



## **Characteristics of Dairy Value Chain in Jordan**

**Zainab Alhammad<sup>1\*</sup>**

<sup>1</sup>*Department of Animal Production, Agricultural Zarqa Governorate, Jordan's Ministry of Agriculture, Jordan.*

### **Author's contribution**

*The sole author designed, analysed, interpreted and prepared the manuscript.*

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### **ABSTRACT**

The objective of this report is to analyze the milk value chain in Jordan depending on information gathering by own experience and The Jordan's ministry of agriculture report 2015.

Total amount of milk production by dairy subsector is (266599) tons which represent 44% of total milk consumption, Sheep and Goat milk production is (78436) tons and the amount of imported milk converted as fresh milk is (262845) tons, which is represent more than 43% of total consumption.

The agriculture sector in Jordan consists of two main sub-sectors: Crop production and livestock industry. Livestock is estimated to contribute to about one-half of the total agricultural GDP. The production of food producing animals is valued to around JD820 million; JD435 million generated from the poultry industry and JD385 million from dairy cattle and small ruminants (sheep and goats) enterprises Ministry of Agriculture.

The livestock industry consists of facilities of food producing animals (dairy cattle, poultry, sheep, and goats) and several supporting services (factories of veterinary medicines, feed factories, milk processing plants, slaughter houses, and marketing services).

*Keywords: Dairy value; livestock; agriculture; Jordan; poultry industry.*

## 1. INTRODUCTION

### 1.1 Dairy Cattle in Jordan

According to MoA the population of dairy cattle is around 28226, distributed among 631 farms and concentrated in four Governorates, as shown in Fig. 1: Zarqa (42.6%), Irbid. (1, 2016) (21.3%), Mafraq (16.2%), and Amman (7.5%). The two dairy cattle breeds are the imported Holstein (88%) and the indigenous baladi (12%). The imported cattle (Holstein) are raised in modern dairy farms while the baladi cattle are raised in small herds (<10 heads) by agricultural families [1].

### 1.2 Dairy Sector Stakeholders

#### 1.2.1 Input suppliers

Most of input suppliers in Jordan are industrial integrated companies, which import and sell the feed as raw material or as ration for cattle consumption by owned factories.

Shortage of feed production is the main problem for livestock farms so Jordan imported the feed which is very expensive for the famers.

Jordan imported about 95% of its needs from corn and 100% SBM and 55-45% Roughage.

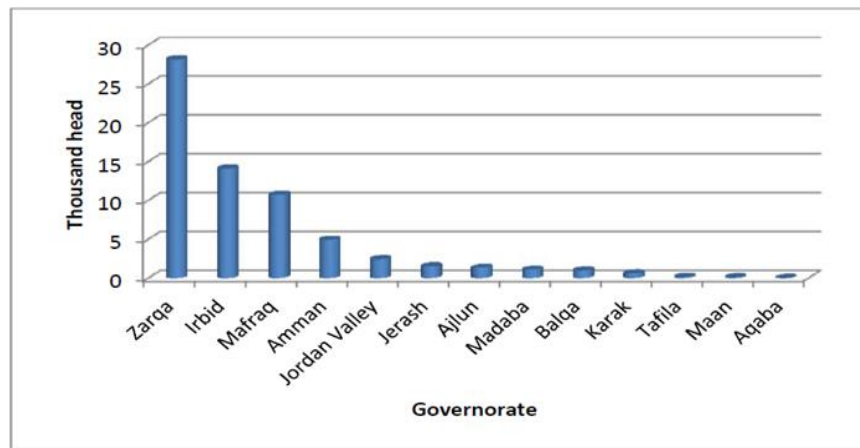


Fig. 1. Population of dairy cattle in the different governorate of Jordan (MoA, [1])

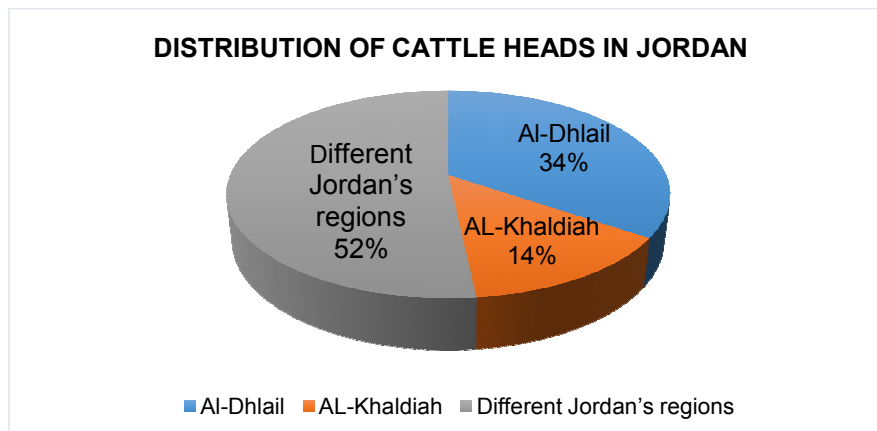


Fig. 2. Distribution of cattle heads in Jordan 2015 (MoA, [1])

Table 1. Feed price for year 2015 (JD)

Yellow corn	SBM	Bran	Barley	Year
230	475	140	211	2015

The total consumption of feed for cattle subsector was 364,707 in Jordan for 2015.

The present study was attempt to analyze the milk value chain in Jordan depending on information gathering by own experience and The Jordan's ministry of agriculture report 2015.

## **2. MATERIALS AND METHODS**

The proposed model for the Characteristics of Dairy Value Chain was as follows.

### **2.1 PESTEC Analysis of Sub Sector**

#### **2.1.1 Political**

Jordan government through Ministry of Agriculture (MOA) imposes the input supplier to Comply with all instructions of Jordanian Agriculture law of imported feed to insure the safety of feed. Also the producers have to register their famers at MOA and obtain a license after meeting the requirements of the Jordanian Agriculture law which should have 4 dunnums and more, with water source, and milking machine, etc.

The MOA also supporting the Cattle breeders Associations and provide farmers with vaccine, antibiotics, etc.

#### **2.1.2 Economical**

Milk produced in Jordan reach about 266599 tons of fresh milk in 2015, processed by 10 large dairy plants and 230 small dairy plants into fresh milk, yoghurt, cheese, jammed (for cooking), labanah (creamy one) and shaneenah (drinking liquid).

Milk production is the most expensive subsector in the whole livestock commercials, because of the high cost of production, processing, feeding, milking machines and heifers, with low financial support to the farmers and leak of expert labor, weak competitive of imported milk UHT, marketing challenges, and entering of large capital investment to the sector.

#### **2.1.3 Social**

Most of the labors who are working in small and medium farms are not educated and do not have a professional experience in the field which affect the volume and the quality of milk production, causing low revenue to the famers, Unlike the

integrated farms who had an educated and Professional labor, making this farms get the maximum revenue from this subsector.

#### **2.1.4 Technological**

All the Integrated farms, and few of medium scale farms have a full automatic production systems such as, feeders, milking machine and cooling systems. The rest of medium farmers have semi-automatic, while small scale farmers doesn't have the ability to afford this equipment, so they use small portable milking machine.

#### **2.1.5 Environmental**

In Jordan the MOE impose the dairy cattle famers to meet with all requirements and instructions to maintain the environment, farmers have to get approved every year from MOE, to make sure that these farms do not impact on environment, also farmers should have with a contact with the Municipal to get rid of manure and other organic or non-organic waste in the right way.

#### **2.1.6 Cultural**

According to last statistic made about labor the Working in this subsector from family labor about 3,820 labor including 620 women, which exist in small and medium farms and about 1340 Permanent workers most of them from foreign nationality which farm owners prefer because they have more experience and they also stay in the farm, although the Jordanian labor don't have tendency to work in dairy farm because of the Low wages.

### **2.2 SWOT Analysis of Sub Sector**

#### **2.2.1 Sustainability**

SWOT analysis is used to identify and categories significant internal factors and external factors faced by the organization or stakeholder. It provides information that is helpful in matching the firms' resources and capabilities to the competitive environment in which it operates and is therefore an important contribution to the strategic planning process.

#### **2.2.2 Gender**

The Number of women who is working in this subsector is (620) woman and all of them are family members of the farmers.

**Table 2. SWOT analysis**

<b>Internal</b>	<b>Strengths</b>	<b>Weakness</b>
	<ol style="list-style-type: none"> <li>1. Milk products are high value source of nutrients in a good price</li> <li>2. Services provided by government</li> <li>3. Suitable climate</li> <li>4. Cattle breeders Assoc</li> <li>5. orations support</li> <li>6. Availability of infrastructure</li> </ol>	<ol style="list-style-type: none"> <li>1. Low milk quality</li> <li>2. shortage in expert labor</li> <li>3. High cost of inputs</li> <li>4. marketing challenges</li> <li>5. Inability of small farmer</li> <li>6. Capital investment</li> <li>7. Very low feed production and scarcity of water</li> <li>8. Milk prices fluctuating</li> </ol>
<b>External</b>	<b>Opportunities</b>	<b>Threats</b>
	<ol style="list-style-type: none"> <li>1. Low cost of foreign labor</li> <li>2. Exporting of milk products</li> <li>3. Import high technology</li> <li>4. machine and high yield breeds</li> <li>5. Financial support by banks and JCC</li> </ol>	<ol style="list-style-type: none"> <li>1. Increase capital investment</li> <li>2. Weak management of milk quality in small farms</li> <li>3. Dairy cattle and calves Diseases</li> <li>4. Imported UHT milk</li> </ol>

**Table 3. Sustainability**

<b>People</b>	<b>Environment</b>	<b>profit</b>
Most of labor who is working in this sector has a low wages. Women are representing in this sector and working in farms, plants and market.	All the farms in Jordan is under control of (MOE) and Municipalities which Maintain the Environment. Water resource scarcity and low average rainfall.	Milk subsector employs a large segment of labor direct and indirect and it is a mean income source for many people and for the country.

In dairy plant and marketing, women are working side by side with man, but her participation still less than men in the chain.

There's No organic farm or fair trade in milk subsector according to Jordanian authorities.

**2.3 Quality Management of Sub-Sector**

**2.3.1 Suppliers**

Suppliers need permission from MOA to import the feed and they have to impose Jordan Standards for importing feed, feed laboratories in the ministry of agriculture made the analysis of feed by taking samples and ensure it is free from pathogenic bacteria and aflatoxin.

**2.3.2 Producer**

*2.2.3.1 Integrated farms*

High animal's health management, high milking hygiene management, Good Control storage conditions of feed, appropriate waste management system.

*2.2.3.2 Medium scale farms*

Low animal's health management accepted milking hygiene management, Bad Control storage conditions of feed, inappropriate waste management system.

*2.2.3.3 Small scale farms*

Low animal's health management, low milking hygiene management, Bad Control storage conditions of feed, inappropriate waste management system.

**2.3.3 Processor**

**In the plants:** Probably the milk is a source for many cases of diseases such as brucellosis and TB as well as food poisoning, Nowadays; milk-borne diseases have fallen dramatically through pasteurisation and through the implementation of eradication programs in livestock Large plants (Processor Wholesalers). The plants checking milk for (acidity and density) before accept it, then starting processing by pasteurization, processing, packaging, storage under cooling condition and transport the product with refrigerated cars for the supermarkets.

It's hard to authority to check quality control for small plants because there's no label on the product.

The small plants product sold in unlabeled plastic boxes at the supermarket, so they have a high risk of diseases.

**2.3.4 Retailers**

Supermarkets selling the final products and keep it below 4C in clean and separated place, to maintain food quality.

**2.3.5 Economic of sub sector**

*2.3.5.1 Selling price*

The selling price of one liter of milk in Jordan in JD currency as following

**Table 4. Selling price**

	<b>Big dairy plants cents/L</b>	<b>Small dairy plants cents/L</b>
Farmers	43	43
Plants	84	75
Wholesaler	88	79
supermarkets	100	85

*Note: (1 JD = 1.30 Euro)*

*\*source: E mails*

*2.3.5.2 Value share of actors in sub sector*

**Small dairy plants Value share:**

**Table 5. Small dairy plants value share**

<b>Marking margin</b>	<b>Producer</b>	<b>Processor</b>	<b>Wholesaler</b>	<b>Retailer</b>
Revenue	0.43	0.75	0.79	0.85
Purchase price	-	0.43	0.75	0.79
Costs	0.39	0.25	0.01	0.01
Net marketing margin	0.04	0.07	0.03	0.05
Margin share %	21	37	15.7	26.3

*\*source: E mails*

**Large dairy plants Value share:**

**Table 6. Dairy plants value share**

<b>Marking margin</b>	<b>Producer</b>	<b>Processor</b>	<b>Wholesaler</b>	<b>Retailer</b>
Revenue	0.43	0.84	0.88	1.00
Purchase price	-	0.43	0.84	0.88
Costs	0.39	0.30	0.01	0.01
Net marketing margin	0.04	0.11	0.03	0.11
Margin share %	13.8	38	10.2	38

*Source: E mails*

**3. RESULTS AND DISCUSSION**

**3.1 Jordan's Milk Value Chain**

Value chain map analysis is essential to an understanding of markets, their relationships, the Participation of different actors and the critical constraints that limit the growth of dairy production and consequently the competitiveness of smallholder farmers.

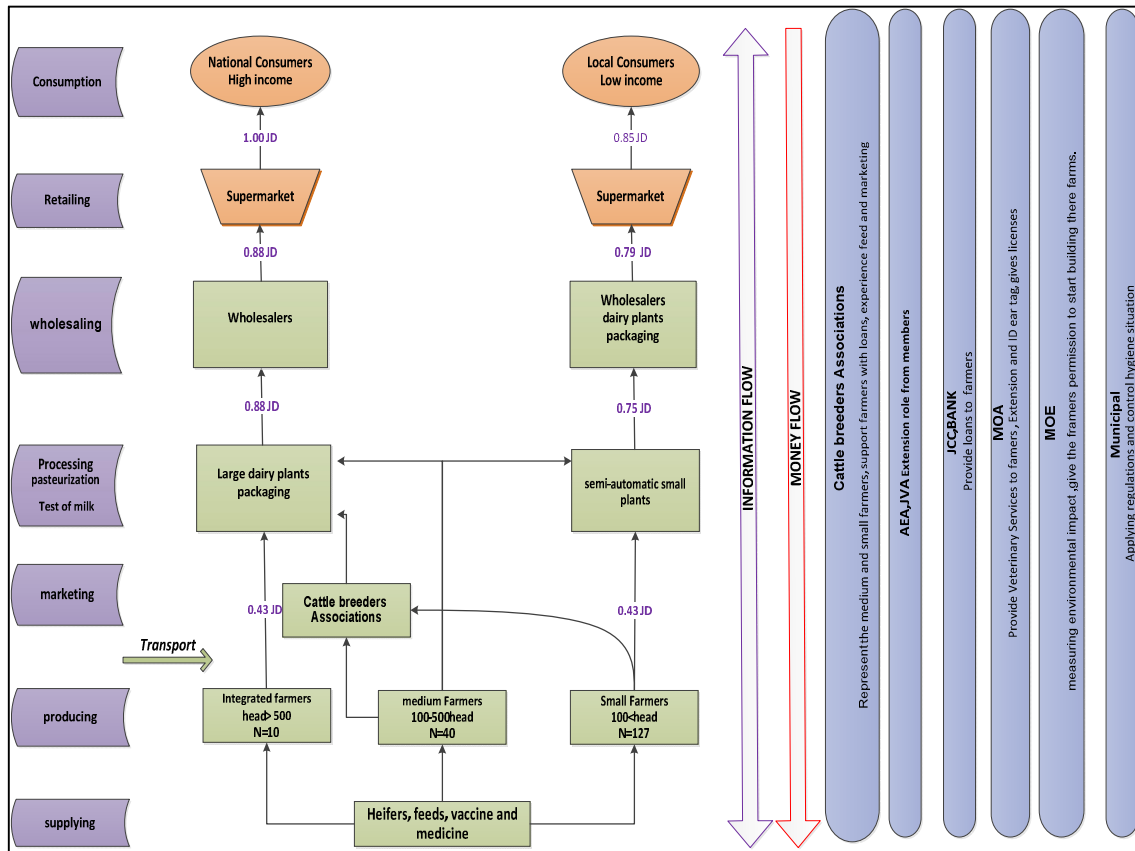


Fig. 3. Jordan's milk value chain

### 3.2 Stakeholders in Dairy Cattle Subsector

A diverse group of stakeholders are involved in the dairy sector in Jordan, from farmers to cooperatives, private sector actors (processors, input providers, extension providers, transporters, and traders), public sector actors (extension providers, regulatory authorities), civil society stakeholders (non-governmental organisations and development agencies) and consumers.

### 3.3 Government Agencies (Supporter and Influencers)

#### 3.3.1 The Ministry of Agriculture (MoA)

Ministries responsible for policy formulation and implementation; facilitate production, delivery of extension services, give the farms license to enable them for getting the agricultural services like, antibiotics and a permission to get a foreign labors, FMD vaccine, Artificial insemination and

Ear tag for animal identification which supported by National Animal Identification project based in MoA.

#### 3.3.2 The Ministry of Environment (MOE)

The farmers must get permission from the ministry before starting building livestock facilities to ensure it is far away from residential neighborhoods.

#### 3.3.3 Jordan Food & Drug Administration (JFDA)

Management of production Safety, and ensure that food safety instructions were applied by those processors and supermarket.

#### 3.3.4 Jordan Credit Corporation (JCC)

It supports the small processors and the producers by providing them with financial support (loans) with long time and low interest to start or expand their production and processing projects.

### 3.4.5 JFDA and municipalities

Supervisory role: Making sure those instructions of food safety and hygiene is applied by processors and supermarket.

### 3.4.6 Associations and unions

Jordanian Veterinary Association and Agricultural Engineering Association and (JVA, AEA). The most of their members working in the chain as agricultural engineers (livestock engineers) and a Veterinarian so these associations play a role as a supporter for the whole agricultural sector by extension services (Association Vet. Jordanian [2]).

### 3.4.7 Cattle breeders Associations

There are two associations:

**Dhulia cattle breeders** this Association was established in Alzarqain 1976, which consists from 110 farmers.

**Alsalam Association** for cattle farmers were established in Almafraaq city in 1993 and consist of 20 farmers. They represent the small scale farmers.

The two associations cooperate with MOA in dairy cattle farmers' issues, and they worked to provide the farmers with a big feed mill, water, vaccines, coordinating with the private sector for importing the high productivity heifers and marketing the milk and the frames Pay milk instead of cash for feed and water cost [1].

### 3.4 Producers

There are 631 working farms in Jordan, and dairy cattle are 28226 heads and their production system may classify as follow:

**Small scale farms:** Who Owens less than 100 head per farm, and these farms are 361 farms, those farms have low inability and don't reach the high technology, they used semi-automatic milking Machines and this is the most problem facing this category [1].

**Medium scale farms:** This are 230 farms with, and this category of fames used also semi-automatic milking Machines but they have more inability to face the chilling in this sector [1].

**Integrated farms:** This has its own dairy farms, dairy plant and feed factory. Include 40 farms. These farms are raising their animal in high technology and have a high milk quality [1].

### 3.5 Processors

The dairy plants are classified in two processors:

**Large dairy plants:** Which include 10 full automatic, and 230 small dairy plants which are less quality product and had less equipments [3].

Processing stag in large plants include: Pasteurization and of milk testing like (acidity, Drug and antibiotics residues and other test is to control products quality. After that milk processed to fresh milk, yoghurt, cheese, jammed, labanah and shaneenah. And in the last packaging stage which is done under cooling temperature.

Small plants usually they did all processing stages except the last stag, so they sell their products in containers [4].

These plants check the acidity and density of milk before receiving, then the milk goes to the cooling system, pasteurization, processing to yoghurt, cheese, labanah, fresh milk and etc., then packaging and storage under cooling temperature.

### 3.6 Consumers

All the milk products goes to the national market and there are two types of consumers divided according to the cost of the market, the national consumers high income where they could have an extra quality and the national consumers low income , with less quality of the products.

## 4. PESTEC ANALYSIS OF SUB SECTOR

### 4.1 Political

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#### 5. CONCLUSION

With the increasing demand for milk and milk products, the importance of identifying challenges and opportunities is accelerate development process of dairy value chain in Jordan.

The main obstacles and challenges are Poor efficiency of cooperative milk producers, weak linkages between stockholders, high cost of feed (especially 95% of feed is imported)which form 72% of milk production cost and low production of feed, limited legislation for milk quality control.

The challenges in this sector are the lake efficiency of the milk producers' cooperative; the ability to overcome these obstacles opens a bright future for the dairy sector in Jordan, supported with high infrastructures, high productivity dairy breeds, distinct geographical.

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#### COMPETING INTERESTS

Author has declared that no competing interests exist.

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