and in-depth interviews there are several ways in which to operate this public slaughterhouse.

A public slaughterhouse may simply provide its location and equipment to butchers to slaughter their cattle and sheep. In this manner, the slaughterhouse is not in charge of the actual process of slaughtering but simply ensuring and providing a hygienic environment in which butchers may undertake this task. The butcher brings in his own staff to undertake the slaughter and pays a fee per cattle and sheep head to the slaughterhouse. However since the municipality only offers facilities, this fee is minimal. In this set-up however, there is a lack of quality control to ensure all the right procedures are undertaken and to ensure the health and hygiene of the animals, staff and meat itself.

Another institutional set-up which may be implemented is to provide employees, hired by the municipality, to be in charge of all the slaughtering process. In this manner, the butchers would bring in their cattle and sheep which would be inspected by the official veterinary at the slaughterhouse, and would have the slaughterhouse staff undertake all the slaughtering procedure. At no point may the butcher or his staff enter the slaughtering area. This technically provides better insurance that proper hygiene, safety and health standards are abided by during the slaughtering process. The butcher in this case pays a higher fee to the municipality since the latter is providing not only the facilities, but also taking care of the whole procedure.

Based on the in-depth interviews and desk review as well as benchmarking assessment, it would appear that the second institutional set-up scenario is that which is recommended and as such, CRI will develop its feasibility analysis based on it. The difference appears mostly in the operational costs in increased salaries and increased energy usage. Despite this however, there are higher revenues due to the higher fees per cattle and sheep head. The main reason however for which CRI recommends this set-up is for the health, hygiene and safety aspect it ensures which cannot be monitored and guaranteed otherwise.

Finally, it is important to delineate the geographic boundaries of the Demand that will be used within this Feasibility Study (FS). In fact, trading zone used by CRI for the FS is that of Tripoli and its surrounding areas (Mina and Beddawi). A larger trading zone will be assessed, comprising areas from Minnieh-Donnieh and other neighboring Cazas. The biggest possible trading zone is that of the whole North Governorate. However, CRI deems it unlikely to be covered by this new slaughterhouse due to mainly transport issues and costs.

2.2 CAPEX-INVESTMENT COST

The total investment cost was provided by the CDR. This investment cost outlined the cost of the following elements:

- Structural and architectural works
- Slaughtering process and refrigeration system
- Mechanical works
- Electrical Works
- Other investment cost (supervision and contingencies)²¹

What must be noted however is that these costs were presented to the CDR in 2006 and in Euros. In order to estimate the current value of the investment cost, CRI has used the exchange rate of 1.3 to determine the investment cost in US dollars. The feasibility study in fact will be determined in USD.

The total investment cost based on the available data is estimated at USD 19,221,226. This investment cost however will be spent or invested over a 2 year period. CRI estimated that the slaughterhouse requires 2 years to be completed. However not all costs are incurred in this first year. The below table summarizes the investment cost and its distribution across the first two years.

Evident from the table is that the "land" on which the slaughterhouse will be built does not incur any cost. The reason for this is that this is a public slaughterhouse being built on a publicly owned land. There is no renting fee. The opportunity cost of this is not taken into consideration as it does not affect the financial feasibility of the slaughterhouse itself but rather may represent a burden or cost on the municipality- which is outside the scope of the study.

Additionally, based on the data provided by the CDR, the VAT is only applied to 15% of the total investment since that is the proportion which is locally funded and upon which this tax may be applied.

²¹ This is part of the investment which was estimated at 5% for supervision and 10% for contingencies by CDR. This amount does not undergo any depreciation

Table 13 CAPEX 2012 in USD

	Total INV	INV-1	INV-2
Land	-	-	-
Architectural and Structural works	5,260,283	5,260,283	-
Slaughtering process and refrigeration systems	6,100,253	-	6,100,253
Mechanical works	3,364,805	1,682,403	1,682,403
Electrical works	1,631,984	815,992	815,992
Other Investment Costs (supervision and contingencies)	2,453,599	1,226,799	1,226,799
Sub-Total	18,810,924	8,985,477	9,825,447
VAT on local funded portion (15% of total x 10%)	282,164	116,380	165,784
Total CAPEX (inclusive VAT)	19,093,088	9,101,857	9,991,231

The above investment cost is incomplete. Indeed, to this must be added the 'working capital'. This working capital is estimated for a 3 months period. The importance of this capital is that it represents the cost of the first few months of operations prior to the generation of any revenue or profit (or even loss). It is important to have an initial amount which may cover the operational costs once the work begins. Wages, taxes and bills need to be paid starting from the first month of operations.

The working capital is estimated from the total operational costs (OPEX) which are detailed in the following section. Based on these, the working capital for this project amounts to USD 147,735 which should be added to the total investment.

Table 14 Total investment including working capital in USD

	Total INV	INV-1	INV-2
Total CAPEX (inclusive VAT)	19,093,088	9,101,857	9,991,231
Working Capital	128,138		128,138
Total Investment Cost including Working Capital	19,221,226	9,101,857	10,119,369

2.3 OPERATIONAL COSTS- OPEX

Operating costs refer to "Expenses associated with administering a business on a day to day basis. Operating costs include both fixed costs and variable costs. Fixed costs, such as overhead, remain the same regardless of the number of products produced; variable costs, such as materials, can vary according to how much product is produced."²²

2.3.1 SALARIES AND SOCIAL ALLOWANCES

The biggest cost incurred by the municipality is that of wages. Based on the in-depth interviews, the number of required employees for this new slaughterhouse was estimated based on the number of different processes involved in a slaughter while taking into consideration the administrative needs as well.

Accordingly, the total number of employees estimated was 43 based on two conveyors each for the cows and sheep. The total wages estimated for the each year of operations are USD 317,400.

In addition it is important to calculate the cost of social allowances which are paid by the municipality as the employer. An employer is intended to pay a 21.5% subscription fee over the wage of the employee. Based on this, the total subscription which should be paid in the first year of operations amounts to USD 68,241. The total wages and social allowances which need to be paid during each year of operations are thus USD 385,641.

The table below represents the salaries and social allowances to be paid over the 10 year period.

²² <http://www.investopedia.com/terms/o/operating-cost.asp#axzz28DI63xUR>

Table 15 Employee Wages

Employee Wages					
Category	Number of Employees	Monthly Salary (LYD)	Monthly Salary (USD)	Monthly Salary (EUR)	Monthly Salary (GBP)
Cow slaughter					
Employees for keeping animals	2	450	900	194	1,094
Slaughter box	1	450	450	97	547
hooking of leg	1	450	450	97	547
slaughter	1	450	450	97	547
opening gut	1	450	450	97	547
Slicing cattle in 2	1	450	450	97	547
Placing slaughter in fridge	1	450	450	97	547
Sheep Slaughter					
Employees for keeping animals	2	450	900	194	1,094
Slaughter box	1	450	450	97	547
hooking of leg	1	450	450	97	547
slaughter	1	450	450	97	547
opening gut	1	450	450	97	547
Placing slaughter in fridge	1	450	450	97	547
Maintenance					
Electricity	1	800	800	140	940
Mechanics	1	800	800	140	940
Lower floor cleaning	3	450	1,350	290	1,640
Administration					
Director	1	2,500	2,500	430	2,930
Supervisor	1	1,800	1,800	323	2,123
Head of bureau (qalam)	1	1,500	1,500	172	1,672
Accounting	1	1,200	1,200	215	1,415
Employee at door	1	450	450	97	547
Counting liveheads	1	450	450	97	547
guards	2	450	900	194	1,094
Vet					
Veterinarian	2	1,700	3,400	731	4,141
Assistants	2	1,200	2,400	344	2,744
Cleaning					
Cleaners	6	450	2,700	581	3,821
Backup employees					
Slaughter backup employees-Cow	2	450	900	194	1,094
Slaughter backup employees-Sheep	2	450	900	194	1,094
Maintenance backup employee	1	450	450	97	547
Total monthly	43		26,450	5,867	32,317
Total annual			317,400	70,404	387,804

2.3.3 DEPRECIATION

There are certain given ratios which determine the depreciation of items over the years. All structural works and building have a life of about 40 years, while equipment and machinery have a life span of 15 years. The lifespan of mechanical and electrical works are estimated at 25 years each. In order to estimate the depreciation it suffices to divide the total investment of each of these over the number of years. The table below outlines the depreciation cost.

Table 17 Value of depreciation

	1	2	3	4	5	6	7	8	9	10	Value of un-depreciated amounts
Architectural and Structural works	131,507	131,507	131,507	131,507	131,507	131,507	131,507	131,507	131,507	131,507	3,945,212
Slaughtering process and refrigeration systems	406,684	406,684	406,684	406,684	406,684	406,684	406,684	406,684	406,684	406,684	2,033,418
Mechanical works	134,592	134,592	134,592	134,592	134,592	134,592	134,592	134,592	134,592	134,592	2,018,883
Electrical works	65,279	65,279	65,279	65,279	65,279	65,279	65,279	65,279	65,279	65,279	979,190
Total depreciation	738,062	738,062	738,062	738,062	738,062	738,062	738,062	738,062	738,062	738,062	8,976,704

2.4 REVENUES

The revenues of the slaughterhouse are estimated based on the number of cattle and sheep it should slaughter to fill demand rather than how much it can slaughter. Two prerequisites are required however in order for this slaughterhouse to operate and they are:

- The gradual shutdown of the current slaughterhouse in Tripoli since the output of two slaughterhouses might exceed the projected demand
- The provision of a law or regulation to enforce that all slaughter activity take place in the slaughterhouse rather than in the streets in front of butcher shops.

Since the demand for the area of Tripoli, Mina and Beddawi were calculated in the market study it is possible to gauge how many animals should be slaughtered in the new slaughterhouse, provided that it is replacing the currently functioning Tripoli slaughterhouse.

To begin, the population growth for the area is estimated in order to estimate future demand. The growth rate employed is 1.4% which is based on CRI estimates alongside international sources. This rate is above national average estimated at around 1.1%, mainly due to the fact that North Lebanon is one of the poorest regions in Lebanon and has the largest average household size. Based on this, the total population of Tripoli and its surroundings will amount to 354,648 in the 10th year of operations.

Based on this it is possible to estimate the demand for beef and sheep over the 10 year period. As noted in the market study, total meat consumption in the study area amounts to nearly 10kg per capita, 8.8kg of beef and 1kg of sheep meat per year. It is assumed however that this meat consumption may increase by 2% year after year. The below table represents the total household demand for red meat today, in the first and second year of investment, and in the 10 year period when operations start.

Table 18 Total beef and sheep household meat demand in Tripoli, Mina and Bedawi area

	2012	INV-1	INV-2	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Beef (tons)	2,657	2,748	2,842	2,939	3,040	3,144	3,252	3,364	3,479	3,598	3,722	3,849	3,981
Sheep (tons)	302	312	323	334	345	357	370	364	395	409	423	437	452
Total (tons)	2,959	3,060	3,165	3,273	3,386	3,502	3,622	37,46	3,874	4,007	4,144	4,287	4,433

The second issue which must be determined is the demand from the intermediate consumption and restaurant consumption in the study area. These were determined for Lebanon on the whole. Determining them for the smaller study area will require the adoption of certain assumptions. The restaurants and hotels share of household demand represents 8.5% in Lebanon. Since North Lebanon which comprises the study area is the poorest in the country, it is assumed that restaurants and hotels represent a smaller share of red meat consumption. Accordingly,

the red meat consumption or demand of restaurants in the Tripoli, Mina, Beddawi area represents no more than 5% of the household demand. As such, based on demand in 2012, this amounts to 148 tons.

Further than this, the intermediate consumption in Tripoli must be estimated. How much of the meat produced in Tripoli goes to intermediate consumption. Intermediate consumption represents 69% of total household consumption in Lebanon. As such this ratio is diminished for the Tripoli area to 35%, based on the fact that the industrial activity in North Lebanon when compared with national averages is much lower. This entails that total red meat demand by the intermediary sector in Tripoli amounts to 1,036 tons in 2012. This brings total demand for the area to 4,142 in 2012.

Table 19 Total Red Meat demand in Tripoli, Minna, Beddawi

	2012	INV-1	INV-2	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Household demand (tons)	2,959	3,060	3,165	3,273	3,386	3,502	3,622	3,746	3,874	4,007	4,144	4,287	4,433
Restaurant demand (tons)	148	153	158	164	169	175	181	187	194	200	207	214	222
Intermediate demand (tons)	1,036	1,071	1,108	1,116	1,185	1,226	1,268	1,311	1,356	1,402	1,451	1,500	1,552
Total Demand (tons)	4,142	4,284	4,431	4,583	4,170	4,902	5,070	5,244	5,424	5,610	5,802	6,001	6,207

Despite the fact that demand exceeds 6000 tons in the 10th year of operations, the demand for fresh red meat as opposed to frozen or chilled red meat which is usually imported, constitutes no more than 50% of demand in cities. Tripoli and its surroundings are considered to be urban areas rather than rural ones. As such, only half of the demand in each year is a demand for fresh red meat.

Table 20 Total demand for fresh red meat

	2012	INV-1	INV-2	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Total Demand (tons)	4,142	4,284	4,431	4,583	4,170	4,902	5,070	5,244	5,424	5,610	5,802	6,001	6,207
Total demand fresh red meat (tons)	2,071	2,142	2,115	2,231	2,370	2,451	2,535	2,622	2,712	2,805	2,901	3,001	3,103

It is possible to estimate then the number of cattle and sheep to be slaughtered and as such estimate the total revenue from these. If total demand for fresh red meat in the first year of operation is 2,231 tons, then it is possible to translate this into number of heads of cows and number of heads of sheep.

Beef comprises of 85%, i.e. 1,896 tons of red meat demand, and if one is to apply the reverse order of the ratios to the total output then the total number of cow to be slaughtered is 7,869. The same rationale is applied to sheep meat and the total number of sheep head to be slaughtered in the first year of operations is 15,276.

CRI estimated the price per head to be similar to that used in the Saida slaughterhouse, LBP 24,000 (16 USD) per cow and LBP 7,000 (5 USD) per sheep since the slaughterhouse undertakes the whole slaughtering process rather than the butcher. This necessitates fees higher than the average. It should be mentioned that these fees may be higher; however, the Tripoli context may not allow significant increases.

The below table details the number of heads to be slaughtered each year starting with the first year of operation, along with the revenues for each year. It is evident that in the 10 year of operation, the slaughterhouse will not generate more than USD 267,085 in terms of revenue.

Table 21 Total revenues from beef and sheep

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Number of cow heads	7,869	8,139	8,418	8,707	9,005	9,314	9,633	9,964	10,305	10,658
Revenue from cattle (USD)	125,911	130,228	134,692	139,309	144,085	149,024	154,132	159,416	164,881	170,533
Number of sheep heads	15,276	15,800	16,341	16,901	17,481	18,080	18,700	19,341	20,004	20,690
Revenues from sheep (USD)	71,288	73,732	76,259	78,874	81,577	84,374	87,266	90,258	93,352	96,552
Total Revenues	197,200	203,960	210,951	218,183	225,662	233,398	241,399	249,674	258,233	267,085

Moreover, the above revenues could notice a slight increase if the slaughterhouse were to sell tripe, offal and other such internal organs to the market; however, these generally belong to the butcher himself. In addition, the value of their revenue is minimal when compared with the total revenue generated by the slaughterhouse. In this context, CRI did not include these additional revenues in the model.

2.5 PROFIT AND LOSS

Since the total costs as well as the total revenues have been estimated, it is now possible to determine whether this project is financially feasible or not. This profit and loss analysis is based on the current scenario at hand which has been described in this feasibility. Following this however, it is important to undertake a sensitivity analysis which will allow CRI to present a series of recommendations to improve the efficiency and feasibility of the slaughterhouse.

Evidenced from all the gathered data and the below table detailing the outcome of the project over a 10 year period, that the project on top of a significant investment experiences a loss year after year. The cost of maintaining the slaughterhouse according to its planned size outweighs the revenue it may generate. Also evident is that there are no taxes since the slaughterhouse is not generating any profit.

The Cash inflows show that the project does not generate any profit. In fact by the 10th year of operation the project would have incurred a cumulative loss of USD 30,007,725.

Nevertheless, as shall be seen in the section entitled Health and Environmental benefits following the sensitivity analysis, despite the financial loss that may be incurred, the social benefits it generates may outweigh this. It is important to note that the aim of the slaughterhouse is to ensure the highest sanitary and best regulation in the slaughter of cattle and sheep to guarantee as much as possible that public health and the environment are both safeguarded. It is possible, as shall be seen to somewhat quantify certain aspects of these health and environmental benefits.

Table 22 Total Profit/Loss

	Inv-1 1	Inv-2 2	Op-1 3	Op-2 4	Op-3 5	Op-4 6	Op-5 7	Op-6 8	Op-7 9	Op-8 10	Op-9 11	Op-10 12
Capex	9,101,857	10,119,369										
Total Revenues	-	-	197,200	203,960	210,951	218,183	225,662	233,398	241,399	249,674	258,233	267,085
Total Opex												
Wages			512,553	530,228	560,729	560,729	591,230	591,230	591,230	591,230	591,230	591,230
Cost Wages			317,400	317,400	317,400	317,400	317,400	317,400	317,400	317,400	317,400	317,400
Maintenance			68,241	68,241	68,241	68,241	68,241	68,241	68,241	68,241	68,241	68,241
Energy-			30,501	30,501	61,003	61,003	91,504	91,504	91,504	91,504	91,504	91,504
Water-Elect			53,026	70,701	70,701	70,701	70,701	70,701	70,701	70,701	70,701	70,701
Other Costs			43,385	43,385	43,385	43,385	43,385	43,385	43,385	43,385	43,385	43,385
Profit or Loss			(315,353)	(326,268)	(349,778)	(342,546)	(365,568)	(357,833)	(349,832)	(341,557)	(332,998)	(324,145)
Taxes												
Depreciation			738,062	738,062	738,062	738,062	738,062	738,062	738,062	738,062	738,062	738,062
Net P&L			(1,053,415)	(1,064,330)	(1,087,840)	(1,080,608)	(1,103,630)	(1,095,895)	(1,087,894)	(1,079,619)	(1,071,060)	(1,062,208)
Project Cash	9,101,857	10,119,369	-	-	-	-	-	-	-	-	-	-
Outflow												
Project Cash	-	-	(1,053,415)	(1,064,330)	(1,087,840)	(1,080,608)	(1,103,630)	(1,095,895)	(1,087,894)	(1,079,619)	(1,071,060)	(1,062,208)
Inflow												
Net	(9,101,857)	(10,119,369)	(1,053,415)	(1,064,330)	(1,087,840)	(1,080,608)	(1,103,630)	(1,095,895)	(1,087,894)	(1,079,619)	(1,071,060)	(1,062,208)
Cashflows												
Cumulative	(9,101,857)	(19,221,226)	(20,274,641)	(21,338,972)	(22,426,811)	(23,507,420)	(24,611,050)	(25,706,945)	(26,794,839)	(27,874,458)	(28,945,517)	(30,007,725)
Cashflows												

2.6 SENSITIVITY ANALYSIS AND RECOMMENDATIONS

Since the baseline scenario of this project has shown that it does not generate sufficient revenue, CRI has undertaken several sensitivity analyses with the aim of increasing revenue and diminishing the loss in order to create profit. Based on these analyses, CRI has concluded that the main factor leading to loss is the size of investment in regards to the need of the market. The size of investment, and as such the size of the slaughterhouse and its slaughtering capacities exceed the demand of the market in the first trading zone of Tripoli, Minaa, Beddawi as well as larger ones.

CRI has taken into account several factors which may lead to the lack of profitability of this project:

- To begin, it would seem that there isn't a need for 4 conveyors in the slaughterhouse, but rather only 2 one for cattle and one for sheep. In this regard, CRI would recommend maintaining the size of the planned building and lot, while only investing in equipment sufficient for one conveyor for cows and one for sheep. In this manner, it would be possible to further develop the capacity in the future should there be a need to, rather than reinvest in construction;
- Since the number of conveyors was reduced, the total investment cost was also reduced. Specifically the investment on 'slaughtering process and refrigeration system' was reduced by 50%, thus decreasing the depreciation value as well as the investments in 'other costs';
- In addition CRI has reduced the number of staff in accordance with the decrease from 4 to 2 conveyors. The staff was reduced to 33 as opposed to 43.
- CRI has kept the social allowances (payments to be made to NSSF), however these may be deducted if it found that the employees are not eligible for this based on the type of contract they are given. This would remain to be seen.
- CRI has increased the trading zone from Tripoli, Mina, Beddawi, to a larger trading zone reaching Minnieh-Dinnieh and other surrounding areas, and finally to North Lebanon as a whole.
- Finally, CRI has increased the fees for slaughtering the cattle and sheep, thus generating more revenue.

Based on all these parameters, the slaughterhouse does generate profits before taking into account taxes and depreciation costs. Nevertheless, the average yearly loss decreased from USD 1,053,415 in its first year of operation to USD 439,553. This loss is mostly incurred by the value of depreciation. This falls in line with CRI's suggestion that the investment cost of this project might be too high in regards to the potential revenue it may generate. The cumulative loss at the end of the 10 year study period is also reduced to USD 19,349,862 from over USD 30 million.

Nevertheless this might be an acceptable loss if one takes into account the actual public and social benefits which the slaughterhouse provides as aforementioned. In fact it must be noted and remembered that this slaughterhouse is a public project which aims to improve the livelihoods of surrounding communities and protecting and safeguarding them against health and environmental risks engendered by slaughtering in unsanitary and inappropriate conditions. An exercise quantifying certain aspects of these benefits is outlined in the following section.

Table 23 Profit/Loss Outcome following sensitivity analysis

	Inv-1	Inv-2	Op-1	Op-2	Op-3	Op-4	Op-5	Op-6	Op-7	Op-8	Op-9	Op-10
Capex	8,873,098	6,756,262										
Total Revenues	-	-	498,091	515,166	532,825	551,091	569,982	589,521	609,730	630,631	652,249	674,609
Total Opex			386,129	399,728	414,979	414,979	430,230	430,230	430,230	430,230	430,230	430,230
Wages			244,200	244,200	244,200	244,200	244,200	244,200	244,200	244,200	244,200	244,200
Cost Wages			52,503	52,503	52,503	52,503	52,503	52,503	52,503	52,503	52,503	52,503
Maintenance			15,251	15,251	30,501	30,501	45,752	45,752	45,752	45,752	45,752	45,752
Energy-Water-Elect			40,797	54,396	54,396	54,396	54,396	54,396	54,396	54,396	54,396	54,396
Other Costs			33,379	33,379	33,379	33,379	33,379	33,379	33,379	33,379	33,379	33,379
Profit or Loss			111,962	115,437	117,847	136,112	139,753	159,292	179,500	200,402	222,020	244,379
Taxes			16,794	17,316	17,677	20,417	20,963	23,894	26,925	30,060	33,303	36,657
Depreciation			534,720	534,720	534,720	534,720	534,720	534,720	534,720	534,720	534,720	534,720
Net P&L			(439,553)	(436,599)	(434,551)	(419,025)	(415,931)	(399,323)	(382,145)	(364,379)	(346,004)	(326,998)
Project Cash Outflow	8,873,098	6,756,262	-	-	-	-	-	-	-	-	-	-
Project Cash Inflow	-	-	(422,759)	(419,283)	(416,874)	(398,609)	(394,968)	(375,429)	(355,220)	(334,319)	(312,701)	(290,341)
Net Cashflows	(8,873,098)	(6,756,262)	(422,759)	(419,283)	(416,874)	(398,609)	(394,968)	(375,429)	(355,220)	(334,319)	(312,701)	(290,341)
Cumulative Cashflows	(8,873,098)	(15,629,360)	(16,052,119)	(16,471,402)	(16,888,276)	(17,286,885)	(17,681,853)	(18,057,281)	(18,412,502)	(18,746,820)	(19,059,521)	(19,349,862)

2.6.1 HEALTH AND ENVIRONMENTAL BENEFITS

Most of the benefits for this project are based on the outcome and recommendations of the environment report. According to the report, this modern and up to date slaughterhouse will eliminate or at least greatly diminish several threats to the environment and in return to public health. An unhealthy environment necessarily leads to an increase in illnesses, i.e. diminishing public health of the residents of the region.

The slaughterhouse will develop a solid and liquid waste management system which will greatly diminish pollution to the sea. When animals are slaughtered in the street, in front of butcher shops, the waste which they generate is not properly disposed off. Blood for example which is a slaughterhouse would be properly store and drain, requires a lot of oxygen and may be harmful to the human population around it in mass quantities. Blood drainage outside a slaughterhouse occurs in the street, next to the population. This is but one example of the benefits of a slaughterhouse.

In addition, "The proposed project will be designed and operated such that all waste products will be treated to meet established environmental standards and pose no threat to human health and environment." Butchers do not have a proper way in which to dispose of waste. Much of this may end up in garbage cans around the city and left to rot. "Uncollected municipal and household waste that may accumulate for shorter or longer periods in urban and rural areas pose a risk to health and impinge on the quality of life. Waste attracts rodents, flies and insects that may be vectors of infectious diseases and cause various allergies. Children in particular are a vulnerable group."²³

It is possible here to quantify to a certain extent the environmental cost of slaughtering in the street. Based on data obtained from in-depth interviews, the cost of transporting waste in Tripoli is around USD 50 per ton. If one is to estimate the quantity of waste which remains from cattle and sheep slaughter then one could estimate the cost of transporting this waste, i.e. the cost on the municipality of Tripoli.

Based on the available figures, it is estimated that the cost of transporting waste resulting from cattle and sheep slaughter is estimated at 151,024 during the first year of operations (based on the biggest trading zone; for the smallest trading zone of Tripoli, Mina, Beddawi it is estimated at USD 75,512 in the first year of operations), increasing to USD 204,546 in the 10th year of operations.

While the impact of the slaughterhouse on the environment is not negligible, it is nevertheless much less than that of not having a slaughterhouse at all. Moreover, the impact of the slaughterhouse in terms of noise pollution and odor for example is localized and mitigated. It is not in the middle of the city among the residents.

Based on certain data obtained from in-depth interviews as well as official documents, it is possible, as above mentioned, to quantify certain aspects of these benefits which may counteract the loss from the activities of the slaughterhouse.

Enforcing that all slaughters be undertaken in a slaughterhouse ensures the quality, health and safety of the meat output. Indeed, according to a report published by the Syndicate of Veterinary in Lebanon, the cost of treating one

²³ World Bank-Environment Department, 2004. "Cost of Environmental Degradation- The Case of Lebanon and Tunisia".

case of a severe food poisoning is estimated at no less than USD 2,000 per case. Recent statistics, from the same source, identified around 5,000 cases between 1999 and 2005. Across Lebanon, these food poisoning cases have cost USD 10 million. As such, per year this has cost USD 1.7 million. In the case of North Lebanon, since it represents 20% of the population, it will be assumed that it also represents 20% of the cases. This brings the cost of food poisoning to USD 333,333 per year in North Lebanon. Over a period of 10 years, this brings the cost to over USD 3 million for the North governorate. In addition, it must be noted that this is only one type of food poisoning which may occur from unhealthy cattle and sheep. If one were to add other types for which there is no data available at this stage, then this cost would necessarily increase.

Since the slaughterhouse has a veterinary and an assistant at all operating times, all the animals go through a medical check to ensure they do not have any diseases. Such safety measures are not undertaken at butcher shops in the streets. There is no regulation in regards to the animals being slaughtered or the means through which they are slaughtered. There is no guarantee of hygiene standards being adequately upheld. Is all slaughter equipment at the butcher sanitized? Such issues may affect the quality of the meat and its hygiene as previously noted, thus impacting the health of the surrounding population.

The below table detailed the environmental and health costs of not having a slaughterhouse, i.e. what the new slaughterhouse will potentially eliminate. This cost should be considered when evaluating both the baseline scenario and the amended sensitivity scenario.

Table 24 Total Environmental and Health Costs in USD

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cost of environmental damages (USD)	151,024	156,201	161,556	167,094	172,822	178,747	184,874	191,211	197,766	204,500
Cost of health damages (USD)	333,333	333,333	333,333	333,333	333,333	333,333	333,333	333,333	333,333	333,333
Total cost (USD)	484,358	489,535	494,889	500,428	506,155	512,080	518,207	524,545	531,099	537,833

If properly implemented, according to the Environmental Management plan outlined by the Environment report the slaughterhouse would have the following effects:

- minimize the quantity of wastes generated
- prevent pollution arising from the disposal of wastes
- prevent nuisance pollution such as odors, dust
- minimize environmental health risks
- improve the efficiency of processes through energy savings

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- Mr. Khansa, Ministry of Agriculture
- Dr. Obeida Veterinary and Ministry of Agriculture
- Statistics Department at Ministry of Agriculture
- Mr. Mohamad Mabsoot, President of the Syndicate of Frozen and Chilled Meat Importers
- Mr. Paul Ariss, President of Syndicate of Restaurant Owners in Beirut

Economic Model

Investment cost (2014) in million LBP

	Total	Inv-1	Inv-2
Architectural and Structural works	11,270	5,635	5,635
Slaughtering process and refrigeration systems, including mechanical and electrical works	15,369	7,685	7,685
Other Investment Costs (supervision and contingencies)	1,486	743	743
Refrigerated transportation (2 units)	307	154	154
Reserves (quantity)	1,716	858	858
Sub-Total	30,148	15,074	15,074
Taxes	-	-	-
Total CAPEX (inclusive VAT)	30,148	16,829	16,829

Exchange rate (USD-LBP)

1500

Investment cost (2014) in USD

	Total	Inv-1	Inv-2
Architectural and Structural works	7,513,333	3,756,667	3,756,667
Slaughtering process and refrigeration systems, including mechanical and electrical works	10,246,000	5,123,000	5,123,000
Other Investment Costs (supervision and contingencies)	990,667	495,333	495,333
Refrigerated transportation (2 units)	204,667	102,333	102,333
Reserves (quantity)	1,144,000	572,000	572,000
Sub-Total	18,954,667	9,477,333	9,477,333
Taxes	-	-	-
Total CAPEX (inclusive VAT)	18,954,667	10,647,000	10,647,000

Financial Model

Investment cost (2014) in million LBP

	Total	Inv-1	Inv-2
Architectural and Structural works	11,270	5,635	5,635
Slaughtering process and refrigeration systems, including mechanical and electrical works	15,369	7,685	7,685
Other Investment Costs (supervision and contingencies)	1,486	743	743
Refrigerated transportation (2 units)	307	154	154
Reserves (quantity)	1,716	858	858
Sub-Total	30,148	15,074	15,074
Taxes	410	205	205
Total CAPEX (inclusive VAT)	30,558	17,034	17,034

Exchange rate (USD-LBP)

1500

Investment cost (2014) in USD

	Total	Inv-1	Inv-2
Architectural and Structural works	7,513,333	3,756,667	3,756,667
Slaughtering process and refrigeration systems, including mechanical and electrical works	10,246,000	5,123,000	5,123,000
Other Investment Costs (supervision and contingencies)	990,667	495,333	495,333
Refrigerated transportation (2 units)	204,667	102,333	102,333
Reserves (quantity)	1,144,000	572,000	572,000
Sub-Total	18,954,667	9,477,333	9,477,333
Taxes	273,333	136,667	136,667
Total CAPEX (inclusive VAT)	19,228,000	10,783,667	10,783,667

Operating Costs

The lifetime of the project is expected to be		25 years																								
Depreciation has not been included in the model																										
Maintenance as % of total investment	1	2	3	4	5	6	7	8	9	10	15	20	25													
Maintenance Cost	25,615	25,615	25,615	25,615	30,738	30,738	30,738	30,738	30,738	30,738	40,984	46,107	51,230													
Maintenance as % of total revenues	6%	6%	6%	6%	7%	7%	6%	6%	6%	6%	7%	7%	7%													
Water/Electricity/Energy	39,440	40,792	42,190	43,637	45,132	46,680	48,280	49,935	51,647	53,417	59,828	66,678	74,020													
Energy costs as % of total revenues	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%													
Other Costs (insurance, other supplies, telecom...etc)	19,720	20,396	21,095	21,818	22,566	23,340	24,140	24,967	25,823	26,708	29,914	33,339	37,010													
Other costs as % of total revenues	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%													

Employees needed for one conveyor for cows and one conveyor for sheep

[illegible]

Total Wages and Salaries (monthly, in USD)													
Employees Title	1	2	3	4	5	6	7	8	9	10	15	20	25
Cow slaughter													
Employees for keeping animals	450	450	450	450	450	450	450	450	450	450	450	450	450
Slaughter box	450	450	450	450	450	450	450	450	450	450	450	450	450
hooking of leg	450	450	450	450	450	450	450	450	450	450	450	450	450
slaughter	450	450	450	450	450	450	450	450	450	450	450	450	450
opening gut	450	450	450	450	450	450	450	450	450	450	450	450	450
Slicing cattle in 2	450	450	450	450	450	450	450	450	450	450	450	450	450
Placing slaughter in fridge	0	0	0	0	0	0	0	0	0	0	0	0	0
Sheep Slaughter													
Employees for keeping animals	450	450	450	450	450	450	450	450	450	450	450	450	450
Slaughter box	450	450	450	450	450	450	450	450	450	450	450	450	450
hooking of leg	450	450	450	450	450	450	450	450	450	450	450	450	450
slaughter	450	450	450	450	450	450	450	450	450	450	450	450	450
opening gut	450	450	450	450	450	450	450	450	450	450	450	450	450
Placing slaughter in fridge	0	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance													
Electricity	650	650	650	650	650	650	650	650	650	650	650	650	650
Mechanics	650	650	650	650	650	650	650	650	650	650	650	650	650
Transport meat													
Drivers	0	0	0	0	0	0	0	0	0	0	0	0	0
Assistants to drivers	0	0	0	0	0	0	0	0	0	0	0	0	0
Lower floor cleaning	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350
Administration													
Director	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Supervisor	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Head of bureau (qalam)	800	800	800	800	800	800	800	800	800	800	800	800	800
Accounting	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Employee at door	450	450	450	450	450	450	450	450	450	450	450	450	450
Counting liveheads	450	450	450	450	450	450	450	450	450	450	450	450	450
guards	450	450	450	450	450	450	450	450	450	450	450	450	450
Vet													
Veterinarian	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Assistants	800	800	800	800	800	800	800	800	800	800	800	800	800
Cleaning													
Cleaners	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700
Backup employees													
Slaughter backup employees-Cow	450	450	450	450	450	450	450	450	450	450	450	450	450
Slaughter backup employees-Sheep	450	450	450	450	450	450	450	450	450	450	450	450	450
Maintenance backup employee	0	0	0	0	0	0	0	0	0	0	0	0	0
Drivers backup employee	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Monthly Wages	20,350	20,350	20,350	20,350	20,350	20,350	20,350	20,350	20,350	20,350	20,350	20,350	20,350
Total Yearly Wages	244,200	244,200	244,200	244,200	244,200	244,200	244,200	244,200	244,200	244,200	244,200	244,200	244,200

Revenues		Inv-1	Inv-2	Op-1	Op-2	Op-3	Op-4	Op-5	Op-6	Op-7	Op-8	Op-9	Op-10	Op-15	Op-20	Op-25
Resident Population in Tripoli and surrounding areas		603800	612253	620825	629516	638330	647266	656328	665516	674834	684281	693861	703575	713425	760268	806195
Population Growth (AYGR)		1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%	1.20%	1.10%
Total per Capita Consumption per Year (in Kg)-Red Meat		9.8	10.0	10.2	10.4	10.6	10.8	11.0	11.3	11.5	11.7	11.9	12.2	12.4	13.1	13.7
Beef	8.8	9.0	9.2	9.3	9.5	9.7	9.9	10.1	10.3	10.5	10.7	10.9	11.2	11.7	12.3	13.0
	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.3	1.3	1.4	1.5
Total meat consumption in Tripoli and surrounding area (tons)		5917	6120	6330	6547	6771	7003	7243	7492	7749	8014	8289	8573	8867	9331	11068
Beef	5313	5496	5684	5879	6080	6289	6504	6727	6958	7196	7443	7698	7962	8218	8698	10333
	604	624	646	668	691	715	739	764	791	818	846	875	905	935	1013	1129
Total Consumption at hotels and restaurants (both HH and tourists)		296	306	316	327	339	350	362	375	387	401	414	429	443	497	553
Total Intermediate Consumption		2071	2142	2215	2291	2370	2451	2535	2622	2712	2805	2901	3001	3103	3476	3874
Total Tripoli and surrounding area Demand of which fresh meat		8284	8568	8862	9166	9480	9805	10141	10489	10848	11220	11605	12002	12414	13904	15496
		4142	4284	4431	4583	4740	4902	5070	5244	5424	5610	5802	6001	6207	6952	7748
Number of Cow heads		14225	14713	15217	15739	16278	16836	17414	18011	18628	19267	19927	20610	21317	23875	26609
Number of Sheep heads		27614	28560	29539	30552	31599	32683	33803	34962	36160	37400	38682	40008	41379	46346	51652
Price per cow		16.0														
Price per sheep		4.7														
Revenues from Cows		251,823	260,455	269,384	278,618	288,169	298,048	308,265	318,832	329,762	341,066	352,739	364,762	377,144	425,739	472,614
Revenues from Sheep		142,576	147,464	152,519	157,747	163,155	168,748	174,532	180,515	186,703	193,104	199,714	206,532	213,560	241,044	267,583
Total Revenues		394,399	407,919	421,903	436,365	451,324	466,795	482,797	499,348	516,465	534,170	552,453	571,294	590,704	666,783	740,197
Old figures (based on 2012 data)																
Cost of environmental damages		151,024	156,201	161,556	167,094	172,822	178,747	184,874	191,211	197,766	204,546	229,095	233,333	233,333	255,326	283,438
Cost of health damages		333,333	333,333	333,333	333,333	333,333	333,333	333,333	333,333	333,333	333,333	333,333	333,333	333,333	333,333	333,333
Total Costs		484,358	489,535	494,889	500,428	506,155	512,080	518,207	524,545	531,099	537,879	562,428	566,666	566,666	588,661	616,771
Inflation rate in Lebanon 2012-2014 (April)		5%														
Cost of environmental damages		158,576	164,012	169,634	175,449	181,463	187,684	194,118	200,772	207,654	214,773	240,550	246,092	246,092	268,092	297,610
Cost of health damages		350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000
Total Costs		508,576	514,012	519,634	525,449	531,463	537,684	544,118	550,772	557,654	564,773	590,550	592,092	596,092	618,092	647,610

	Inv-1 1	Inv-2 2	Op-1 3	Op-2 4	Op-3 5	Op-4 6	Op-5 7	Op-6 8	Op-7 9	Op-8 10	Op-13 15	Op-18 20	Op-23 25	Op-24 26	Op-25 27
Capex	10,783,667	10,783,667													
Total Revenues		-	394,399	407,919	421,903	436,365	451,324	466,795	482,797	499,348	572,100	638,866	709,908	724,894	740,197
Total Opex		-	381,478	383,506	385,603	387,773	395,140	397,460	399,861	402,343	418,379	433,517	454,419	456,667	458,962
Wages			244,200	244,200	244,200	244,200	244,200	244,200	244,200	244,200	244,200	244,200	244,200	244,200	244,200
Cost Wages			52,503	52,503	52,503	52,503	52,503	52,503	52,503	52,503	52,503	52,503	52,503	52,503	52,503
Maintenance			25,615	25,615	25,615	25,615	30,738	30,738	30,738	30,738	35,861	40,984	51,230	51,230	51,230
Energy-Water-Elect			39,440	40,792	42,190	43,637	45,132	46,680	48,280	49,935	57,210	63,887	70,991	72,489	74,020
Other Costs			19,720	20,396	21,095	21,818	22,566	23,340	24,140	24,967	28,605	31,943	35,495	36,245	37,010
Profit or Loss			12,921	24,413	36,299	48,593	56,184	69,335	82,937	97,004	153,721	205,349	255,489	268,227	281,234
Taxes			1,938	3,662	5,445	7,289	8,428	10,400	12,440	14,551	23,058	30,802	38,323	40,234	42,185
Net P&L			10,983	20,751	30,854	41,304	47,757	58,935	70,496	82,454	130,663	174,547	217,165	227,993	239,049
Project Cash Outflow	10,783,667	10,783,667	-	-	-	-	-	-	-	-	-	-	-	-	-
Project Cash Inflow	-	-	12,921	24,413	36,299	48,593	56,184	69,335	82,937	97,004	153,721	205,349	255,489	268,227	281,234
Net Cashflows	(10,783,667)	(10,783,667)	12,921	24,413	36,299	48,593	56,184	69,335	82,937	97,004	153,721	205,349	255,489	268,227	281,234
Cumulative Cashflows	(10,783,667)	(21,567,333)	(21,554,412)	(21,529,999)	(21,493,699)	(21,445,107)	(21,388,922)	(21,319,587)	(21,236,651)	(21,139,646)	(20,475,059)	(19,556,193)	(18,380,454)	(18,112,227)	(17,830,993)