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# Identification of opportunities in the traditional grass-lamb supply chain to create a value chain in Middle Atlas of Morocco

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**Abstract.** A value chain is a vertically aligned partnership between the alliances of a supply chain. It is used to support small holder farmers and to promote their incomes through better market integration and value addition. In Middle Atlas area the existing grass-lamb supply chain does not respond to the expectations of different actors involved. In order to valorize this traditional supply chain, this work was conducted to study relationships between different alliances to identify opportunities to explore. This study was based on field research and discussions with key actors in the province of Boulemane in the Middle Atlas of Morocco. The main results showed that there are promotional opportunities to create a grass-lamb value chain in the area. Good adaptation of local breeds, local expertise of breeders and large rangelands allow to produce a healthier and a lower cost lamb. However, disorganization, lack of relations between operators, the strong presence of speculators, and finally rudimentary slaughterhouse structures are the main factors compromising lamb valorization. A better organization of stakeholders should be encouraged and promoted to move from a traditional grass-lamb supply to a value supply chain.

**Keywords.** Value chain – Traditional supply chain – Grass lamb – Middle Atlas – Morocco.

## **Identification d'opportunités dans la chaîne d'approvisionnement traditionnelle de viande d'agneau broutard en vue de créer une chaîne de valeur dans le Moyen Atlas du Maroc**

**Résumé.** Une chaîne de valeur est une relation verticale entre les maillons d'une chaîne d'approvisionnement. Elle est utilisée pour soutenir les petits agriculteurs et pour promouvoir leurs revenus grâce à la valeur ajoutée à leurs produits et la meilleure intégration dans le marché. Au Moyen Atlas, la chaîne d'approvisionnement en viande d'agneau broutard existante ne répond pas aux attentes des acteurs impliqués. Dans le but de donner de la valeur ajoutée à cette chaîne, ce travail est réalisé pour étudier les relations entre ses différents maillons afin d'identifier les opportunités à explorer. L'étude est basée sur un travail de terrain et des discussions avec les acteurs clés de la chaîne au niveau de la province de Boulemane au Moyen Atlas du Maroc. Les principaux résultats ont montré que des possibilités de promotion pour créer une chaîne de valeur de viande d'agneau broutard existent. La bonne adaptation des races locales, le savoir-faire des éleveurs et les grandes superficies des parcours permettent de produire une viande de bonne qualité nutritionnelle et à moindre coût dans le Royaume. Toutefois, la désorganisation, l'absence de relation entre les opérateurs, la forte présence des spéculateurs et l'infrastructure rudimentaire des abattoirs sont les principaux facteurs compromettant la valorisation de cette viande. Ainsi, une meilleure organisation des parties prenantes devrait être encouragée pour évoluer vers une chaîne de valeur de viande d'agneau broutard.

**Mots-clés.** Chaîne de Valeur – Chaîne d'approvisionnement traditionnelle – Viande d'agneau broutard – Moyen Atlas – Maroc.

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## **I – Introduction**

A value chain approach (VCA) is a strategy that is used to adapt industries' activity to the markets and to the changing technologies. The basic characteristic of a value chain is market-focused collaboration. It is a vertically aligned partnership between production, processing and marketing ac-

tivities in the supply chain, in order to meet consumer demands and create value to the final product (Cantin, 2005). Unlike horizontal alliance, the product's value increases at each stage of a vertical aligned chain. Traditionally, buying decisions of commodity meat marketing systems are based on price. Little information is shared between the production and processing sectors. Producers do not have a feedback from consumers about the delivered meat quality in markets in order to make the necessary changes (Barnes, 2004). In Morocco small ruminant sector occupies about 1.6 million jobs in 2013 (Ministère de l'Agriculture et de Pêche Maritime, 2013). In this sector meat is still produced and marketed in the traditional way. The Middle Atlas area is one of the principal meat supplier regions to the country. The big part of this meat is produced on rangelands which cover about 1.3 million hectares in the Boulemane province (Direction Provinciale de l'Agriculture de Missouri, 2007). As an effort to identify opportunity to create greater value from the production, processing and retailing of meat from local sheep breeds, this work tries to study the current state of grass-lamb supply chain in Middle Atlas of Morocco. The main objective of this paper is to explore relationships between different alliances in the traditional grass-lamb chain, that create little added value, to identify opportunities that allow upgrading traditional supply chain to a value chain.

## **II – Materiel and methods**

In order to fulfil the purposes, the study was based on field research and discussions with key actors. Thus, 75 sheep farmers, 12 butchers and 10 intermediaries were surveyed in the province of Boulemane in the Middle Atlas of Morocco. In this study, the VCA framework of Kaplinsky and Morris' (2001) was applied in the context of local value chains. Their methodology has four main components. First, it maps the activities in the chain and characterizes the actors participating in it. The purpose of mapping the value chain is to give a visual presentation of the actors in the chain and connections between them. Second, VCA assesses governance structures in the value chain to understand the relationships and coordination mechanisms that exist between actors in the chain and how these may need to be re-structured to reduce the margins of the intermediaries in order to give more value to the farmers and a lower meat price to the consumer. Third, VCA highlights upgrading strategies based on constraints and opportunities in the chain. Finally, upgrading can involve a move into a new value chain altogether by using the skills gained from participating in an existing value chain.

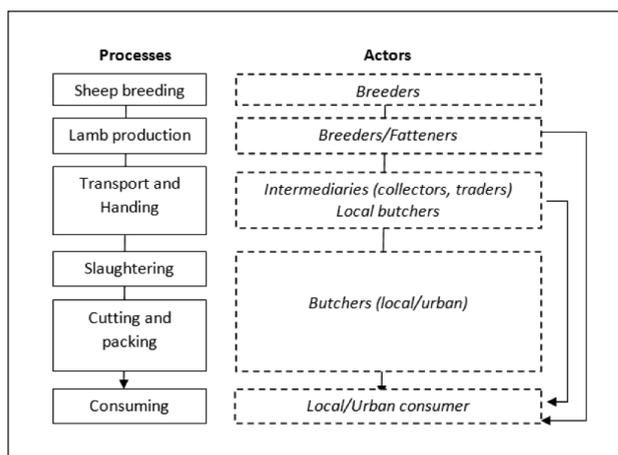
## **III – Results and discussion**

### **1. Activities and actors participating in the local lamb value chain in the Middle Atlas**

In the Middle Atlas, there are no exports of lamb and no value-addition either through all the lamb chain. It is a short and simple traditional supply-chain compared to the meat-value-chains in some other countries. Lamb is produced by breeders on rangelands, or finished by fattener in feedlots; bought by traders or local butchers. Traders collect animals from local markets then sell them to urban butchers or directly to consumers (in the periods of religious celebrations such as Eid El Adha), whereas local butchers sell lamb to local consumers (Fig. 1).

#### ***A. Input suppliers at the production system level***

Grass lamb production is based not only on local breeds (Timahdite and Beni Guil) but also on a foreign breed (Ouled Djellal) that is adapted to the local environment and population from cross-breeding. The feeding system based on the deliberate combination of the various feed resources existing in the area i.e. fodder plants, agricultural by-products, concentrate, pastoral plants etc. Two extensive production-systems were identified in the region: pastoral and agro-silvo-pastoral sys-



**Fig. 1. Lamb supply chain map.**

tem with a feeding calendar varying according to the year, the season and the animal category. The first system regroupes 47 farmers from mountains and hilly areas where the main raised sheep breed is Timahdite. This breed is usually raised on forestry pastures from spring to summer and on pastures of mountains' foothills during autumn and winter. The second system gathers 28 farmers situated in eastern part of Boulemane province, who raise their sheep on steppes of Alfa and sagebrush and who practice the horizontal transhumance during all the year. Herds move for long distance depending on availability of pasture in conjunction with the seasonal distribution of rain and water points. Pastoral sheep herds are characterized by a diverse genetic composition that constitute two breeds and their crossbreeds i.e. the local Beni Guil breed of the Eastern area of Morocco, the introduced Ouled Djellal breed originated from Algeria, and their cross the "Safrá" population.

During spring of a good year, animals are raised exclusively on pasture, except pregnant and suckling ewes which receive concentrate-feed-supplement. Whereas, supplementation becomes systematically practiced for all the flock during dry years. Purchase of concentrate feeds and forage starts in April to June. Farmers purchase from local wholesale grains traders in their warehouses, or from traders from distant regions on the weekly markets. In some cases such as periods of lamb weaning, the Sheep and Goat National Association (ANOC) might propose to its adherent breeders some industrial feed with an affordable price.

### ***B. Live animal supply at the market level***

All animals categories, weaned lambs and culled females, are concerned by selling operation that depends on the period, the season, the household treasury and the farmer's marketing strategy. In both extensive systems, two marketing streams are observed: a primary one links the production area to the local weekly markets and a secondary one runs from the production areas to the cities. Indeed, the local markets represent a marketing link between rural areas and cities which are characterized by a highly differentiated offers and a wide range of stakeholders.

- a) In agro-silvo-pastoral system, two categories of lamb farmers were identified according to their marketing strategy. The first represents 58% of surveyed farmers that sell their product, usually fattened lambs and not reproductive ewes, during the religious sacrifice feast in order to take advantage of relatively better sale prices and culled females are sold along of the year. The fattening process takes place during 3 months and begins always from Ramadan

month (Muslim fasting month that begins 100 days before the Feast). In 80% of cases, fattened lambs and ewes are sold often in local market as a group of 10 to 20 animals to collectors and small traders to avoid constraints of long distance transportation to markets of big cities. Collectors are usually traders that purchase animals from different local markets and sell them in the cities' markets to meat wholesalers or butchers, whereas small traders sell their purchased animals to other traders in other local markets or to collectors. The rest of farmers sell their animals in the markets of Fez and Meknes cities. The second category includes farmers who sell their lambs and culled females out of Eid El Adha period to cover feeding costs as well as household's needs. In these farms around 19% of reproductive ewes are sold each year as culled females. Between April and July, when fodders and concentrate feeds are available on market, 51% of the annual lamb production of these farms and a part of culled females are sold to collectors and fatteners; while 42% of this production is sold during the rest of the year in addition to the culled females according to the treasury of the household. Such animals are sold regularly (twice a month on average) usually in local markets where butchers and other breeders are the principal purchasers.

- b) In pastoral system, the majority of surveyed farmers (78%) are "fattening breeders" that sell their animals only during Eid El Adha period after fattening them for 3 to 4 months. Fattened lambs are sold on this religious occasion in markets of big cities such as Casablanca, Fez, Meknes, Nador and Rabat where urban consumers prefer animals from "extensive" systems. Collectors and traders are the principal purchasers of these animals. The rest of the surveyed farmers prefer selling groups of young weaned lambs in local markets to intermediaries, feeders or butchers in order to avoid feeding costs. Around 15% of culled females in pastoral farms are sold along the year also in local markets.

### ***C. Carcass and meat supply at rural slaughterhouses***

Out of Eid El Adha period, lambs produced in this area are usually consumed locally. Animals are sold to local butchers or to small traders that sell them in other local markets in the neighbouring area. Animals are transported to slaughterhouses by traditional means (carts...). Slaughterhouses, especially rural one consist of a rudimentary building, small and non-mechanized. It is equipped with a tap water and not fulfilling all hygiene international requirements. The bleeding as well as the despoliation of the animal is done in the same area. After slaughtering, carcasses remain attached until the veterinary inspection which is handled in some cases by a technician from the veterinary service of the region. Veterinaries or technicians stamp the carcass after the examination of the liver, the lungs, and the presence of enlarged lymph nodes... After that, carcasses are transported to butchery in carts or on shoulders if the butcher does not have any vehicle. The number of purchased lambs depends on the season and the storage capacity in the butcheries. Meat is sold in traditional butcheries which are equipped with the most simple machines: a refrigerator and a meat grinder. Storage of meat do not exceed one week. Meat is sold per kilo without taking into account the type of the piece. Its price is previously defined by the local authority.

## **2. Governance structures in the value chain**

### ***A. Relationships between alliances***

Farmers do not give any importance to the type of the buyer or to the nature of the relationship existing between them. Price is always negotiated between both parts. In fact, the different actors have already an idea about the price from other local markets in the region. However, intermediaries are key players in the supply-chain, especially in terms of determination of the price. They try always to buy animals at a lower price and to take advantage from breeder's crises such as in-

tense drought, need for money... to amplify the gain. During the recent drought crisis for example, male lambs could be purchased at an average price of 400 DH and sold in the same day at an average price of 600 DH in urban area or to fatteners; while the price of purchasing of culled ewes do not exceed 200 DH. Out of crises, the increase depends on the type of intermediaries and the period of the year. The most important price increase is observed during Eid El Adha imposed by collectors in major consumer areas. The price of animal can be enlarged from 500 to 2000 DH compared to the price in the local markets (US dollar = 9 DH).

During this period, in local markets fattened lambs are sold in form of big groups (on average 10 heads) to collectors for an average global price of 20,000 DH for the 10 lambs, or sold in form of little groups (between 3 to 5 heads) to small traders for a global price ranged between 6,000 and 10,000 DH, or for local consumer for an average price of 2700 DH per head. Small traders transport and sell their lambs in other neighbour local markets for prices ranged between 2200 and 2500 DH per head to other collectors, or sell them individually for local consumers for an average price of 2700 DH. Collectors transport and sell individually their lambs in the big markets of cities to urban consumers at least at 3500 DH, depending to the type of market. According to this, we can conclude that the speculative attitude of intermediaries in the traditional supply chain of lambs' meat allows them to accumulate value.

Out of Eid Al Adha period, the average price of a non-fattened lamb in local market is 1700 DH and that of reformed ewes is around 500 DH. The main purchasers during this period are fatteners, small traders or local butchers. Transported in urban area, which is not so frequent, the price of male lamb does not exceed 2000 DH.

In butcheries, meat price is already predefined by the local authority. In rural area, the price for 1 kilo of lamb is 60 DH, however in the urban area it is at least 75 DH because it depends on the type of butchery and the places in the urban areas. Though, farmers and butchers are not satisfied by these prices because of the strong presence of intermediaries. The first group affirmed that they are not paid for the quality of the meat they are produce. The second group find that their margin is very small.

## **B. Information flux through the chain**

The organisms involved in the management of small ruminants meat industry in Morocco are the Ministry of Agriculture, the National Association of Sheep and Goat (ANOC) and the National Office of Food Safety (ONSSA). All of them are represented at the regional level. ANOC is having a strong partnership with the breeders in the area. However, not all the breeders are adherent to this association. Its members benefit from health and management of breeding supervision provided by the technicians of the association. There is communication between the breeders and the responsible of the association, while in their meetings, the main subjects discussed between breeders concern the variation of prices of concentrate feed and the price of live animals in the market. Serious problems like the increased rate of mortality, the lower rate of prolificacy and fecundity, the lower potential of production... are not considered.

The Ministry of Agriculture is mainly responsible to put rules and regulations regarding farm and genetic management. The veterinary service represented by ONSSA is responsible of issues concerning meat safety, animal health and disease control. Communication between actors involved in lamb supply chain and those of these two organisms is almost absent. Communication is restricted to some periods like draught when breeders get access to subsidised feed or when farmers suspect any disease in the region.

### 3. Opportunities outlining

Grass lamb supply chain opportunities and difficulties can be addressed using a value chain approach. The good adaptation of breeds, the local farm management practice, the use of natural resources may allow farmers to be the lowest-cost suppliers for relatively expensive and healthier lamb. Indeed, in our study the cost of production of 1 kilo of live weight of a non-fattened male lamb aged 180 days in extensive farms was estimated at 6 DH vs 8 DH in intensive farms. In addition, the proportion of healthier fatty acids in lamb from extensive systems is higher than that from intensive system. This meat contains lower proportion in palmitic fatty acid (C16:0), responsible for higher increase cholesterol in the blood, and more of polyunsaturated fatty acids of the omega-3 family, such as the linolenic fatty acid and its homologues long chain acids. The ratio of the omega 6 and omega 3 fatty acids (n-6/n-3) is also much more favourable than that found in indoor raised lambs (Araba *et al.*, 2009; Dufey, 2012). These qualify the Middle Atlas lambs' meat as a quality product that should be valorised.

These improvements aim first to increase farmers and butchers gains, to encourage young people to continue in sheep farming and to ensure the durability of the chain.

### 4. Upgrading to a value chain

In Middle Atlas, some important aspects need to be improved in order to valorise the produced grass-lamb, in order to market it in urban areas, even out of the period of Eid.

A better organization of stakeholders ensuring continuity of information and the transmission of origin, enables reliable and regular supply, and allows developing common rules and product specifications, etc. should be encouraged and promoted. The recent development of large retailers (supermarkets) in the country seems also to be favourable to a valorisation approach because these structures have the ability to segment the supply of meat. In fact, these spaces, which target a wide variety of clients, intend to offer to these consumers a wide range of products by providing as much information as possible on these products (through their labelling system), which is not always provided by butchers. These spaces can be target to market the grass-lamb. So, a kind of collaboration between grass-lamb farmers of the Middle Atlas and these large retailers should be settled, allowing the Middle Atlas grass-lamb be marketed for a relative higher price than that of the conventional product for consumers who seek for a quality product, then an add value could be created along the chain and could be shared between all the involved actors: farmers, intermediaries and butchers.

We can then resume that a value chain approach can be applied if communication between different actors is realized, information is shared and a feedback system from consumer to producer is established. Consequently, a regulatory framework for labelled meat will be created and an added value will be given to the Middle Atlas grass lamb.

## IV – Conclusion

Value chain can improve quality, increase system efficiency and develop a differentiated product. There is always an opportunity to produce a safe and health lamb in the country when producers, processors and retailers track products through the lamb chain. Opportunities exist to achieve lower costs and to increase efficiencies in the market if producers, processors and marketers collaborate.

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