DETERMINANTS OF SMALL SCALE DAIRY SHEEP PRODUCERS' DECISIONS TO USE MIDDLEMEN FOR ACCESSING MARKETS AND GETTING LOANS IN DRY MARGINAL AREAS IN SYRIA

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SUMMARY

The paper describes value chain actors and institutional arrangements along value chains, and identifies major determinants of farmers' decision making to work with middlemen/traders '*jabbans*' (or cheese makers), and based on those identify short implications for research, development and policy processes. We hypothesize that small-scale sheep producers are more dependent on middlemen for market and loans than larger holders, leading to welfare losses. Our empirical findings based on a Heckman model applied for 120 farming households conducted in Khanasser region (Syria) show that despite unequal benefits, local arrangements are more blessing than curse for the poor. Small-scale sheep producers and middlemen developed intricate institutional arrangements that are mutually beneficial. Producers act collectively to pool sufficient quantity of milk to be attractive to traders (*jabban*) while gaining access to market and cash loans mainly for feed. This provides the middlemen needed supplies with reduced transaction costs. This suggests that development organizations should support local capacity of producing organizations to work together, small-scale producers to organize, develop small scale dairy processing workshops for pooling and possibly processing milk, support training for direct market access and facilitate access to loans. Finally, supporting organizations such as rural financial services and micro-finance need to ensure up-to-date market information is available to ensure fair prices are paid. They should also be able to negotiate favourable conditions for loans and reach out to these resource-poor rural populations where formal credit systems are absent.

INTRODUCTION

A major hurdle in improving the livelihoods of small-scale farmers in developing countries is their limited access to information, markets, credit and new technologies. This is even more so in low-potential dry environments with poor infrastructure where small-scale farmers produce low volume of marketable surplus that makes them less attractive especially to large-scale buyers. Poor access to output and credit markets are among the major bottlenecks that keep small-scale farmers in persistent poverty (Wenner *et al.*, 2007). Farmers' ability to increase their income not only depends on their access to markets but also increasingly depends on their ability to compete in

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the market (Markelova *et al.*, 2009). The absence of credit markets and the constraints limiting farmer access impinge significantly on farm profitability (Foltz, 2004), and on efficient market organization as important precondition for the ability to compete in markets. Due to male-dominated societies, women in the developing world have even more severe constraints to access credit markets when compared to men under equivalent socio-economic conditions (Fletschner, 2009).

Small-scale farmers in dry marginal environments are often linked to product and financial markets through traders. But many traders will not venture into these marginal dry areas unless they secure a certain minimum amount of supply that ensures their profitability. Even when they do come into such areas, they possess substantially higher bargaining power, making themselves the price makers as farmers do not have other options. Support programmes by government and non-governmental organizations (NGOs) could improve the bargaining power of small holders, and ensure that traders can operate effectively. In Syria, traders not only buy small-scale producers' output, but also provide loans. However, this dual role further strengthens traders' bargaining positions (Abdelali-Martini and Aw-Hassan, 2007). One way of getting greater bargaining power is through collective action. Meinzen-Dick *et al.* (2004) indicate that collective action should be voluntary and requires the involvement of a group of people, a shared interest within the group, and some kind of common action that works in pursuit of that shared interest. Although small-scale farmers' participation in the product value chain may allow them to secure loans from lenders, this may come at high cost (Miller and Da Silva, 2007). High interest rates of over 70% were documented for informal input credit markets in Jabal El-Hoss area in Syria (Buerli *et al.*, 2007). Moreover, the nominal interest rates charged by most Micro Finance Institutions (MFIs) in Asia and the Pacific region range from 30 to 70% per year; they are high because micro lending remains a high-cost operation (Fernando, 2006). However, there are some tangible differences as the corresponding figure for Pakistan varied between 10 and 20% (Akram *et al.*, 2008) most probably due to the variability in lending costs.

The Syrian case study offers an example where small producers live in poor areas with low agricultural input, low incomes and low investment, lack basic services and appropriate technologies and are poorly connected to the market where production is too small to allow individual access to markets for sale without risks (low prices, product spoilage, etc.) and high transaction costs. Producers are in need of traders and money lenders to link them to output and financial markets. In the study area, milk producers, driven by their shared interest of accessing loans, act collectively at the village level in delivering their milk to traders through middlemen (cheese makers or *jabbans*), a service they cannot get without their involvement in collective action (Abdelali-Martini and Aw-Hassan, 2007; Abdelali-Martini *et al.*, 2006). Therefore, driven by a need to understand more in order to better intervene and formulate recommendations, local institutional arrangements of collective action, market and financing interdependence and its implications are analysed in this paper. In addition, the modalities and functioning mechanisms of dairy processing, marketing operations and related issues are assessed.

Even though the financial system is dominated by public enterprises, the informal sector plays a major role in the Syrian dairy market industry, which remains highly unstructured as a result of the presence of a powerful informal market (Fayad, 2009). Thus, institutional arrangements that involve producers, middlemen (*jabbans*) and traders who provide such financial services through *jabbans*, and facilitate access to financial services such as loans and credits to farmers are largely unstructured and informal, and, hence, there is limited information about how they function.

Given the statement provided above, the main objectives of this paper are (1) to describe the dairy value chain and the institutional arrangements with special emphasis to its main actors, and (2) identify and analyse the determinants on farmers' decisions to work with traders/milk processors or cheese makers. We hypothesize that milk producers are driven in their decisions to deal with *jabbans* among other objectives by the provision of loans, then by market access. This is to test the potential determinants of this interdependent relationship guaranteed by trust and by the milk production potential at these resource-poor villages.

Aiming at responding to the paper's objectives, the remaining sections are structured as follows: Section 2 specifies the methodological framework with special emphasis to the study area, data analysis and the specification of the econometric model. The presentation and discussion of our empirical findings are outlined in Section 3. Finally, Section 4 concludes with some remarks on policy implications drawn from this study.

METHODOLOGICAL APPROACH

Study area

Khanasser Valley is located in northern Syria approximately 70 km southeast of Aleppo city (Figure 1) where rainfed agriculture and rangelands intersect. Its total area is approximately 200 km^2 falling between zone 4 (where average annual precipitation ranges between 150 and 200 mm per year) and 5 (where average annual rainfall is below 200 mm) and is characterized by limited income-generating options. Its farming systems are characterized by specific features that are described in Table 1. Sheep production is a dominant source of income, with many small-scale milk producers raising dairy sheep for own consumption and sales of any surplus. Sheep milk production is seasonal (February–June) and variable – with feed production heavily dependent on rainfall. Dairy products (yogurt, cheese and ghee) are integral and critical components of the Syrian diet, in both urban and rural areas. High demand for these products in major urban centres such as Aleppo and Sfireh indicates the presence of good potential for income-generation potential for poor dairy farmers.

Data collection and statistical analysis

We collected qualitative and quantitative information from the site. The investigations include the following:

1. Group discussions on livelihoods using historical calendar: Out of the 44 villages, 13 (30%) were selected randomly to collect qualitative information from stakeholders through focus group discussions. Group discussions with farmers (15–30) were
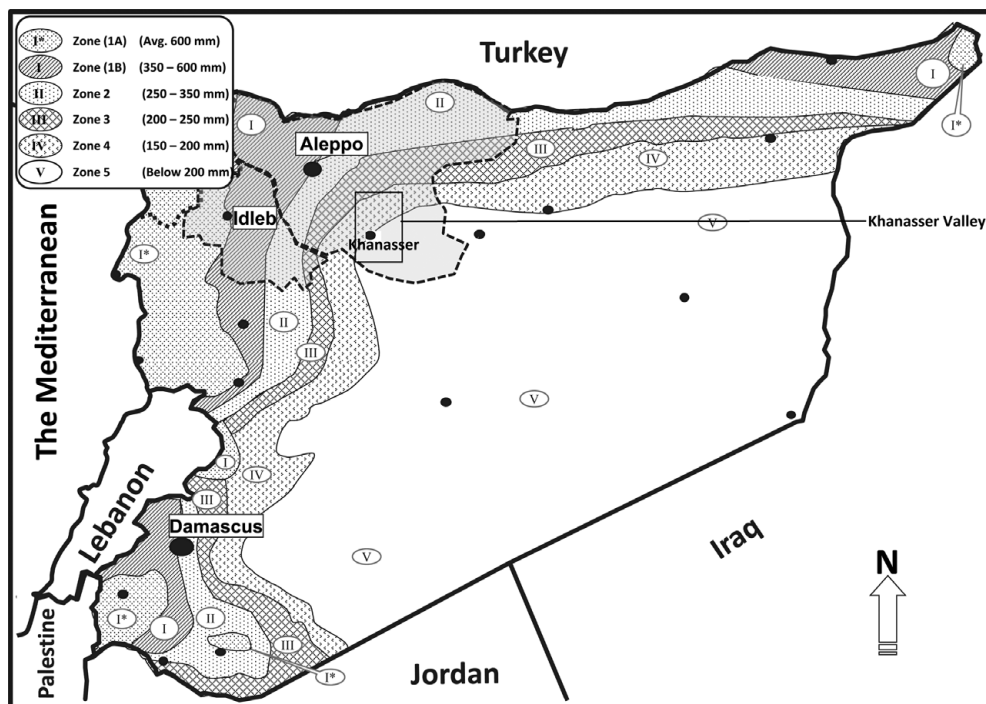
Figure 1. Study Area – Khanasser Valley.

held in each village. Historical calendar profile was used to record changes in social, economic and bio-physical conditions including population, land tenure, migration, irrigation, health, education, electricity, tribe organization, distribution and functioning, and weather. When we identified dairy production as one of the main livelihood strategies and sources of income, we identified the main actors in the dairy sheep value chain. In addition to observations of different operations of milk delivery and processing in a number of villages, individual and group discussions were held with community members (men and women together and separately) to identify their main livelihood strategies.

2. Rapid survey for sample selection purpose: Prior to formal surveys, a rapid survey was conducted in 44 villages out of a total 156 in Jabal El-Hoss and Khanasser Valley to assess the importance of livestock population and cheese makers' settlements during the 2004 season, and to evaluate the trends of livestock and dairy production over time, through retrospective investigations of cheese makers during the past 30 years. The information was also used as a basis for the selection of the households' sample for the formal survey.

3. Formal households' survey: We have used a data set collected in 2004 (Abdelali-Martini *et al.*, 2006) through a formal household survey. Villages with and without cheese makers were included to understand more about their comparative milk-processing strategies. Out of the 34 villages that did not have a *jabban* (cheese maker)

Table 1. Characteristics of the farming systems in the study area.

Characteristics	Main feature	Additional information
Location	80 km southeast of Aleppo city	The valley is oriented in a north–south direction, between the hill ranges of the Jebel Shbeith in the east and the Jabal El-Hoss in the west
Altitude	300–400 m above sea level	
Area	450 km^2	
Rainfall	200–250 mm annual	Dry marginal rainfed mixed crop-livestock farming system. Rain falls from September to May, with a peak during December and January. High annual and inter-annual variability. Annual extremes for the last 50 years are 93 and 393 mm
Major habitat	Agricultural area and the natural rangelands of the steppe meet	The northern part of the valley drains towards the Jabbul Salt Lake and the southern part drains towards the Adami depression in the steppe
Jabbul Lake (Salty)	The Jabbul Lake is a resting place for migrating birds. It has recently been named as an environmentally protected area	
Vegetation	234 species, belonging to 40 families and 153 genera	The climax vegetation of the region was probably dry steppe-forest. Cultivation and heavy grazing have changed the vegetation. In some sites around settlements, the vegetation has been severely degraded
Livestock	Large flocks of sheep that graze the steppe during the winter months cross the valley in early summer on their way to greener pastures	Diverse biophysical features and socioeconomic conditions that create a dynamic ecosystem in the valley and surrounding areas
Constraints	Market marginalization	Widespread poverty/poorest area in Syria
Farming systems/crops	Barley (mainly grazed at green stage), livestock, cumin, feeds	Very few vegetables in home gardens when some water source is available

Sources: Mazid and Aw-Hassan (2003), La Rovere and Aw-Hassan (2005), and La Rovere *et al.* (2006a; 2006b).

in 2004, 22 were selected on the basis of the number of animals raised and the human population, then 10 of them were randomly selected from each village of which five households were selected for group interviews in their respective villages.

The final sample interviewed was 68 households from the villages who had a *jabban* in 2004, and 52 households from villages who did not have a *jabban* in 2004. In some villages, all dairy producers in the village had dealt with the *jabban*. Four of the 10 villages selected for group interviews did not have cheese makers (*jabban*). Eight households from four of these villages (two households in each village) were interviewed because they were delivering their milk to a *jabban* in a neighbouring village. The total sample was then 120 households selected using the stratified sampling technique where villages are used as strata. The formal interview survey area covered a total of

Table 2. Small ruminants size by village type and by farm type.

	With *Jabban*				Total	Without *Jabban*				Total
Small ruminants	1–15	16–50	51–100	>100	–	1–15	16–50	51–100	≥100	–
Deal with *Jabban*	5	15	9	18	47	6	23	10	6	45
	(10.6)	(31.9)	(19.1)	(38.3)	(100)	(13.3)	(51.1)	(22.2)	(13.3)	(100)
Does not deal with *Jabban*	2	3	7	10	22	0	3	2	1	6
	(9.1)	(13.6)	(31.8)	(45.5)	(100)	(0)	(50)	(33.3)	(16.7)	(100)

Pearson chi-square: Deal with *Jabban* = 0.475; Do not deal with *Jabban* = 0.010.
Source: Own elaboration from survey data (2004).

20 villages from the valley (Table 2). The questionnaires were developed based on the qualitative information collected previously through informal surveys and focus group discussions and all were administered with male household heads.

The questionnaires were administered to male heads of farming households. Realizing that the formal survey administered to milk producers would not provide information on other actors, we have conducted additional investigations about actors' involvement in dairy value chain – cheese makers/traders' investigations.

We initially intended to conduct a formal survey of cheese makers. However, their number was limited. Therefore, we opted for collecting information through informal discussions. Using a checklist of questions, we interviewed 22 women and men cheese makers in their residence near Idlib city[1] during the summer of 2005 in presence of household members involved in cheese processing. Collection of information was combined with personal observation, to understand related arrangements. Follow-up field visits were made during milking seasons of the following years, and observations made on dairy processing, payment and the provision of loans to producers. We also paid visits to traders and local markets to collect information on cheese types, the destination and demand for cheese production, and the importance of capital flow destined to this activity. In May 2011, we made additional visits to the area to update available information on dairy-processing activities, and complete previous investigations through group discussions held with milk producers and cheese makers.

Model specification and description of variables

Given the objective provided above that consists on the identification and analysis of the determinants on farmers' decisions to deal with traders, milk processors or cheese makers, the preliminary findings from surveys suggest that there are three major ways in which determinants may affect the decisions of farmers to deal or not with *jabbans*. They can be summarized as social (family size, working off-farm, total of daughters 12 years old and working), economic (farm size, herd size in 2004, temporary heads owned in 2004, other source of loans in the year 2003, proportion of cheese produced for selling) and institutional (*jabban's* working place, satisfaction with *jabban's* work, knowledge about market prices of dairy products, reception of loans in advance from

[1] All cheese makers were originated from Idlib province.

the *jabban's*, destination of the produced yogurt), holding the potential to enable the design of clear policy and stable socio-economic system for small-scale producers.

To model such determinants, it is important to consider the fact that not all households in our sample deal with *jabbans*. Thus, the dependent variable has a censored nature and the application of Ordinary Least Squares (OLS) regression would be invalidated (Greene, 1998).

We used the Heckman selection model to address the likely selection biases resulting from dealing or not with *jabbans*. Statistical analyses based on non-randomly selected samples can lead to erroneous conclusions and poor policy. The Heckman correction, a two-step statistical approach, offers a means of correcting for non-random selection. Heckman's correction provides a test for sample selection bias and formula for bias corrected model. This is an application of the standard Heckman (1979) two-step procedures and variants that can be used in modelling the decision to take a loan (deal) or not from *jabbans* (Banerjee, 1984; Cox, 1987; Hoddinott, 1992).

The advantage of this approach is that it treats the decision to sell milk and take a loan in a two-stage estimation procedure. In the first stage the decision whether to take a loan or not takes place, and in the second stage is the decision on the determinants of transferred amount that is taken allowing for the effect of a given variable to be different in different stages. We can overcome such a problem by using a second approach that assumes that the decision to deal with *jabbans* and the amount of loans is made simultaneously. A censored probit model that uses data from both dealers and non-dealers can be used. In this case the independent variable has two effects: it affects the probability of dealing in the sub-sample and how much farmers receive from *jabbans*. The maximum likelihood estimation of this model yields parameter estimates that are consistent but, in the context of modelling farmers' behaviour, it has the disadvantage that a given determinant is restricted to having the same sign effect on the decision to deal with *jabbans* as on the size of the received amount. To overcome this disadvantage, two econometric procedures are explored in our paper.

Based on the first approach we define the dealing process with *jabbans* in two stages.

First we formulate a model, based on economic theory for the probability of the decision of taking a loan or not, and try to account for the factors that affect the probability that a farmer will decide to receive a loan. The canonical specification for this relationship is a probit regression of the form

$$\text{Prob}\,(D = 1/\mathcal{Z}) = \Phi\,(\mathcal{Z}\gamma), \tag{1}$$

where D indicates whether a farmer decides to receive loan or not. ($D = 1$ if the respondent decides to receive loan and $D = 0$ otherwise), $\mathcal{Z}$ is a vector of explanatory variables, γ is a vector of unknown parameters and Φ is the cumulative distribution function of the standard normal distribution. Estimation of the model yields results that can be used to predict this probability for each individual.

In the second stage, we correct for self-selection by incorporating a transformation of these predicted individual probabilities as an additional explanatory variable. The

selection equation can be specified as follows:

$$D_i^* = W_i\alpha + \varepsilon_i \tag{2}$$

where,

$$D_i = \left\{ \begin{array}{l} 1, \text{ if } D_i^* > 0 \\ 0, \text{ if } D_i^* \leq 0 \end{array} \right\}$$

where,

D_i = the observed behaviour of a household with respect to the dealing process; it takes the value of 1 if the farmer deals with *jabbans* and 0 otherwise. In this step, the probability of (propensity to) dealing with *jabbans* is estimated;
W_i = vector of covariates for observation i;
α = vector of coefficients to be estimated;
ε_i = random disturbances.

And the outcome equation takes the following form:

$$Y_i = \left\{ \begin{array}{l} X_i\beta + u_i, \text{ if } Z_i^* > 0 \\ 0, \text{ if } Z_i^* \leq 0 \end{array} \right\} \tag{3}$$

where:

i: indexes households (farmers);
Y_i is the dichotomous variable denoting the decision to take or not take a loan from *jabbans*. In a first step, $Y_i = 1$ if a farmer takes a loan and $Y_i = 0$ if the farmer does not take a loan, and in a second step, Y_i is the amount of loan received by the household (farmer) i;
X_i = vector of covariates (some of the covariates from the first step estimation and others that are believed to affect the outcome variables directly) determining loans for household (farmer) and the Inverse Mills Ratio (IMR) derived from the first-stage equation that corrects for selectivity bias and endogeneity (Greene, 1998);
β = vector of parameters estimates;
u_i = random disturbances assumed identically and independently distributed normal with mean zero and a constant variance.

The estimation of two separate equations, equation (2) and equation (3), implicitly assumes that farmers take the decision about whether to request a loan or not from *jabbans* and the amount to request sequentially, which depends on the number of sheep the farmer owns.

The variables used in the model are shown in Table 3.

Table 3. Summary statistics of the variables used in the empirical models.

Variable description	Minimum	Maximum	Mean	Std. deviation
Dealing with *Jabban's* (0,1)*	0	1	0.44	0.49
Family size (number)	4	37	11.94	15.40
Farm size (ha)	0.1	25	7.33	7.3
Herd size in 2004 (number)	1	600	108.3	145.4
Temporary heads owned in 2004 (% with respect to total heads)	0	100	18.7	45.8
Jabban's working place (0,1)†	0	1	0.78	0.53
Satisfaction with *jabban's* work(0,1)‡	0	1	0.41	0.48
Knowledge about market prices of dairy products (0,1)§	0	1	0.35	0.48
Other source of loans in the year 2003 (0,1)¶	0	1	0.90	0.3
Working off-farm (0,1)**	0	1	0.33	0.48
Reception of loans in advance from the *jabban's* (0,1)††	0	1	0.32	0.47
Total of daughters 12 years old and working (number)	0	8	1.7	1.6
Proportion of cheese produced for selling (%)	0	97	28.9	39.8
Destination of the produced yogurt (0,1)‡‡	0	1	0.64	0.48

*1, if the farmer dealing with the *jabban*, 0 otherwise.

†1, if the *jabban* worked in the same village, 0 otherwise.

‡1, if the farmer is satisfied with the *jabban's*, 0 otherwise.

§1, if the farmer has known the prices before, 0 otherwise.

¶1, if the farmer have other sources of loan in 2003, 0 otherwise.

**1, if the farmer have worked off-farm, 0 otherwise.

††1, if the farmer received loans from *jabbans*, 0 otherwise.

‡‡1, if the farmer made yogurt to sell to the market, 0 otherwise.

Source: Model results.

RESULTS AND DISCUSSION

The empirical results of the paper are two-fold: First, we present the institutional arrangements and mechanisms of milk production, processing and marketing. Second, we present and assess the factors affecting farmers' decisions to call upon those arrangements.

Dairy value chain and the institutional arrangements

Value chain actors. Milk producers raise dairy sheep for their own consumption and marketing. They are engaged only in dairy milk production, with no influence over the management of the entire chain. As small- and medium-sized producers, they are constrained in directly reaching product markets and accessing credits. Markets are far from the area, and they are not connected to dairy products' traders; they reach these markets only through middlemen/cheese makers and traders. Producers sell milk to traders in Aleppo city through middlemen/cheese makers who process milk on site into cheese (these specialized middlemen are called *jabban*), whose wives and daughters are the primary processors of dairy products. In order to access this market, producers in each village have to agree that they will collectively provide a minimum quantity of milk that the middleman considers economically justified to move into that village. They have little information about market requirements. Making the traditional white cheese that is largely in demand across Syria is an easy process, but producer motivations in engaging in this collective action are to access markets

and loans, thus lowering transaction costs, and to avoid processing small quantities of cheese every day that otherwise could be spoiled and not marketed. Few large milk producers make their own cheese and sell it to markets; however, their cheese does not comply with consumers' requirements who prefer to buy regular large and well-designed cubes of cheese. Most producers lack facilities to store the daily milk production to allow processing of a large quantity of cheese at once. They keep part of their milk production for consumption, and sell the other part to respond to other households' needs.

Cheese makers / middlemen. The middlemen work mainly in the valley where processing takes place. He has the monopoly on the trade through his relationships and connections with traders in the city. The average processing ranges around 800 litres per day, meaning 5600 litres per week that is equivalent to 1120 kg of cheese sold at 120 Syrian pound per kg (134,400 SP = 2688 US$[2]). However, this initiative to process milk from the remote Khanasser Valley implies costs and risks for traders who pay for feeds early during the year, and in case of dry season, they may not get the potential supply of milk expected.

The last group is that of middlemen and traders who control prices at markets, and have knowledge about local consumers' preferences as well as market requirements. They control both milk production and the distribution of cheese among local markets. They all have different interest, challenges, motivations and degrees of power (Table 4). This suggests that development programmes should work on many sides, through empowering farmers' bargaining power, and capacity to take initiatives, and also ensure that traders can operate effectively in such difficult and challenging environments. This could be through capacity building of both parties to undertake collective initiatives for making the value chain work better, providing good quality product and exploring international market demands for similar products. However, this will require special skills to face the international market competitiveness and challenges.

Institutional arrangements between the different actors. Local smallholder sheep herders, who have limited access to loans from city traders, dominate dairy production, processing and marketing industry in the valley. Therefore, the dairy production and marketing is an important livelihood strategy (Kirsten and Sartorius, 2002). Sheep and goat milk producers build their strategy on the basis of market prices over the season. Besides cheese making through local arrangements there are other strategies that depend on market prices and are affected by the timing of the different dairy operations. In January/February, farmers produce yogurt individually because it is more profitable, and sell it collectively[3] to Aleppo city market. Starting March–April and sometimes mid-May, they start delivering their milk to cheese makers (*Jabbans*), fulfilling their contracts, first because they got loans from them, and because the

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[2] Exchange rate 2004: 1 US$ = 50 Syrian Pounds.
[3] The community leader makes arrangements with one truck driver to take the yogurt production daily to the market.

Table 4. Description of the value chain actors.

Actors	Type of power	Interests	Challenges	Motivations
Women and men milk producers	Ownership of small ruminants; knowledge about livestock management	Loans; market access	Remoteness from cities and markets; poor infrastructure; poor storage facilities; lack of cash to feed animals in winter; lack of formal credits	Market access; loans; securing funds to feed their animals; other services
Middlemen	Connection with traders; information about market prices	Control a large number of milk production in the valley	Depend on milk from producers; lack of cash/depend on big traders	Profit
Traders/ wholesalers	Market control; knowledge about consumers' preferences; capital cash; storage facilities; facilities to process primary cheese type to a different cheese that can be stored; control prices	Control a large number of milk production in the valley	Costs of lending cash to producers operating in rainfed high risks areas; collect enough milk at low prices; costly initiative with no written contracts/all based on trust and social networks	Profit
Women processors/men	Skills to make a *mushallaeh*[*] and *mujadaleh*[†] cheese from the cheese cubes that are not sold the same day of product at the market place	Produce a distinguished *mushallaleh* cheese	No information about preferences;no market access	Add value/profit
Retailers	Controls demand from cities; consumers' preferences	Specific types of cheese	Securing the quantity needed to satisfy demand	Profit

[*]*Mushallaleh* cheese is a type of cheese that is processed from cheese cubes after cooking. It is made of strands of cheese woven together. It lasts a long period of time before being consumed and is sold at higher prices given this added value.
[†]*Mujadaleh* cheese is a salty white cheese made up of strands of cheese braided together.
Source: Our surveys (2004 and 2011).

weather starts getting hot, which means they cannot store milk and cheese for a long time. Later during the season, as milk production decreases, they stop delivering milk to cheese makers, and start producing their own cheese and some ghee that will support them during the following winter until the next milking season.

Dairy sheep producers, cheese makers and traders are connected through commodity marketing and financial services (Figure 2). The figure explores the flow
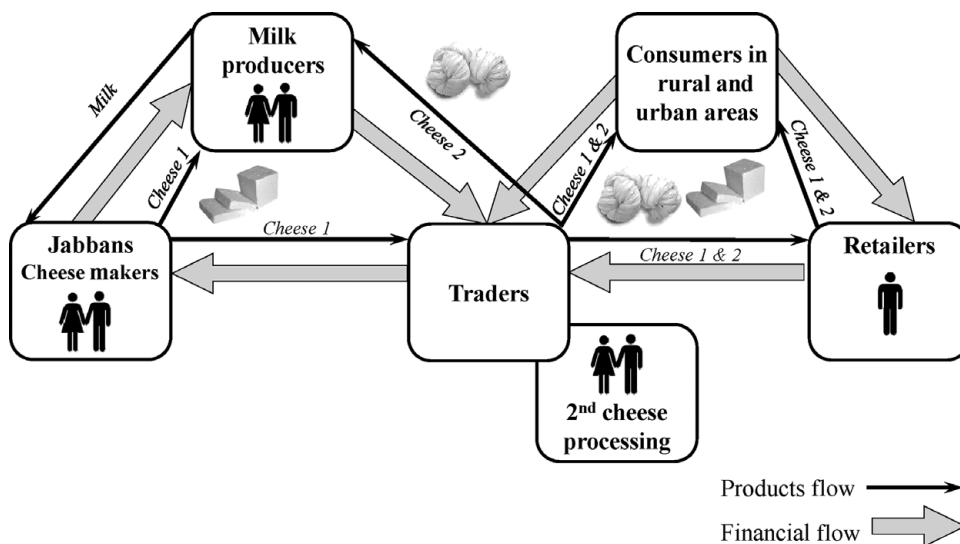
Figure 2. Structure of the institutional arrangements of dairy production, processing and trade in Khanasser Valley.
Source: Abdelali-Martini *et al.* (2006).

of milk from producers to cheese makers, then the products flows (cheese 1 – cubes) again from cheese makers/middlemen to traders. Traders sell the cheese cubes the same day of production and process the rest into *mushallaleh*[4] type (cheese 2) that is cooked and therefore can be stored as is. The financial flow takes an opposite direction going from traders to *jabbans*/cheese makers and then to milk producers. Traders deal usually with many cheese makers who act as intermediaries between them and milk producers. Depending on access to capital, a trader operates with a maximum of 15 cheese makers. There are no services provided in this regard by public or private formal institutions. All players involved are private businesses and individuals who have different motivations in keeping the relationships (Temu and Temu, 2005). Although living in the cities, traders are often natives of the Khanasser Valley, who know the situation and the potential of rural households and their needs. The arrangements between producers, cheese makers and traders are built on local social capital through mutual recognition and trust of the players involved and the system works under specific rules of inclusion and exclusion of its members (Abdelali-Martini and Aw-Hassan, 2006). These arrangements are considered here as local institutions linking the three main actors described above – milk producer, cheese makers (*jabbans*) and traders – who have mutual responsibilities. By providing loans and services to poor farmers in absence of formal institutions, these institutions are a blessing for the poor. Furthermore, milk producers who deal with *jabbans* spend about 25–30% more than those who process their milk directly. This amount includes commissions, processing, labour and transportation to market. Despite that, small and

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[4]*Mushallaleh* cheese is a white cheese presented as a braided mass coloured with *Nigella sativa* grains and smelling the local *Mahlab* spice. It is easy to entangle before eating or filling in a sandwich.

medium flock-size producers continue to deal with *jabbans* due to lack of other options and alternative for development and financial support in the area.

The informal surveys conducted in the study area revealed that milk producers get loans mainly from two sources: cheese makers and traders (mainly feed traders). Feed traders provide in-kind loans in the form of feeds during winter. Repayment of loans depends on weather conditions being either good or bad year (mainly depending on rainfall). In the latter case repayments are moved to the next year without additional charges. Bad seasons impact negatively on milk production and can lead to producers selling part of their flocks to settle loans. In addition, there are some conflicts between rural communities and cheese makers concerning the milk price and high commissions (Kydd and Dorward, 2004).

Despite these constraints, almost 57% of medium and small sheep producers (semi-sedentary) process and market their produce through cheese makers, the remaining being too small producers with no extra production for market, or not having a *jabban* in their village, or remaining far from the village where the *jabban* settles. For large producers (transhumant), 69% process their milk through *jabban*s, while others process their own products, either because they are far from the *Jabban's* area or because they are able to balance the quantities with the market demand without any intermediaries. However, in the study area more than 100 heads is relatively a large flock compared to hundreds of heads owned by one producer in the Syrian steppe further down in drier areas. Cheese makers deal with large number of small- and medium-size milk producers and provide them with relatively small loans as compared to large producers living in the steppe. Very few cheese makers do not provide loans, due to the risk of low milk production as a result of drought, in addition to the risk of failing to find producers who may have left the village for grazing in other areas during spring. These producers are semi-sedentary as compared to those living in the steppe. They move along small distances with their animals for grazing.

Cheese makers in their turn get finance from traders in towns and cities. Small cheese makers face difficulties in financing their operations, particularly less experienced beginners. They are sometimes unable to secure funds for providing loans to producers. Furthermore, some of them may be unable to get any loans from big traders who prefer to deal with experienced cheese makers. Provision of loans from dairy traders is a function of the potential milk production – the larger the production the higher the loans.

Loans are provided to dairy sheep producers directly by input traders (called *khanji*[5]). These are in the form of fertilizers, seeds and feed for their animals, the costs of which are calculated at higher prices, an established practice of indirectly charging interest for loans (deferred payments). Usually feed credits are settled when newly born lambs are sold after some fattening. Loans from dairy traders to individual yogurt producers are provided in winter at a marketing commission fees varying from 8 to 10% of

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[5]*Khanji* is a trader/wholesaler who operates into a large shop – the *Khan* – made of stones in the local traditional market after which he is called. Therefore, the *Khanji* is the one who operates into the *Khan*.

sales. In this case, producers have to sell their yogurt production to these same traders according to their strategies discussed below.

Two types of loans are granted to dairy producers: (1) loans granted during winter, and (2) loans granted during the milking season (spring). Winter loans (*qardah*[6]) help producers to purchase feeds for their animals and other home consumption items. Settlement is made during the milking season through regular payments at 11-day intervals (*hittins*)[7]. Loans are granted in the presence of a third party, usually a trusted producer from the community, who plays the role of intermediary between the cheese maker and the community. Although the major proportion of loans is provided in winter, some cheese makers grant additional small amounts during the milking season. These are subtracted from the milk income received at the 11-day intervals (*hittins*).

Factors affecting farmers' decisions in dairy processing: integrating quantitative findings

Several variables describing household characteristics were included in the two-stage model. The interest of these variables is justified by their effects on the decision of dealing with *jabbans* as well as their importance in explaining the level of received loan. Results from the censored probit model are presented in Table 5. The signs and the magnitude of the estimated parameters are as expected.

The sign of the variable that identify farmers' satisfaction with *jabbans'* work is positive and statistically significant at 1% level. This suggests that farmers expressed their satisfaction about their overall relationship with *jabbans* mainly in the absence of other alternatives in this poorest area in the country, with poor infrastructure. Therefore, even when they realize that there is some inequity in sharing benefits from this relationship, their bargaining power remains weak as compared to *jabbans* and traders, because farmers and traders have varying incentives, preferences and interests.

Therefore, their interactions are characterized by both cooperation and conflict. Milk producers cooperate with cheese makers, a cooperation that provides market access and solves problems for different parties, in a better way than for households who are not members in these arrangements. This market transaction relationship is considered as cooperation among farmers to pool their milk collectively in order to secure the acceptance of the *jabban* to come to their village, and thus they get market access for their products. However, the collective action we are discussing is along the value chain, and mainly between milk producers whose common incentives are to bring the *jabban* to their village for processing and market access, especially that *jabbans* accept to settle in a village only where they can secure at least 800 litres of milk to process daily. Our results on this type of collective action are in agreement with Olson's (1971) findings that argued that without selective incentives to motivate participation, collective action is unlikely to occur even when large groups of people

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[6] *Qardah* is an advance loan paid by the trader/milk processor to milk producers.

[7] The *Hittin* is a routine payment called as such by milk producers and cheese processors, and is made every 11 days to milk producers. It is in fact used only by these categories of producers and is part of the terminology used in this business.

Table 5. Probit estimates and marginal effects for producers dealing with *jabbans* function.

Independent variables	Parameter estimates	Standard error	Marginal effects after estimations with offsets	
			Parameter estimates	Standard error
Reception of loans in advance from the *jabban's* (0,1)[†]	0.733	(0.4)*	0.181	0.535
Total of working daughters 12 years old (number)	−0.175	0.525	−0.043	0.130
Proportion of cheese produced for selling (%)	−0.006	0.017	−0.001	0.004
Satisfaction with *jabban's* work (0,1)[‡]	5.188	(2.13)***	0.856	0.133
Knowledge about market prices of dairy products (0,1)[§]	3.542	(1.46)***	0.698	0.162
Other source of loans in the year 2003 (0,1)[¶]	3.459	(2.157)*	0.507	0.237
Herd size in 2004 (number)	0.005	(0.002)***	0.001	0.002
Temporary heads owned in 2004 (% with respect to total heads)	0.002	0.011	0.000	0.003
Quantity of yogurt production marketed (kg)	−1.498	1.321	−0.358	0.288
Family size	−0.014	0.120	−0.003	0.030
Intercept	−5.718	5.360	–	–
Sample size	120			

[†]1, if the farmer received loans from *jabbans*, 0 otherwise.
[‡]1, if the farmer is satisfied with the *jabban*, 0 otherwise.
[§]1, if the farmer knows about the market price, 0 otherwise.
[¶]1, if the farmer has a source of loan, 0 otherwise.
***Significant at 0.01 level; **significant at 0.05 level; *significant at 0.1 level.
Source: Model results.

with common interests exist. Also, collective action refers both to the process by which voluntary institutions are created and maintained and to the groups that decide to act together.

Collective action[8] is traditionally defined as any action aiming to improve the group's conditions (such as status or power), which is enacted by a representative of the group (Wright *et al.*, 1990). It can assume various forms ranging from voluntary self-help groups to formal organizations that aim to manage a community's natural resources or to advocate for political change at the national level. However, there are outcomes that benefit the different parties. The relative benefit depends then on different bargaining power capacities of the parties involved, and 'one-person's gain is another person's loss', suggesting possibly conflicting situations (Agarwal, 1997).

Information technology is key and instrumental as when farmers were more informed about cheese prices at the market through their mobile telephones, they were more confident in dealing with *jabbans*. However, cheese prices in the market

[8]In this case, collective action is between producers to sell their milk together to *jabbans*.

fluctuate over the day. They are almost stable over the morning and start decreasing by the end of the day because all cheese should go and be processed the same day to avoid spoliation.

Herd size in 2004 was an important factor in determining the relationship of farmers with *jabbans*. This affirmation is confirmed by the positive and significant parameter. The more sheep that farmers own, the more they are likely to deal with *jabbans* especially to get loans and feed their animals in winter, and less due to potential workload of processing dairy products. *Jabbans* are mainly serving small and medium milk producers; large producers do not need *jabbans'* services. Given the present explanation, one strategy adopted by farmers in the Khanasser Valley is to raise sheep only during the milking season to avoid the burden of animal feed during the other seasons especially in winter. From survey analysis results, it appears that farmers who keep temporary sheep – regardless of the flock sizes – during the milking season deal less with *jabbans*, mainly because they have no need to feed animals in winter before the start of the milking season. This result shows clearly that sheep producers are driven by their needs for loans in winter at a time where no other alternatives are available.

On the other hand, whether other sources of loans were available to dairy producers, results indicate that even when farmers have other sources of loans, these are mainly in kind, and they are still in favour of dealing with *jabbans* to get cash loans to feed their animals in winter.

Estimated coefficient for the variable called 'reception of loans in advance' from the *jabbans* is positive and significant at 10% level, implying that loans provision is an important determinant for a farmer's decision to deal or not with *jabbans*. This result indicated that by local standards, milk producers are poor and accept to have their milk processed by an external agent to get in exchange some loans to feed their animals in winter, despite the fact that the processing itself is easy and does not need too much time to be carried out. However, for small and poor producers, the transaction costs of processing everyday a small quantity and taking or sending it to market is not cost effective, therefore they rely on this arrangement knowing that this is the best option under the circumstances where the State and development projects have not yet invested in developing milk processing in the study area.

The empirical findings presented in Table 6 confirm the positive impact of the herd size in 2004 on the level of loan received by farmers. Farmers who own more sheep are likely to get more loans from *jabbans*. This confirms previous observation that *jabbans* provide loans based on the number of sheep of individual farmers and decide to settle in the village based on the number of sheep in the whole village.

Further, the analysis of the parameter explaining the impact of temporary heads owned in 2004 on the quantity of received loan indicates that the more temporary sheep there are during the milking season, the less the loans provided to farmers. This finding is explained by the fact that in winter farmers do not have animals to feed. Owners of temporary sheep have more flexibility for processing their products into cheese or yogurt depending on the market demand, prices and ownership of transportation facilities because they do not have any obligation to deliver their milk to *jabbans* against reception of loans in winter.

Table 6. Loan amount function: estimated parameters of the generalized Heckman two-step models.

Independent variables	Outcome equation *Loan quantity*		Selection equation *Take a loan (0,1)*	
	Parameter estimates	Standard error	Parameter estimates	Standard error
Household size (number)	−0.0011	0.0008	0.108	(0.060)*
Farm size (ha)	−0.0001	0.0004	−0.069	(0.039)*
Herd size in 2004 (number)	1.0012	(0.0004)***	−0.003	(0.002)*
Temporary heads owned in 2004 (% with respect to total heads)	−0.0008	(0.0002)***	0.175	0.204
Dealing with *jabbans* (0,1)[†]	−0.0012	(0.0007)*	1.069	0.692
Satisfaction with *jabban's* work (0,1)[‡]	0.0039	(0.0023)**	1.800	(0.757)***
Knowledge about market prices of dairy products (0,1)[§]	0.0008	(0.0005)*	−0.249	(0.151)*
Other source of loans in the year 2003 (0,1)[¶]	–	–	−3.872	656.395
Working off-farm (0,1)[††]	–	–	−1.485	0.656
Intercept	−0.004	(0.002)*	2.710	656.395
Lambda	0.001	(0.007)**	–	–
Rho	0.289		–	–
Sigma	0.002		–	–
Sample size	54			

[†]1, if the producers are living in the village where the *jabban is settled* and dealing with him, 0 otherwise.

[‡]1, if the farmer is satisfied with the *jabban*, 0 otherwise.

[§]1, if the farmer knows about the market price, 0 otherwise.

[¶]1, if the farmer has a source of loan, 0 otherwise.

[††]1, if the farmers have worked off-farm, 0 otherwise.

***Significant at 0.01 level; **significant at 0.05 level; *significant at 0.1 level.

Source: Model results.

In addition, the coefficient that elucidates the causality between the amount of loans and the satisfaction of farmers with *jabbans'* work is positive and statistically significant. When farmers get the required amount of loans from *jabbans*, they are more likely to express their satisfaction about the nature of this relationship because it solves one of their most critical constraint, i.e. loans provision in the absence of other sources in the area, even when they realize that there is some inequity in sharing benefits from this joint initiative.

Finally, knowledge of market prices affects positively the amount of loans. Thus, the more milk producers are informed about prices, the greater the amount of loans they get and the more they deal with *jabbans*. The introduction of mobile phones in rural areas has provided producers with more information, and more confidence about the prices determined by *jabbans* because they can check remotely, at any time, the milk and cheese prices at the market. Furthermore, their overall awareness was strengthened through Information and Communication Technologies (ICTs) that have opened for them a wider window of information, helping to build their bargaining power.

CONCLUDING REMARKS AND POLICY IMPLICATIONS

The analysis contributes to understanding why certain institutional arrangements exist and why alternatives (fail to) develop. In the examples we highlighted, the framework investigates the factors that affect farmers' decisions to deal with *jabbans* (cheese makers/traders) in Khanasser area. The hypothesis that the provision of loans to milk producers in dry marginal areas of Syria can enhance and increase the efficiency of collective action and facilitate development efforts in reducing poverty enabled us to develop some understanding of the failure of producers' organizations to rise in milk products value chains, without complementary but formal institutional arrangements such as contract farming. These institutional arrangements lower transaction costs, and furthermore it appears that the institutional environment may also play a key role in determining the potential for this economy to take place.

The dominance of these kinds of institutional arrangements to process and market dairy products triggers the question why no other institutional arrangements exist and are used by small-scale farmers to lower transaction costs or to command a higher price. The premise used in this paper is that the transaction costs of other institutional arrangements are apparently higher than those of this special market. But which factors are likely to play a key role in this regard?

Empirical findings demonstrate that small-scale sheep producers and middlemen have established mutually beneficial arrangements based on trust and the supplies of sufficient quantity of milk that is attractive to the middlemen and beneficial to sheep producers. The supply of that quantity of milk was achieved by collective agreement among dairy sheep producers in each village. In turn, sheep producers received access to market and loans for their feed and other households' needs. The main driving force for this interdependent relationship between milk producers and cheese makers/traders in dry marginal areas is the provision of loans during winter. Although imperfect, local institutions provide essential services to the poor. Sheep producers have multiple benefits from cheese makers/traders such as access to market and loans. Although originating from different areas, cheese makers are well organized and trusted by communities. Cooperation between the different parties was successful, partly due to respect for traditional aspects and norms, a factor that needs to be considered when perhaps establishing formal loan provision through external development agencies or the State.

The study has also showed that farmers' decision to deal with *jabbans* is function of the provision of loans, especially in cash. Few farmers do get in-kind loans such as barley, feeds and fertilizers, among other products from traders, but they still favour that relationship with *jabbans* to access cash for use to feed animals and buy other consumption items. Despite the unequal benefits of the different actors in these arrangements of milk processing and marketing, of which milk producers are aware, farmers expressed satisfaction about this relationship underlying their limited options existing in dry areas. Furthermore, farmers are also aware of market prices given their access to improved communication due to the rapid rise of information technology. However their bargaining power needs to be strengthened by providing, for example, options of sustainable micro-finance.

This highlights the need for governmental development institution in collaboration with a development project to play a role in working directly with farmers through the creation of a small community-owned and managed milk processing workshops/plants that would provide the necessary services, loans to milk producers and link them to markets through a collective initiative that lowers transaction costs. Any improvement to existing arrangements needs to take into account the aspirations and activities of these communities. Efforts deployed by the government and NGOs should concentrate on improving access to technologies, financial assets and markets in order to strengthen the position of producers, improve productivity and maximize advantages of new market opportunities. In addition, there is a need to build the capacity of producing organizations to work together through the creation of nexus between all organizations. Moreover, there is also a need to create a supporting mechanism for these organizations to ensure an up-to-date availability of market information that leads to control that fair prices are paid. Finally, rural financial services and micro-finance need to reach out to these resource-poor regions where formal credit systems are absent. The creation of 'formal institutions' that provide loans without interest (but with service fees) based on cultural and traditional systems is also a potential sustainable option. Providing support for the creation of a 'revolving local community' fund that would be used by dairy producers to feed their animals in winter among other uses, based on accepted cultural and traditional systems, is more likely to be successful. The loans from the fund should be paid back to sustain the fund. This will allow farmers to get more benefit from their products avoiding the trap of traders and cheese makers (*jabbans* who are also the intermediaries living out of commissions) whose actions are solely profit-oriented and who are in a much stronger bargaining position.

This paper constitutes a first attempt at understanding institutional arrangements in the milk production sector in marginal areas of Syria. Several questions are still open for further investigation. For instance, there is little information on how farmers in contract farming have overcome these transaction costs. How were the relations with the middlemen/traders established? What role did social capital and trust play in this? Are poorer farmers likely to be excluded from participation in such schemes?

What is the potential to stimulate the development of these new institutional arrangements? With the illustrative material presented here, we have only scratched the surface of what can be done. The next step is to apply the framework to specific in-depth case studies, in a comparative fashion, in order to develop more sophisticated and robust insights into these issues.

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