

Forms of Cheese Producers' Inclusion in the New Supply Chain of the Jordan Badia Region

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1. Introduction

Jordan has recently become a member of the World Trade Organization (WTO) and this has led to changes in some regulations in the agricultural sector. The Agricultural Marketing Organization has taken steps towards setting up quality standards for fresh fruit and vegetables. Some already existing standards have been amended in order to comply with international norms (MoA, 2007).

The retail sector in the Jordanian major cities has undergone internal changes: transforming and raising the consumer expectations about food product; selling a wide range of food items; changing agro-food product standards; increasing market share of chain retailers at the expense of small independent stores; making sweeping changes in the size and style of stores; competing in prices; and increasing the level of foreign investment. Examples of chain of supermarkets include C-Town, Al Mukhtar, Cozmo, Abbadi, Al Radaideh, Safeway, and Carrefour. In small cities and villages, groceries and convenience stores still play an important role in the retail sector (Chaudhry, 2006).

Abstract

Based on field research in the Badia region, Jordan, this paper attempts to answer questions about levels of small producers' inclusion in the new cheese market that opened after the launch of a cheese-making factory. Data were elicited from 118 interviewed subjects on the occasion of a survey carried out in March-June 2007. Additional data were collected by interviews with key informants and PRA of farmers. Conclusions indicated that farmers' entrance into the new supply chain involved investments, in contrast with traditional systems. Levels of inclusion were mostly affected by village location, farmers' additional job, provision of assistance, disease control, feed requirements, availability of loans, land ownership, bank savings, farm labour, and educational level. The capacity of small-scale producers to maintain their participation in the factory supply chain was poor because they had no capital and no expertise in market shares. Choice of technology, as well as value-added quality and quantity, are directly associated with the inclusion level of farmers. As recommendations, the factory should improve milk quality and follow a management development strategy in order to implement better governing measures.

Key-words: supply chain, cheese market, Jordan.

Résumé

Sur la base de recherches sur le terrain menées dans la région de Badia, en Jordanie, cet article essaye d'éclaircir quels sont les différents niveaux de participation des exploitants au nouveau marché du fromage ouvert après l'établissement de la première fromagerie de la région. Les données ont été collectées en interviewant 118 personnes à l'occasion d'une enquête faite en mars-juin 2007. D'autres données ont été obtenues grâce à des interviews d'informateurs clés et grâce à la technique du DRP appliquée aux exploitants. Différemment des systèmes traditionnels, l'entrée des exploitants dans la nouvelle chaîne de production a demandé de nombreux investissements. Les différents niveaux de participation ont été influencés par la localisation du village, les autres emplois des exploitants, la disponibilité d'assistance, la lutte contre les maladies, les besoins en aliments pour les animaux, et par le niveau d'éducation. Les petits producteurs étaient faiblement capables de maintenir leur participation dans la chaîne d'approvisionnement de l'industrie car ils n'avaient pas de ressources financières et d'expérience dans les parts de marché. Le choix de la technologie et de la valeur ajoutée de la qualité et quantité va de pair avec le niveau de participation des exploitants. A ce propos, l'industrie fromagère devrait améliorer la qualité de son lait et suivre une stratégie plus attentive de gestion et de développement du secteur.

Mots-clés: chaîne d'approvisionnement, marché du fromage, Jordanie

The most important factors negatively affecting the competitiveness Jordanian product are: (1) the small size of production and marketing companies; (2) the absence of organizations of producers and exporters; (3) the government failure to provide the needed enabling environment to encourage the private sector investment in the marketing infrastructure; (4) the government failure to provide effective support services; (5) the penalty of post-harvest facilities (MoA, 2007).

The selection of cheese as main commodity to be studied by this study is based on the fact that it is affected by changes that occurred in the food industry and are found to be critical for small-scale farmers in the Badia region of Jordan. The dairy production for unorganized sheep, goat and cattle holdings in Jordan is 2,060 M.T., valued at 9,688,910 JD¹ (2005 Statistics). With an output of 165,000 tons of fresh milk, Jordan produces 35 litres per capita, while consumption is 50 litres per capita. The country imports about 8,000 tons of powdered milk each year. The cheese production in Jordan averaged about 7,250 tons a year in 2002-2004, compared with only about 2,950 tons in 1999-2001, reflecting an expansion of Jordanian dairy industries. Jordan's production of sheep cheese is estimated at nearly 60kg/head/year (Parker, 2005).

Sheep cheese is considered as a traditional product consumed in Jordan and in the Arab region. Although many con-

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¹ Note: 1 JD = 1.42 US\$, 1 JD = 0.97 EUR (Year 2008).

sumers in the region are more familiar with cheese from cow milk, such as Cheddar and Swiss, there is an important growing market for sheep cheese. There is no market for foreign sheep cheese. The most recent figures of cheese imports rose from 7,130 tons in 1999 to 10,533 tons in 2003. Figures show that Jordan imports about 19.7 million USD of cheese annually. Total US cheese exports to Jordan rose from 1,316 tons in 2002 to 3,008 tons in 2003. Jordanian imports of cheese in 2004 were as follows: (1) Total Imports in Million USD: 8.9; (2) Imports from the U.S.: 2 million USD; (3) U.S. Market Share (%): 22%; (4) U.S. Tariffs on Selected Jordanian Exports on Cheese: 18.7%, (5) Change in Export Revenue of Cheese: about 5.0%; (5) NPV of 5-Year additional revenue on \$100,000 Initial Exports: \$ 61,756 (Parker 2005).

The geographical location of the present study is the northern Badia² region, which has often been neglected in the Jordanian development process, with most resources being devoted to Amman. The Badia region constitutes approximately 80% of Jordan, and 74% of its livestock is found there. Sheep in Jordan are 2,024,810, of which 967,790 are in North Badia (2005 Statistics). Livestock holders in northern-eastern Badia number 845. The breeding size averages 203 heads, and a few breeders have as many as 3,000 or more heads (Al-Oun, 1997; 1998). Milk is considered the most important source of income from livestock after meat. With a birth rate of 3.0%, the northern Badia population equals 257,200 persons (2005 Statistics), making up 4.7% of the entire Jordan population. Most people in the area depend on livestock for livelihood, as 22% of households consider livestock as their main income source and 35% consider livestock production as main activity (Al-Oun, 1997; 1998).

Generally, there are two environmental issues Badia producers are facing: land tenure and water resources. Water shortage, water depletion and rangeland degradation are factors that have worsened desertification. People in the area have adjusted their sheep management systems and cope with current circumstances in the livestock industry after frequent severe droughts and suspension of feed subsidies in 1996. One of the tools to fight against desertification in the Badia region was the reduction of the number of heads but this resulted in poverty and unemployment among Bedouins. The removal of Grain subsidy in 1996 led to an increase of 100% in the feed costs compared with prices during the early 1980s. This increased the overall livestock cost by nearly 70%. Since then, large-scale livestock investments have been yielding a net loss. It is estimated that livestock numbers have dropped by 25% from the mid-1990s. Better opportunities encouraged many Bedouin families to shift from animal production to a settled agricultural life (Al-Oun, 1997; 1998; Shahbaz, Al-Oun & Ras, 2003).

2. The New Supply Chain and Its Context

The new supply chain model is a critical one for Jordan and involves the improvement of the socio-economic status of livestock owners in the Badia region. Its launching coincided with the issuing of a series of laws by the Ministry of

Planning (MoP) in charge of supporting development projects. It is a new combination of entrepreneurship and government policies designed to raise benefits above the average. The process included actions by the Development Agency and the Badia Research and Development Centre (BRDC), in cooperation with the Tal Arrimah Cooperative Association (TACA) that led to the setting up of a milk factory to enhance the market participation of small milk producers in northern-eastern Badia. The main objectives of the new supply chain were creating new jobs, getting rid of wholesalers' monopoly, guaranteeing better milk prices for farmers, producing good quality cheese, increasing farmers' income, and providing labour to unemployed people (Gorman, et al., 2007; Shahbaz, et al., 2006).

The new supply chain was launched to facilitate the Badia farmers' entrance into the market. Traditional cheese marketing channels included individual producers, middlemen, retailers, and consumers. Despite marketing channels were short and middlemen's services were simple, marketing margins were still unreasonably high, by creating a huge gap between farm-gate and consumer prices in most cases. This led to higher benefits for middlemen than for farmers and consumers (Al-Oun, 1997; 1998). The new supply chain's consumers included Jordanian Armed Forces and American Army in Mafraq, Azraq, and Safawi, local communities, BRDC, Higher Council of Science and Technology, Al Al-Bayt University, Jordan University, and National Information Centre. It sold 30% of its products to these consumers and 70% to wholesale contractors (Gorman, et al., 2007; Field Work, 2007).

Based on collective actions, the new supply chain was not launched until local people became members of a NGO. Management was established with the local community participation, both at the Factory and TACA, and distributed according to kinship. Incentives were attractive, but financial support was not sustainable. Incentives for farmers' participation included loans, membership in TACA, better milk prices, and milk marketing (Gorman, et al., 2007; Shahbaz, et al., 2006).

At the beginning, the access to cash was available through the MoP, which attributed 175,000JD in 2003 to set up the cooperative association and infrastructure, and 20,000JD in 2004 for operational costs. Later on, land was provided by the local Bedouins in exchange for membership in TACA and stock shares. The supply chain under study was initiated in 1999, but the Factory was not able to start processing cheese until 2004 because of financial and economic constraints (Gorman et al., 2007).

The production system included buying milk from farmers and delivering it to the cheese factory. The institutional profile for the Factory was basically aiming at satisfying the requirements of quality and hygiene in compliance with international standards and codes. There were minor technologies in use, and values were set on low pH and reduced fat content. The local community was not collaborating with the Factory and TACA, as kinship disputes and competition made it difficult to operate the new supply chain. Some farmers did not supply milk to the Factory simply because some of their kin were not members of TACA, or labourers or managers working in the factory (Field Work, 2007).

² The arid and semi-arid land inhabited by Bedouins (Badu); annual rainfall does not exceed 200 mm.

Badia is an arid and dry region with an average rainfall of less than 200 mm. Lack of rangelands makes farmers travel in springtime for grazing outside the region. This mobility created longer travelling distances and made it difficult to supply milk to the factory. Factory supply chain fluctuated regarding milk prices and faced a sudden production increase during the spring months of March and April. This situation was positive for farmers but not for the factory because farmers looked for better prices, especially that farmers supplied milk to the factory under informal agreement. Farmers looked for other accessible alternatives to market their milk when they moved more than 70 km far from the factory. In addition, lack of rangelands and dependence on forage increased input prices and made milk prices unstable (Field Work, 2007).

Farmers' needs included animal medication, natural animal feed of high quality, winter feed, cash, and sustainability of milk sales. General incentives facing small-scale farmers outside the new supply chain were competitive prices, product marketing, cash flow availability in winter, and accessibility to milk collection. Farmers outside the supply chain sold their products to wholesalers, sub-retailers, sweets shops, or directly to consumers. Risks for small-scale farmers outside the new supply chain were the overproduction during the spring months of March and April and the inability to commercialise the milk. Farmers' risks included uncontrolled or new animal diseases, sudden price increases for the animal feed and dry seasons. Opportunities included providing milk to the Factory especially from areas close to the factory. Better opportunities meant getting better prices and sustainable outlets for milk sales (Field Work, 2007).

Since the Factory was established in the Badia region, the question posed was the level of inclusion or exclusion small growers were facing as for quality requirements and marketing determinants. Farmers' entrance into associate supply chain involved more investments as compared with traditional systems, and this may have created more barriers for producers with less capital or capacity.

Inclusion is the capacity of small-scale producers and rural SMEs to sustain their participation in a given supply chain and restructured market as it evolves. This capacity is the ability to undertake the technological, managerial and organizational changes along with the financial implications required as a consequence of the continuous transformation of supply chains. Inclusion or exclusion refers to dynamic outcomes as observed in a timeline; it is the capacity of groups of small-scale producers to remain viable agents in rapidly and continuously changing supply chains. Inclusion can take different forms: mere participation as individual suppliers; collective action with other suppliers to meet basic demands for volume and supply consistency; becoming a specialized supplier on the basis of value-adding activities; and becoming co-owners of a supply chain or one of its segments depending on the sort of incentives and set of attributes that farmers attain. The development agencies can change the set of incentives for small-scale farmers and/or boost farmers' capacities to benefit from these incentives (Peppelenbos, 2005).

Restructured agro-food supply chains are dominated by modern forms of retail, characterised by the emergence and continuous evolution of procurement systems based on the four pillars of inclusion. Strategies evolve along the procurement systems varying in their stage of development along these four pillars (Berdegue, et al., 2005). Product attributes change, and conditions of commercial transactions get redefined. Changes may get accompanied by continuous and strong incentives for small suppliers to undertake successive and never-ending changes in the areas of technology, management, and inter-firm organizations, along with their financial implications (Kaplinsky & Morris, 2001).

In order to explain inclusion in each critical stage in the New Supply Chain, a timeline should be constructed. Construction of New Supply Chain timelines highlights the main events and critical stages in the development of the New Supply Chain and its evolution. It stresses the changes in incentives and the role played by each actor in response to these changes. Further, it describes factors that foster and constrain the Associate Supply Chain process by comparing it with previous literature findings (Douthwaite and Ashby, 2005).

3. Methods

The aim of the present study is to empirically identify levels of inclusion of small-scale Badia producers and the strategies that affect forms of inclusion of small farmers in ways that may strengthen the resilience of their economies. To achieve these goals, the chosen research method was based on a case-study analysis and comparison between traditional and new cheese market channels. Primary data were gathered through semi-structured interviews, focus groups, and surveys among farmers.

The major hypothesis states that farmers' attributes affect their form of inclusion. Attributes include: (1) human capital (education level, farm labour, and farmer's additional job). The education the farmer has received may provide him with knowledge and additional jobs. Labour included permanent or temporary employment on the farm; (2) Off-farm income sources (bank savings and deposits, household enterprise, and land ownership). Sources of income serve as risk management, counterbalancing initial risk of selling to a non-traditional market and financing operations. Access to work and investment includes access to financing and sources of operational and investment capital; (3) Access to risk control factors (credit and loans, provision of technical assistance, and contract use); (4) Prices offered, individual farmer's shares (profit they get per head and increase in household income), and input costs; (5) Incentives like disease control and feed requirements. These attributes are based on those of Sadoulet and de Janvry (1995).

The first sub-hypothesis states that the village location affects level of inclusion of farmers in the cheese Factory, as indicated by Staal, et al (1997). Additionally, farm size affects the attribute of yields required by each channel; therefore, it affects the form of inclusion farmers choose, as indicated by Cook (2004) and Berdegue, et al..(2004). The second sub-

hypothesis states that the form of inclusion of farmers is affected by the technological requirements as incentives for farmers. It further states that value-related quality and quantity affect farmers' form of inclusion.

Semi-structured interviews were conducted during the months of April and May 2007 with nine key actors, i.e. Civil Corporation procurement officers, Safeway Supermarket managers, administrators, procurement coordinators, two wholesale agents, Factory manager, the TACA president, and local small farmers and producers.

Focus group discussion: the Participatory Rapid Appraisal (PRA) approach was used during the months of March and April 2007. PRA included three focus-group meetings in different cluster villages. Headed by research assistants, meetings lasted for 1-2 hours.

Surveys: the sample was randomly selected using stratification by flock size: (1-100 heads) 46.5%, (101-200) 14.9%, (201-300) 12.3%, and (301-400) 7.9%. Subjects, randomly selected from the different cluster villages, represented small-scale producers connected with the three marketing channels present in Badia: traditional retailers, wholesalers, and the Factory. The final sample was made up of 114 small producers, of whom 70 subjects chose the traditional channel, 28 the factory, and 16 the wholesale channel. The questionnaire investigated socio-economic characteristics of the producer (head of the household), the marketing accessibility, and adaptation. The major variables of the survey were based on Reardon and Glewwe's (2000) household survey and included: (1) market channel choice; (2) production technologies and embodied technologies; (3) attributes and incentives; (4) input and output prices; (5) household characteristics; and (6) risk control and quasi-fixed capital.

The study included a multi-dimensional model as a function of different factors that affected inclusion and exclusion (choice of market). Therefore, the quantitative model of analysis included a test of difference among the four levels of inclusion and farmers' attributes using the Analysis of Variance (ANOVA) and a test of association with the nominal attributes using a Chi-square test.

4. Results, Analysis, and Discussion

This section presents the major findings of the case study, a normative and positive analysis, and a complete discussion.

4.1. Evolution of the Supply Chain

This part introduces the marketing strategies and mechanisms that enhanced farmers' inclusion in the new cheese market channel. The New Supply Chain gradually evolved with the cheese chain development in response to changing conditions, as required by the four pillars. Only farmers who had livestock size of ten or less heads or who did not conform to pH level and fat content were excluded from participation. Farmers' interest in participating in the Factory channel meant selling and marketing their milk and increasing their revenues. The informal criteria of participation included active male and female small producers. They had access to the supply chain through membership in the Association, which promoted itself

by getting in direct touch with farmers. The formal criteria of participation were to get financial support to the Factory and the Association from the MoP.

Farmers' inclusion has been in the form of a collective action since 2005, and as individual suppliers since 2006. Small-scale producers participated in the Factory channel because it was more consistent, it offered better prices than the traditional market and it was available all the time. Major factors that explained small-scale producers' inclusion were basically price and availability of a support system provided by BRDC and TACA, including provision of loans and technical assistance. Therefore, commitment to delivering throughout the season received 10 piasters (14 cents) more than the wholesalers' price for each kg. Other factors that explained the reason why farmers sold to the New Supply Chain were long-term financial stability, direct sales, protection from wholesalers' monopoly, reliability and sustainability, and payback period.

4.1.1. Drivers of Inclusion

Procurement systems based on "four pillars": as mentioned above, in the Badia region there were three cheese marketing channels: the Factory, the wholesalers, and the traditional retailers. The Factory sourced from farmers who were members of TACA and the cluster villages, as well as from others who were not. There were no chain supermarkets in Badia and those available in the main cities did not take milk directly from farmers for various reasons: producers were not able to supply throughout the year, producers were geographically scattered, the milk quality was inconsistent and there was a tendency not to join the formal economy which imposed taxable invoices.

Organizational Changes: the four pillars of the procurement system of cheese products available in Badia included:

a. Specialized, dedicated wholesalers: traditional wholesalers had the following characteristics: (1) They dealt with clients who had no particular quality demands (they lacked incentives to develop, monitor, and enforce standards because they gained no benefits by doing so); (2) they did not get involved in any sort of production support programs; (3) they did not establish any long-term commercial relationship with selected producers; (4) they bought and sold on a day-to-day basis in a spot market; (5) they lacked capacity to define, monitor, or enforce quality or safety standards which were well beyond the norms of wholesale markets; (6) they delivered to individual small and medium-size supermarkets. The changes introduced in terms of procurement system for small producers included shift from dealing with traditional wholesalers who required low-quality standards and simply relied on what was available in the market for reasons of convenience and personal security. Farmers who relied on this traditional system included those who were travelling in springtime and those who lived far from the factory.

b. Centralization of Procurement: there was no distribution centre opened by a major retailer that may have led to a new centralized procurement system and a complete redefinition of contract conditions. However, farmers directly sold to the Factory and to other cheese makers because they had

no time to transport the raw material and favoured short distances so that the milk could not turn bad. Therefore, there was a shift to centralized procurement through distribution centres. A decentralized mixed procurement system was also found through the Factory, which sourced directly from individual growers and NGO. This required higher quality standards, but only a limited and rapid expert evaluation was available at the Factory.

c. Preferred Suppliers to ensure consistent supply: a centralized proactive procurement system co-existed with the above-mentioned ones at the NGO and New Supply Chain. The associate supply chain initiated technical assistance and training programs to help suppliers being in compliance with higher quality and safety standards. Small producers were offered stable access to the Factory at prices higher than those of the wholesale market, as well as input credit. The new supply chain reduced the wholesalers' power by working with a group of farmers to increase product quality, safety and freshness and to get the volumes it needed at lower transaction costs.

d. Private grade, standards, and conditions: the following institutional (Technological Upgrading) issues were conducted by the new supply chain:

Processing improvement enhanced final product quality and shortened time to reach market.

Product improvement resulted by new product development.

Changing functional position by adjusting activities undertaken in terms of new functions and in terms of division of labour for cheese, Jameed (Hard Yoghurt), and Samn (Geese) productions.

Factors that enabled technological upgrading included BRDC commitment, effective R&D management, and structured process for continuous improvement. Other factors included new legislation, rising prices for inputs, and increased competition. Factors that blocked technological upgrading included senior management's failure to commit resources to the new product development.

Transaction Attributes: Institutional issues of standards are related to the benchmarks of performance and practices (Kaplinsky and Morris, 2001). The product and transaction attributes required in the chain included: (1) Price to be paid should be the best fixed price available in the local market. The average price of milk sales to cheese producers was 0.33JD per kg, while the Factory paid farmers about 0.4JD per kg. About 55% of farmers believed that market prices rose due to the New Supply Chain. (2) Payment complied with the agreed-on monthly period, depending on cash flow availability. (3) Volume requirements were open. (4) Shipments were daily fresh. (5) Quality attributes included low pH level and no or low fat content, as well as good hygiene. (6) Safety attributes included general health requirements and expiry dates.

Farmers' financial capacities included:

1. Agricultural input/output assets: (a) land holdings: about 61% of interviewed farmers owned land that varied in size from 20 to 5,215 donums, with an average of 301 donums. About half of them stated that the land was not good for agriculture, compared with 48% who reported to use the land to grow crops; only 4% said they used it for pastures. About

41% reported planting wheat, and 11% barley; 6% of them owned irrigated lands. Average land price was about 200JD per donum. (b) Farm capital inventory: about 95% of the sample had no farm machinery, and only 5% reported having tractors. In terms of production, during the 12 months preceding the interviews, only about 37% of the sample had planted wheat and barley. (c) Livestock ownership holdings: the range of flock size was 5-1,500 with the average size of 236 heads, see Figure 1. Prices ranged from 60-200JD with the average of 88JD per head, see Figure 2. (d) Access and use of extension unit services: about 65% of the subjects reported visiting extension units in the range of 1-15 visits in 12 months. About half of the subjects reported paying an average price of 44JD per visit depending on the type of assistance they required. About 60% of them visited an extension unit for vaccination and treating animal diseases, 22% for animal feed, 25% for insemination, 5% for marketing advice, 4% to get credit, and 15% for general advice.

2. Savings input/output and assets: (a) property investment: only about 3% of the subjects reported renting out their land at an average price of 192JD per donum. About 7% reported purchasing land and premises for an average amount of 3,293JD in the last 12 months. About 18% reported selling inherited property at an average price of 8,882JD. (b) Bank deposits: about 30% had checking accounts in banks, and 11% had savings accounts with average savings of 4,000JD.

3. Credit use: (a) loans: about 32% of the subjects requested loans, while 61% of the sample rejected the idea because they were not in need. Other reasons for not getting loans were negative religious beliefs about debts and lack of bank facilities and availability. The average amount of borrowed money during the final 12 months was 585JD. Most frequent sources of loans were friends and family (30%), and governmental agencies and pawning shops (2%). Reasons for borrowing included farming needs (as reported by 23% of the subjects), and household consumption (as reported by 9%).

4. Family-run enterprises: about 14% of the subjects reported the existence of a non-farm enterprise. Persons in charge of such enterprise included family members, but 23% reported using additional labour. Enterprises working days ranged from 4 to 14 during the final 14 days with an average of 12 days. Average transactions from the enterprises during the final 12 months were about 346JD, family consumption about 1,125JD, and average input costs about 205JD.

4.1.2. Changes of Inclusion: Strategies and methodologies used

Changes undertaken by farmers to respond to the new incentives included technology, management and organization, together with their significant financial implications. Changes of inclusion comprised screening of potential members via TACA, assurance of quality and quantity via TACA also, and trust building between TACA and its members. Small holders managed to comply with product and transaction requirements by conforming to informal contract requirements and formal agreements to provide a minimum quantity and by increasing livestock by getting loans from associations, something new to Badia farmers.

Technological Implications: Technologies required that producers had to deliver a minimum volume of milk with a low pH level. Additional changes in the attributes of the product included taking away 50% of the fat. Farmers had to invest in providing feed to sustain production during the winter months in order to maintain participation. The option available to deliver the same quality and quantity those farmers had meant was by substituting labour with capital.

Implications of product and transaction attributes required by the Factory in terms of technology required that NGOs had to establish a collection centre with cooling tanks in order to gather milk from farmers before sending it to the factory. Implications of product and transaction attributes required by the New Supply Chain in terms of management were provided by the Factory, but it had no direct marketing services to major and chain supermarkets around Jordan. It was unable to market its products, so a marketer or a firm did the job on its behalf. The Factory did not require a records-keeping system or any monitoring and enforcement procedures; it paid members according to their compliance with the new rules. Furthermore, implications of product and transaction attributes required by the New Supply Chain in terms of organizational changes stipulated that farmers had to organize themselves into local associations. At the beginning, the NGO and BRDC closely worked with farmers and provided them with training workshops. Table 1 shows the timeline of the New Supply Chain.

4.2. Evidence of Inclusion

The Association was able to implement deeper changes by including 100 small producers. Different groups of small

farmers managed to put in place different strategies to remain included in the supply chain. Some did not worry about the cost and problems of being included as individual suppliers, while others were included as groups and TACA members. Forms of inclusion of the interviewed farmers were as follows: 7% as groups, 12% as individual suppliers, 27% as TACA members, and about 54% as excluded individual suppliers (Figure 3). Those excluded were not worried for the following reasons: they had other market alternatives, enough cash, had experience, considered the New Supply Chain (especially the role of the NGO) as negative, did not want to deal with loans and interest rates, and had forage subsidies from the government. They found benefits in getting higher income and in having autonomy in decision-making, but most of them were not sure about the sustainability of such benefits.

About two-thirds of them saw no loss in being excluded. However, some of the excluded farmers (about 32% of them) were worried about production costs and risk exposure. Those excluded asked to compare the traditional market with the New Supply Chain reported better prices, familiarity, security, quality control, accessibility and mobility, loan availability, less complexity, less input costs and labour, and cultural conformity to heritage. Meanwhile, farmers who were included as individual farmers felt secure because they got loans and enjoyed marketing access, proximity, stability and higher prices. Farmers included as groups did not see any benefits or losses. Farmers included as NGO members saw the benefit of getting higher income, but they saw no losses.

4.2.1. Inclusion Costs and Benefits

Each of these forms of inclusion implied different costs and benefits, as well as different ways in which these costs and ben-

Figure 1 – Sampled Livestock Size.

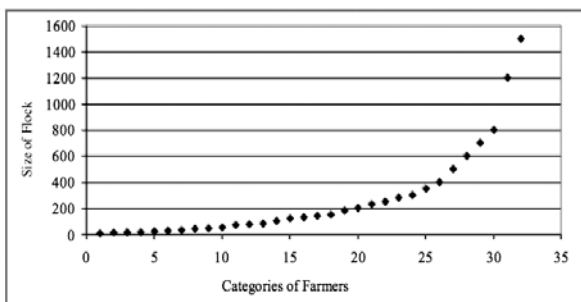


Figure 2 – Average Daily Price per Head.

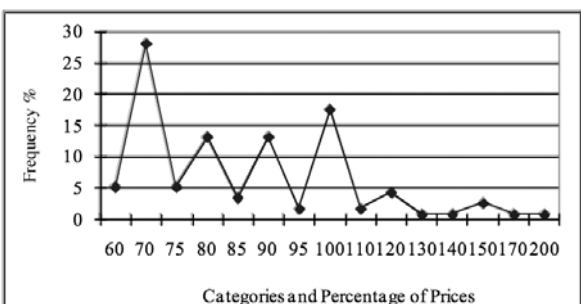
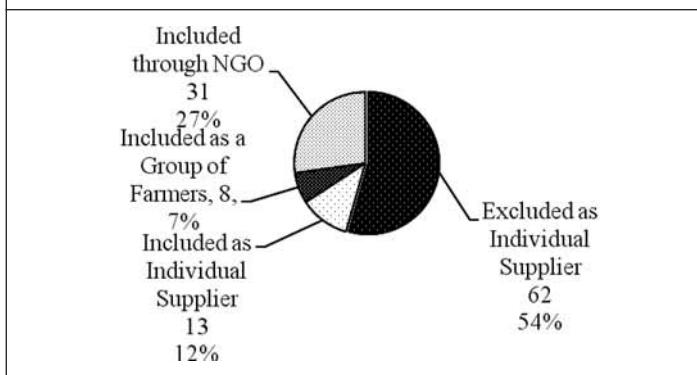


Table 1 – Analysis of Timeline.

Date of Event	Supply Chain Events	New Supply Chain Events
1999	BRDC decided to establish a milk collection Factory for cheese-making. The Ministry of Health requested a mechanical cheese-production line in the factory.	BRDC contacted the MoP to get aids to establish the required infrastructure that included building the factory, buying equipment and machinery for mechanical cheese production, and electricity generators.
2000	BRDC Factory established mandatory quality standards for sheep milk supplied to the factory. A major requirement was the year-round supply. A consequence of that was to get a year-around animal feed and increase the size of farmers' livestock.	BRDC held meetings with numerous small-scale farmers to introduce the new standards. Eventually, it was agreed to involve the support of TACA, which ran the rural finance program that provided the needed investment. Farmers donated land in exchange of membership shares in the NGO.
2001	BRDC Factory evaluated the options for getting animal feed to sustain production throughout the year and increase flock size to sustain quantities of supply.	An association was established with the membership of 40 farmers from different clans coming from different cluster villages, and was registered as formal organization. Eventually, the MoP was contacted to get additional loans for the farmers.
Early 2002	Enforcement system for new standards of supply stability was defined and implementation schedule was agreed.	The BRDC specialists helped farmers and TACA through training workshops to set up a program for feeding sheep all year-long. Meetings between BRDP, Factory management, and TACA were held to define responsibilities for each party.
Late 2002	Feeding programs and new pastures were established.	Training programs were established with farmers, and specialists from BRDC were monitoring animal feeds in farms. TACA provided 10-year loans and implemented record keeping system for loans.
2003	Delay because of lack of money	Farmers were put off and disappointed
2004	Factory started its operations	The milk collection centre was established in the village of Tal Ar-rimah and equipped with cooling tanks. Cooled cars were purchased and put in operation.
2005	First supply of milk. Establishment of new quality standards like hygiene, fat, and pH level.	Meetings between BRDP, Factory management, and TACA were held to revise the implementation schedule. The agreed on dealing with problems of quality, monitoring the enforcement of procedures and opening up to all farmers who were not members of TACA to encourage their participation in the New Supply Chain.

efits were allocated to the different participants of the chain. Costs included investment requirements, production costs, and risk exposure. Costs affected the BRDC's reputation, because whenever the New Supply Chain struggled, farmers gave the blame to BRDC. Farmers could not improve their efficiency in collecting milk and selling it to the Factory because this latter was not guaranteeing a regular transport.

Figure 3 – Level of Farmers' Inclusion.



Benefits included higher net income, net assets, access to new services, better living standards, and autonomy in decision-making, all of which were sustainable. Other benefits included improvement in rangeland and water supply, directly at the profit of livestock keepers. The rest of the rural population benefited from increased availability of livestock products for better nutrition. Neighbouring villages also benefited from the gained experiences, transcending tribal differences and allowing people to become integrated with a new socio-economic development process.

4.2.2. Economic-financial Impact Assessment

Economic benefits generated in the chain included improvements in costs, prices, and profit margins, as follows:

1. Income benefits for small-scale producers:

Changes in production costs: about 51% of the farmers faced changes in production costs. They reported an increase in costs per head from 4 to 50JD. The reported average increase of production costs was about 5.5JD per sheep, and the most frequent increase, as reported by one-third of the sample, was 10JD.

Changes in yields: about 42% of the sample had yields of 4-70JD per head. The average amount of yield per head was 8.3JD, and the most frequent yield change was 20JD per head, as 26% of them reported.

Changes in the product price: about 41% of the sample reported a change averaging 6JD per head in product value. Price change ranged from 4 to 30JD per head, and the most frequent product price increase was 15JD per head (as 28% reported).

Profitability changes: about 47% reported an increase in profit at an average of 7.1JD per head. The range of profit change was 2-40JD per head, and the most frequent profit per head was 15JD, as 30% of the sample reported.

2. Benefits at the household level:

Higher income: about 49% of the subjects reported an average income of 1,762.1JD a year. The range of income increase was 75-9,000JD and the most frequent (according to 6% of those who reported income increase) was 4,500JD.

Changes in the share of the total household income: about a quarter of the sample (21%) reported an increase in household income from the chain, but none of them provided exact information about it.

Changes in income diversity and security: about 21% of the subjects reported change in income security, but they provided no information about it.

Changes in employment: about 12% of the subjects reported an increase in required labour to meet the change required by the New Supply Chain, but they provided no information about it.

Uses of additional income: only 27% of the subjects reported using the additional income to buy forage and sheep.

4.3. Analysis of the Statistical Model

All the statistical tests were considered significant at the level of $\alpha = 0.05$.

4.3.1. Inclusion Level

To test the hypothesis that the level of farmers' inclusion affected their contribution, an ANOVA analysis was conducted to test the differences among the averages of each attribute across the four forms of inclusion. This analysis showed no statistical differences among averages of the following attributes: increase in production costs per head, increase in product price, increase in profitability per head, increase in household income, and flock size across the four levels of farmers' inclusion (Excluded as Individual Supplier, Included as Individual Supplier, Included as a Group of Farmers, Included through NGO).

However, village location was found significant ($F = 4.494$, $p\text{-value} = 0.005$) in relation to the level of farmers' inclusion. Farmers included as groups were basically far away from the Factory as they lived in the other cluster villages forming a group of farmers who were supplying the most milk to the Factory ($M = 11.13$); meanwhile, farmers who were included as individuals supplied the least milk to the factory ($M = 3.38$). Further, those excluded as individual farmers lived far away from the Factory and probably went away in search of natural rangelands.

To test the association of the nominal attributes with the level of inclusion, a chi-square test was carried out (Table 2). Farmers' additional job, educational level, bank savings and deposits, credit and loan availability, land ownership, and required farm labour were all quasi-fixed capital variables that were significant in relation to forms of inclusion. Incentives like provision of technical assistance and risk factors like disease control and feed requirements were also found significant. Other variables like contractual relationship and household enterprise were not significant.

Checking accounts were used more than savings, as indicated by 57.9% of the sample (Table 3). About the two-thirds of the sample were land owners, the two-thirds got loans, about 52% paid for technical assistance and only about 12% hired labour.

Excluded farmers had more checking accounts, owned more land, paid more for technical assistance, got more technical assistance, more disease control, and more animal feed, and had more farm labour than all the other levels of inclusion.

Table 2 – Chi-Square Tests of Nominal Attributes with Inclusion level.

	Farmers' Addition al Job	Con tracted Rel ation ship	Provis ion of Techn ical Assist ance	Disea se Contr ol	Feed Requi rements	Hou sehol d Enterpr ise	Avail ability of Chain Credit and Loans	Land Own ership	Bank Savin gs and Depos its	Farm Labor	Educ ation al Level
Pearson Chi-Square	61.148	7.594	28.087	16.032	12.277	2.232	11.981	8.20	18.316	13.202	21.352
df	27	3	9	3	3	3	3	3	9	3	9
P-value	.000	.055	.001	.001	.006	.526	.007	.044	.032	.004	.011
N of Valid Cases	114	114	114	114	114	114	114	114	114	114	114

This may be due to the fact that they owned more money and land, were independent, and liked to look after their business. Potentially, farmers who were included were poorer and relied on the NGO and BRDC to get things done. However, those who were members of TACA had the more savings and got more credits and loans. Nevertheless, they got the lowest quality of animal feed because they did not receive any forage aid from the government and did not travel to natural rangelands.

4.3.2. Inclusion and Production Technology Choice

The relationship between technology choice and forms of inclusion was significant, as shown in Table 4. Half of the sample tended not to use technology. However, technologies were used the most by excluded farmers and the least by farmers who were included as a group outside the cluster village.

4.3.3. Inclusion and Embodied Technology Use

The relationship of embodied technology use with the form of farmer's inclusion was significant for both value-added quality (F = 5.83, p = .001) and value-added quantity (F = 3.244, p = .025) (Table 5). Most users of value-added quality were farmers who were included as individual suppliers. Value-added quantity was used most by farmers who were included as a group; they tended to have larger flock size of 300 heads. In terms of animal feed, most farmers tended not to invest in this attribute. However, farmers who were included as individuals tended to invest more in it. Based on the Standard Deviation values presented in Table 5, the Value Added Technology for Quality was more homogeneous (SD = .93) than Value Added Technology for Quantity (SD = 1.41) for those Included as a Group of Farmers. In addition, the Value Added Technology for Quality was more homogeneous (SD = .89) than Value Added Technology for Quantity (SD = .99) for those Included as NGO members.

5. Conclusions and Recommendations

The development of the new supply chain in the Badia region of Jordan has led to a greater inclusion of small farmers through their membership in the Association at one level, and through their capability, regardless of membership, to supply milk conforming to quality fat and pH levels as well as hygiene, at another level. The critical stages and success factors in the evolution of the New Supply Chain were due to the management provided by BRDC employees. At the beginning, direct and indirect subsidies that contributed to the New Supply Chain had a positive influence on the sustainability of the New Supply Chain itself. Later on, however, unsustainable funds and lack of cash flow in the Factory made farmers suffer.

Table 3 – Cross-Tabulation Results of Inclusion Level with Farmer's Attributes.

	Educational Level		Bank Savings and Deposits		Land Ownership		Availability of Chain Credit and Loans		Provision of Technical Assistance		Disease Control		Feed Requirements		Farm Labour			
	Illiterate	High School	University Degree	Graduate Studies	None	Checking Accounts	Savings Accounts	Post Office Accounts	No credit extended	Assistance for	Extensive assistance	DK	Yes	No	Total	Yes	No	Total
Excluded as Individual	47	11	3	1	40	17	4	1	46	33	11	21	15	47	62	13	54.4	62
Included as Individual	6	5	2	2	6	3	4	1	9	3	4	8	5	8	13	8	41.2	47
Included as a Group	7	4	1	1	8	5	3	7	16	8	13	14	4	11	14	8	54.4	62
Included through	12	7	1	1	12	14	11	11	23	18	13	10	1	30	31	7.0	8	11.4
Total	63.2	28.9	7.0	5.3	63.2	29.8	11.4	10.0	64.0	36.0	100.0	21.9	78.1	100.0	12.3	87.7	100.0	100.0

Financial investments needed on farm were realized by obtaining money through TACA. Farmers basically responded to the required investments by taking loans from the NGO, but interest rates were high. Organizational changes of inclusion required the screening of potential members via TACA and the creation of trust between TACA and its members. Technological investment required low pH and fat levels, as well as daily fresh milk delivery. Small holders managed to comply with product and transaction requirements by conforming to informal contracts and formal agreements to provide a minimum quantity of milk and to increase their size. The capacity of small-scale producers to maintain their participation in the supply chain and in the restructured market in evolution was low because they had no capital and no expertise in market shares. Only those who had available cash and resided close to the factory presented this

Table 4 – Chi-Square Result of Inclusion Level with Technologies Choice.

	χ ² Value	df	P-value	Production Technology Choice		Total
				High Technology	No Technology	
Excluded as Individual Supplier	10.616	3	.014	28	34	62
				45.2%	54.8%	100%
				24.6%	29.8%	54.4%
Included as Individual Supplier				9	4	13
				69.2%	30.8%	100%
				7.9%	3.5%	11.4%
Included as a Group of Farmers				6	2	8
				75.0%	25.0%	100%
				5.3%	1.8%	7.0%
Included through NGO				8	23	31
				25.8%	74.2%	100%
				7%	20.2%	27.2%
Total				51	63	114
				44.7%	55.3%	100%
				44.7%	55.3%	100%

Table 5 – ANOVA Result of Inclusion Level with Embodied Technologies.

Market Choice			Value Added Technology for Quality	Value Added Technology for Quantity
P-value			.001	.025
F			5.831	3.244
Inclusion Level	Excluded as Individual Supplier	Mean	2.00	1.87
		N	62	62
		SD	1.16	1.09
	Included as Individual Supplier	Mean	3	2.46
		N	13	13
		SD	1.53	1.33
	Included as a Group of Farmers	Mean	2.50	2.63
		N	8	8
		SD	.93	1.41
	Included through NGO	Mean	1.52	1.55
		N	31	31
		SD	.89	.99
Total		Mean	2.02	1.90
		N	114	114
		SD	1.20	1.15

capacity, as the factory was not able to provide those who lived far away with refrigerated vehicle to transport milk.

There is a potential for up-scaling the New Supply Chain in Badia itself and for replication elsewhere, but only if lessons are learnt from management failure by the NGO and Factory. Further, lessons need to be learnt from the financial and economic mistakes of the New Supply Chain, like the lack of funds in the initial stage. Public and private policies can contribute to upgrade the New Supply Chain by providing farmers with continuous technical training, supervision, assistance and loans, and by protecting the small producers' rights. The contextual preconditions for this up-scaling may include providing rangelands or animal feed, stimulating farmers' and local community's positive attitude, developing marketing and networking, and focusing on product quality.

In order to cope with the new free-market economy, the Factory needs to improve milk quality, especially in terms of hygiene, inspection and processing, and to improve its management by increasing the farmers' participation.

The New Supply Chain can be replicated in other poor agro-communities around Jordan under the following favourable conditions: (1) creation of associations of small farmers; (2) development of human resources; (3) increase in milk prices; (4) increase in volume of input milk; (5) provision of better rangelands; (6) and provision of efficient marketing channels.

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References

Al-Oun S., 1998. "Farmers' Sales Patterns in the Northern Badia of Jordan." Proceedings of the Sustainable Development of Mafraq Region and Future Prospective Conference, pp5-35. Al Al-Bayt University, Mafraq, Jordan.

Al-Oun S., 1997. Livestock Marketing in the Jordanian Badia. PhD thesis, Durham University, UK.

Berdegue J., Balsevic F., Flores L. and Reardon T. 2005. Central America's Supermarkets Private Standards of Quality and Safety in Procurement of Fresh Fruits and Vegetables. Food Policy 30: 254-269.

Chaudhry A., 2006. Jordan Retail Food Sector. GAIN Report. USDA Foreign Agriculture Service.

Cook R., 2004. "Supermarket Challenges and Opportunities for Fresh Fruit and Vegetable Producers and Shippers: Lessons from the US Experience," Paper presented at the Conference on Supermarkets and Agricultural Development in China – Opportunities and Challenges, Shanghai, China, May 24, 2004, <http://ucce.ucdavis.edu/files/datastore/234-240.pdf>.

Douthwaite B. and Ashby J., 2005. Innovation histories: A method for learning from experience. ILAC Brief 5.

Gorman W., Grassberger R., Abuamoud I., Al-Tabini R. and Al-Oun S., 2007. Profitability Assessment of the Tal-Rimah Dairy Processing Factory Badia Region, Jordan. Jordan Component of the Sustainable Development of Drylands Project Report # 2. University of Arizona, USA.

Kaplinsky R. and Morris M., 2001. A handbook for value market chain research. Available at: <http://www.ids.ac.uk/ids/global/pdfs/VchNov01.pdf>.

MoA, 2007. The national strategy for agricultural development 2006, Ministry of Agriculture, Jordan.

Parker J., 2005. Boom for US Exports to Jordan, Vol.129, No.38.

Peppelenbos L., 2005. The Chilean miracle: patrimonialism in a modern free-market democracy. Ph.D. Thesis, Wageningen University.

Reardon T. and Glewwe P., 2000. "Agriculture. Designing Household Survey Questionnaires for Developing Countries" Grosh M. and Glewwe P. (Eds.) Lessons from 15 years of the Living Standards Measurement Study. Washington, D.C., World Bank. 2: pp.139-181.

Sadoulet E. and De Janvry A., 1995. Quantitative Development Policy Analysis, The John Hopkins University Press, Baltimore and London.

Shahbaz M., Al-Oun S. and Ras R., 2006. "Moving from Research to Sustainable Community Development in the Badia of Jordan - Case Study: Tall Rimah Project." Drylands' Hidden Wealth - Integrating Dryland Ecosystem Services into National Development Planning Conference Amman, Jordan.

Staal S. J., Chege L., Kenyanjui M., Kimari A., Lukuyu B., Njubi D., Owango M., Tanner J., Thorpe W., and Wambugu M., 1997. Characterization of Dairy Systems supplying the Nairobi milk market. A pilot survey in Kiambu District for the Identification of target groups and producers.

Reardon T. and Berdegue J., 2002. 'The Rapid Rise of Supermarkets in Latin America: Challenges and Opportunities for Development', Development Policy Review 20/4.

Reardon T., Codron J.M., Busch L., Bingen J., and Harris C., 2001. "Global Change in Agrifood Grades and Standards: Agribusiness Strategic Responses in Developing Countries," International Food and Agribusiness Management Review, 2 (3).