COMPARING THE ROLE OF WOMEN IN SHEEP AND GOAT DAIRY VALUE CHAINS
IN AL-KARAK, JORDAN AND ONTARIO, CANADA

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ABSTRACT
Comparing the Role of Women in Sheep and Goat Dairy Value Chains in Al-Karak, Jordan and Ontario, Canada

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Some women who are smallholder farmers face challenges that prevent them from achieving their full potential as sheep and goat farmers. This is especially true in some areas of the world, such as the Middle East, but not necessarily in other regions such as North America. This study finds that the sheep and goat dairy industry in Jordan is almost exclusively a family operation. Sheep and goats are raised in Jordan for multiple purposes such as milk products, meat, wool, and hides. Jordanian rural women play an important role in the sheep and goat production systems. They are more often engaged in feeding, milking, processing and annual harvesting of forages while the control over decisions and income, marketing and distribution of sheep and goat dairy products are taken by men. This is not the case in Ontario, Canada where sheep and goat dairy production is both a lifestyle choice and business venture in which women and men are equally active. This study examines why cultural differences such as gender are important aspects to be understood for small scale livestock production systems. Specifically, the research paper addresses knowledge and cultural aspects of the value chains for dairy goat and sheep products in Al-Karak, Jordan with a comparison to those value chains in Ontario, Canada. Findings include the roles of men and women, their access to resources and participation in household decision making, all of which can impact resource allocation, technology adoption, and marketing and food consumption. The approach to this research project is based on exploratory approach involving mainly literature review and qualitative methods used in farm visits (Ontario) and key informant interviews with producers in Jordan.
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Table of Contents
ABSTRACT ................................................................................................................... 2
ACKNOWLEDGEMENTS ................................................................................................. 3
1.0 INTRODUCTION ...................................................................................................... 7
1.1 Overview of the Topic ............................................................................................. 7
1.2 Research Goal ........................................................................................................... 8
1.3 Research Objectives ............................................................................................... 8
1.4 Methodology ............................................................................................................ 9
1.5 Study Context and Design ...................................................................................... 9
1.6 Key Informant Interviews ...................................................................................... 11
1.7 Data Analysis .......................................................................................................... 13
1.8 Limitations of the Methodology ........................................................................... 14
1.9 Organization of the Research Paper ..................................................................... 15
2.0 LITERATURE REVIEW ............................................................................................ 16
2.1 Gender Roles and Women’s Participation in the Livestock Sector ....................... 16
2.2 Conceptual Framework ......................................................................................... 22
3.0 BACKGROUND ...................................................................................................... 25
3.1 The Sheep and Goat Dairy Industry in Jordan ....................................................... 25
3.2 The Value Chain of Sheep and Goat Dairy in Jordan ............................................ 26
3.3 Gender Roles and Relations in the Livestock Sector in Jordan ............................... 28
3.4 An Overview of the Value Chain of Sheep and Goat Industry in Ontario .......... 30
4.0 FINDINGS ................................................................................................................. 36
4.1 Introduction ............................................................................................................. 36
4.2 Interviews Findings ............................................................................................... 36
5.0 FINAL DISCUSSION AND CONCLUSION ............................................................. 40
5.1 Final Discussion ..................................................................................................... 40
5.2 Recommendations ................................................................................................. 42
5.3 Conclusion ........................................................................................................................................... 42

ANNEXES .................................................................................................................................................. 48

Annex 1. A list of questions for key informant interviews and table for coding and labeling data from the key informant interviews in Ontario, Canada and Al-Karak, Jordan .................................................................................................................. 48

Annex 2. Machinery system for milking in Ontario (milking parlors, pipelines and bulk tanks).................................................................................................................................................. 52

Annex 3. Some of dairy sheep and goat products from Jordan (Jameed and white cheese).................................................................................................................................................. 53

Annex 4. Dairy sheep and goat farms in Southern Ontario................................................................. 54
A LIST OF TABLES

Table 1. Number of sheep and goats and quantity of sheep and goat milk production in Jordan in 2001 and 2010.................................................................25

Table 2. Characteristics of the dairy goat farming system in Ontario..................31

Table 3. Characteristics of the dairy sheep and goats in Al-Karak, Jordan and Ontario, Canada.................................................................37

Table 4. Comparison of gender in activities and responsibilities.........................38

A LIST OF FIGURES

Figure 1. Al-Karak Jordan Map (Study Area).....................................................10

Figure 2. Southern Ontario, Canada Map (Study Area).....................................11

Figure 3. Conceptualizing Meinzen-Dick et. al.’s Framework..............................22

Figure 4. Market Channels for dairy sheep and goat products in Al-Karak, Jordan...27

Figure 5. Number of goats by province, Census 2001-2011.................................30

Figure 6. Number of licensed goat milk producer in Ontario, 1997-2013...............31

Figure 7. Market Channels for dairy sheep and goat products in Ontario, Canada....32
1.0 INTRODUCTION

1.1 Overview of the Topic

Rural households worldwide depend on livestock such as, poultry, sheep, and goats, to produce food, generate income, and build up assets (Food and Agricultural Organization, 2012a). Livestock is considered a key element for sustaining poor households in rural areas (Food and Agricultural Organization, 2010) in many parts of the world. Both men and women engage in the livestock and agricultural production systems, and women farmers constitute up to 50 percent of the agricultural workforce in some developing countries (Food and Agricultural Organization, 2011). However, women’s contribution to the livestock sector and other agricultural production systems is often unrecognized and invisible due to gender disparities. Women farmers are often constrained by limited access to agricultural assets, inputs, services, new technologies and markets. These constraints impact women’s ability to access and use improved livestock technologies or even engage in community incentives (Baden, 1998; Food and Agricultural Organization, 2011). In turn, gender inequality can have substantial negative effects on food nutrition and security in developing countries, communities and households (Baden, 1998; Food and Agricultural Organization, 2011). Food and Agricultural Organization (2011) also estimates an increase by 20-30 percent in agricultural yields if rural women in developing countries have equal access to production resources as compared to men.

This situation is typically not the case in Ontario, Canada where women farmers may independently operate their own farms or work with men to operate family farms and agri-businesses. Statistics Canada reports that 27 percent of farm operators in Canada are women. Women farmers are also recognized for their contribution to the micro-livestock sector such as sheep and goat dairy production. Women farmers in Ontario are considered responsible for day-to-day decision making, assets, inputs, services, new technologies and markets on a family farm.
This is a true when women farmers do not have another full-time job in their own professional careers. However, there is very little in the current literature on the roles of men and women, their access to resources and their participation in household decision making in the micro-livestock sector and more specifically the sheep and goat dairy production systems in Ontario, Canada. In Ontario, there both women and men have specific areas of responsibility in the dairy value chain, again this is true when both women and men rural farmers are working on their own farms as a full-time job. The literature, however, indicates that there has not been any specific focus on women’s role as owners or operators of sheep and goat farms in Ontario. In contrast, there is an existing body of literature on Jordanian women in sheep and goat dairy production. Comparing the two contexts of Canada and Jordan sheds light on the influence of ‘culture in agriculture’ and such comparisons may be of benefit to the industry in both countries in order to draw attention to the role of women as operators within the sheep and goat dairy value chains.

1.2 Research Goal

This research paper focuses on the role of women in sheep and goat dairy value chains. It also considers opportunities for knowledge sharing and capacity development. Cultural and gender aspects of the technologies and value chain in Jordan and Ontario, Canada are examined. Research is expected to shed light on the sheep and goat industry as an opportunity for women farmers or entrepreneurs in Canada and Jordan.

1.3 Research Objectives

The specific research objectives are to:

1. Understand the dynamics of dairy value chains comparing experience in rural Jordan and Ontario, Canada; and
2. Address good practices in enabling farmer decision-making over technologies (breeding, feeding, milk processing, and marketing) at the individual, household, or community levels, including benefits to rural women.

1.4 Methodology

The approach to this research project was based on exploratory approach involving mainly literature review and qualitative methods used in farms visits (Ontario) and conversation by voice over internet (Skype) to small-scale farmers and producers in Al-Karak, Jordan. This research included two case studies to analyze the original research questions (Yin, 2003). Data collection used a purposive sample for the selection of illustrative cases whereby “people and locations are intentionally sought because they meet some criterion for inclusion in the study” (Palys & Atchison, 2008, p.124). Original data collection involved only key informant interviews. There were two farm visits for observation and interviews in Ontario, Canada and three interviews by Skype/email to small-scale farmers and producers in Al-Karak, Jordan. The goal was to gain an understanding of some cultural norms and practices influence rural livelihoods and adaptive capacities to enhance women’s income-generation activities from the dairy sheep and goat value chains of rural Jordan and Ontario. The interviews were involved general questions and allow probing for more specific questions about the farmer’s experiences with their dairy production and value chain.

1.5 Study Context and Design

Data collection strategy was used for the research such as key informant interviews. The focus and site of the research study is illustrated in Figure 1 in Al-Karak, Jordan in rural regions where dairy sheep and goat sector was identified as a major source of livelihood of people and part of their identity. This initiated discussions and support communities through the roles of
men and women in dairy sheep and goat sector which led to greater equity over time. Samples were selected purposively from dairy sheep and goat farms and producers of Al-Karak. The researcher was the main data collector as the researcher is familiar with the cultural and traditional conditions in the region. The other focus and site of the research study in Ontario, Canada as illustrated in Figure 2 which was in selected farms in Southern Ontario. The ethics procedure was described including the informed consent and confidentiality issues for all participants. This research study has been reviewed by the Research Ethics Board (REB) for compliance with federal guidelines for research involving human participants.

Figure 1. Al-Karak, Jordan Map (Study Area)
1.6 Key Informant Interviews

The qualitative data were collected mainly through small-scale producers of the Al-Karak dairy sheep/goat farms in Jordan by Skype/email and the Ontario sheep/goat farms in Canada in person at the place of work of the participant or a location of their convenience. The interviews which were conducted, in total five interviews. The sample size were five interviews (n=5) and often the point at which theoretical saturation of the data is achieved. Baseline questions were provided prior to the interview sessions. Stakeholders and individual interviews are two way communications and were conducted by asking more general questions and then probing more specific questions. The interviews were designed to collect in-depth information from people, usually those identified as knowledgeable about the dairy sheep and goat value chains involves both male and female farmers. This method allowed the researcher to obtain insights on rural women’s decision-making power in the household because they are responsible for managing and processing dairy products and then related data at individual, household and community
levels. In interviewing individuals, the researcher was able to have a greater understanding and hear their thoughts on some cultural aspects in the dairy sheep and goat sector. Through the interviews the researcher was able to generate context and actual experience of individuals and stakeholders. The research aimed to gain an understanding of the attitudes, behavior, perceptions of the participants on the research issue.

The hand written notes were taken during the interviews and were later typed and transcribed. The interviews were kept confidential. Consent to participate in the interviews were obtained in person and then confirmed verbally and with a written consent form. Open coding was applied in the analysis of the interviews by the researcher who performed the interviews. The interviews are a verbal interchange where one person, the interviewer, attempts to elicit information from another person by asking questions. Although there was a set of questions, the participants had a chance to explore issues they feel are important during such an interview.

Farm visits and conducting interviews with small-scale farmers in both countries provided key insights and described attitudes into cultural aspects in the dairy sheep and goat activities. This helped the researcher to be familiarized with dairy sheep and goat value chains in Ontario. The farm visits were also used to understand the dynamics of ownership by men and women and control over dairy sheep and goat in the community, women’s leadership and control over this sector in the community. Observing insightful interpersonal behaviour, the reality and the context in the field was the aim of these visits. Overall, qualitative data of gender research, value chains in the dairy sheep and goat sector, and cultural aspects of this sector require understanding gender relations and other aspect of well-being such as empowerment, issues of social differentiation, social norms, and self-perception by individuals of communities in that
particular society. Qualitative data in gender research can however, be more subjective and hard to predict or deduct general patterns from the data (IFPRI & ILRI, 2012).

1.7 Data Analysis

The data from both interviews were organized and analyzed according to Bryant’s four stage model of qualitative analysis (Bryant & Charmaz, 2007). The first stage was done by transcribing and reading the whole text of the data. Then making notes on the text and the major themes by interviewees. The second stage has done by reading the text again and highlighted the text. Then identify some keywords and notes about ideas emerging from the data. The third step was done by coding the data and writing notes from the data coding, coding the data by identifying and categorizing themes in the text. The final stage has done by interpreting the data and writing notes about the relation of the coding to the objectives of the project.

In this process, the data collected from the interviews were coded into emergent categories. Each individual response to the interviews was considered in light of other responses and placed with similar responses, leading to the development of individual coded groupings. The interview responses were coded into categories by highlighting significant text. These categories were then considered for similarity and separated into major thematic categories. Common themes of interest including access to resources and inputs in the dairy sheep and goat, capacity development and women’s leadership, control over dairy sheep and goat production in the community, the integration of technology into the dairy sheep and goat sector, decision making over technologies, norms and gender relations in the dairy sheep and goat. Analysis of the data was carried out using open coding which helped in identifying themes from the qualitative data.
1.8 Limitations of the Methodology

The limitation of research methods is the possibility that participants may not be too comfortable about sharing their own opinions in the discussions. Nonetheless, this depends on the dynamics and the nature of the questions that were asked. In other situations, some people may adapt to the dominant ideas present in the local area and may be a bit shy about sharing information, therefore, the context and discussion will have implications on the quality of the collected data. Furthermore, lack of prior research studies and collaboration on gender roles in the dairy sheep and goat in Ontario, Canada as well as in Al-Karak, Jordan might require extended time of research in both countries. The researcher might not be able to generalize much to the whole population. There were not enough collaboration and participants to allow for the significance and confidence of collected data to be established. This is a small study and lacked a means of triangulation data.

The exploratory approach to this research involved mainly literature review and qualitative methods used in two farm visits (in Ontario) and interviews with six producers (via Skype) in Jordan. # key informant interviews were also conducted.

The analysis here is phenomenology (interpretive science) which uses qualitative and naturalistic approaches to understand human experience inductively and holistically in specific contexts and settings. Ideas are developed through inductive reasoning. The task is "to appreciate different constructions and meanings that people place upon their experience" (Easterby-Smith et al., 1994). The general approach in this research might result in the acquisition of new knowledge that can guide further research, including a larger dataset.
1.9 Organization of the Research Paper

Following Chapter One of this paper which includes the introduction and methodology of the study, the Second Chapter of this paper reviews the relevant literature on gender and development issues on the global livestock sector, including the importance of gender roles and women’s participation in the livestock sector. In Chapter Three, the paper then presents the background to this study including a general discussion of the value chains of sheep and goat industry in Jordan and Ontario, Canada. The Fourth Chapter of this paper presents the findings of the study. Chapter Five discusses the results of the study and presents its final conclusions and recommendations.
2.0 LITERATURE REVIEW

2.1 Gender Roles and Women’s Participation in the Livestock Sector

Globally, there have been several studies that focused on women’s participation in livestock and agricultural activities where women have least participated in selling and marketing sheep and goat dairy products, including an analysis conducted in Pakistan (Javed, Sadaf & Luqman, 2006). A further study found that women were merely involved in selling livestock products at the end of the value chain in Bangladesh and not engaged in improved livestock production practices (Mamun-ur-Rashid & Gao, 2012). Other studies in gender issues of access to and control over income in the livestock in Nepal and elsewhere have shown that women are the primary caretaker of livestock but they were unable to have access to and control over income (Thomas-Slayter & Bhatt, 1994). The literature suggests that there is a relationship between gender, resource management, and the ability to build livestock assets and security, in different household production systems based on analysis from villages in Indonesia, Bolivia and Peru, and Kenya (Valdivia, 2000). However, women who are smallholder farmers are facing challenges such as women’s access to land, technology and markets that prevent them from achieving their full potential as livestock farmers. In fact, as the following review of literature suggests the causes and consequences of gender differences are important aspects to be understood for livestock production systems.

To begin, it is important to recognize that gender inequalities in agriculture and economic development has been analyzed since 1970 when Ester Boserup’s ground-breaking book “Women’s Role in Economic Development” was published. This book addressed gender inequalities in agriculture identifying women’s contribution to the household and economy. Gender relations are social constructs that have been used to indicate social relations between
men and women in a given society and these relations are often characterized and derived from biological differences between women and men (KIT, Agri-ProFocus and IIRR, 2012). It is very important to distinguish between the two concepts of gender equality and gender equity. Gender equality means perceiving equally and respecting the different behaviours, aspirations and needs of women and men, it means that the rights, responsibilities and opportunities are not dependent on whether a person is born male or female. Gender equity, however, means fairness of treatment for women and men according to their respective needs, for example, equal treatment, recognizing that often women and men need to receive different treatment in order to receive the same benefits and to experience their rights (KIT, Agri-ProFocus and IIRR, 2012).

There have been some studies focused on the great contribution of rural Jordanian women in the livestock production (Brandenburg, 1993; Brockhaus, 1996). These studies demonstrated the importance of women’s work in the livestock sector and animal care activities. This contribution by women in this specific sector can be a key factor that determines the socio-economic position of women and influence their status and well-being. In a different context, some researchers represented the patriarchal gender ideology and roles of men and women within the family (Kroska, 2007). However, nowadays the situation and pattern are different in most of developing countries and men and women are expected to fulfil their family roles and share bread-wining and care-taking activities. These choices that men and women engage are likely determined by social norms, beliefs, power relations and established gender roles. On the other hand, gender roles in the value chain of the livestock sector have been defined extensively by different context. For instance, gender disparities in roles and activities such as access to assets, resources, ownership and management of these resources. Therefore, women can gain or
lose from these interactions. But understanding gender and family dynamics in a specific context can have impact for all members of local communities.

Although Ester Boserup’s book focused on the role of women in economic development, the concept of gender has only recently been applied to the notion of economic value chains. A value chain is the entire system of production, processing and marketing from inception to the finished product. The literature identifies many constraints and opportunities for women in value chains by analysing women’s and men’s access to resources (Farnworth, 2010). Kabeer (1999) finds that a large part of the workforce in agriculture is constituted by women, but they are often disadvantaged and their contribution to the economy is largely invisible. Gender inequality can be evident in terms of income, control over income, and the opportunities men and women have for expanding their capabilities (KIT, Agri-ProFocus and IIRR, 2012). Furthermore, the roles of women and men in the rural societies of developing countries are characterized and shaped by ideological, religious, cultural, ethnic, and economic factors. These factors are important in identifying the gap between men and women (Food and Agricultural Organization, 2010). Additionally, the traditional structure of these societies plays an important role in gender disparities. Women often have limited access to resources and services and less participation in decision-making (Food and Agricultural Organization, 2011).

Gender roles are norms that are related to the social and behaviour of individuals of male or female in a specific culture. They differ widely between cultures and over time (WHO, 2009). Culture and tradition, however, are key factors in gender roles. For example, in Africa, most of the farm work is performed by women. But for example, if a new kind of cultivation technology is introduced such as a plough, men often take over this role and the resources associated with it
(e.g. owning the plough and controlling income from ploughing) (KIT, Agri-ProFocus and IIRR, 2012).

The literature is clear, therefore that there are many challenges in the livestock industry for both women and men, in particular accessing, managing and controlling livestock assets. However, women face greater challenges than men in decision-making and the full potential to exercise powers in the livestock sector (CGIAR Research Program on Livestock and Fish, 2013). This can impact the ability of women to have a stable income and therefore, create an adverse impact on overall household income from this sector (CGIAR Research Program on Livestock and Fish, 2013). The different dynamics of economic, social, and cultural contexts in each specific region, country, and community have influenced the roles women and men might play in the livestock sector (Food and Agricultural Organization, 2013). Furthermore, gender studies address the main constraints and challenges for women and men to control and manage livestock. For these reasons, the causes and consequences of gender differences are important aspects to be understood for livestock and agricultural production systems. One important aspect for future gender studies to consider is to direct attention towards addressing gender accommodation and gender transformative approaches to recognize the need for implementation and integration of gender strategy into agricultural research and development (CGIAR Research Program on Livestock and Fish, 2013).

Some gender research studies warned that the livestock marketing projects and livestock production scale up need to involve gender in their research studies, otherwise men more often will have control over decision and income and the entire enterprise while women continue to provide the labour (FAO-ILRI, 2012). As mentioned previously, women are more often engaged in processing and retailing of livestock and livestock products but often in mainly low or semi-
skilled positions. Supporting women in their roles as livestock owners, livestock product processors, and livestock product consumers, while strengthening their decision making power and capabilities, constitute key aspects of promoting women’s economic and social empowerment, which leads to enabling them to break out of poverty (FAO-ILRI, 2012).

The relevant literature identifies three important challenges that both men and women face in the livestock sector. Firstly, challenges arise in access to and control over natural resources such as water, energy, biodiversity and ownership of land (Food and Agricultural Organization, 2011). Some of the research programs of the Consultative Group of International Agricultural Research (CGIAR) have recognized and elaborated some of gender issues in the livestock sector in the context of the region and society, in particular Jordan, by considering the local statutory and customary laws that are closely linked up to these natural resources. Secondly, distribution of roles and activities are attributed to sex and age within the household. Thus, the tasks are performed and managed based on “male” or “female” and the age of the member of household (Food and Agricultural Organization, 2012b). Decision-making is also often left to male members (CGIAR Research Program on Livestock and Fish, 2013). Thirdly, there is a lack of equitable access to technologies, training, extension services, financial services, and access to markets for women.

Another research study indicated the importance of access to extension services by both men and women and the disparities in gender to access to extension services was a key factor of adoption of new knowledge, use of new technologies and farming practices (World Bank/IFPRI, 2010). The cost of gender disparities on nutrition and food security due to limitations in the following, “recognition of the rights of women and poor households to sufficient nutritious foods, women’s income control, or women’s voice in expending decisions” (CGIAR Research
Program on Livestock and Fish, 2013, p.3). Therefore, a new global initiative led by the CGIAR is investigating and determining causes of gender differences and uncovering ways to improve access to and availability of food that support all household members. This new initiative is also strengthening capacity of agricultural and food systems to address gender. Capacity deals with the creation of public value in that it is making a positive contribution to public life (Morgan, 2006). Countries and organizations are called upon to develop and implement gender strategies to help improve the role of women in the agricultural sector and then ultimately improve the food security of all regions.

Overall, capacity aims to create value (Morgan, 2006). For example, the CGIAR gender research aims to get women involved in agriculture which can increase production to combat low food security in the drylands regions (CGIAR Research Program on Livestock and Fish, 2013). It also aims to address gender inequalities which are ultimately a factor of the attitudes of the individuals in the region. By addressing these inequalities, and integrating gender into the research, the research programs can shift overall views to improve livelihoods of not only the women but the entire community (“Drylands systems,” 2014). The focal point is strengthening women’s technical skills and building the capacity to use new technologies to reach transformative change (CGIAR Research Program on Livestock and Fish, 2013).

Organizations need to focus on specific leadership training to strengthen women’s voice and leadership in the livestock sector (CGIAR Research Program on Livestock and Fish, 2013). Through the involvement and potential of women, the regions can aim for more positive living conditions. In summary, this review of global literature suggests that within the sub-sector of sheep and goat dairy production and value chains, women’s roles and responsibilities are important, gender and cultural differences are not only relevant for analysis but also practice, and
finally, there is a need for gender strategies for organizations and governments to address the role of women in sheep and dairy value chains.

2.2 Conceptual Framework

As the literature on gender and livestock elaborates, access, control, and management of resources, such as small ruminants, grazing areas, and feed resources, are in theory and practice, assets that provide and potentially improve gender equality and empowerment. The conceptualization of asset access and ownership that allow women to gain and improve their welfare expenditures is illustrated in Figure 3. The conceptual framework for this study is adapted from the work of Meinzen-Dick et. al., 2011 in their paper titled “Gender, assets, and agricultural development programs: a conceptual framework”. This framework looks specifically at different types of assets enable different livelihoods and how men and women use these assets to cope with different types of shocks which results in well-being outcomes and improve the bargaining power of the individual who control that asset. The conceptual framework utilized for this study illustrates the approaches to how women can be integrated into the dairy sheep and goat sector by improving access to resources and technologies. In all parts of the world, a promotion of gender equity in the dairy sheep and goat sector by accessing to, controlling over and ownership of assets and livestock technology, enables men and women to create stable and productive lives, and furthermore, allows women to have a share in income, to build their access to assets, generate income and improve their livelihoods.
Figure 3. Conceptualizing Meinzen-Dick et. al.’s Framework

This study expects that based on the existing literature, the gendered division of assets, access to resources and technology, participation in household decision-making and marketing are unequally distributed between men and women in the dairy sheep and goat sectors in Jordan. In Ontario, Canada, it looks that the distribution of these gendered division aspects within the household is likely equally distributed between men and women if both of them are working as a full-time job on the farm. This is critical to household and individual well-being. Understanding distribution of assets, access to resources and technology, participation in household decision-making and marketing and how these influence individual and household livelihoods are crucial to comparing the dairy sheep and goat value chains in both countries.

It has been reported that in some countries, increasing women’s access to, and control over assets such as land, financial and physical assets, has lead to improve women’s wellbeing and improved outcomes for the household and community (Kabeer, 2010; Quisumbing, 2003; Smith, 2003; World Bank, 2001). The conceptual framework of gender roles and needs stems from the work of Meinzen-Dick et. al. in developing and developed countries. They are making
the case by promoting and closing the gap between men’s and women’s ownership of assets, and taking a firm stand on the necessity of these concepts towards achieving global development goals. This can be used to improve livelihoods, well-being and bargaining power within the household and community. In some countries and following cultural aspects, a family could force a woman to sell her own jewellery to cover expenses and debts that are jointly held between the wife and husband.

A very important aspect in Meinzen-Dick et. al.’s work that they looked at how different types of assets were accumulated by gender during the different stages of women and men’s lives. It may be the case that research needs to understand how household members (men and women) allocate assets, access to resources and technology, participation in decision-making and marketing in different cultures and contexts. Cultural norms explicitly important in defining roles and responsibilities for men and women in some countries. The conceptual framework investigates the link between culture, context and gender roles in the dairy sheep and goat value chains in these specific societies and how participation in different types of value chains is gendered. The research paper addresses the roles of men and women, their access to resources and their participation in household decision making, all of which impact resource allocation, technology adoption, and marketing and food consumption. Furthermore, the conceptual framework presented in this paper explores the following research questions to compare the role of women in the dairy sheep and goat sector in Jordan and Ontario. The main objectives in applying the conceptual framework are to understand the dynamics of dairy value chains comparing experience in rural Jordan and Ontario; and address good practices in enabling farmer decision-making over technologies (breeding, feeding, milk processing, and marketing) at the individual, household, or community levels, including benefits to rural women in Jordan.
3.0 BACKGROUND

3.1 The Sheep and Goat Dairy Industry in Jordan

Livestock in Jordan constitutes a major source of income for about a quarter of a million of the population. The proportions of contribution of various sectors of the livestock sub-wealth in agricultural output are as follows: in the first place is the poultry sector, followed by sheep and goats sector, then by cattle (Awawdeh, Tabbaa, & Migdadi, 2001). The climate in Jordan is Mediterranean, dry and semi-dry in most areas. Rainfall starts from November and ends in March. Therefore, the feedstuff from the rangeland is not good enough to sustain flocks of small ruminants (Al-Rimawi, 2002). Consequently, feed represents 75 percent of the value of animal husbandry costs. High feed prices, a lack of pastureland and a reduction in the number of sheep and goat owners often result in short milk supply. The livestock activities and farming system include animals grazing on fallow farmland and pasture as well as the use crop residues as feedstuffs. More specifically, rain-fed barley production and natural grazing in the rangelands are important for small ruminants (sheep and goats). Farmers keep sheep and goats in small farms which lack large fodder resources. Sheep and goats are raised in Jordan for milk products, meat, wool, hair and hides, while cows are raised for milk production and meat. Livestock is a key component of the agricultural sector as it contributes to about 60 percent of the value of agricultural output components. The number of sheep and goats as well as the quantity of milk produced in Jordan in 2001 and 2010 are illustrated in Table 1.
Table 1. Number of sheep and goats and quantity of sheep and goat milk production in Jordan in 2001 and 2010

<table>
<thead>
<tr>
<th></th>
<th>Sheep Heads</th>
<th>Milk Production (ton)</th>
<th>Goat Heads</th>
<th>Milk Production (ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>1457910</td>
<td>NA</td>
<td>425920</td>
<td>NA</td>
</tr>
<tr>
<td>2010</td>
<td>2429886</td>
<td>84544</td>
<td>982314</td>
<td>20186</td>
</tr>
</tbody>
</table>

Sources: Awawdeh et al., 2001; Husein Alomari, Personnel Communication, Muta University, 2014

3.2 The Value Chain of Sheep and Goat Dairy in Jordan

Shatanawi et al. (2007) reported that processed dairy sheep products contributed to the household income and enhanced the livelihood of rural communities. The main production system for sheep and goat sector is semi-intensive. Sheep and goats are small ruminants that depend mainly on rangeland and stubble grazing. Typically, a flock has sheep and goats combined and raised together by small-scale farmers. The main sheep breed in Jordan is Awassi (local sheep) and is mainly raised for meat consumption. However, other breeds of sheep were introduced to Jordan from Australia, Romania, Bulgaria and other countries. The main goat breed in Jordan is Mountain Black. There are several breeds of goats such as Desert goat, Dhaiwi goat, and Shami goat. In addition, crosses of all these breeds together can be identified (Awawdeh et al., 2001). There are a few government-operated farms and stations that aim to conduct research and breeding for sheep and goats.

In most villages in Jordan, small ruminants or micro-livestock farmers are able to start up small-scale milk processing enterprises with support of non-government organizations and other government agencies that provide credit loans, facilities and technical assistance. Among smallholder farmers, raw milk is often extracted from sheep and goat by only manual milking
and most of it is used for dairy processing products (Al-Hiary, M., Yigezu, Y. A., Rischkowsky, B., El-Dine Hilali, M., Shdeifat, B., 2013). In small scale farms of dairy sheep and goat, milk is available for the family needs first although the vast majority of milk is marketed. Manual milking, as mentioned, is the only method used to extract milk from the sheep and goat. Once the livestock are milked, processing takes place. Milk processors can be privately-owned or cooperatives which in many cases buy the fresh milk from farmers. Individual farmers may also sell processed dairy sheep and goat products. Market channels for dairy sheep and goat products are explained in Figure 4 below.

Figure 4. Market channels for dairy sheep and goat products in Al-karak, Jordan

There is no formal market system for buying and selling fresh milk in Jordan. Milk processing into cheeses is a traditional female responsibility and women operate these small-scale farm or household-level dairy enterprises. Dairy sheep and goat processed products, for example Jameed (a processed and dried yogurt), is a very popular dairy product in Jordan and specifically in Al-Karak which is the location of the interviews conducted in this study. Other dairy products are Labaneh (strained yogurt), ghee, white cheese, yogurt and butter. Women sell the processed products from their dairies to the buyers who come to them and in this case women do not need to go to the market because buyers come to the area (Shatanawi, Naber, Al-Smadi &
Al-Shneikat, 2007). In some cases, the household does not even own sheep. In these cases, households buy milk daily for women to process dairy sheep products for both home consumption and marketing. Al-Hiary et al. (2013) mentioned that the responsibility of buying milk is done by men while other responsibilities such as processing and marketing are done by women in most of rural communities in Jordan.

There is very high demand on specific processed sheep dairy products in the Jordanian market such as Jameed, ghee (clarified butter), white cheese, and then yogurt, Labaneh and butter. Interestingly, production of cheese from goat’s milk (unlike sheep’s milk which can be stored frozen without any loss of quality) has to be done on the same day of milking unlike other dairy products. This is due to any physical changes that might occur during handling and storing the milk. For example, the milk’s fat globules can be altered releasing enzymes that might affect cheese ripening. Furthermore, during cold storage, some of calcium in the milk can become a coagulated liquid that might weaken the dairy product and undesirable bacteria might grow and increase to very large populations. All of the above has impacts on the daily milk production and the milk quality. Therefore, in Jordan, some of milk production will be used for household consumption and the rest will be used or sold to milk processors. Jordanian people do not, however, consume very much fluid milk.

3.3 Gender Roles and Relations in the Livestock Sector in Jordan

Livestock production in Jordan is mostly owned and operated by a family and involves all family members, including men and women. Al-Rimawi (2002) noted that there were several studies that confirmed the importance of the role of women in the livestock production in Jordan. Jordanian rural women play an important role in all aspects of the micro-livestock production
systems. They are most often engaged in feeding, milking, processing and annual harvesting of forages while the control over decisions and income, marketing and distribution of livestock production are typically men’s responsibilities (CGIAR Research Program on Livestock and Fish, 2013). Al-Rimawi (2002) in his research study in Jordan finds that 89 percent of men and 85 percent of women made a medium to large contribution to and participation in decision-making regarding household or farm-level livestock production activities. Al-Rimawi (2002) concludes that the technical know-how and the ability to manage one’s specific responsibility in the livestock production are shared by both men and women.

Women who are smallholder farmers are, however, facing challenges that prevent them from achieving their full potential as livestock farmers. According to organizations such as the FAO, the implementation and design of capacity building projects to empower women in the livestock sector are required to address these challenges in order for women to be fully involved (Food and Agricultural Organization, 2013). For example, rural women in Jordan contribute to 90% of the work of livestock production systems such as animal farming, feeding, milk processing. However, other aspects of livestock such as marketing, services, finance, and decision-making processes are controlled by men (Dina Najjar, Personnel Communication, 2014). Al-Rimawi (2002) observed that Jordanian rural women were cognizant of the habit, behavior of the animals and how to feed and handle them. This review of literature finds that there are recommendations but few, if any practical initiatives to support women in Jordan’s micro-livestock industry.
3.4 An Overview of the Value Chain of Sheep and Goat Industry in Ontario

Globally, goat milk production represents about 2 percent of total milk production. The goat milk industry is expanding in North America but its production contribution is very minimal compared to supply in other areas of the world such as Asia, Europe and Africa (Agriculture and Agri-Food Canada, 2006). According to Agriculture and Agri-Food Canada (2006) the goat dairy industry remains a developing sector in Canada and one of the fastest growing agri-food sub-sectors in Ontario. The Ontario dairy goat industry is experiencing steady growth, especially milk production steadily in rise since 2008. Ontario Province holds the largest number of goats in Canada, with 52 percent of the goats and the highest growth in the overall numbers of goat (Kennedy, 2014) as shown in Figure 5.

![Figure 5. Number of goats by province, census 2001-2011. Source: Statistics of Canada](image)

There was a total of 225 licensed goat milk farms in Ontario as of 2013 (Kennedy, 2014) as shown in Figure 6. In 2015, there was approximately a total of 240 licensed dairy goat farms produced just over 42 million liters of goat milk. In comparison, there were only 161 licensed dairy goat farms in Ontario, produced 14 million liters of goat milk in 2005. Eighty-five percent of the goat milk produced in Ontario was made into goat cheese. The fluid goat milk holds 14
percent of the Canadian goat milk production and the remaining one percent was manufactured into a variety of products such as yogurt, ice cream, butter, and soap (Ontario Goat, 2016; Kennedy, 2014).

These farms range in size from large commercial herds with about 1000 goats to smaller herds producers with about 200 goats. The goat milk cheese (soft goat cheese) is the only cheese identified as goat cheese by the Canadian Dairy Information Centre. Many cheeses contain a mixture of different types of milk of cow, goat and sheep such as Feta, Ricotta and Romano (Kennedy, 2014). Characteristics of the dairy goat farming system are summarized in Table 2.

Table 2. Characteristics of the dairy goat farming system in Ontario

<table>
<thead>
<tr>
<th>Dairy Goat Farms Size</th>
<th>Dairy Goat Feed</th>
<th>Dairy Goat Breeds</th>
<th>Fluid Goat Milk Production</th>
</tr>
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<td></td>
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</tbody>
</table>

Figure 6. Number of licensed goat milk producer in Ontario, 1997-2013. Source: Food Industry Division, OMAFRA
From 150 to over 400 goats (largest herds 1200 goats)  | A mixture of pasture, hay and commercial feed | Toggenberg, Lamancha, Alpine, Saanen, and Nubian | Estimates about 40 million litres per year


Ontario also represents the majority of sheep and lamb slaughter at 50.6 percent (Kennedy, 2013). The total sheep flock size continues to increase in Ontario as of 2013 (Statistics Canada). Ontario sheep flock is the largest breeding flock in Canada (Kennedy, 2013). The dairy sheep industry in Ontario is small comparing to other dairy industries. However, the number of dairy sheep producers varies and depends on the processors of milk who buy it. The majority of sheep milk is used to produce a variety of cheeses (Kennedy, 2013). Perhaps there is marketing difficulties with the milk in the dairy sheep industry in Ontario. This because of producing small amounts of sheep milk on individual farms that are far away from the milk processors who are processing sheep milk (Thomas, 2004). Thomas (2004, p. 6) indicated that “farmers who are not a member of a marketing cooperative sell their milk direct to a commercial processor, process their milk into cheese or other products on their farm, have their milk custom processed into cheese by a commercial processor, or sell their milk to another dairy sheep producer who processes their own milk plus purchased milk”. Market channels for dairy sheep and goat products in Ontario, Canada are explained in Figure 7 below. Compared to North America, the dairy sheep industry is much larger in other regions such as Europe, Middle East and Asia. The most well-known brands of processed cheeses are made primarily from sheep’s milk (and goat milk) are Romano, Roquefort (French brand), Ricotta, Pecorino (Italian Brand), Asiago, Feta (Greek Brand) and Artisanal cheese…etc.
In Ontario, and elsewhere in Canada, modern sheep farms use sophisticated machinery system for milking such as milking parlors, pipelines, bulk tanks…etc. This is very important because dairy ewes produce relatively small amounts of milk at each milking and therefore maximizing amount of milk produced per unit of labor. Sheep (Ewes) flocks are milked once or twice per day (19th Dairy Sheep Symposium, 2013). The major dairy breeds in Ontario, Canada are East Friesian and Lacaune sheep that produce in average 500 to 600 pounds of milk.

Individual goat dairy producers are responsible for marketing, transportation and sales of dairy products. The Ontario Ministry of Agriculture and Food (OMAF) regulates the system whereby farmers market fluid goat milk, this permission is called “Grade A status”, in addition to one of the following: an agreement with one of the brokers of milk, a direct contract with a licensed processor or be a licensed processor to pasteurize milk. However, unpasteurized milk is prohibited by law in Ontario under the Health Protection and Promotion Act (Ontario Goat, 2016). In contrast, dairy sheep industries do not have government regulations for shipping the milk in Ontario. However, milk processors have the right to reject milk if they do not meet their “in-house” standards. In terms of accessing sheep and goat milk, there is no collective marketing system unlike cow dairy milk, therefore, cheesemakers and dairy processors need to make arrangements to have milk delivered to specific factory, in addition to buying fresh milk from farmers. Perhaps this process is different for each type of milk as mentioned previously. For
example, the Ontario Goat Milk Cooperative facilitates the delivery process of goat’s milk. Others such as Hewitt’s Dairy Limited (owned by the Ontario Dairy Farmers), and Gay Lea Foods Cooperative Ltd. While, there is no central organization responsible for facilitating (collection and distribution) sheep’s milk in Ontario. the only option is available to cheesemakers to have direct arrangements with sheep milk producers to access sheep’s milk.

There are no specific licensing requirements for cheese makers or dairy processors in Ontario. However, “the building must be licensed either by the local health authority (sheep milk only) or by the Ontario Ministry of Agriculture, Food and Rural Affairs (to sell cheese only in Ontario) or the Canadian Food Inspection Agency (to sell cheese in other Provinces or countries)” (Huron County Artisanal Cheese Investor Guide, 2012). There is also the Milk Act in Ontario which “regulates the production and processing of goat and cow milk products in the province of Ontario”. However, sheep and other types of milk products and processors are regulated under the Ontario's Food Safety and Quality Act (Huron County Artisanal Cheese Investor Guide, 2012).

In Ontario, there are currently a few associations that are concerned with the development of the dairy goat industry. The most important dairy goat association in Ontario is Ontario Goat, located in Guelph, that represent Ontario’s dairy, meat and fibre sector. Ontario Goat enhances the goat industry through education, collaboration, innovation and strategic alliances. There are also three producer-owned cooperatives that serve as brokers, buying raw milk and selling it to its processors as mentioned previously. These are: Hewitt’s Dairy Limited, the Ontario Dairy Goat Cooperative (110 members) and Gay Lea Foods Cooperative Ltd. Overall, the dairy goat industry remains a developing sector in Ontario with limited official data and information
services. Goat farmers abide and use the most advanced husbandry practices in accordance to the recommended Code of Practice in the Province.
4.0 FINDINGS

4.1 Introduction

This chapter presents the research findings as they pertain to the study objectives. The findings are drawn from key informant interviews and farm visits in both Al-Karak, Jordan and Ontario, Canada in the dairy sheep and goat sector. Three participants were selected from small-scale farmers in the dairy sheep and goat in Al-Karak, Jordan for in-depth interview and conversation by voice over internet (Skype). Another two participants were selected from the dairy sheep and goat in Ontario, Canada for farm visit and in-depth interview.

The interview with Jordanian rural women and small-scale farmers in Ontario contained a total of seven questions. The interview took about 30 minutes per participant. The questions examined the perception of the interviewees on the value chain of dairy sheep and goat and the role of women in farming production in this sector. A list of questions for key informant interviews and table for coding and labelling are provided in Annex 1.

4.2 Interviews Findings

Throughout the interview process, it was noted that dairy sheep and goat production is part of a family farm enterprise in both countries. Rural farmers in the dairy sheep and goat sector in both countries are dependent on natural grazing especially in the summer and supplemental feeding with other crops for feeding sheep and goat. However, the climate in Jordan is characterized by hot and dry conditions in the summer and low rainfall in the winter which has influence on the feedstuff of the sheep and goat farms. There are some differences in the herd size and land and other aspects of the dairy sheep and goats sector presented below in Table 3. In Jordan, the herds are usually a mix of sheep and goats, but in Ontario, the herds are either sheep or goat and hardly to find a mix of sheep and goat in the herds.
Table 3. Characteristics of the dairy sheep and goats in Al-Karak, Jordan and Ontario, Canada

<table>
<thead>
<tr>
<th></th>
<th>Average Number of Ownership of Herds</th>
<th>Feeding &amp; Major Feed Sources</th>
<th>Land</th>
<th>Milk Processing</th>
<th>Milking</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ontario</strong></td>
<td>300 sheep or goats</td>
<td>Natural grazing &amp; supplemental feeding with barley, wheat, chickpea, lentil, straw, and stubble crops</td>
<td>Small-scale farmers own land</td>
<td>Cheese, yogurt, butter, ice cream</td>
<td>Mechanized, milking parlors, pipelines, bulk tanks as illustrated in Annex 2</td>
</tr>
<tr>
<td><strong>Jordan</strong></td>
<td>70-100 sheep and goats</td>
<td>Natural grazing &amp; supplemental feeding with barley, wheat, chickpea, lentil, straw, and stubble crops</td>
<td>Small-scale farmers own or rent land</td>
<td>Jameed, labaneh, white cheese, ghee,</td>
<td>Milked seasonally by hand and the primary work of female</td>
</tr>
</tbody>
</table>

In one of the interview with Ontario’s farmers, a key informant indicated that she and her husband are having a fulltime job outside the farm but they are both responsible for the management and financial aspects of the dairy farm and they have other family members who are working and assisting on the daily work of farm. In another interview, a key informant indicated that he is working a full-time job on the farm and his wife is having another full-time job as a veterinarian outside the farm.
In contrast to Ontario, Canada, key informant interviews in Jordan revealed that in one situation, the woman and her husband are working a full-time on the dairy farm and they have different responsibilities on the farm. However, the third key informant indicated that she is the only one working on the dairy farm and take full responsibility and care of the farm because her husband has another fulltime job outside the farm. Men and women who are small-scale farmers in the dairy sheep and goats’ production systems support and encourage activities and efforts of their husbands and wives when they see each other are earning money and improving the family budget, and therefore, women and men begin to decide things together. In the past few decades, it was noted that there was a significant improvement in the well-being of Jordanian rural women. However, there are still some constraints in regard of women participation in agricultural production such as cultural context, lack of technical support and education. In general, producing milk from sheep and goat and processing it into a variety of products are traditional and cultural aspect of women’s responsibility in rural Jordan. Social context, belief and norms are key factors in women’s participation in the dairy sheep and goat production farming system which can impact decision-making, access to land, marketing, and other resources. Unlike Ontario, the social norms and cultural aspects are characterized by devoting a primary responsibility for women in making decision, access to land, marketing and other resources.

In some situations, women do not raise sheep or goats but they buy milk from other producers and process milk into a variety of products for home consumption and marketing. For example, at the national level in Jordan, it is very well-known the quality of Jameed as a processed product in Al-Karak region. There is a high demand on the processed dairy sheep and goats’ products such as Jameed, labaneh and white cheese. Some of these products are illustrated
in Annex 3. In some areas of Al-Karak, small-scale farmers who own dairy sheep and goats constitute about 70% of the household. Most milk producers lack facility to store the daily milk production. While in Ontario, most of milk producers have a facility on the farm to store the daily milk production. Selected activities and responsibilities of men and women on dairy sheep and goats’ farms are presented in Table 4.

Table 4. Comparison of gender in activities and responsibilities

<table>
<thead>
<tr>
<th>Cultural Norms</th>
<th>Gender Ideology</th>
<th>Income Control</th>
<th>Decision on Marketing &amp; Production</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ontario Context</strong></td>
<td>Women is economically self-reliant and responsible for production in their own right</td>
<td>Men and women are expected to share bread-winning and care-taking activities</td>
<td>Women prefer to control the earnings from dairy sheep and goat production</td>
</tr>
<tr>
<td><strong>Jordan Context</strong></td>
<td>Women is economically not self-reliant</td>
<td>Men are expected to fulfil their family roles through bread-winning activities and women are expected to fulfil their roles through homemaking and care-taking activities</td>
<td>Women rely on their husband to share the earnings with the family</td>
</tr>
</tbody>
</table>
5.0 FINAL DISCUSSION AND CONCLUSION

5.1 Final Discussion

This study examined some similarities and differences in Al-Karak, Jordan and Ontario, Canada related to the dairy sheep and goat production systems. Production is found to be very different in these two contexts due to the role of both technology and social relations within the production system. It is also found, however that both systems are growing more important and have a significant potential for female producers and processors.

For instance, with the increasing demand for goat milk in Ontario, the province’s dairy goat industry has grown immensely in the last few years. There’s great potential for expansion, new producers are getting into goats and existing producers are looking at ways they can increase their milk yields, whether through increasing herd sizes or individual production. While this is exciting, it also poses some real challenges for farmers in the management of their operations, and producers are using new cost of production information to make improvements, expand facilities and create efficiencies on their farms. It was noted that some rural families milking the sheep or goats, making the cheese and marketing it, but others produce milk and sell to a processor. As mentioned previously, the most well-known sheep breed in Jordan is Awassi (Middle Eastern breed) and the most well-known sheep breed in Ontario is East Friesian (German breed), these two breeds are the most productive and have the longest lactation periods of dairy breeds.

The discussion on gender and women’s empowerment in Jordan continues to invoke social, cultural, economic and historical factors as a guide to gender organization in the region. To a great extent, nationally and internationally, women’s empowerment involves the right to have access to opportunities and resources and the ability to influence the direction of social
changes. Therefore, initiatives to enhance women’s income-generation activities from new enterprises and technologies to improve the processed product and generate higher yields and profits, time and cost efficiency. For example, this could be milking machine (which is essential when the flock is large), processing machine, or equipment for better packaging and sterilization and women’s access to new technologies in the small ruminant (sheep and goat) dairy value chains in Jordan are essential aspects to improve women’s decision-making power in the household and strengthening women’s economic capacity.

With respect to gender roles and relations in the sheep and goat dairy value chains, in both countries, both male and female farmers are involved. In Ontario and Jordan, both women and men have specific areas of responsibility in the dairy value chain. In both contexts women farmer’s decision-making power is apparent in the household and the livelihood opportunity of sheep and goat dairy strengthens women’s economic capacity because they are responsible for managing and processing dairy products. In recent years, some processed dairy sheep and goats’ products from Jordan such as labaneh and white cheese (a traditional Arabic cheese) are being widely produced in Ontario in some small dairy sheep and goats’ farms. Even in Canada, there is a possible opportunity for fair trade or ethical marketing these products with attention to solidarity with women in Jordan who have a traditional role in production and processing.

The literature review conducted in this study, however, indicates that there has not been any specific focus on women’s role as owners or operators of sheep and goats’ farms in Ontario and there is no literature that has investigated the value chains in either Ontario or Jordan, or comparatively. This research paper sheds initial light on some cultural and gender aspects in the area of dairy value chains and opportunities for knowledge sharing and capacity development. The comparison of some cultural aspects in the dairy value chain (sheep and goat) with Jordan
may suggest that women in Ontario and women in Jordan have both similar and different circumstances for women’s role in sheep and goats value chains.

5.2 Recommendations

The following recommendations are made to improve the opportunities for women farmers and gender roles and relations in the sheep and goat dairy value chains of Ontario and Jordan:

1) Change of policy to encourage women’s engagement, participation and decision-making, and giving the opportunity for women to maintain access and control over assets, services and more in the dairy sheep and goat sector, to have a fair portion of income and food;

2) Review extension services to increase women’s role in training activities and education related to the dairy sheep and goat sector. The contribution in activities should be accompanied with some power over the resources derived from those activities;

3) Determining specific gender gaps in the dairy sheep and goat sector that impact management and development (such as skills, abilities, and resources), underlying social factors that affect relationships between genders, ways to change gender disparities and how this will impact relations;

4) Change of attitudes at the local level must be adjusted as well for successful use of the gender role to integrate the sheep and goat dairy value chains;

5) Efforts must be made to increase the capacity of women so that they are able to confidently negotiate and meet their strategic needs. More training opportunities to producers and processors with the knowledge and skills in the dairy sheep and goat sector.

5.3 Conclusion

The above discussion and research area highlights gender roles and women’s participation in the dairy sheep and goats sector in Jordan and Ontario. This paper identified possible and applicable theories for gender issues that impact the development of the dairy sheep and goats’ sectors. Around the world, and especially in countries like Jordan, women’s
contribution to the dairy sheep and goat sector is often unrecognized and disadvantaged due to gender disparities and issues such as access to assets, control over assets and decision, productive resources and marketing, which limits the opportunities for both men and women to participate productively in this sector. However, the situation is a little different in Ontario due to cultural and economic aspects of farm operations and institutional support. In general, women and men often have separate sources of income and different expenditure patterns, and this relates to greater shared power in farm and household decision-making. This is however, a generalization and there may be further complexity of the issues surrounding livelihood development, access to assets, land, and other resources.

A broad range of relevant themes were explored in this study in order to examine the interconnection of gender analysis in the dairy sheep and goats sector. The conceptual framework illustrated how women’s participation and empowerment in the small ruminant (sheep and goats) dairy value chains involves right to have access to opportunities and resources and the ability to influence the direction of social changes. This comparison (similarities and differences) is extremely important taking in consideration gender is influenced by cultural factors and beliefs that are highly dynamic and constantly changing. While women in both rural Jordan and Ontario are active in sheep and goat dairy value chains, there is still room for improvement. Women farmers in Jordan, in particular, face constraints in developing sustainable livelihoods that generate income and strengthening women’s economic capacity.
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KIT, Agri-ProFocus and IIRR. (2012). *Challenging chains to change: Gender equity in agricultural value chain development*. KIT Publishers, Royal Tropical Institute, Amsterdam.


## ANNEXES

Annex 1. A list of questions for key informant interviews and table for coding and labelling data from the key informant interviews in Ontario, Canada

<table>
<thead>
<tr>
<th>Questions</th>
<th>Comments from key informant # 1</th>
<th>Comments from key informant # 2</th>
<th>Comments from key informant # 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Question 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many sheep/goat do you raise and milk?</td>
<td>70 goats and 15 sheep</td>
<td>100 goats and 20 sheep</td>
<td>60 goats</td>
</tr>
<tr>
<td><strong>Question 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you have other sources of income generation?</td>
<td>Producing and processing milk is the only income. Raising sheep for meat consumption and selling it in special celebrations such as Eid</td>
<td>Producing and processing milk is the only income. Raising sheep for meat consumption and selling it in special celebrations such as Eid</td>
<td>Producing and processing milk is the only income for the wife. Husband has another source of income. Wife manages the money for purchasing feed and other resources</td>
</tr>
<tr>
<td><strong>Question 3</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you buy milk from other producers to process cheese and other products?</td>
<td>Produce milk and process milk into Jameed, ghee, and cheese</td>
<td>Produce milk and process milk into Jameed, and cheese</td>
<td>Produce milk and process milk into Jameed, cheese and labaneh</td>
</tr>
<tr>
<td><strong>Question 4</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you market your products yourself or use a cooperative or others?</td>
<td>Husband sells the processed products, traders, stores, city market and through networking (individual consumers)</td>
<td>Husband sells the processed products, traders, stores, city market through networking (individual consumers)</td>
<td>Wife sells the processed products, festivals and through networking (individual consumers)</td>
</tr>
<tr>
<td>Question 5</td>
<td>Do you engage in feeding herds, milking herds, processing milk?</td>
<td>Wife engages in feeding herds. Wife and husband are milking herds by hand. Wife processes milk into a variety of products mainly Jameed and cheese. Husband has another source of income from employment.</td>
<td>Wife engages in feeding herds. Wife and husband are milking herds by hand and processing milk into a variety of products mainly Jameed and cheese, and labaneh. Husband has another source of income from employment.</td>
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</tr>
<tr>
<td>Question 6</td>
<td>What is your role in decision-making, income, marketing and distribution of dairy sheep and goat products?</td>
<td>Husband controls over decision-making, income, marketing and distribution of dairy sheep and goat products. Husband shares income and spend it on the family needs.</td>
<td>Husband controls over decision-making, income, marketing and distribution of dairy sheep and goat products. Husband shares income and spend it on the family needs.</td>
</tr>
<tr>
<td>Question 7</td>
<td>Who does the breeding?</td>
<td>Husband takes a big responsibility in breeding</td>
<td>Husband takes a big responsibility in breeding</td>
</tr>
</tbody>
</table>
A list of questions for key informant interviews and table for coding and labelling data from the key informant interviews in Al-Karak, Jordan

<table>
<thead>
<tr>
<th>Questions</th>
<th>Comments from key informant # 1</th>
<th>Comments from key informant # 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Question 1</strong>&lt;br&gt;How many sheep/goat do you raise and milk?</td>
<td>100 sheep</td>
<td>180 goats</td>
</tr>
<tr>
<td><strong>Question 2</strong>&lt;br&gt;Do you have other sources of income generation?</td>
<td>Producing milk and seeking others (friends) to process milk. This is the only income for husband. Sometimes raising sheep for meat consumption and selling it for specific people. Wife is a veterinarian and has a full time job. Husband sells breeding stock for other farmers who are interested in sheep milk.</td>
<td>Husband and wife have a full time job outside the farm. Some of other family members are taking care of the farm. Husband and wife help after work hours and weekends. Producing milk and processing milk into cheese (Feta cheese).</td>
</tr>
<tr>
<td><strong>Question 3</strong>&lt;br&gt;Do you buy milk from other producers to process cheese and other products? What type of products do you process and sell?</td>
<td>Produce milk and process milk into cheese and yogurt. Producing milk only in summer. Freezing milk in a cold storage facility on farm. Frozen milk can stay for 1.5 year.</td>
<td>Produce milk and process milk into cheese.</td>
</tr>
<tr>
<td><strong>Question 4</strong>&lt;br&gt;Do you market your products yourself or use a cooperative or others?</td>
<td>Husband sells the processed products in farmer’s market, traders, friends. Hard to sell yogurt.</td>
<td>Husband and wife sell the processed products to traders, farmers market and friends.</td>
</tr>
<tr>
<td>Question 5</td>
<td>Husband engages in all farm activities, feeding herds, milking herds by machines, pipeline system. Husband sends milk to friends who own small factory to process milk into cheese and yogurt.</td>
<td>Wife and husband produce milk and process milk into cheese and have a contract with third parties to sell the processed products.</td>
</tr>
<tr>
<td>---</td>
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<td>---</td>
</tr>
<tr>
<td>Do you engage in feeding herds, milking herds, processing milk?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question 6</td>
<td>Husband controls over decision-making, income from farm, marketing and distribution of dairy sheep and goat products. Husband and wife share income and spend it on the family needs and farm expenditure.</td>
<td>Husband and wife control over decision-making, income, marketing and distribution of dairy sheep and goat products. Husband and wife share income and spend it on the family needs and farm expenditure.</td>
</tr>
<tr>
<td>What is your role in decision-making, income, marketing and distribution of dairy sheep and goat products?</td>
<td></td>
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<tr>
<td>Question 7</td>
<td>Husband takes a big responsibility in breeding (from German and Holland).</td>
<td>Husband and wife take a big responsibility in breeding.</td>
</tr>
<tr>
<td>Who does the breeding?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Annex 2. Machinery system for milking in Ontario (milking parlors, pipelines and bulk tanks)
Annex 3. Some of dairy sheep and goat products from Jordan (Jameed and white cheese)
Annex 4. Dairy sheep and goat farms in Southern Ontario

- Wooldrift Farm
- Kabul Farm
- Cold storage of milk
- Wooldrift Farm