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**Guide To
Commodity Chain Analysis
Applied To Syrian Sheep Meat**

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Table of Contents

1. Theoretical Background	1
1. 1. Introduction	1
1.2. Basic Concepts.....	1
1.3. Commodity Chain Specification.....	2
1.4. Quantitative Analysis.....	3
1.4.1. Supply Utilization Accounts.....	3
1.4.2. Commodity Accounting Matrix.....	3
2. Steps of the CCA Illustrated by Syrian Sheep Meat	4
2.1. Designing the Flow Chart of the Functional Analysis.....	4
2.2. Constructing the Basic Data Tables.....	5
2.3. Constructing the Tables for Assumptions.....	5
2.4. Constructing the Tables for Prices.....	5
2.5. Designing the Flow Chart of the In/out Commodity and Flow Percentages.....	5
2.6. Constructing the Fattening Budgets.....	5
2.7. Furnishing the Commodity Accounting Matrices.....	5
2.8. Furnishing the Budgets of Non-farm Activities.....	6
2.9. Furnishing the Agents' Budget Summary.....	6
2.10. Furnishing the Summary Concerning Agents' Shares and Indicators.....	6
2.11. Designing the Flow chart of the Value Added.....	6
3. Concluding Remark	6

Commodity Chain Analysis Applied to Syrian Sheep Meat

This review paper investigates in more detail the technical and socio-economic aspects and the methodology of the Commodity Chain Analysis (CCA) to assist in solving policy issues conducted by the Agro-Food Division of NAPC. This tool is applied to Syrian sheep meat after a brief presentation of its theoretical background. An expansion of the core methodology is also presented.

1. Theoretical Background

The theoretical background of the CCA relies on the theory of chain and network science. Accordingly, the main aspects are presented below.

1.1. Introduction

The need to collect more precise information before proceeding to detailed project design may sometimes entail in depth investigations on a single or a small group of commodities. This is often the case when dealing with sub-sectoral projects focusing on a single product and/or with projects involving products of strategic value to the country or to the region, e.g. wheat in Syria and so on.

This type of investigations normally requires a good understanding of the structure and functioning of the entire commodity “system” from primary production to final consumption. This is necessary because in real life the various components of a production-consumption system are interlinked (like the rings of a chain) , whereby actions taken by agents at certain points cause the status of agents at other points to alter. Only by understanding the structure and the functioning of the system and the needs and strategies of individual agents (or groups of agents), it is possible to identify bottlenecks in the system and simulate the effects of interventions at different points in the chain.

CCA is an approach, based on systems analysis theory, which can be of help in carrying out such the above mentioned task in a coherent and systematic manner. The essence of CCA is that the agents concerned with a given commodity (e.g. farmers, traders, processors, retailers, etc.) are studied not in isolation but taking into account their linkages and interdependencies with other agents.

1.2. Basic Concepts

A commodity chain could be defined as the whole of agents participating in the production, processing and marketing of a given commodity (or a set of commodities). The chain represents therefore a coherent and well defined portion of the economy whose agents are interlinked by a single interest ((i.e. the commodity under study).

Commodity chain agents may be individuals, groups, institutions, enterprises, or whatever, and will usually be differentiated according to their role, occupation or function in the commodity system. Thus, a commodity chain encompasses all the economic agents:

- Producing the raw material (usually the one that gives its name to the chain, e.g. “rice, banana or beef commodity chain”), or importing it from abroad;
- Moving it to the processing units;
- Processing it to make it usable by consumers or other processors that will incorporate it into a new product (this phase may include several stages of processing by various agents);
- And eventually bringing it to the final “consumer “market (retail market) or to the “wholesale” market in the case of intermediate or export products.

The links are represented by the commodity transactions between agents (or groups of agents) which take place as the commodity is progressively transformed from raw material (or intermediate product) into one or several products for final consumption. The commodity chain describes, therefore, the various paths a commodity follows within an economy, from its origin as primary product, through several transformations, up to its final destinations.

It is quite common in CCA- especially when dealing with complex commodity systems characterized by a large number of heterogeneous agents closely interlinked – to disaggregate a commodity chain into its constituent sub-systems or sub-chains, e.g. raw material production, transportation, processing, etc. Such a disaggregating is done in order to efficiently organize the investigative and analytical work of the formulation team, by assigning the study of different sub-chains to different team members (or working groups), while retaining the essence of the chain or systems analysis approach. It is implied that the various parts of the chain or systems analysis approach. It is implied that the various parts of the study are eventually brought together ensuring overall consistency in the data and analysis carried out.

1.3. Commodity Chain Specification

There is no particular procedure to be followed for identifying the key agents, their critical activities and the structure of interactions with each other. The most appropriate approach will depend on the particular situation. Much useful information will come from the analysis of the situation carried out during the “Reconnaissance” phase of project formulation, but further field work at a more detailed level, including discussions and interviews with agents and possibly also special surveys of agents’ activities, will usually be necessary.

First, however, a provisional specification of the commodity chain is needed on which to base the next stages of field work. This performs the function of a “working hypothesis”, to be accepted, modified or rejected and replaced, after further detailed study. A good strategy is to begin by asking each member of the formulation team to sketch on a piece of paper what he or she sees as being the essential features of the commodity systems on the basis of information so far obtained. Each specialist will probably view things in a different light and this helps to ensure that nothing of importance is omitted.

The commodity chain can be given a visual representation in the form of a flow diagram. In construction the flow diagram, one could use as symbols: the “box “to represent an agent (or group of agents) and the “arrow “to indicate the sense of commodity flow or transaction. Names of agents are normally indicated within the box.

The construction of the flow diagram should start as early as possible in the commodity chain analysis. This means that the initial flow diagram (often a single diagram with only a few branches) is likely to gradually evolve becoming increasingly elaborate and accurate as the acquisition of information and quantification of commodity flows enables the formulation team

to gain deeper and deeper understanding of the structure and functioning of the commodity system.

1.4. Quantitative Analysis

Once the commodity chain structure has been clarified, the next step is the quantification of commodity transactions or flows amongst the various agents (or groups of agents). This quantification is required in order to assess the relative importance of the various sub-chains, to identify constraints and bottlenecks to commodity development, and to simulate the effects of possible interventions aiming at removing or easing up such constraints.

Two techniques can be of help in ensuring accounting consistency in the physical quantification of flows; they are known as Supply- Utilization Accounts and Commodity Accounting Matrix.

1.4.1. Supply Utilization Accounts

The Supply Utilization Account (SUA) of an agent (or groups or agents) is a table showing, on the left hand side, commodity inflows (or supplies) and on the right hand side, commodity outflows (or utilizations). Physical flows are usually referred to a one year’s time frame and are expressed in terms of commodity raw material equivalents (e.g. paddy, raw maize, etc). Computations of physical flows are based on the following formula:

Supply = Inflows from backward agents ±Δ stocks

= Corresponding outflows of suppliers – transport losses ±Δ stocks

Utilization = Outflows to forward agents + auto - consumption + wastage & losses ±Δ stocks

Where Δ indicates the change.

If correctly estimated, with due attention given to losses, wastages and variations in agent’s stock, the supply side should equal the utilization side.

Expressing commodity flows in raw material equivalents entails the use of “technical coefficients” or conversion factors. Technical coefficients indicate the quantity of input required for obtaining one unit of output and are expression of the technology used. Although standard technical coefficients are frequently available from existing specialized literature, one need to be careful in identifying and using appropriate technical coefficients when dealing with projects that change the technical production processes significantly. Table 1 provides an example of a SUA of farmers.

Table 1. An Example of a SUA of Farmers

	Supply (t)		Utilization (t)
Primary Production	16,280	Seed	1,523
		Home Consumption	8,262
		Millers (Urban)	1,357
		Millers (Rural)	4,723
		Loss, Wastage	415
Total	16,280		16,280

It is worth noting that a correct utilization of SUA allows verifying the consistency of available information. Whenever the SUA of an agent is unbalanced (i.e. total supply ≠ total utilizations), one is induced to check and deepen the analysis until an acceptable consistency is reached.

Once the commodity inflows and outflows have been quantified for each agent (or group of agents) in the chain , the corresponding values could be easily entered on the flow diagram.

1.4.2. Commodity Accounting Matrix

The structure of transactions and the direction in which commodity exchanges go could equally well be represented in the form of a commodity Accounting Matrix (CAM). Conventionally, CAMs are structured as follows:

- (a) Agents from whom commodity passes are listed along the top of the matrix in columns;

(b) Agents to whom commodity passes are listed down the left hand side of the matrix in rows;

(c) The quantities transacted are shown in the corresponding matrix's cells.

In construction a CAM, the first step is to prepare the so-called "core matrix", showing commodity intermediate flows between the various agents in the chain. It can be noticed that the core matrix does not show end-users, losses, wastages and stock changes. In order to take into account these omissions and check accounting consistency, the core matrix needs to be expanded by adding rows and columns accordingly. The following rows and column are normally added to the core matrix:

(a) Additional rows for: -end –users

-rest of the world

-losses, wastages and change in stocks

(b) Additional column for: - rest of world

CAM accounting consistency could then be checked by verifying that row totals equals column totals. Another identity which will be shown, if the cells of the matrix have been filled in correctly, is:

Domestic Production + (Rest of the world) (Farmers)	Imports	Final Consumption + (Rest of the world) (End-users)	Exports	Losses, wastages, and stock changes

COLUMN TOTALS

ROW TOTALS

In practice, the matrix could become very large and detailed depending on the actual complexity of the commodity chain and the level of details required in the project formulation exercise.

2. Steps of the CCA Illustrated by Syrian Sheep Meat

This section focuses on the major stages followed by conducting a CCA illustrated by Syrian sheep meat. It is advisable also to discuss deliberately the agents involved in the commodity transactions and marketing taking into account their economic importance, structural changes, policies governing the chain, value creation and production systems (Grad 2006, sheep meat outlook).

2.1. Designing the Flow Chart of the Functional Analysis

This step is considered very important to determine the main functions of the commodity system. Normally, these functions are depicted in a flow chart. At the beginning it is advisable to include all functions which thereafter are consolidated to major functions. Annex [Figure 1](#) shows the functional analysis of the Syrian sheep meat including the agents operating in the chain. The squares in bold point out to the activities which have to be studied. The other squares represent the agents out of the chain and consideration.

The agents under consideration are farming (private, cooperative and state), live animal wholesalers, slaughter houses (private and public), carcass wholesalers, carcass retailers, importers and exporters. Input suppliers can also be considered as agents when their activities are very closely related to the chain functions. Furthermore, when the chain becomes very complicated, it is advisable to divide it into sub-chains taking into account their interdependences.

2.2. Constructing the Basic Data Tables

The basic data tables are very important to conduct the analysis in a later stage. All other tables are connected with them to enable the possibility of making policy scenarios. These tables have the same data for both the base and current time. As illustrated in annex tables [1](#) and [2](#) for Syrian sheep meat, these tables include the basic information for farming and trading activities taking into account two scenarios. It is worth noting that the analyst should follow a logical order in presenting the information to facilitate the analysis in the following stages. These tables are used also to establish the agents' budgets. Annex table [1a](#) presents the unit cost and revenue items of the fattening budget in the State Centers. These centers, however, are not involved in the fattening activities because their objective is producing milk. Therefore, they sell sheep meat only. Thus, there is no fattening budget. Annex tables [1b](#) and [1c](#) include the unit cost and revenue items of the fattening budget per one ton live weight for the cooperative sector. Revenue items are total production, total fattened lamb sales, manure as by-product and prices. Cost items represent the purchased inputs. Annex tables [2a](#) and [2b](#) depict the unit marketing and processing costs for the traders and slaughterhouse.

2.3. Constructing the Tables for Assumptions

These tables include losses, wastage, self-consumption, home-consumption and net-flows. Therefore, they help calculating the conversion factors which represent the level of technology in the sheep meat chain. The tables include all the agents involved in the commodity chain. Annex tables [3a](#) through [3c](#) illustrate the agents' net-flows and the conversion factors including two scenarios.

2.4. Constructing the Tables for Prices

Annex [table 4](#) includes the prices of sheep meat along the entire chain taking into account two scenarios.

2.5. Designing the Flow Chart of the In/out Commodity and Flow Percentages

Annex [figure 2](#) depicts the in and out products for each agent and the flow percentages among the agents. The in and out commodities give a brief overview about the activities carried out by each agent. The flow percentages are useful to construct the commodity accounting matrices.

2.6. Constructing the Fattening Budgets

These budgets have the same budget structure as the basic tables. To use these tables for modeling, they should be interlinked with the basic tables' data. Annex tables [5a](#) and [5b](#) illustrate the structure of the fattening budgets for both the cooperative and private sectors. Both budgets are aggregated to the total fattening budget (annex table [5c](#)).

2.7. Furnishing the Commodity Accounting Matrices

There are three types of matrices namely: matrix of flow coefficients (percentages), matrix of flow quantities and matrix of prices.

Annex [table 6a](#) depicts the form of the flow percentage matrix. The activities are listed in rows and columns. The rows incorporate the farming activities, traders of raw material, slaughterhouse, meat traders, consumption, waste, home consumption and three additional rows for sub-total and grand total. The grand total of all rows has to be zero. When an agent receives the commodity, he will be market with a minus sign. A plus sign indicates the distribution of the commodity. The first column of the matrix includes the general major functions of the commodity chain, final destinations, wastage and losses, and self-consumption. In the second column the specific functions of the agents (careers) and their abbreviations are identified. The third column incorporates the products of each agent. Columns 4 through 7 are designed to incorporate domestic production, diversified into the producing sectors namely: the private, cooperative and public sectors), and imports. These columns receive 100% of the

production documented in the farming budgets and imports. When there are a lot of data about imports, it is advisable to include them in a separate table in the basic data. The other columns incorporate the same agents listed in the rows with the difference that additional columns are added for the conversion factors and processing rates. These additional columns are marked with arrows. After finishing the final table, it is advisable to make a list of abbreviations in order to avoid misunderstanding. All percentages are linked to either the *in /out flow chart* or the assumption table of net flows.

Annex [table 6b](#) shows the matrix of flow quantities. It has the same structure as the matrix for flow percentages, but it includes the flow quantities instead. The flow quantities result from multiplying the flow percentages with the quantities. The central cells for the distribution are the cells for farming production and imports. These quantities are calculated by multiplying the percentages of the columns 4 through 7 with the quantities available in the farming budgets and import table (or import quantity). All other quantities are calculated from applying the flow percentages of the flow matrix taking into account the conversion factors, which can be used to assess the impact of various technologies on the value added of the system.

Annex [table 6c](#) shows the matrix of prices, which are used to assess the budgets of non-farm activities. The prices included in the matrix have to be interlinked with the basic tables of prices to enable conducting policy scenarios.

2.8. Furnishing the Budgets of Non-farm Activities

The tables concerning the agents' budget are calculated based on the data available in both the basic tables and the established accounting matrices. Assessing the flow quantities is considered a very important step to produce reliable calculations. Annex [tables 7-12](#) illustrate the various budgets for sheep meat, which include the purchase and sales as well as the marketing or slaughtering cost of the following agents namely: live animal wholesalers, slaughterhouse, carcass wholesalers, carcass retailers, exporters and importers. The budgets incorporate two scenarios.

2.9. Furnishing the Agents' Budget Summary

Annex [table 13](#) illustrates such a budget summary. It is useful to give a general overview about the process of the value added creation. It aims also at assessing the outputs and inputs whether they are delivered from outside or inside the chain to calculate the impact of input suppliers and the contribution of the various agents. This table can be used also to identify the impact of wages and salaries, profit, taxes, interest, amortization and depreciation on the outcome of the chain.

2.10. Furnishing the Summary Concerning Agents' Shares and Indicators

Annex [table 14](#) summarizes the shares and indicators of the activities involved in the sheep meat chain. From this table it can be concluded who are the dominant agents in the chain and which activities are making the best use of resources. The information involved in this table can be used also to establish the flow chart of the value added creation.

2.11. Designing the Flow chart of the Value Added

Annex [figure 3](#) shows the value added flow diagram including the value added in SP million and as percentage share. This figure is derived from annex table 14 (interlinked).

3. Concluding Remark

The history of development contains many examples of agricultural production projects which have succeeded in raising outputs only to confront with problems and even failures because of bottlenecks or inadequate planning in the “downstream” stages of the production–consumption chain. Such problems arise when new technologies are instituted.

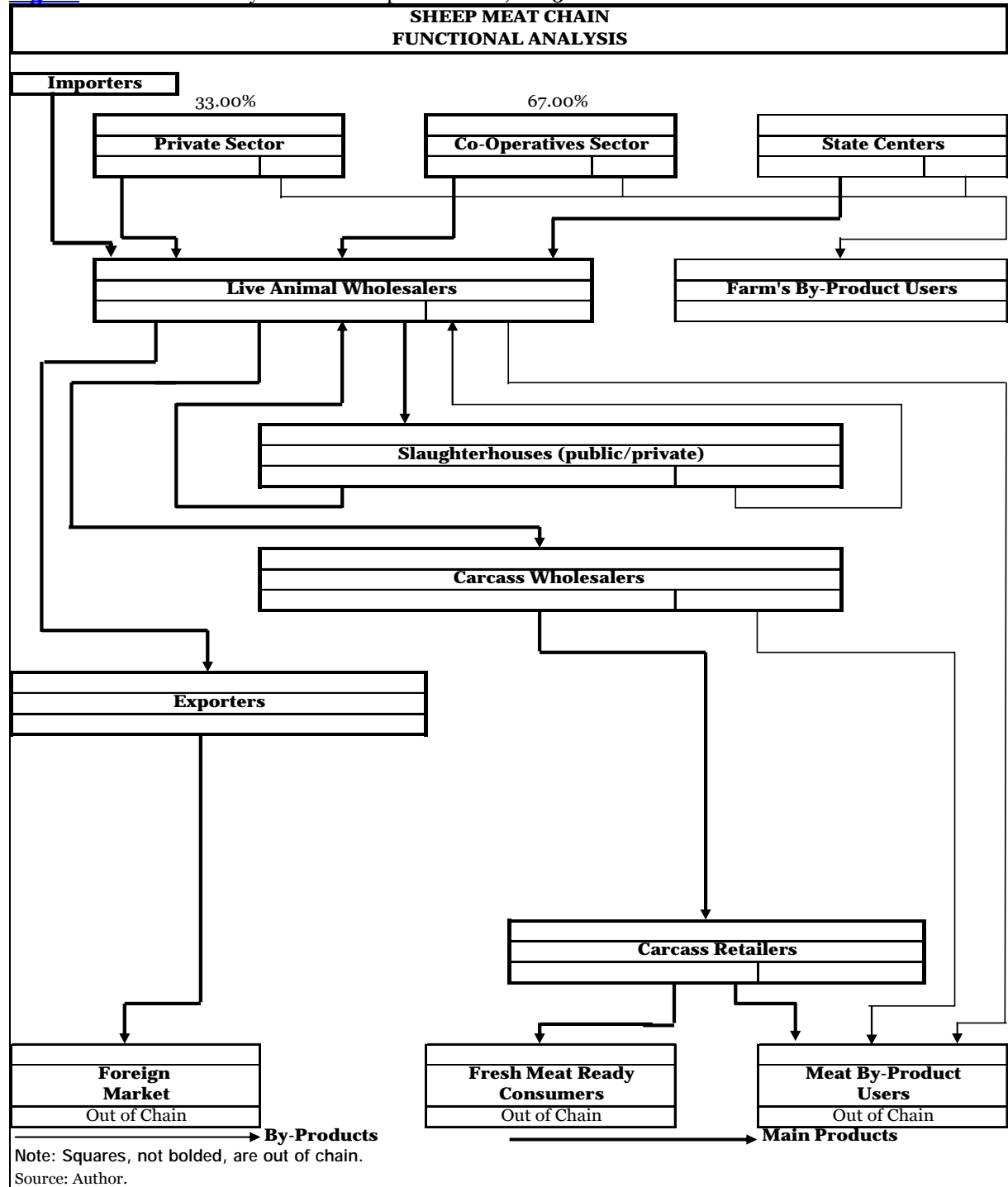
In order to avoid, or reduce the risk of, falling into the above pitfalls, sound project identification and preparation needs to adopt a chain or “systems” analysis approach. This means that networks of interrelationships linking agricultural production, processing, marketing, consumption, etc., have to be clearly identified and analyzed. In such a context, CCA provides an approach which could be extremely valuable, especially in preparing development projects concerning a single (or small groups of) commodity (ies) of significant importance for the economy of the concerned country or region. It is worth using a CCA approach, even if the whole job of constructing a CAM is not done formally. It is a useful way of setting down the structure of commodity flows in a systematic way, and coming to a series of guesstimates. Furthermore, the process of designing a matrix provides the formulation team with rigorous approach to seeking information and identifying data needs for project design and analysis.

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- Grain Marketing Project in Kenya (pp54-58), Rome , 1986.
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Annex

Figure 1. Functional analysis of the sheep meat chain, 2003



Tables 1a-1c

Basic Data 2002 of the Sheep Meat chain					
Sectors					
Table 1a. Unit cost and revenue items for fattening one ton lambs live weight of state centers					
Item	Unit	Baseline		Current	
		Quantity	Price SP	Quantity	Price SP
Total revenue items					
Live sheep sales	Ton	66	75	66	75
Cost items per one ton fattened live weight					
Source: Ministry of Agriculture (MAAR).					
Table 1b. Unit cost and revenue items for fattening one ton lambs live weight of co-operative sector					
Item	Unit	Baseline		Current	
		Quantity	Price SP	Quantity	Price SP
Total revenue items					
Production	Ton	206,271		206,271	
Fattend lamb sales	Ton	194,307	97	194,307	97
Manure	M ³	54	300	54	300
Cost items per one ton fattened live weight					
Lambs for fattening			54,000		54,000
Fodder			26,000		26,000
Milk			2,984		2,984
Veterinary expenses			663		663
Electricity, fuel, and water			435		435
Services			414		414
Waste			882		882
Hired labor			2,454		2,454
Family labor			1,380		1,380
Other expenses			950		950
Source: MAAR and UN(1995).					
Table 1c. Unit cost and revenue items for fattening one ton lambs live weight of private Sector					
Item	Unit	Baseline		Current	
		Quantity	Price SP	Quantity	Price SP
Total revenue items					
Production	Ton	59,200		59,200	
Fattend lamb sales	Ton	55,766	97	55,766	97
Manure	M ³	15	300	15	300
Cost items per one ton fattened live weight					
Lambs for fattening			54,000		54,000
Fodder			26,000		26,000
Milk			2,984		2,984
Veterinary expenses			663		663
Electricity, fuel, and water			435		435
Services			414		414
Waste			651		651
Hired labor			2,454		2,454
Family labor			1,380		1,380
Other expenses			899		899
Source: MAAR and UN(1995).					

Tables 2a-2b

Traders and Slaughterhouse of the Sheep Meat Chain, 2002						
Table2a. Unit marketing cost of wholesalers, 2002						
Item	Live Animal WHS		Carcasses WHS		Exporters	
	Baseline Price(SP)	Current Price(SP)	Baseline Price(SP)	Current Price(SP)	Baseline Price(SP)	Current Price(SP)
Slaughtering	404	404				
Transport	850	850	400	400	400	400
Wages	450	450	360	360	360	360
Services	1.5	1.5	0.8	0.8	0.8	0.8
Others	34	34	25.5	25.5	25.5	25.5

Source: Survey.
 WHS:Wholesalers.
 Pr.:Processed.

Table2b: Unit marketing cost of importers, retailers, and slaughterhouses, 2002						
Item	Importers		Slaughterhouse		Carcasses RT	
	Baseline Price(SP)	Current Price(SP)	Baseline Price(SP)	Current Price(SP)	Baseline Price(SP)	Current Price(SP)
Slaughtering						
Transport	400	400	85	85	150	150
Wages	360	360	175	175	200	200
Services	0.8	0.8	64	64	0.08	0.08
Others	25.5	25.5	7	7	13	13

Source: Survey.

RT:Retailers

Note: 1.Costs for live animal wholesaler (live Animal WHS) are given per one ton live weight.
 2.Costs for carcass wholesaler are given per one ton carcass.
 3.Costs for exporters are given per one ton live weight.
 4.Costs for carcass retailers(RT) are given per one ton fresh meat ready.
 5.Costs for slaughterhouse are given per one ton live weight.
 6.Costs for importers are given per one ton live weight.

Tables 3a-3c

Waste & Self Consumption of the Sheep Meat Chain, 2002							
Table 3 a. Waste & self consumption coefficients							
Item	Output Input	Baseline			Current		
		Waste	S.Cons	Net Flows	Waste	S.Cons	Net Flows
Sectors	lambs	1%	4.8%	94.2%	1%	4.8%	94.2%
	sheep	0%	0%	100%	0%	0%	99.6%
	Average	0.8%	4.8%	94.4%	0.8%	4.8%	94.4%
	By-Product	0%	0%	100%	1%	0%	100%
Live Animals Wholesaler	Lambs	0%	0%	100%	0%	0%	100%
	Sheep	0%	0%	100%	0%	0%	100%
	Carcasses	0%	0%	100%	0%	0%	100%
	By-Product	0%	0%	100%	0%	0%	100%
Slaughterhouse	Carcasses	0%	0%	100%	0%	0%	100%
	By-Product	0%	0%	100%	0%	0%	100%
Carcass Wholesaler	Carcasses	0%	0%	100%	0%	0%	100%
	Meat R	0.0%	0%	99.90%	0.0%	0%	99.90%
	By-Product	0%	0%	100%	0%	0%	100%
Carcass Retailers	Fr.Meat R	0%	0%	100%	0%	0%	100%
	Bons	0%	0%	100%	0%	0%	100%
Exporters	Lambs	0%	0%	100%	0%	0%	100%
Importers	Lambs	0%	0%	100%	0%	0%	100%

Source: Author.

S.Cons: Self-Consumption.

Table 3 b. Assumptions and slughtering rates for sheep, 2002

Item	Baseline	Current
Slaughterhouse		
Carcass	67.80%	67.80%
By-product	32.20%	32.20%
Carcass Retailers		
Meat Ready	78%	78%
Bons	22%	22%

Source: Auda and Abu Al-Kair (1983-1984).

Table 3 c. Assumptions and slughtering rates for sheep, 2002

Animal parts share according to the live weight	%
Carcass weight	88.80%
Carcass emptied	67.80%
Hear and head	7.40%
Intestine and stomach	10.20%
Blod	4.10%
Bons	13.60%
Meat	41.80%
Eatable fat	11.00%
Ineatable fat	4.00%
Skin	7.90%
Bons according to carcass emptied	22.00%
Fattend lamb weight	kg 45

Source: Auda and Abu Al-Kair (1983-1984).

Table 4

Prices of the Sheep Meat Chain, 2002			
Table 4. Prices (SP per unit)			
Agents	Unit	Baseline Price	Current Price
Sectors			
Fattened lamb meat- live weight	kg	97.00	97.00
Sheep meat- live weight	kg	75.00	75.00
Mixed meat (lambs+sheep)-live weight	kg	92.60	92.60
Manure of private and co-operative sector	M³	300.00	300.00
Lambs for fattening	lamb	3,000.00	3,000.00
Ready made feed mixture for private	kg	7.10	7.10
Ready made feed mixture for co-operative	kg	7.10	7.10
Ready made feed mixture for state	kg	13.93	13.93
Hay	kg	4.00	4.00
Traders			
Carcass/ Live animal wholesalers	kg	150.00	150.00
By-product/Live animal wholesalers	kg	38.00	38.00
Carcass/ Carcass wholesalers	kg	164.00	164.00
Fresh meat ready / Carcass retailers	kg	300.00	300.00
Meat by-products	kg	800.00	800.00
Bons	kg	1.00	1.00
Exporters	kg	83.00	83.00
Slaughterhouse			
Service/ Slaughterhouse	kg	0.67	0.67
Carcasses and by-products/ Slaughterhouse	kg	93.27	93.27
Live Animal/Exporters	kg	116.00	116.00
Importers			
Live Lambs (Purchase)	kg	60.00	60.00
Live Lambs (Sales)	kg	80.00	80.00

Source: MAAR, Department of Economics.

Figure 2. In/Out commodities and flow percentages of the sheep meat chain, 2003

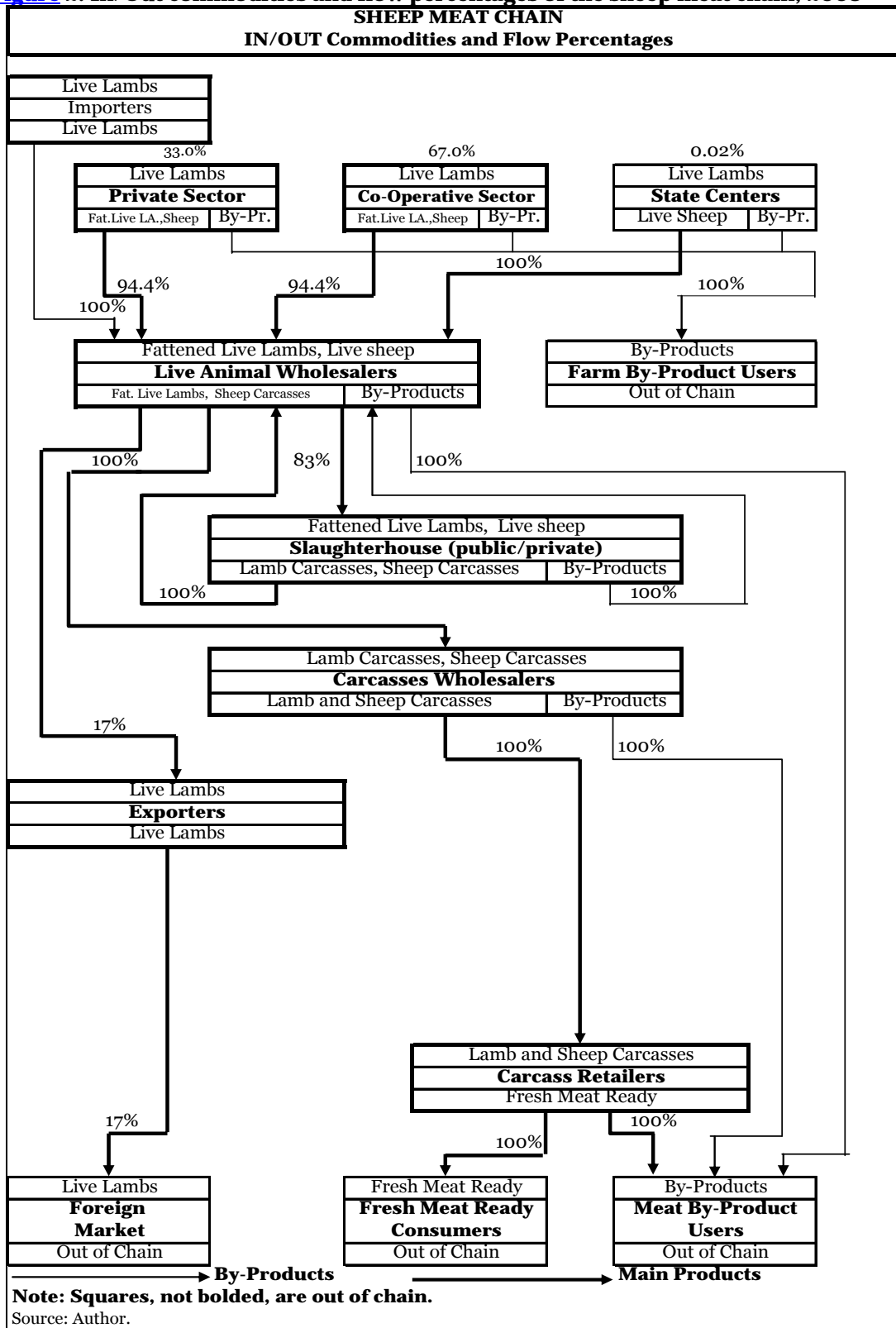


Table 5a. Co-operative sector - Lamb fattening budget, 2002

Item	Unit	Baseline			Current		
		Quantity	Price SP	Value Mill.SP	Quantity	Price SP	Value Mill.SP
1- Revenues							
Fattend lamb production - Live weight	Ton	206,271			206,271		
Sheep meat production* - Live weight	Ton	41,951			41,951		
Total meat production - Live weight	Ton	248,222			248,222		
Waste	Ton	1,986			1,986		
Home consumption	Ton	11,915			11,915		
Fattend lamb sales - Live weight	Ton	234,321	97,000	22,729	234,321	97,000	22,729
Manure sales	M	54	300	0.0	54	300	0.0
Total sales				22,729			22,729
2. Variable cost**							
Lambs for fattening	Ton	234,321	54,000	12,653	234,321	54,000	12,653
Fodder	Ton	234,321	26,000	6,092	234,321	26,000	6,092
Milk	Ton	234,321	2,984	699	234,321	2,984	699
Veterinary expenses	Ton	234,321	663	155	234,321	663	155
Electricity, fuel, and water	Ton	234,321	435	102	234,321	435	102
Services	Ton	234,321	414	97	234,321	414	97
Waste	Ton	234,321	882	207	234,321	882	207
Hired labor	Ton	234,321	2,454	575	234,321	2,454	575
Family labor	Ton	234,321	1,380	323	234,321	1,380	323
Other expenses	Ton	234,321	950	223	234,321	950	223
Total variable cost				21,127			21,127
3. Value added				2,400			2,400

Source: Author.

* Sheep meat production refers to Milk Farms

** Variable Cost are calculated per ton of meat sales- Interest , taxes, rent, and depreciation are not included within because they are part of the value added

Table 5b: Private sector - Lamb fattening budget

Item	Unit	Baseline			Current		
		Quantity	Price SP	Value Mill.s.p	Quantity	Price SP	Value Mill.s.p
1- Revenues							
Fattend Lamb production - Live weight	Ton	59,200			59,200		
Sheep meat production* - Live weight	Ton	12,040			12,040		
Total meat production - Live weight	Ton	71,240			71,240		
Waste	Ton	474			474		
Home consumption	Ton	2,842			2,842		
Fattend lamb sales - Live weight	Ton	55,885	97,000	5,421	55,885	97,000	5,421
Manure sales	M	15	300	0.00	15	300	0.00
Total sales				5,421			5,421
2. Variable cost**							
Lambs for fattening	Ton	55,885	54,000	3,018	55,885	54,000	3,018
Fodder	Ton	55,885	26,000	1,453	55,885	26,000	1,453
Milk	Ton	55,885	2,984	167	55,885	2,984	167
Veterinary expenses	Ton	55,885	663	37	55,885	663	37
Electricity, fuel, and water	Ton	55,885	435	24	55,885	435	24
Services	Ton	55,885	414	23	55,885	414	23
Waste	Ton	55,885	651	36	55,885	651	36
Hired labor	Ton	55,885	2,454	137	55,885	2,454	137
Family labor	Ton	55,885	1,380	77	55,885	1,380	77
Other expenses	Ton	55,885	899	50	55,885	899	50
Total variable cost				5,023			5,023
3. Value added				585			585

* Sheep meat production refers to milk farms

** Variable cost are calculated per ton of meat sales- Interest , taxes, rent, and depreciation are not included within because they are part of the value added

Table 5c: Sectors -Total lamb fattening budget

Item	Unit	Baseline			Current		
		Quantity	Price SP	Value Mill.SP	Quantity	Price SP	Value Mill.SP
1- Revenues							
Fattend Lamb production - Live weight	Ton	265,471			265,471		
Sheep meat production* - Live weight	Ton	53,991			53,991		
Total meat production - Live weight	Ton	319,462			319,462		
Waste	Ton	2,459			2,459		
Home consumption	Ton	14,756			14,756		
Fattend Lamb sales - Live weight	Ton	248,255		28,150	248,255		28,150
Manure sales	M ³	69		0.0	69		0.0
Total sales				28,150			28,150
2. Variable cost**							
Lambs for fattening	Ton	248,255		15,671	248,255		15,671
Fodder	Ton	248,255		7,545	248,255		7,545
Milk	Ton	248,255		866	248,255		866
Veterinary expenses	Ton	248,255		192	248,255		192
Electricity, fuel, and water	Ton	248,255		126	248,255		126
Services	Ton	248,255		120	248,255		120
Waste	Ton	248,255		243	248,255		243
Hired labor	Ton	248,255		712	248,255		712
Family labor	Ton	248,255		400	248,255		400
Other expenses	Ton	248,255		273	248,255		273
Total variable cost				26,150			26,150
3. Value added				2,985			2,985

Table 6a. Matrix of flow coefficients, 2002 (%)

To ↓	From →		Supply			Production			Traders		Slaughterhouse			Meat Traders						
			Domestic Production			Import	PS	CS	SC	IMP	LAW	SHLA	SHC	SHB	LAW		Carc. Retail. (CR)			Ex
			PS	CS	SC										LAWC	LAWB	CWC	CR	CRM	
Meat Production	Private Sector (PS)	Live An.	100%				-100%													
	Co-op. Sector (CS)	Live An.		100%			-100%													
	State Centers (SC)	Live An.			100%		-100%													
Trader	Importers (IMP)	Live An.				100%			-100%											
	Live An. W. (LAW)	Live An.					94.4%	94.4%	100%	100%	-100%									
Services	SI. H. (SHLA)	Live An.								97%	-100%									
	SI. H. (SHC)	Carc.									67.8%	-100%								
	SI. H. (SHB)	By-Pro.									32.2%	-100%								
Meat Traders	Live An. W. (LAWC)	Carc.										100%		-100%						
	Live An. W. (LAWB)	By-Pro.											100%	-100%						
	Carc. W. (CWC)	Carc.												100%	-100%					
	Carc. R.C	CRC													100%	-100%				
	Carc. R. Meat (CRM)	Meat														78%	-100%			
Consumption	Carc. R. Bons (CRB)	Bons														22%			-100%	
	Exporters (EX)	Live An.								3%										-100%
Sub Total	Consumers	F. M. R.																		
	Meat By-Pro. Users	By-Pro.												100%					100%	
Sub Total	Foreign Market																			100%
							-5.6%	-5.6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Waste							1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
H. Consump.							4.8%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Sub Total							5.6%	5.6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Grand Total							0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Source: Author.
Farm by-Products are not taken into account.

Abbreviations:

Private Sector (Farms): PS
Co-operative Sector (Farms): CS
State Center (Farms): SC
Live Animals: Live An.
Live Animal Wholesalers (Live An.W.): LAW
Slaughterhouse: SLH.
Slaughterhouse Live Animals: SHLA
Slaughterhouse Carcasses(Carc.): SHC
Slaughterhouse By-Products(By-Pro.): SHB

Live Animal Wholesalers Carcasses: LAWC
Live Animal Wholesalers By-Products: LAWB
Carcass Wholesalers (Carc.W.): CW
Carcass Wholesalers Carcasses: CWC
Carcass Wholesalers Meat: CWM
Meat Ready: Meat R.
Carcass Wholesalers Bons: CWB
Carcass Retailers (Carc.Retail.) Carcasses(Carc.R.C): CRC
Carcass Retailers Meat (Carc.R.Meat): CRM

Carcass Retailers Bons (Carc.R.Bons): CRB
Fresh Meat Ready: F.M.R.
Consumption: Cons.
Home Consumption: H.Consumpt.
EX: Exporter.

Table 6b. Matrix of flow quantities (000 tons), (-)inflow, (+)outflow, 2002

To ↓	From →		Supply				Production			Traders		Slaughterhouse			Meat Traders						Total		
			Domestic Production			Import	PS	CS	SC	IMP	LAW	SHLA	SHC	SHB	LAW			Carc. Retail. (CR)					
			PS	CS	SC										LAWC	LAWB	CWC	CR	CRM	CRB		EX	
Meat Production	Private Sector (PS)	Live An.	71.2				-71.2															0.0	
	Co-op. Sector (CS)	Live An.		248.2				-248.2															0.0
	State Centers (SC)	Live An.			0.1			-0.1															0.0
Trader	Importers (IMP)	Live An.				0.4				-0.4													0.0
	Live An. W. (LAW)	Live An.					67.3	234.3	0.1	0.4	-302.0												0.0
Services	Sl. H. (SHLA)	Live An.								292.9	-292.9												0.0
	Sl. H. (SHC)	Carc.									198.6	-198.6											0.0
	Sl. H. (SHB)	By-Pro.									94.3	-94.3											0.0
Meat Traders	Live An. W. (LAWC)	Carc.										198.6		-198.6									0.0
	Live An. W. (LAWB)	By-Pro.											94.3	-94.3									0.0
	Carc. W. (CWC)	Carc.												198.6		-198.6						0.0	
	Carc.R.	CRC													198.6	-198.6						0.0	
	Carc. R. Meat(CRM)	Meat														155.0	-155.0					0.0	
Exporters(EX)	Carc. R. Bons (CRB)	Bons														43.6				-43.6		0.0	
	Exporters(EX)	Live An.								9.1												-9.1	0.0
Consump.	Consumers	F. M. R.																155.0					155.0
	Meat By-Pro. Users	By-Pro.												94.3						43.6			137.9
Sub Total	Foreign Market																					9.1	9.1
							-4.0	-13.9	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waste						0.6	2.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H. Consump.						3.4	11.9	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sub Total						4.0	13.9	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grand Total						0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

ource: Author.

Farm by-products are not taken into account.

Live An.: Live Animal.

F.M.R.: Fresh Meat Ready.

Tables 7-12

Live Animal Wholesalers, 2002

Table 7a. Live animal wholesalers - Purchase & Sales

Item		Flow Ton	Price SP/Ton	Value Mill.SP
Purchase:	Sectors	301,996	92,600	27,964.8
	Importers	358	80,000	28.7
				27,993.5
Sales to :	Carcass Wholesalers	198,605	150,000	29,790.7
	By-product Users	94,331	38,000	3,584.6
	Exporters	9,060	92,600	838.9
	Total	301,996		34,214.3

Source: Author.

Table 7b. Live animal wholesalers - Marketing cost

Item	Baseline			Current		
	Unit Cost SP/Ton	Flows Ton	Total Cost Mill.SP	Unit Cost SP/Ton	Flows Ton	Total Cost Mill.SP
Slaughtering	404	301,996	122.0	404	301,996	122.0
Transport	850	301,996	256.7	850	301,996	256.7
Wages	450	301,996	135.9	450	301,996	135.9
Services	1.5	301,996	0.5	1.5	301,996	0.5
Others	34	301,996	10.3	34	301,996	10.3
Total			525.3			525.3

Source: Author.

Slaughterhouse, 2002

Table 8a. Slaughterhouse - Purchase & Sales

Item		Flow Ton	Price SP/Ton	Value Mill.SP
Purchase:	Live Animal Wholesalers	292,936	92,600	27,125.9
Sales to :	Live Animal Wholesalers	292,936	93,270	27,322.2

Source: Author.

Table 8b. Slaughterhouse - Slaughtering cost

Item	Baseline			Current		
	Unit Cost SP/Ton	Flows Ton	Total Cost Mill.SP	Unit Cost SP/Ton	Flows Ton	Total Cost Mill.SP
Slaughtering	0	292,936	0.0	0	292,936	0.0
Transport	85	292,936	24.9	85	292,936	24.9
Wages	175	292,936	51.3	175	292,936	51.3
Services	64	292,936	18.7	64	292,936	18.7
Others	7	292,936	2.1	7	292,936	2.1
Total			97.0			97.0

Source: Author.

Carcass Wholesalers, 2002

Table 9a. Carcass wholesalers - Purchase & Sales

Item	Flow Ton	Price SP/Ton	Value Mill. SP
Purchase: Live Animal Wholesalers	198,605	150,000	29,790.7
Sales to : Carcass Retailers	198,605	164,000	32,571.2

Source: Author.

Table 9b. Carcass wholesalers - Marketing cost

Item	Baseline			Current		
	Unit Cost SP/Ton	Flows Ton	Total Cost Mill.SP	Unit Cost SP/Ton	Flows Ton	Total Cost Mill.SP
Slaughtering	0	198,605	0.0	0	198,605	0.0
Transport	400	198,605	79.4	400	198,605	79.4
Wages	360	198,605	71.5	360	198,605	71.5
Services	0.8	198,605	0.2	0.8	198,605	0.2
Others	25.5	198,605	5.1	25.5	198,605	5.1
Total			156.2			156.2

Source: Author.

Carcass Retailers, 2002

Table 10a. Carcass retailers - Purchase & Sales

Item	Flow Ton	Price SP/Ton	Value Mill. SP
Purchase: Carcass Wholesalers	198,605	164,000	32,571.2
Sales to : Consumers	155,011	300,000	46,503.3
By-product Users	43,594	1,000	43.6
Total	198,605		46,546.9

Source: Author.

Table 10b. Carcass retailers - Marketing cost, 2002

Item	Baseline			Current		
	Unit Cost SP/Ton	Flows Ton	Total Cost Mill. SP	Unit Cost SP/Ton	Flows Ton	Total Cost Mill. SP
Slaughtering	0	198,605	0.0	0	198,605	0.0
Transport	150	198,605	29.8	150	198,605	29.8
Wages	200	198,605	39.7	200	198,605	39.7
Services	0.08	198,605	0.0	0.08	198,605	0.02
Others	13	198,605	2.6	13	198,605	2.6
Total			72.1			72.1

Source: Author.

Exporters, 2002
Table 11a. Exporters - Purchase & Sales

Item	Flow Ton	Price SP/Ton	Value Mill. SP
Purchase: Live Animal Wholesalers	9,060	92,600	838.9
Sales to : Foreign Market	9,060	116,000	1,050.9

Source: Author.

Table 11b. Exporters - Marketing cost

Item	Baseline			Current		
	Unit Cost SP/Ton	Flows Ton	Total Cost Mill. SP	Unit Cost SP/Ton	Flows Ton	Total Cost Mill. SP
Slaughtering	0	9,060	0.0	0	9,060	0.0
Transport	400	9,060	3.6	400	9,060	3.6
Wages	360	9,060	3.3	360	9,060	3.3
Services	0.8	9,060	0.0	0.8	9,060	0.0
Others	25.5	9,060	0.2	25.5	9,060	0.2
Total			7.1			7.1

Source: Author.

Importers, 2002
Table 12a. Importers - Purchase & Sales

Item	Flow Ton	Price SP/Ton	Value Mill. SP
Purchase: Foreign Market	358	60,000	21.5
Sales to : Live Animal Wholesalers	358	80,000	28.7

Source: Author.

Table 12b. Importers - Marketing cost

Item	Baseline			Current		
	Unit Cost SP/Ton	Flows Ton	Total Cost Mill. SP	Unit Cost SP/Ton	Flows Ton	Total Cost Mill. SP
Slaughtering	0	358	0.00	0	358	0.00
Transport	400	358	0.14	400	358	0.14
Wages	360	358	0.13	360	358	0.13
Services	0.8	358	0.00	0.8	358	0.00
Others	25.5	358	0.01	25.5	358	0.01
Total			0.28			0.28

Source: Author.

Table 13. Agents' budget summary of the sheep meat chain, 2002 (Mill.SP)

Item	Sectors			SH	Traders						Total Chain
	PS	CS	Total		LWA	CWC	CR	IMP	EX	Total	
Outputs out of the Chain											
Fresh Meat Ready/Carcass Retailers			0.00				46503			46503	46503
Meat By-products/Live Animal Wholesalers			0.00		3585					3585	3585
Meat By-products/Carcass Retailers			0.00				44			44	44
Farm By-products/Private Sector	0.00		0.00							0.00	0.00
Farm By-products/Co-operative Sector		0.02	0.02							0.00	0.02
Live Animals/Foreign Market			0.00						1051	1051	1051
Total Outputs out of the Chain	0.00	0.02	0.02	0.00	3585	0.00	46547		1051	51182	51182
Outputs within the Chain											
Live Animals/Private Sector	5421		5421							0.00	5421
Live Animals/ Co-Operative Sector		22729	22729							0.00	22729
Live Animals/Live Animal Wholesalers			0.00		839			29		868	868
Carcasses/Live Animal Wholesalers			0.00		29791					29791	29791
Services/Slaughterhouse			0.00	196						0	196
Carcasses/Carcass Wholesalers			0.00			32571				32571	32571
Total Outputs within the Chain	5421	22729	28150	196	30630	32571	0.00	29	0.00	63230	91576
Home Consumption	317	1103	1420								1420
Total Home Consumption	317	1103	1420	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1420
Total Outputs	5737	23832	29570	196	34214	32571	46547	29	1051	114412	144178
Inputs out of the Chain											
Fodder	1453	6092	7545							0.00	7545
Veterinary Expenses	37	155	192							0.00	192
Electricity, Fuel, and Water	24	102	126							0.00	126
Services	23	97	120	19	0.45	0.16	0.02	0.00	0.01	0.64	140
Transport			0	25	257	79	30	0	4	370	395
Live Lambs					29			22		50	50
Other expenses	50	223	273	2	10	5	3	0.01	0.23	18	293
Total Inputs out of the Chain	1588	6669	8257	46	296	85	32	22	4	439	8741
Inputs within Chain											
Lambs	3018	12653	15671							0.00	15671
Milk	167	699	866							0.00	866
Waste	36	207	243							0.00	243
Live Animals/Live Animal Wholesalers			0.00		27965				839	28804	28804
Slaughtering/Live Animals Wholesalers			0.00		122					122	122
Carcasses/Carcass Wholesalers			0.00			29791				29791	29791
Carcasses/Carcass Retailers			0.00				32571			32571	32571
Total Inputs within the Chain	3221	13559	16780	0.00	28087	29791	32571	0.00	839	91288	108068
Total Inputs	4809	20228	25037	46	28383	29875	32604	22	843	91726	116809
Total Value Added	929	3604	4533	151	5831	2696	13943	7	208	22686	27369
Value Added Items											
Wages & Salaries	214	898	1113	51	136	71	40	0.13	3	251	1414
Profit, Taxes, Interest, Amortization, and Depreciation	715	2706	3420	99	5724	2624	13904	7	205	22464	25983
Total Value Added	929	3604	4533	151	5860	2696	13943	7	208	22714	27398

Source: Author.

Table 14. Agents' shares and indicators of the sheep meat chain, 2002

Indicators	Revenues or Sales	Share	Purchase	Share	Cost	Share	Total Cost	Share	Gross Margin	Share	Value Added	Share	Indicators	
													Shar of Cost to Revenues	Share of Value Added to Cost
Agent	Mill.SP	%	Mill.SP	%	Mill.SP	%	Mill.SP	%	Mill.SP	%	Mill.SP	%	%	%
Private Sector	5420.83	3.19		0.00	5022.93	18.60	5022.93	3.46	397.90	1.62	928.81	3.39	92.66	18.49
CO-operative Sector	22729.19	13.38		0.00	21126.89	78.23	21126.89	14.54	1602.31	6.52	3603.99	13.17	92.95	17.06
Sub - Total	28150.02	16.57	0.00	0.00	26149.81	96.82	26149.81	17.99	2000.21	8.14	4532.80	16.56	92.89	17.33
Live Animals Wholesalers	34214.26	20.14	27964.83	23.64	525.32	1.95	28490.15	19.60	5724.11	23.30	5831.34	21.31	83.27	20.47
Carcasses Wholesalers	32571.20	19.17	29790.73	25.18	156.16	0.58	29946.89	20.61	2624.30	10.68	2695.80	9.85	91.94	9.00
Sub - Total	66785.46	39.31	57755.56	48.82	681.49	2.52	58437.04	40.21	8348.41	33.99	8527.14	31.16	87.50	14.59
Carcasses Retailers	46546.92	27.40	32571.20	27.53	72.11	0.27	32643.30	22.46	13903.61	56.60	13943.34	50.95	70.13	42.71
Slaughterhouses	27322.15	16.08	27125.89	22.93	96.96	0.36	27222.85	18.73	99.31	0.40	150.57	0.55	99.64	0.55
Importers	28.67	0.02	21.50	0.02	0.28	0.00	21.78	0.01	6.89	0.03	7.01	0.03	75.98	32.20
Exporters	1050.95	0.62	838.94	0.71	7.12	0.03	846.07	0.58	204.88	0.83	208.14	0.76	80.51	24.60
Total	169884	100	118313	100	27008	100	145321	100	24563	100	27369	100	86	19

Source: Author.

Figure 3. Value added of the sheep meat chain, 2002

