

Wool Feasibility Study



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Purpose

The purpose of the feasibility study is to assess conditions and market opportunities which could be utilized through better linkage between the sheep-farmers and producers, and to outline key items and success factors which will have to be considered as part of the overall project. The study will appraise and present the findings on the existing wool supply chain and the quality of raw materials, while assessing the potential for BiH to extend this supply chain and produce higher quality of wool and wool products. Based on the results and key finding, the study will cover detailed recommendation and implementations steps aimed at creating organized and coordinated purchasing/production chain with defined links and access to the market place.

Method

Material for this study was collected through contacts, meetings and surveys. It will be used relevant official sources, publications, textbooks as well as personal experience, data base and documentation.

1. Executive summary

If one would be asked to describe the wool market in BiH in one word, he would shout 'Disarray'.

Wool market in BiH is heavily fragmented. One segment of the market, organized collection, is missing. Each segment of the market lacks information from other complementary segments and this additionally aggravates situation. ***Farmers do not know where they can sell wool. Wool dealers are missing significant quantities of wool. While farmers across the country are reporting stocks of unsold wool from the last two or three years in their barns, the biggest wool dealer is planning to import 800 tons of wool from Croatia and export it to Turkey.*** Some processors complain that they cannot locate farmers who produce finer wool. Handcraft sector is complaining that they have difficulty with finding yarn made of finer wool.

Most of the domestic wool is of a low quality in term of appropriateness for production of fabric for use in textile industry. Therefore, purchase price of wool is low.

Key issue: Textile BiH sector which was the biggest consumer of domestic wool has almost entirely vanished. Those who survived suffered devastation in terms of their infrastructure and are now hardly coping with the cheap synthetic fiber industry products from China which has flooded BiH market. Existing textile companies complain of lack of finer wool which they use in their operations. Some smaller capacities for wool processing and production of semi finished products (washed wool , carded wool, yarn) emerged after the war as result of joint actions of international agencies and competent Ministries in order to support primary producers and resolve problem of wool.

A few small companies, recently founded, recognized potential of the sector of traditional woolen products such as carpets, garments, covers, bedding etc. Techniques used in these companies are manual, labor intensive operations employing mainly women. Although these companies are using woolen semi finished products such as yarn they complain that the domestic yarn hardly meets requirements of this industry.

This study will try to answer some of the questions posed after the first glance on the wool market in BiH. Main segments of the wool market in BiH will be identified, constraints for each sector described and viable recommendation will be proposed.

Special attention will be given to linking of farmers to the potential wool market channels, identifying sales opportunities, while creation of employment opportunities for the poor will be considered within the identified wool value chain.

Wool production is a part of sheep sector. A part of this study will be devoted to recommendation for securing additional profits and working posts for the farmers through introduction of new products, such as milk, cheese and vermi-compost which would ultimately lead to improvement of sheep farm productivity and profitability.

2. Introduction

Wool production and collection as a primary part of the wool market was well organized in BiH before the war. Cooperatives as part of business-agricultural corporations were collecting and marketing all surpluses of wool from private farmers and state owned stock farms. There were three major such 'combinates' operating in BiH and providing all food and agricultural commodities: HEPOK in the southern region of BiH, UPI in the central and eastern part and AIPK Krajina in the eastern part of BiH. Each corporation had the entire production cycles closed: primary production, processing, packaging and distribution network. Their regional branches were covering every territorial segment of the specific market, and like any other commodities, all wool surpluses were collected and forwarded along the market chain.

Domestic wool was used by textile industry sector which gathered several big factories and corporations. Textile market of former Yugoslavia was a stable economic sector. One, big textile corporation for production of wool carpet (major portion of production) and other complementary products consumed the entire annual wool production of former Yugoslavia. This company at some point was exporting over 50% of their production. Major component of all their products was wool. In addition, each factory has had military production program and this component sometimes made over 40% of the entire annual orders for some products. Also, most of the military programs used a great deal wool as major component of final products.

Domestic wool supplies before the war were insufficient to satisfy demands of textile industry. It made only 15% of the entire wool consumption. The rest of wool was imported from Australia and New Zealand.

Domestic wool was not appropriate for the use in textile industry. It had to be mixed with the Merino wool or wool of breeds crossed with the Merino. Wool of cross breeds was appropriate for carpet industry.

Quality of wool and its appropriateness for textile industry is, amongst other factors, judged by its finenesses i.e. diameter of wool fiber and is measured in μm . For the Merino breeds fiber this parameter is 18 μm and for the Pramenka 35 to 40 μm (*see Annex 3*).

Number of pre war sheep population in BiH was close to 1.3 million heads (*see Annex 1*). Over 80 % of the sheep population was domestic Pramenka with some variations within the breed, while 20% were cross breeds with more productive breeds mainly with Wuirtemberg or Merinolandschaf. The state breeding program with 13,000 sheep on 7 stood farms introduced this breed in order to increase productivity of the domestic sheep and decreased dependence on import of wool. Private farmers were buying rams from the stood farms.

2.1. Current situation

System of cooperatives has not recovered. Collection of wool in some regions does not exist at all. Existing forms of organization do not have capacity to perform the role that belongs to them.

Almost entire textile sector of BiH has vanished. Once the strong economic segment employing thousands of workers, has had collapsed during and after the war. Only few businesses survived but they are hardly coping with cheap Chinese and Indian fiber industry. Wool producers lost a reliable partner.

Sheep sector is in the process of recovery. Current estimates are showing that it reached 75% of the pre war sheep population which is above 1,000,000 heads (see Annex 1). It yields some 1 400 tons of wool per annum (see Annex 2).

Key note: While large amounts of wool are thrown into the rivers and forest in the regions where sheep business is dominating but the sheep are not being sheared, the biggest wool dealer is preparing to import 800 tons of wool from Croatia and export it to Turkey.

Links within processing sector and its complementary segments are weak or in some cases do not exist at all.

2.2. Background

2.2.1. Sheep subsector

Sheep breeding is an important and traditional activity in Bosnia and Herzegovina (BiH), particularly in the hilly and mountainous regions of the country where there are few alternative forms of production or income generating opportunities. However, the BiH sheep flock has been in steady decline for more than twenty years.

This decline accelerated during the recent conflict resulting in a reduction from pre-1991 levels of approximately 1.3 million head to current levels of approximately 1,030 000 head, representing a 76% of prewar population. Some estimates suggest that that during the war the total number of farm animals has been more than halved.

Table1. Sheep population, source Bosnia and Herzegovina state veterinary office

Year	1990	1996	2007
Sheep population	1 318 673	787 759	1 030 654
Index	100%	59,7%	75,9%

2.2.2. Sheep farm characteristics

Pre-1991, individual farmers privately owned ninety percent of agricultural land. Average farm size was approximately 2.5 ha. Migration during the conflict was high. Many of those owners have not yet returned to their land with the consequence that a high percentage of arable land and improved pastures and meadows are not currently being cultivated. In addition, in the absence of a land market for land sale and/or leasing farm size have not and are not envisaged to change significantly in the foreseeable future.

The traditional sheep production system both pre- and post conflict has tended to be small flocks kept on small-scale mixed farms. Sheep production was, and is, seen as a minor farm activity, predominantly undertaken for home consumption purposes (with only small marketable surpluses generated). It is estimated that the majority (95 %) of professional sheep-breeders in BiH today own sheep stocks of 20 to 50 ewes. It is estimated that only 3 % of the sheep-breeders own flocks between 50 to 100 ewes and 2 % have flocks of 200 ewes or more.

In some regions of BiH farmers keep their flocks on the higher mountains and hillsides during the summer (May to Sept.) and on the slopes of the valleys in the autumn (Oct/Nov). Pre- 1991, winter migration, especially from Central Bosnia, to feeding grounds in the lower northern regions, was common.

2.2.3. Characteristics of domestic breed

Almost the entire sheep population in Bosnia and Herzegovina belongs to the Pramenka breed. There are estimates indicating that over 80% of the BiH sheep are the local Pramenka breed with different regional varieties. The remaining 20% tend to be Pramenka-Merino with a smaller number being other crossbreeds. Within the Pramenka breed there are a number of sub-breeds found in specific regions. Merino and other crossbreeds tend to be found in the eastern and southern regions of BiH in the vicinity state owned stood farms.

Pramenka is bred and kept by small farmers for production of meat, milk and wool. Defining characteristic of the breed is the animal's right-angled trunk.

There is a great number of local types, which differ in height (from 55 to 67 cm), weight (ewes from 25 to 60 kg, rams 40 to >100 kg), milk production (from 40 to 110 liters- one third of this amount goes to lamb) and wool (0,750 to 3 kg). Wool of Pramenka is white except the hair on head and legs, which can be black. One can find even pure black sheep. Rams have strong horns, ewes are usually without them. Pramenka finishes its development with 3-4 years of age. As mentioned above, 80 percent of income from sheep production comes from meat. 50% of body weight is eatable. Lambs after birth weigh 2-4 kg and 20-40 kg by the time of a slaughter. Their meats are specific in taste and appreciate at consumers. All types are endowed with an excellent ability to survive and reproduce in harsh climatic conditions and on poor pastures. Some types are specially developed for transhumant production systems. Types of Pramenka are mostly different by their location of breeding, and lesser by its morphology and characteristics.

The most important types of Pramenka in BiH are Dubška (Vlaščka), Privorska, Kupreška, Podveleška (mountain seep of Herzegovina), Stolacka and Sjenicka. During the summer and fall, sheep are fed only by pasture and during the winter by hay.

The Sjenicka type of Pramenka was traditionally kept in the eastern part of the country and was used as a multi-purpose breed. Its conformation and adaptability to various geographic regions of the country made it an ideal base for developing a meat sheep suitable for the major part of the country.

As for milk production, Dubška and Privorska types are of special importance. Farmers for milk production have developed them in nomadic system. Dubška sheep is kept mostly in the area of Vlašić Mountain where, according to the data from 1991 there were some 140.000 animals. Privorska sheep is considered the best type of Pramenka by the production of milk. Pure breed can be found around town Gornji Vakuf, and near or on mountain Vranica

Kupreška sheep is a little bigger sheep then other types of Pramenka. Its wool production is poor, but they have a very good milk production. Podveleška and Stolacka sheep can be originally found in the southeastern part of B&H where pasture is very pure, so these sheep are smaller than other types. They are mostly kept because of milk.

In the past, there were many projects to improve production of meat, milk and wool. Some were based on selection within the given type of Pramenka (e.g. development of Dubška type, Sjenicka type) and some on imported breeds, which were used to improve some of production traits.

The most comprehensive program called "Merinization", aimed at improving wool production, was carried out from 1947 to 1950. Local and imported Merino type rams were used for artificial insemination (some 800.000 ewes were inseminated in one year in the former Yugoslavia) of local ewes. The first generation produced 25 to 50 percent more wool than local sheep, but the sheep were lighter, smaller and more susceptible to parasitic and infectious diseases. In addition, farmers did not accept the program, which was implemented without their consensus and participation. The most successful and promising breeding programs aimed at increased meat production were those based on the Sjenicka type of Pramenka.

2.2.4. Production potentials

Production tends to be undertaken for both meat and milk. The production of lambs for barbecuing has a long tradition in BiH and is still considered to be the most important market for producers (with the exception of some specific areas such as Travnik, where sheep cheese is the main focus of production).

Sheep tend to have an average weight of between 40 to 60 kg for the females and 60 to 100 > kg for the males. Milk production is on average between 60 to 70 liters per lactation (excluding milk produced for suckling lambs).

Estimates suggest that over 60% of lambs are sold per annum/for barbecue consumption. Meat production tends to be about 45% of the carcass weight for adults and 50% for lambs after dressing. Lambing rates are estimated to be around 90%. Lamb raising rate is estimated to be around 80%.

Milk production is on average between 60 to 70 liters per lactation (excluding milk produced for suckling lambs). An average flock of 100 milking ewes would produce milk for 2200 kg of a special cheese, which is sold at local and external markets.

The white wool of the Pramenka has a fiber diameter between 35 μ m to 40 μ m on average. Lock length average is between 12 to 20 centimeters. Wool yield is 1.7 kg per sheep. Dressing out of wool is estimated to be between 50 to 70%.

Overall it is estimated that the genetic productive potential of the breed today is greatly underutilized (approximately 60 % to 70%). This is related to problems of poor feeding and housing, resulting in both low milk and meat yields. Improved production conditions on some farms suggest that meat and milk yields can be increased by between 30 to 40 %.

2.2.5. Constrains of the sector

Sheep sector is traditionally dominated by small scale sheep breeding and production systems. Farmers lack technical knowledge resulting in low productivity and profitability of the farms. Development strategies for individual agricultural sectors are not implemented. There are no specialized breeding institutions and professional staff supporting sheep sector. Number of indigenous pure bred high genetic Pramenka pedigree flock is minor and it cannot satisfy increasing demand in this market. Support of existing extension services (mainly regional level) is insufficient to support producers and offer timely and valuable advice and information. There are no permanent training and demonstration facilities for sheep farmers. Association or cooperatives in sheep sub sector are still rear and are not recognized amongst the farmers as an opportunity to strengthen their market position. Farmers usually act individually thus exposing themselves to the market risks.

Market and distribution channels are weak and in some segment are blocked (particularly for wool); rural market support services (e.g. commercial feed traders and distributors, agri-business, slaughterhouses, agro-processors, traders, etc.) are weak. Market information services do not exist.

2.3. Wool

2.3.1. Some history

For thousands of years, sheep have been able to adapt to even the harshest of environments, as their wool protects them through hot, cold, damp and dry seasons. In this time, man has also used wool for this very protective property and for the many other benefits offered by the material. Because of their crimped nature, when wool fibres are packed together, they form millions of tiny air pockets which trap air, and in turn serves to keep warmth in during winter and out in the summer.

Wool was probably the first animal fiber to be made into cloth. The art of spinning wool into yarn developed about 4000 B.C. and encouraged trade among the nations in the region of the Mediterranean Sea.

The first wool factory in England was established in 50 A.D. in Winchester by the Romans. In 1797, the British brought 13 Merino sheep to Australia and started the the country's Merino sheep industry.

2.3.2. World wool production

There are 40 different breeds of sheep in the world producing a rough estimate of 200 types of wool with varying standards. The leading countries in wool production traditionally are: 1) Australia 2) New Zealand 3) China 4) Former Soviet Union and 5) Uruguay. These five countries represent about two-thirds of all world wool exports each year. Currently, world production of clean wool is about 1.42 billion tons, which amounts to slightly more than 0.33 kg per person.

About 80% of the world production is apparel wool, used for clothing and similar fabric; designated as combing, French combing, or clothing wool. The remainder is carpet wool, used for rugs, carpet padding, and similar materials.

2.3.3. Wool properties

Wool properties are result of its chemical composition and very complex protein structure.

Table 2. Wool average chemical compositions (Krajinovic)

	carbon	hydrogen	oxygen	nitrogen	sulphur
%	50	7	22-25	16-17	3-4

Each wool fiber has an outer layer of flat, scale-like cells which overlap like shingles and which are covered with a thin membrane. This is known as the epidermis. This membrane repels rain, but water vapor can penetrate it. The protein cells in the center of the fiber absorb the moisture, which may penetrate the membrane. This is known as the cortex. This property allows water-soluble *dye* to react with the proteins so the color becomes an integral part of the fiber.

A single wool fiber may be from 18 to 41 μm thick and 4 cm to 14 cm or more long.

The attributes of wool include fineness, length, crimp, color, strength, uniformity, and in grease wool, percentage of foreign material.

Fineness is considered the most important. Fineness is important because it allows the spinning of a finer yarn, tighter weaving of cloth, and production of lighter fabrics and garments.

Wool is elastic. It can be stretched 30% or crumpled tightly, and will recover its natural shape rapidly. This property becomes a built-in characteristic of fabric that has a high percentage of wool. It may be wrinkled, twisted, and stretched, but will regain its shape if allowed to hang overnight.

Wool has crimp. This natural wavy appearance adds to its effective elasticity, but also provides other advantages. Crimp prevents the individual fibers from lying close to each other in cloth. This produces a bulky effect with tremendous insulation value. Depending on texture and fineness of the fiber, from 60%-80% of the volume of woolen fabric may be air.

Wool is strong. It is often said that a single wool fiber is stronger than steel of the same diameter.

Wool's unique advantage is its breathability. That is its ability to absorb and release moisture from the surrounding air, without compromising its thermal efficiency. When wool fibres absorb moisture, they generate tiny amounts of heat. While the exterior layer of a wool fiber is hydrophobic (water-resistant), its inner layer, its cortex, is hydrophilic (water-loving). The cortex can absorb about to one-third of its weight in moisture without feeling damp.

- Wool is natural, renewable and sustainable material
- It causes no irritation to the eyes, skin or lungs and wool fibres present no hazard to human health
- Wool fibres are breathable, meaning they can absorb and release moisture without reducing thermal performance unlike fibre glass based products which make it a perfect insulation material
- Wool does not support combustion and will extinguish itself in the event of fire
- Sheep wool is static resistant. Wool has very little tendency to collect static electricity because wool naturally absorbs moisture from the air.
- Wool absorbs noise and reduces noise levels.
- Wool is dirt resistant. Wool's ability to absorb moisture and therefore its low build-up of static electricity means that wool does not attract lint and dust from the air. The crimp in the fiber and the scales on the outside of the fiber keep dirt from penetrating the fabric.

2.3.4. Wool processing

The processing of wool involves four major steps. First comes shearing, followed by sorting and grading, making yarn and lastly, making fabric.

Sheep are sheared once a year, in early spring or early summer. The best wool comes from the shoulders and sides of the sheep. This is followed by grading and sorting, where workers remove any stained, damaged or inferior wool from each fleece and sort the rest of the wool according to the quality of the fibers. Wool fibers are judged not only on the basis of their strength but also by their *fineness* (diameter), length, *crimp* (waviness) and colour.

The wool is washed to remove impurities, sand and dust. After the wool dries, it is *carded*. The carding process involves passing the wool through rollers that have thin wire teeth. The teeth untangle the fibers and arrange them into a flat sheet called a *web*.

After carding, the processes used in making yarn vary slightly, depending on the length of the fibers.

Woolen yarn is generally made of shorter and thicker fibers that may lie in all directions, to produce thicker, fuzzier fabrics, such as tweeds.

Worsted yarn is made of longer, finer fibers, so the fabrics will be lighter and have a harder, smoother finish.

Wool manufacturers knit or weave yarn into a variety of fabrics. Wool may also be dyed at various stages of the manufacturing process and undergo finishing processes to give them the desired look and feel.

3. Findings

3.1. Market segments analyses

There are 5 segments identified in the wool market in BiH:

- Production
- Collection
- Wholesales
- Processing and
- Production of final products

Production is organized on farms and estimates indicate that some 1400 tons of wool is harvested annually. Harvesting is seasonal job and it takes place from April till June depending on the region. Harvesting in BiH is done mainly manually and price of wool is low. Apart from majority of wool produced in BiH being inappropriate for industrial use, dealer and processors are also complaining that wool has too much dirt and burr. Producers should make an effort to prevent contamination of fleeces. Feeders which keep hay and chaff off the backs of sheep should be used. Hay should not be carried or thrown over the sheep. Grain should not be poured over their heads. Sawdust or shavings should not be used as the sole type of bedding. Burr-producing plants should be removed from pastures.

After harvesting, wool should be collected but this segment is very weak and in some regions does not exist at all. Therefore, a significant quantity of wool stays out of market channels. Some estimation by main dealers suggests that some 400 tons were not collected last year. Collection should be the job of associations, cooperatives and farmers groups. Currently, collection is performed by 2 wholesalers and 3 processors. They very often lack information on quantity of available wool; farmers often misjudge quantity of wool and give wrong information to collectors. Collectors are not able to cover the entire territory of BiH. Wholesalers and processors would prefer organized way of collection, completed by someone else. Collectors question quality of wool in terms of impurity, wrapping and packaging. Packaging is particularly a problem for the biggest wool dealers who export wool to Turkey as greasy fleece. Fleece should be kept in one piece but due to inadequate shearing, this is often not the case.

After being collected wool goes into 2 channels:

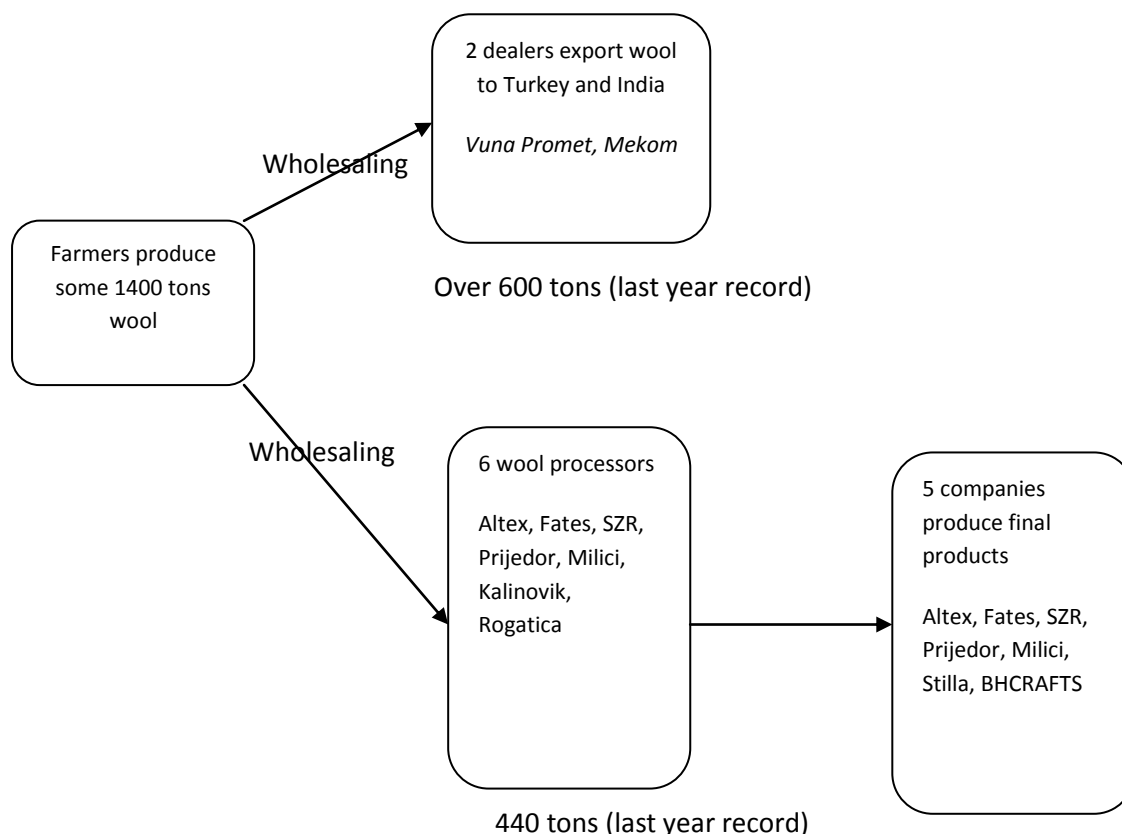
- Export of greasy fleece to Turkey, and
- Wool processing.

As outlined above, 2 BiH companies are dealing with export of greasy fleece and according to their records they have exported some 600 tons of wool last year.

Six companies are engaged into processing of wool. Five plants can do washing, carding and spinning of yarn and 1 company can do washing and carding only. Five companies can produce final products. Of these 5 companies producing the final products, 2 are making handmade items. Industrial products are carpets, pillows, beddings, mattresses, covers etc. Handmade products are various pieces of garment, gloves, hats, decorative items, toys, carpets etc.

Links between processors and producers of the final products are weak. Two handmade producers complain that yarn that they buy locally does not meet requirements of this sector. Yarn producers should fine tune their technology and agree on the quality of yarn that their partners need.

Wool market channels



Value chain

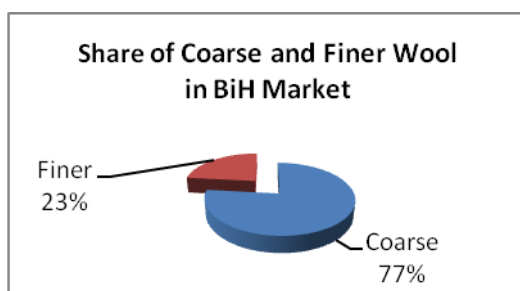
Price of raw wool has always been low and wool has never presented significant source of income for farmers. It represents less than 1% of their gross income.

Price of greasy fleece or coarse wool (35 μm to 40 μm) is 0.3 to 0.6 KM for 1 kg. Price of finer wool (28 μm to 32 μm) is 0.8 to 1 KM for 1 kg. For comparison price of the Merino wool in the international market is about 8 USD. Price of 1 kg of washed wool is 2.2 to 2.5 KM. Price of carded wool is 3.5 for 1 Kg. Price of 1 kg of wool in final industrial products varies from 32 to 35 KM. These products are industrial carpets, beddings, mats, mattresses pillows and similar items. However, price of 1 kg of wool can reach several hundred KM in handmade garment, hats, carpets etc. It should be mentioned that the high price of the last products apart from design and quality, is also contributed by strong marketing component. Namely, BHCRAFTS (*see Annex 4, 7.4.8.*), an export oriented company, is leading professional and well organized marketing campaign which adds value to their products. This is an excellent example how marketing is important in modern business practices.

3.2. Raw wool market

Quantities of wool produced in BiH amount to some 1400 tons per annum. It is estimated that 80% of sheep population in BiH belongs to the Pramenka breed and rest to the Wuirtemberg cross breed. It can be concluded that 77% of wool or some 1150 tons is coarse wool and rest of about 23% or 350 tons is finer wool (Figure 1).

Figure 1



Diameter of the Pramenka fiber is from 35 μm to 40 μm which make it inappropriate for the use in textile industry. It is called coarse wool. Yarn made of this type of wool can be used for hand knitting and weaving.

Biggest quantities of coarse wool in the market are purchased by wool dealers as greasy fleece (raw wool). According to the records of the two biggest dealers **Makom and Vuna Promet** (*see Annex 4*) some 600 tons of this type of wool was purchased and exported to Turkey and India last year. They also stated that they were missing some 400 to 500 tons of wool last year. Purchase price varies from 0.35 KM to 0.60 KM for 1 kg of wool. First dealer stated possibility to export over 1000 tons of this type of wool annually to Turkish market; with further 800 tons from the second dealer sold to the same market independently.

Biggest problem the dealers have identified is a lot of dirt in the fleece, shearing technique (shearing machines should be used instead of scissors), external parasites (scabies) and inappropriately wrapped fleece. Namely, this fleece has a special purpose (it is a kind of wedding gift in Turkey) and should be kept in one piece. It often happens that fleece is delivered in several pieces which decreases price of the wool and makes it inappropriate for this purpose.

3.3. Processed wool figures

Most of wool harvested in Bosnia and Herzegovina or 69 % is sold as greasy wool (Figure 2). It is mentioned earlier that this wool is exported to Turkey and India.

Some 440 tons of wool or 31% of all harvested wool is processed in 6 plants (Figure 3).

Figure 2

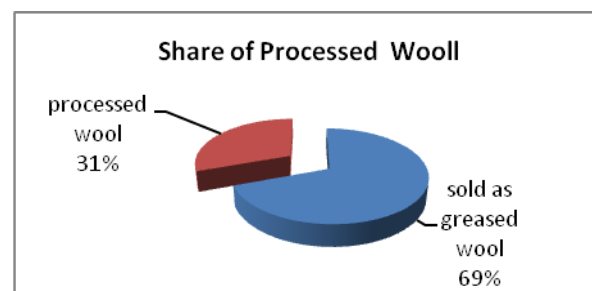
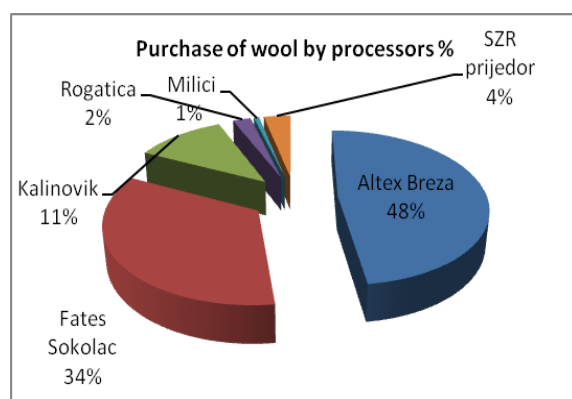


Figure 3



Altex collects some 210 tons of greasy wool or 48% of all wool purchased for processing. Fates purchases 150 tons or 34%, Kalinovik collects 50 tons of wool or 11%, Rogatica 10 tons or 2%, Prijedor purchases 15 tons or 4% and Milici only 3 tons or 1% of the all wool purchased for processing. Kalinovik and Rogatica collect most of wool from farmers and do washing for farmers (see Annex 4).

Processed wool is mainly finer wool and it originates from Wuirtemberg cross breed (finer wool) whose diameter ranges from 24 μm to 30 μm (A and B class). Diameter of the Wuirtemberg cross breeds ranges from 28 μm to 32 μm (B and upper C class) and it is appropriate for the use in industry (see Annex 4).

This wool is mostly used by the only carpet factory in Sokolac. Estimates suggest that some 350 tons of this type of wool can be collected in BiH mainly in wider Romanija region, Rogatica, Han Pijesak and some areas of eastern Hercegovina. Purchase price of this type of wool is 0.8 KM and in some cases if wool is cleaner even 1 KM for 1 kg.

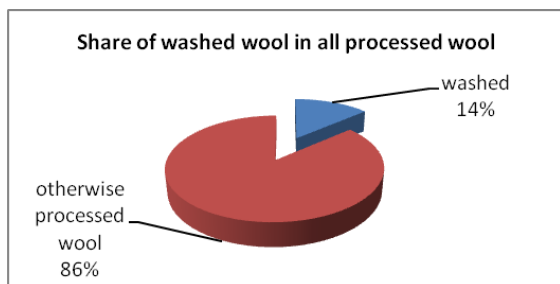
Before being incorporated into the final products, wool must be washed, carded and converted into yarn. Carded wool is used for production of mattresses, beddings other stuffed items. Yarn is used for knitting, weaving. Products are industrial carpet, covers, rugs, beddings textile garments etc. Price of carded wool is 3.5 KM for for 1 kg. Price of yarn is from 12 to 14 KM for 1 kg.

All interviewed yarn processors complained about lack of finer wool such as Wirtemberg type. They have also stated that wool in general has a lot of dirt and presence of burdock (*Arctium lappa*) which hooks on the wool fiber on the pasture and additionally increases dressing percentage (less wool for yarn).

3.3.1. Washed wool and carded wool

Some 60 tons or 14% of all processed wool finishes as washed wool in 2 processing plants in Kalinovik and Rogatica (Figure 3). This operation is performed as service for the farmers, who are using it for home purpose. Other 380 tons of wool or 86% is further processed into carded wool and yarn. Two processors Milici Plant and SZR Prijedor produce 5 tons of carded wool and use it in their own production (see Annex 4).

Figure 3

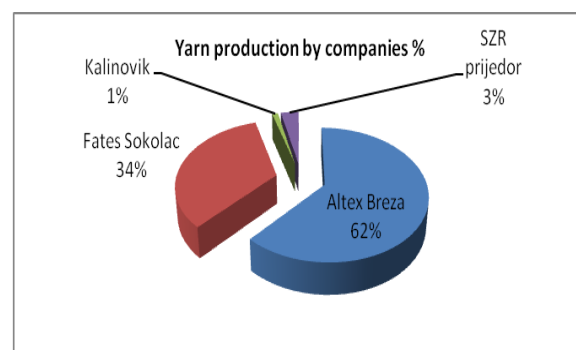


3.3.2. Yarn production

Total yarn production of 4 plants is some 178 tons. The biggest producers are Alteks Breza with 110 tons and Fates Carpet Factory from Sokolac with 60 ton annually (Figure 4) They produce 96% of all produced yarn in BiH. Alteks is producing yarn through contracted order and exports over 100 tons of yarn to Serbia or over 56% of the entire yarn production in BiH. They also sell yarn to BHCRAFT.

Fates uses yarn in production of carpets and other products. Other 2 processors, Kalinovik Plant and SZR Prijedor produce 8 tons of yarn or only 4% of the entire yarn production. SZR Prijedor uses it in their production while Kalinovik sells it all (*see Annex 4*).

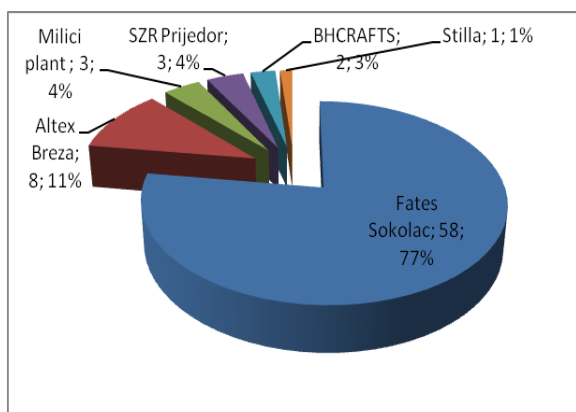
Figure 4



3.3.3. Production of final products

Production of final product is organized in 5 companies. Total annual production of final products where wool constitutes at least 80 % of the weight of final product is some 75 tons annually.

Figure 5



Fates carpet factory produces some 58 tons of final product, or 77% of the entire production of final woolen products. Most of the production or 50 tons are machine woven carpets and some 8 tons are other products such as beddings, woolen covers, mats.

Aletex Breza produces some 8 tons of final products which is 11% of the entire annual production. Products such as mattresses, pillows, blankets are dominating Alteks's production.

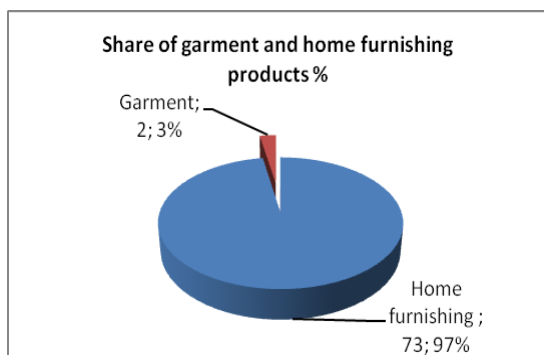
Both, Milici and SZR Prijedor plants account for 4% of the market of final woolen products. They each produce 3 tons of final products such as blankets, mattresses, sleeping bags, and pillows.

BH CRAFTS produces 2 tons of the final products which represents 3% of the entire production of the final woolen products. Most of their production is, handmade textile garments, covers, decorative pieces, toys, gifts etc.

Stilla art shop produces less than 1 ton of the final products which is 1% of the entire production of final products. They produce traditional carpets, mats, covers and various knitted items (*see Annex 4*).

3.3.4. Home furnishing and garment

Figure 6



Entire annual wool based production (final products) is some 75 tons of the final products. Out of this quantity, 97% or 73 tons belongs to category of home furnishing products, such as carpets, beddings, blankets, pillows, covers etc. Five producers contribute to this type of production.

Three companies, BH CRAFTS, Milici and Stila art shop produce garments such as jackets, pullovers, sweater, sock, hats, gloves, in the amount of some 2 to or 3% of the entire production (see Annex 4).

3.3.5. Building and construction industry

Because of its natural attributes and in particular its thermal efficiency, wool is an excellent insulation material. Countries like England, Ireland, Austria, and New Zealand developed appropriate technology for production of wool insulation rolls.

Being made from a naturally produced fibre, sheep wool insulation requires less than 15% of the energy required to produce than glass fibre insulation. It can absorb and break down indoor air pollutants, such as formaldehyde, nitrogen dioxide and sulphur dioxide. Wool is a sustainable and renewable resource, that has zero ozone depletion potential and at the end of its useful life can be remanufactured or biodegraded. Sheep wool insulation is safe and easy to handle and no protective clothing or special breathing apparatus is required to install it.

In an attempt to resolve problem of wool in BiH and develop a sustainable business associated to the growing construction industry and its demands, an Association of entrepreneurs from Travnik in January 2007 has installed equipment for production of wool insulation rolls. Partners of project were an American NGO CHF, International financial corporation IFC and World Bank. The association provided building to accommodate equipment and other partners allocated 148 000 KM. Initially it was planned to produce some 6 tons of rolls and employ 6 workers.

However, project was soon canceled because equipment malfunctioned.

3.3.6. Production of lanolin

Lanolin wool wax, wool fat or wool grease, is a greasy yellow substance secreted by the sebaceous glands of sheep. Lanolin is used commercially in many products ranging from rust-preventative coatings to cosmetics and lubricants. However, no company in former Yugoslavia produced lanolin.

3.4. Analysis of the key benefits and value added activities

3.4.1. Utilization of the available production capacities

Due to problem with reduced market demands and current economic recession all processing companies are operating at significantly lower level than the installed capacities.

Alteks Company from Breza which produce yarn, mattresses, beddings, mats and covers operates at the one fourth of the installed capacities. They purchase some 210 tons of greased wool and convert this into 110 tons of yarn and other 8 tons of other wool products. Alteks exports some 100 tons of wool annually to Serbia.

Similar situation is with processing plant in Kalinovik. Their installed capacities can wash 120 tons a year while realistic demands are only 50 tons. Yarn production capacities are 30 tons while they produce only 1.5 to 2 ton annually.

Rogatica installed capacities can wash 120 tons a year while realistic demands are only 10 tons. Although yarn production capacities are 30 tons annually, they do not produce it at all.

Stilla Company has reduced its production over the last six months. Their annual demands are 0.5 tons of yarn, which is then turned into carpets and hand knitted products of high value.

Carpet factory Fates reported stock of unsold products. Therefore, they reduced its production to 70% of the installed capacities. They purchase 150 tons of raw wool and convert it to 50 tons of carpets and other 8 tons of different products. They export 15 % of the entire production which is almost 9 tons annually.

Milici carding plant with capacities of over 3 tons of carded wool annually reduced its production by 15% for carded wool, while they shifted production of final products such as blankets, covers, jackets.

BHcrafts are using 1.4 ton of yarn made of finer wool which is converted into high value products which contains at least 80% of wool, and 0.12 ton of coarse wool. They also report production decrease of over 15%.

SZR Milan Pilipovic purchase 15 tons of greased wool and converts it to 6 tons of yarn to 2 tons of carded wool which is then turned into other products such as mattresses, blanket, and mats. Company reduced its production by 5% (*see Annex 4*).

3.4.2. Employment opportunities

Current wool chain or wool related businesses are supporting 138 full time jobs, 4 part time jobs and some 500 contracted jobs.

Out of this number 14 full time jobs are provided by two companies who deal with greasy wool in Breza and Bugojna. All their workers are men. Vuna Promet manager stated that he would need 5 new workers in case they are able to collect the remaining 400 tons which exist in the market channels.

Processing sector has 4 part time jobs in 2 washing, carding and yarn production plants in Kalinovik and Rogatica. Carpet factory Sokolac has 75 full time jobs for women and 5 full time jobs for man. Milici Company has 2 full time jobs for women and 1 full time jobs post. Stilla from Sarajevo employs 6 women. BHCRAFTS has 10 full time jobs, 2 for man and 8 women. In addition BHCRAFT provides contracted jobs for over 500 women in different part of BiH (*see Annex 4*).

Collection of greasy wool can offer some jobs, although this is a seasonal activity. This segment of the market is weak and in some regions of BiH does not exist. There are estimates that some 400 tons of wool is out of the market chain in BiH and in some eastern areas wool was not collected for several years. Collection, sorting and packing of wool is a segment of a market that naturally belongs to farmers' associations, cooperatives or farmers' groups.

Ideally, the Wholesalers would like to hand over organization of collection to farmers' associations. They can take part of the profit for running these operations. It can generate 0.1 KM to 0.2 KM per kilogram of wool collected for dealers. Dealers proposed such a scenario. They are ready to support establishment of collection points. It would facilitate their operations (*see Annex 4*).

Current estimation for wool processing sector indicates that this segment cannot offer new jobs. All companies are recording decreases in their production.

Sector of final products is hardly coping with cheap artificial fiber industry. Nevertheless, example of BHCRAFTS, which combine strong marketing component, natural properties of wool, perfect design and quality of final products shows that this sector can offer employment opportunities for women. Manager of BH CRAFT said that they need good and productive knitters and welcomed idea of expanding this business to other parts of BiH. Women's associations from all over BiH should be linked with or join to BHCRAFTS' Centre for Transfer and Traditional Craft Skills. However, being an export oriented business, BHCRAFT has very strict rules and demands in terms deadline, quality and standards of their products. Manager of this company stated that they have problem to find women who can meet requirement of these kind of job. Therefore, they need to organize trainings to involve more women-knitter in this activity. In addition, BH CRAFT is entering into Scandinavian market and they need more trained staff to meet demands of this market.

Wool, being a natural and renewable material has many advantages over its artificial competitors. It should be explored. For example, wool absorbs radiations from computer, TV and other electrical appliances. Producing woolen pieces that can be seated near these appliances can be an idea for new woolen products. Approaching growing IT sector and finding partner for realizing this idea is worth trying.

Joining efforts of small companies such as Milici plant and SZR Prijedor or BHCRAFTS can spin some ideas. Manager of Milici started to produce babies' garment plying on the card of natural properties such as breathability good insulation etc.

Links with tourism can also be also an option.

Wool can also be organic product. There is a broad movement in developed countries popularizing natural organic products. This bond could be useful.

Marketing is a complex and costly activity. However, strategic and long term marketing approach combining modern design, properties of wool and quality of products should be a receipt.

Other productions within sheep sector however, can surely generate new incomes and working posts. For example, sheep dairy sector is not utilized on most of the sheep farm in BiH. Cheese production can offer new post for family members. Milking of sheep and cheese production is a new production line and requires on an average sheep farm of 100 sheep approximately 4 to 5 working hours a day.

Compost production is a new production which can be organized on a sheep farm. It is not labor demanding activity, it does not require too much time but it can generate additional income for farmers. Another possibility is to organize specialize farms with production of compost and specialized types of compost which requires different technology.

3.4.3. Review of incremental income generated for the rural areas and pro-poor

Wool represents less than 1% of sheep farm gross income and cannot be a significant source of revenue for farmers.

However, other segments of sheep business can generate significant incomes for

Applying various affordable, simple and efficient techniques it is possible to increase meat production significantly. Reliable estimates indicate that meat production in an average flock in BiH can be increased by 30 to 40%. It involves improved feeding pattern, targeted herd management, selection and specific techniques. In addition, accelerated lambing system with 3 lambing in 2 years instead of 2 lambing in 2 years can result in an increase of 50% of number of lambs per lambing season.

Dairy production can be another significant source of income. A flock of 100 sheep flocks can yield about 6000 l of milk in one season which can be converted into 1500 kg of cheese. Price of cheese can vary from 10 to 14 KM. Cooperation between Slow Food, an Italian foundation for protection of traditional food and Nevesinje Association of Agricultural Producers resulted in export of Mjesinski cheese, a unique type of cheese produced in Herzegovina region only. Price of 1 kg of this cheese is over 15 KM. This shows that this production has export potential.

Price of 1 ton of first class compost this year reached 800 KM. For 1 ton of compost 2 tons of manure is needed.

3.4.4. Environmental impact

Since collection of wool is not organized in many parts of BiH farmers are throwing wool into rivers or set it on fire in open places. Organized wool collection would resolve this issue.

Vermi-compost is used in organic production with excellent results. Vermi-compost is beneficial for soil in many ways: It improves the physical structure of the soil. It improves the biological properties of the soil (enrichment of micro-organisms, addition of plant hormones such as auxins and gibberellic acid, and addition of enzymes, such as phosphates, cellulose, etc.). It attracts deep-burrowing earthworms already present in the soil. It improves its physical structure. It also improves water holding capacity.

Besides reducing the application of chemical fertilizers and pesticides that is detrimental to the environment, it is also confirmed that the water requirement of their plants was much less with the use of vermin-compost because of its moisture-holding capacity. Same results were reported in all

publications in all continents. Worms can turn almost any organic waste into compost. Therefore it can be used in elimination of bio wastes.

3.5. Overview of complimentary products

3.5.1. Compost collection

The process of producing vermi-compost is called *vermi-composting*. Vermi-composting is a simple biotechnological process of composting, in which certain species of earthworms are used to enhance the process of waste conversion and produce a better end product. Vermi-composting differs from composting in several ways. It is a mesospheric process, utilizing microorganisms and earthworms that are active at 10–32°C (not ambient temperature but temperature within the pile of moist organic material). The process is faster than composting; because the material passes through the earthworm gut, a significant but not yet fully understood transformation takes place, whereby the resulting earthworm castings (worm manure) are rich in microbial activity and plant growth regulators, and fortified with pest repellence attributes as well. In short, earthworms, through a type of biological alchemy, are capable of transforming manure and other types of organic garbage into best natural fertilizer.

Containing water-soluble nutrients, vermi-compost is an excellent, nutrient-rich organic fertilizer and soil conditioner widely used in organic farming.

Vermi-compost is beneficial for soil in many ways: It improves the physical structure of the soil. It improves the biological properties of the soil (enrichment of micro-organisms, addition of plant hormones such as auxins and gibberellic acid, and addition of enzymes, such as phosphates, cellulose, etc.). It attracts deep-burrowing earthworms already present in the soil. It improves its physical structure. It also improves water holding capacity.

It is important for plant growth because it enhances germination, plant growth, and crop yield and also improves root growth and structure. In addition, many studies reported higher content of dry matter, proteins and plant carbohydrates as well as improved flavor.

Worms can turn almost any organic waste into compost. Therefore it can be used in elimination of bio wastes. As result low-skill jobs at local level can be created.

Due to low capital investment and relatively simple technologies vermi-composting can be used practical for less-developed agricultural regions.

In the world of vermi-composting, the rule-of-thumb is that one ton of inputs results in 0.5 ton of compost. In other words, 50% of the mass is lost, mostly as moisture and CO₂. Of course, the final weight and volume of product varies with original feedstock, bulking agent used, etc., but the above rule-of-thumb is an easy way to quickly calculate output.

The economics of vermin-compost production and its use in agriculture is well documented. It is applicable in any agricultural production. All studies reported increased yields and improved quality of products. It is also concluded that the use of vermin-compost is highly profitable and gives better net income to the users than non-users.

Besides reducing the application of chemical fertilizers and pesticides that is detrimental to the environment, it is also confirmed that the water requirement of their plants was much less with the use of vermin-compost because of its moisture-holding capacity. Same results were reported in all publications in all continents.

Apart from compost production, worms can be used in aquaculture. Namely, surplus of worms which have high reproduction rate can be used as an excellent protein component of fish fodder (it is always the most expensive component of any animal fodder). One company from Sarajevo is planning to develop and apply such a technology in one fish farm in Mostar region.

Some restaurants in the Croatian coast serve worms as a specialty reaching high price for a meal.

The production process is not complicated but requires specific technology, knowledge, enough food for worms (manure and other organic waste), some water and awareness that it can be a way to make farm business more profitable.

Technology of vermi-composting will not be elaborated here. It will rather be given some lines about economy of and its effects on productivity and profitability of sheep business in BiH.

As earlier said, vermi-compost production is a low capital investment and a relatively simple technology business.

One litter (1 kg of worms) of worms needs two 2m² of space and one ton of manure and other waste to eat which they turn into 0.5 ton of vermi-compost. As they have very good reproduction rate one litter of worms under favorable conditions (enough fodder, water, and ambient temperature over 10 ° C) can produce two more litters within a production cycle. One production cycle lasts 12 months. One litter of worms costs around 200 KM. Compost is harvested once a year, usually in early spring. Worms can live up to 15 years.

An average commercial sheep farm with a hundred heads can produce some 50 tons of manure. It can be turned into 25 tons of compost. Some compost must be left for worms as a habitat and some Current price of one ton of 1st class compost is between 600 and 800 KM. Part of the compost can be used for the farm production while the rest can be sold out to market.

Vermi-compost can easily be organized on any sheep or cattle farm. UDRDP has organized production of vermi-compost on 25 demonstration farms in 2009 in the Upper Drina region. Each farmer was supplied with 10 liters of worms; extension service and monitoring were performed on each farm. Both producers and a wholesaler (Sark from Sarajevo) reported purchase of first tons of compost in March this year.

Market demands, according to the statement of manager of Sark company from Sarajevo was 1 000 tons of 1st class vermi-compost for export only. Significant quantities of compost can be sold in BiH especially for green house production and fruit production.

3.5.2. Milk collection and cheese production

Though sheep produce a far smaller volume of milk than cows, it is richer in fat, solids, and minerals. Sheep milk is highly nutritious, richer in vitamins A, B, and E, calcium, phosphorus, potassium, and magnesium than cow milk.

It contains a higher portion of short and medium chain fatty acids, which have recognized health benefits. For example, short-chain fatty acids have little effect on cholesterol in humans and make milk easier to digest. Chemical composition of sheep milk makes it ideal for the cheese-making process.

Table 3 Chemical composition of sheep and cow (Djordjevic)

Content (%)	Sheep	Cow
Water	81.50	87.25
Solids	18.50	12.75
Fat	7.20	3.80
Total Proteins	5.70	3.50
Casein	4.50	2.80
Lacto albumin and Lacto globulin	0.98	0.60
Lactose	4.30	4.80
Ash	0.90	0.65

Data from the British Sheep Dairying Association shows that although whole sheep's milk has a higher fat content than cow's milk (6.7 to 2.5 per cent), riboflavin B2 is 4.3mg/l to 2.2mg/l, thiamine 1.2mg/l to 0.5mg/l, niacin B1 5.4mg/l to 1.0mg/l, pantothenic acid 5.3mg/l to 3.4mg/l, B6 0.7mg/l to 0.5mg/l, B12 is 0.09mg/l to 0.03mg/l and biotin is 5.0mg/l to 1.7mg/l. Folate content for both is 0.5mg/l.

Calcium content in sheep's milk is between 162 and 259mg/100g compared to 110mg/100g for cow's, and phosphorous, sodium, magnesium, zinc and iron levels are also higher.

Average composition of milk from sheep, goats, cows and humans is comprehensively documented and compared relatively to the nutrient supply from human milk and to the recommended human daily dietary allowances. The unique richness in short chain and medium chain fatty acids in sheep milk, sheep cheeses, sheep butter (so far very neglected commercially), and their special values in human health and as treatment for many disease conditions is discussed extensively. This can lead to sheep dairying alongside the cow milk industry as a unique and justified *niche industry* with considerable growth potential.

Though not widely drunk in any modern culture, sheep's milk is commonly used to make cultured dairy products. Well-known cheeses made from sheep milk include the Feta of Greece, Roquefort of France, Manchego from Spain, the Pecorino Romano (the Italian word for sheep is *pecore*) and Ricotta of Italy.

Our cheeses are Travnicki made of sheep milk, Livanjski made of 80% of sheep milk and 20% of cow milk, and Mjesinski cheese (mjesina is a sack made of lamb skin used as package for cheese) made of sheep milk or mixed with cow milk with different portions in the different areas of BiH. The last cheese is produced in the Hercegovina region. Yogurts, especially some forms of strained yogurt, may also be made from sheep milk.

Technology of the above cheeses will not be studied here. It will rather be given some more lines about economy of milk processing and its effects on productivity and profitability of sheep business in BiH. It will be done on the Travnicki cheese case.

Milk production capacity in domestic Pramenka varies from 40 to 110 liters of milk in the lactation period of 5 to 6 months per sheep. One third of produced milk goes for lamb nutrition. However, milk production as an economic trait has a low heritability. It means that this trait is under strong influence of non genetic factors such as nutrition, age, stage of lactation, herd management etc. In other words quantity of milk i.e. productivity can be increased by improving feeding patterns, improved accommodation, etc.

Dressing, or quantity of cheese produced from 100 l of milk depends on several factors. The most important among others factors are the stage of lactation which has mayor effects on content of solids (dry matter) in milk. According to prof. Dozet dressing of this cheese produced in July was 30.3 (or 3.3 l of milk for one kg of cheese), in September 41, 6 (2, 4 l of milk for 1kg of cheese). Also, prof. Dozet, while examining dressing of the Vlasicki cheese found that dressing was varying from 27.60 in March to 38.15 in September. However, it can be concluded that on average 100 l of milk can yield 25 kg of cheese.

Production of cheese requires technology, knowledge, equipment, and above all awareness of producers that it could be an additional production line in their business which significantly can increase profitability and productivity of their farm. It also can secure some additional working posts for members of the farmer's families or their neighbors.

Cheese production requires investment. Facilities for cheese production and associated equipment, of course, depend on type of cheese, foreseen capacity, way the milk will be collected. However, in today's market there is available certified and financially affordable cheese production hardware. The cost of such a specialized equipment with the capacity of 200 to 500 l of milk/shift and more ranges between 25 000 KM to 40 000 KM. It includes all hardware needed for the processing. It does not include building costs but the mentioned equipment could be accommodated in a facility not bigger than 40 m².

Having in mind above facts it can be concluded that production of cheese can generate additional and significant income for sheep farmers. This can be a profitable business branch within sheep sector. Realistic estimates in the Vlasic cheese production example shows that an average flock of 100 ewes would produce milk for 100 kg of a special cheese, which is sold at local and external markets. The wholesale price of 1 kg of matured cheese is between 10 and 12 KM. In this case it would mean the farm can earn from 16000 and 20 000 KM a year more depending on price. Most of the farmers are neglecting this fact.

Cooperation between Slow Food, an Italian foundation for protection of traditional food and Nevesinje Association of Agricultural Producers resulted in export of Mjesinski cheese, a unique type of cheese produced in Herzegovina region only. Price of 1 kg of this cheese is over 15 KM. This shows that this production has export potential.

Sheep dairy and cheese production can be developed as a unique and justified *niche industry* with considerable growth potential. Marketing of cheese and other sheep milk product requires particular strategy. Example of Vlasic cheese production, where some five or six specialized cooperatives existed before the war, shows the need for creation of similar business linkages in other parts of BiH. This is also important for any aspect of sheep business, not only for sheep dairy. This would secure better market position for the producers, giving them better insight in market demands, requirement, standards, and quality requirements of their products and ultimately increase their incomes.

It must be mentioned the importance of expertise and technical knowledge from specialized institutions such as faculties, developing agencies, extension services. Without their involvement and proper strategy, even the case of Vlasicki cheese with documented tradition of over 150 years, would not be a success story.

In the 60's and 70's of the last century, staff of Agricultural faculty from Sarajevo University led by prof. Natalija Dozet has undertaken comprehensive research in order to study technology of this cheese. This resulted in a standardized production, increased quality, better packaging, improved marketing, development of distribution network and ultimately increased profitability of the farms. Producers were trained in all aspects of cheese production. Research results were publicized. This was a significant period for sheep production in this part of BiH.

It also proves that primary production needs processing industry (value added products) in order to develop its full capacity.

Generally speaking, sheep dairy sector is immensely underutilized and neglected. Apart for Vlastic region and some areas of Livno and Hercegovina cheese production is rear. In the Upper Drina Region with over 700 and 6 municipalities not a single farmer produced cheese. UDRDP extension officer started to popularize cheese production providing basic trainings. This resulted in an increased interest of the farmers in this type of production.

It should be popularized among producers and financial benefits presented. Many interviewed farmers are stating that milking would mean additional work. It is of course true. It is also true that it is a profitable business which generates additional incomes, employment opportunities and it also increases profitability. Two skilful persons can milk 200 sheep in 40 minutes.

There is a milking machine specially designed for sheep. Sheep need to get accustomed to milking or usage of machine. It is workable. Once the animals are trained it goes smoothly. There are special types of cages made for milking of sheep. Farmers also need to be advised that animals are following certain behavioral patterns and this can be exploited in milking operations. For example, feeding of sheep with grains or concentrates or providing minerals in the milk parlour while milking can facilitate this operation, relaxing animals and making this operation more pleasant for them.

Cheese production can be organized on an individual farm using only milk from that farm. Another way is that one specialized farmer collect milk from neighboring farms and processes it. Profit is shared amongst all partners.

3.5.3. Sheep meat production

Most of fresh meat is consumed as lamb meat (mutton). Some estimation suggests that over 60% of mutton in BiH is used for barbecue. Meat of mature sheep is usually used in processing industry either as dried, smoked meat or as canned meat.

Table 4. Average chemical composition of fresh meat (Krajinovic)

Component	Water	Protein	Fat	Ash
%	63	18.5	16	0.9

Sheep meat is highly valuable nutritional product, a rich source of high quality protein and a very rich source of B vitamin complex. It has excellent dietetic properties and its digestibility ranges from 85 to 90%.

Table 5. Proportion of muscle, fat tissues and bones in sheep carcasses (Krajinovic)

Tissue	Muscle	Fat tissues	Bones
%	60 -70	5-25	15-25

The above proportions depend on age, breed, sex, body status, feeding pattern etc.

Some of factors that are judged while determining eating quality of sheep meat are: intensity, odour, tenderness, softness, taste and flavour.

The diet of an animal hugely affects the flavour of its meat. Because of feeding pattern in BiH, sheep are mostly kept on mountain pasture and in carst areas and in winter time fed on hay. Sheep meat in BiH has a particular flavor appreciated by consumers.

Lambing rates are estimated to be around 90% which means that a hundred sheep give ninety lambs. Potential for this trait is between 110 to 130 % depending of the Pramenka type. Lamb raising rate is estimated to be around 80% which means that a hundred sheep raise eighty lambs. These are reproductive traits and as such are under strong influence of non genetic factor. These bad performances are related to poor feeding practices and housing, resulting in both low milk and meat yields. This can be significantly changed through improved feeding, introducing more protein in rations, providing minerals regularly, etc. There are inexpensive and affordable techniques which can increase meat production per sheep. Investment in fodder in specific phases of production (flushing method) will pay off and producers should not see this as a unnecessary cost but a high return investment. Induction and synchronization of estrus can be used in accelerated lambing system and have 3 lambing in 2 years.

There are estimates that potential of production of meat is immensely underutilized and that existing potentials and level of production can be increased over 40 %. UDRDP Agriculture team covering six municipalities and providing extension service for 86 sheep farmers, oriented on meat production only, applied various techniques aimed at increasing productivity and profitability. Results showed that gross income was increased between 18% and 42 % on the existing level of production (the size flocks remained unchanged). This variation depended on the nature of intervention and methods used on different farms. This proves that there are big reserves within this sector that can be utilized.

Lambs are slaughtered at the age of three to six months weighting between 25 and 40 kg or more. It depends on the region of the country (for example, consumers in western Herzegovina prefers lighter lambs between 25 to 30 kg live weight in early spring). Meat production tends to be about 45% of the carcass weight for adults and 50% for lambs after dressing.

Sheep meat consumption in BiH reaches its peak at the time of religious holidays Christmas, Easter and Bajram and New Year and prices are highest at that time. It reaches 6 KM while it drops to 4.5 to 5 KM for the rest of year. Period from February to May is basically period when supplies are at the lowest level and prices of live weight can go up to 8 and 9 KM.

Farmers do not seize this opportunity. Various herd management techniques make it possible for farmers to have lambs of commercial weight at this time of the year.

The nature and structure of sheep production has a significant impact on marketing pattern of this industry. Like any other livestock production, sheep production consists of several operations involving breeding, raising lambs and feeding them to market weight. Usually, all these operations are performed on one farm which makes market channels relatively short.

In addition, there are enough slaughterhouse capacities within BiH in all regions where sheep farming is dominating. However, stronger links between these two segments are missing.

Organization of sheep producers through associations of sheep breeders or cooperatives is still not recognized among farmers as a way to strengthen negotiating position in the market. They usually act individually in the market. It often happens that farmers do not understand market requirements. Their lambs vary in age, weight, dressing percentage, etc. while market requires more uniformity, certain live weight at specific period of year in specific regions. Therefore, producers are getting lower price. Although farmers are aware of the fluctuation of the prices throughout year due to imbalance between supply and demand, they are not seizing opportunity to produce more lambs when supply is low and earn more money. Only few individual producers managed to secure their market position and sell their lambs when they want at favorable price. This is because they understood the fact they should monitor market and adjust to market requirements.

Development of sheep industry is not limited by demand. Imported sheep meat cannot compete in quality with the one produced in B&H. Sheep industry makes the most important model for efficient resources allocation, especially mountain pastures and can become mean to attract people in parts of BiH with low population density. However, the sheep meat consumption is far behind the one found for other animal meat and is just above 2 kg per capita (source Agency for statistics of BH).

3.6. Involvement of men and women in the proposed project

Sheep shearing job can be done by both women and men. Work in processing plants like washing carding and spinning of yarn is done by woman. Art of hand making is traditional job for women. Cheese production is another activity where women are dominating. All other activities related to the implementation of the project can be done by both women and men.

3.7. Training needs and practical support

In order to meet requirements of wool market farmers need to be advised in prevention of fleece contamination, shearing technique, wrapping of fleece and packing into sack.

In order to strengthen wool supply segment it would be necessary to collect wool in an organized way. Farmers should be informed on wool harvesting campaign. Association and cooperatives should assume function of organizing information campaign and wool collection. Where there are no associations or cooperatives, this could be organized through farmers' groups. The function of the group is to offer bigger quantity of wool and ensure that wool meet market requirements (free of too much dirt, properly sheared and wrapped).

Also, one of the options is to organize shearing in one communal place or demonstration farm for more producers of a group. Shearing point could also be a collection point with necessary infrastructure such as fences for sheep or platforms for shearing or it can simply be organized in a stable with enough space, light and ventilation. Each farmer can shear its own flock or one trained farmer can shear all other flocks and get reimbursed for it.

Since wool is bulky material collection point should have enough space to accommodate several tons of wool. Collection points should be equipped with weight scales. Collection points should be accessible for vehicles.

All associations, cooperatives and farmers' groups will be supplied with names and contacts details of wool dealers and vice a versa. Initial meetings could be organized and hosted by UNDP.

Sector of handmade products can offer some job opportunities for women. In order to involve more women in handmade production it is necessary to link women's' association from all over the country to BHCRAFT. They are ready to offer trainings for women interested in this kind of business.

It was earlier described that exploring sheep dairy production, increasing production of meat and production of vermin-compost can significantly increase productivity and profitability of sheep farms. Training curriculum for each activity should be developed. Related extension service is the most effective way to conduct these activities.

3.8. Analysis of technical and financial resource capacities

Great majority of wool is purchased and sold as greased fleece. Collection of wool is the weakest part of wool chain or it does not exist at all. Organization of collection points does not need significant investment. Existing infrastructure could be used of associations, cooperatives or bigger farms or demonstration farms established through UNDP projects. Collection points need to have room to accommodate wool and keep it until delivery. Collection points must be accessible for trucks. One of the solutions could be to have one point for shearing and collection in a communal location where farmers would bring their flock to shear it and hand over wool right after that. Farmers can be supplied with shearing machines and trained in proper shearing technique. Wool dealers are interested to support organization of activities in collection points. They can advise farmers and those organizing collection as to what are market requirements in terms of fleece quality.

Dealers need balers to compress wool and make it appropriate for transport, and forklift for loading of wool cubes. It would speed up operations and employ more people in the season of harvesting.

Information about wool collection activities can be disseminated through MZ councils, association cooperatives and farmers' groups. Organization and hosting of initial meetings between wool dealers, farmers, associations, and cooperatives could be an useful activity.

Cost estimation

Shearing machine cost form 900 KM (for 100 to 200 sheep a day) to 1500 to 1900 KM for shearing over 500 sheep a day. Prices can be lower if more pieces are ordered.

One trailer cost 30 000 KM, and forklift 25000 to 30 000 KM.

Shearing training costs 100 KM per training day for local trainers.

Other segments of wool market would need different approach. Complementary segments of the wool chain have weak bonds or they are missing. Producers of final products such as Stilla and BH crafts in particular are in search of yarn made of finer wool. SZR Milan Pilipovic or Carpet factories Sokolac are producing this type of yarn but they do not know that that Still or BHCRAFT exist. These bonds should be strengthened. SZR Milan Pilipovic has problem to find enough finer wool. He needs addresses of producers from Romanija region, farms from Han Pijesak, Rogatica who are breeding this type of sheep. Carpet factory producing excellent woolen staff needs to explore foreign market but they do not realize that marketing must be a strong element of business operation that can add value to the final products. He can surely get some valuable advices from manager of BHcrafts. Manager of Milici plant is a quick learner in quest for advice from experienced colleagues. He would be more than happy to meet BHCRAFT staff or someone from Sokolac factory or Stilla art shop. Kalinovik processing plant and Alteks Breza need to adjust technology in order to produce thinner and less whirled yarn.

Cost estimation

Sector of handmade products can offer some job opportunities for women. In order to involve more women in producing it is necessary to train women interested in this business. BHCRAFT and their technical staff can offer this type of training, select suitable candidates and offer them contracts. This 20-hours training cost 12 000 KM for a group of 20 women.

Cost estimation

Cheese production requires investment. Facilities for cheese production and associated equipment, depends on type of cheese, capacity, way the milk will be collected. However, in today's market there is available certified and financially affordable cheese production hardware. The cost of such a specialized equipment with the capacity of 200 to 500 l of milk/per shift ranges from 25 000 KM to 40 000 KM. It includes all hardware needed for processing. It does not include building costs but the mentioned equipment could be accommodated in a facility not bigger than 40 m².

Increasing meat yields per head and overall meat production within a flock is matter of herd management techniques such as flushing method, induction and synchronization of estrus, selection, etc. Specific, affordable and simple techniques are developed for this purpose. For example, cost of synchronization and induction of estrus costs some 15 KM per sheep plus fodder costs which will not exceed 20 KM per sheep. This method is used in accelerated lambing system i.e. 3 lambing in 2 years. It can increase number of lambs by 50% in one production year in comparison to conventional method.

Vermi-compost is low investment activity. A farm with 100 sheep needs 10 litters of worms which cost 2000 KM.

4. Conclusions

1. There are 5 segments within wool market in BiH. Production, collection, wholesales, processing and production of final products
2. Wool market is heavily fragmented and in disarray. There is no organized wool collection as a necessary part of the wool market chain. A lot of raw wool is out of the market channels. This is a key problem identified by farmers and wholesalers.
3. Over 77 % of the wool is of the lowest quality (fineness of 38 μm to 40 μm) and does not meet textile industry requirements. Most of this wool is exported to Turkey as greasy wool.
4. Revenue from wool constitutes less than 1 % of gross income for sheep farmers.
5. Current supply of greasy wool are lower than demands. Organized wool market would result in increased prices of greased wool.
6. Most of the wool does not meet basic requirements (a lot of dirt, burdock). It increases dressing percentage and it additionally decreases anyway low price of wool.
7. Wholesalers are showing interest to support farmers' groups, associations and cooperatives in organizing wool collection. It would generate some income for the farmers, associations and cooperatives and facilitate operations for the wholesalers.
8. Only about 23% of domestic wool (28 μm to 32 μm) is finer and is used for industrial purposes.
9. Bonds within the wool processing sector and its complementary segments are weak. Companies from the sector should meet and define specific needs of each participant and agree how to support each other for the benefit of all.
10. Quality of yarn produced in BiH does not meet standard and requirements of hand craft industry. This can be improved within the existing technology of processing plants.
11. Handcraft industry has potential to open some working post for women. There are good examples of well organized hand craft production with export orientation that prove that.
12. Meat production, sheep dairy sector and compost production are immensely underutilized. Producers should be encouraged and trained in utilizing those resources. These production lines can generate new incomes and working posts in sheep sector.
13. Lack of organization, weak marketing segments, weak bond with processing industry and other complementary industries are constraints which apart from other things, have a very negative impact on the sector of agricultural primary production.

5. Recommendations

1. Organized wool collection as well as strengthened market channels would resolve chaotic situation in the wool market in BiH.
2. Collection should be the job for farmer's groups, associations and cooperatives. They should be supplied with contact lists of wool dealers. Initial meetings could be organized. Agenda for the meeting should be proposed sent to the participants and updated upon their suggestions. An updated agenda will be resent to all participants prior to the meeting. All participants should prepare and come with concrete proposals and solutions. Solutions are not costly. Upon identifying market demands, farmers' associations and cooperatives or bigger farms should notify farmers that they could sell their wool and explain market requirements in terms of sorting, wrapping, and packaging. Dynamics of collections should be planned and arranged jointly.
3. Existing infrastructure of associations, cooperatives or farmer's groups (wherever they exist) should be used as collection points. Usually they owe some facilities adequate for this purpose.
4. Wool is a bulky material which takes a lot of space. Bearing in mind the high transportation costs and the rising fuel prices it should be considered provision of balers for compressing of wool and making it more appropriate for transport. This would decrease transportation costs.
5. Associations, cooperatives should take a share of the profit as a reward for organizing collection of wool. Wholesalers as the biggest market dealers are ready to share it.
6. Overall improvement of finesse of the Pramenka wool is a matter of strategic planning and state breeding program. It is related to cross breeding with other finer wool breeds and change of genome structure of domestic sheep population. Effects of this program in the past were highly challenged.
7. As it often happens that wool is thrown into rivers or burned in the open fields (causing terrible smell) it can present an environmental problem. Therefore, it is necessary to involve competent authorities in resolving problem of wool market. For example Ministries, while allocating subsidies to sheep farmers, can request a receipt from a farmer that all produced wool is either sold to registered wholesaler or in some other way introduced in the legal market in order to avoid throwing it and creating environmental issues out of this.
8. It is necessary to strengthen links between processors' segment of the market. Meetings between yarn producers and handcraft companies should be organized. The list of all potential partners in this market channel should be distributed. Initial meetings could be organized. Agenda for the meeting should be proposed sent to the participants and updated upon their suggestions. An updated agenda will be sent to all participants prior to the meeting. All participants should prepare themselves for the meeting and come with concrete proposals and solutions. Samples of yarn and final products should be brought and presented. Yarn producers should fine tune their hardware to provide as much yarn as possible for value added products.

9. Resolving problem of wool market should be a part of a wider strategy aimed at improvement of sheep business. Therefore, it is necessary to draft a comprehensive plan which will offer viable solutions for this sector. Great, unused reserves lie in the dairy, meat and compost production.
10. One set of interventions would focus on individual farmers. The most effective way is to provide on-farm extension service. It would result in improved business performances, optimized existing production, introduced new production lines, improved productivity, and increased profit. It would be necessary to develop detailed training curriculum for the entire sector as well as for each individual segment of the production.
11. The other set of interventions would be of strategic nature. This would involve diversification of primary production such as commercial breeders, reproductive centers, and demonstration farms, specialized dairy farms and meat production farms. In addition, it would be necessary to work on foundation of cooperatives, general and specialized associations, breeders associations, dairy associations, joint business or marketing cooperatives.
12. Bearing in mind that marketing is a weak component of any agricultural business in Bosnia and Herzegovina, there is a need to support agro business sector in this segment. Links with food processing sector must be strengthened. Bosnia and Herzegovina is abundant in agricultural products of prime quality. Even more, many outputs of primary production are natural and organic. It needs to be loudly spoken of, citizens of BiH need to know about it. Situation with other agro sectors, with the rare exceptions, is similar to wool market. Lack of organization and timely information, lack of standardization, poor marketing capacities etc., make it for many excellent outputs of primary production to stay out of the market and for producers to lose their profits. Therefore, system to support exchange of information within agribusiness, associated sectors and food processing capacities is strongly recommended.

6. A list of key contacts

1. **Mekom** , Contact person, Zijad Koljenovic, Manager, zijad@mekom.ba, mekom@bih.net.ba, tel/fax 032 735 645 ili 733 645, 061 162 499. Visoko. Wool dealer.
2. **Vuna Promet**, Contact person Eniz Muratspahic, Manager, www.vuna-promet.com, 030 258 566, 061 737 245. Bugojno. Wool dealer.
3. **Alteks, Breza**, Contact person Izet Bajramovic Breza, 061 795 285, Processor
4. **Fates** , Contact person, Miodrag Dupljanin, Manager, fates_sokolac@yahoo.com , 057 448 133, 448 324, fax 057 448 572, Carpet factory Sokolac . Carpet factory.
5. **Washing and yarn production plant Kalinovik**, Contact person Zeljko Djogo, mladensladoje@hotmail.com , 065 951 365, Kalinovik bb
6. **Washing and yarn production plant Rogatica**, Contact person Snezana Konostrevac skonostrevac@yahoo.com
7. **Milici carding plant**, Contact person Sinisa Sekulic, potrci.sekulic1@gmail.com,
8. **Stilla Sarajevo**, Conatact person Amila Smajlovic, Manager, www.stilla.ba, stila@bih.net.ba phone 033 214 060, 061 202 367. Art shop.
9. **BH CRAFTS Sarajevo**, Contact person Lejla Radonicic, Manager, www.bhcrafts.org, bhcrafts@bih.net.ba, Izeta Sarajlića 5, 75 000 Tuzla , Tel/fax: + 387 35 314 460 / 314 461 Muhameda Hadzizahica 29, 71000 Sarajevo, +38733 551 535 / 551 536.
10. **SZR Milan Pilipovic Prijedor**, 065 586 363, 052 237 200
11. **Lalba, wool dear Serbia**, Contac person Zoran, lalba@sezampro.rs, www.tekstilsrbija.com, 381 64 1159 939
12. **Fata Aganovic, Gorazde**, Sheep farmer 062 317 103
13. **Planina Han Pijesak** , Sheep Farm Contac person Goran Obradovic, Manager 065 381 449, ,
14. **Selver Perjan, Gorazde**, Sheep farmer, 061 462 975
15. **Radenko Janjic Foca**, Sheep farmer, 065 592 009
16. **Udruga poljoprivrednih proizvođača Srednja Bosna**, Contact person Zlotrg Adem, 061 629 912, kontakt@up-sbkksb.ba,
17. **Planinsko Dobro Gacko**, Sheep farm, Contact person, Zdravko Zelenovic, Manger, 065 528 726, 059 472 365
18. **Agro information centre B.Luka**, 051 435 830, fax 051 435 831, office@aic.ba www.aic.ba.
19. **Sark Sarajevo**, Vermicompost dealer, Contact person Tatjana Vuckovic, tatjanahillary@gmail.com 063 870 511.
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25. **Regional extension service Banja Luka**, banjaluka@pssbih.org, 051 317 989

7. ANNEXES

ANNEX 1 Number of livestock (Source: Agency for statistics of BH)

Production	2007	2008	Indexes 2008/2007
Ewes for breeding	781.173	743.872	95,2
Other	252.091	286.642	113,7
Sheep Total	1.033.264	1.030.514	99,7

ANNEX 2. Sheep sector figures (Source: Agency for statistics of BH)

Production	2007	2008	Indexes 2008/2007
Number milk ewes	343.549	299.737	87,2
Liters per milk ewe	60	63	105
Ewes milk 000 lit.	20.491	18.774	91,6
Number sheared sheep	875.259	875.286	100
Kg per sheep	1,7	1,6	96,1
Wool tons	1.474	1.416	96,1

ANNEX 3. Wool classification by Lehmann

Class	Average thickness of the fiber in μm
5A	18
4A	18-20
3A	20-22
2A	22-24
A	24-26
B1	26-28
B2	28-30
C	30-37
D	37-45
E	45-60
F	>60

ANNEX 4 Companies from the sector

7.4.1. MEKOM

Contact person, Zijad Koljenovic, Manager

zijad@mekom.ba, mekom@bih.net.ba

tel/fax 032 735 645 ili 733 645, 061 162 499.

Visoko

Company is privately owned and operating since 2000. Purchase of wool began in 2001. Trade of fabric is the basic activity of the company. The company employs 7 workers.

Capacities

Lack of raw wool in the domestic market made the Mekom to deal mostly with the fabrics instead with greased wool. However, with stable wool supply in domestic market, they would be able to sell 1000 tons of greased wool in Turkey annually. Company's last year record shows export of 200 tons of greasy wool.

Market and marketing strategy

Wool prices, due to poor quality ranges between 0.35 and 0.50 KM per kilogram. However, prices are valid only if the minimum requirements are met (free from dirt).

Mekom's managers stated that if properly sorted, prices of wool could go from 0.60 to 0.65 KM and even 0.80 KM per kilo. According to the records, company managed to distribute 80 tons of greased wool in Turkish market this year. He believes that export of greased wool can reach up to 1000 tons per year if the wool collection is organized.

Mekom mostly works with two local companies: KTK Visoko and Fates Sokolac.

Constarins

Unorganized wool collection, inadequate shearing. Solution could be adequate wool collection network and training of farmers.

Manager of the company expressed his interest in organizing collection point and training of farmers in wool market requirements. Due to high transportation costs he would need to have at least 20 tons of wool per collection point at a time.

7.4.2. Vuna Promet Bugojno

Contact person Eniz Muratspahic, Manager

www.vuna-promet.com,

030 258 566, 061 737 245.

Bugojno

Company was founded in 2005. It employs 7 workers permanently and 5 more in the season. Primary activity of the company is trading of greased fleece. Company is the biggest greased wool dealer in BiH.

Market and marketing strategy

Their main markets are Turkey and India. Company recorded export of some 400 tons of greasy wool last. Price that company currently pays for wool is 0.6 KM per kilo. Nevertheless, according to the statement of the Vuna's manager he would be willing to pay 0.70 KM if fleece is properly wrapped and is free of too much dirt. According to the companies' records export of wool in this year reached over 200 tons. He explained that current demands in wool market in Turkey in the areas where his company exports are over 40 tons a week. Manager of company is willing to cooperate and support farmer's associations, groups and cooperatives in order to improve wool supply chain.

Constraints

Unorganized wool collection, lack of information about availability of the wool within BiH. Although there is a lot of wool out of the market chain in BiH, manager of the company stated that he would import even 800 tons of greased wool from Croatia and export it to Turkey.

7.4.3. Alteks

Contact person, Izet Bajramovic,

061 795 285, Breza

Breza

Altex was established in 1971 and operated as one of the main wool processors in the Balkan, with capacity of 12 tones of wool per day. Company's infrastructure was partially destroyed during the war and caused reduction of pre-war processing capacities.

Altex Company is now privately owned and works in a rented part of the pre-war factory. Currently employs 25 employees.

Production capacities

Company purchases 210 tons of greasy wool annually and converts it to over 110 tons of yarn and 8 tons of other final products. Company is engaged in purchasing of raw wool as well as its processing. The production assortment includes washed wool, different sort of yarn, mattresses, bed sheets, and covers. Current processing range from 3 to 4 tons of wool per day. Their main product, various types of yarns is sold at 12 to 14 KM per kilo. The entire production is sold as contracted purchase.

Since Altex has a good distribution network in the region they assume they could process the entire annual production of greased wool. However, there are serious problems with the quality of wool in terms of presence of dirt and sorting.

Company is planning an investment of 8000 KM in the improvement of their washing facilities. Company is ready to increase wool price to 1 KM if farmers improve the quality.

Market and marketing strategy

Director is convinced that costumers will prefer natural fabrics to cheap synthetic products and artificial colors.

Although market demands in wool products are high Altex is facing a problem of insecure wool supplies. Manager emphasized lack of organized collection as the main problem in addition to dirty wool and problem with sorting. Another problem is lack of finer wool in local market. Therefore, they import 12 to 15 tons of finer wool from Serbia (Itex Nis Company).

According to Altex' manager they have a very good cooperation with Simpo Vranje from Serbia. Annual export for Simpo is about 100 tones of different sort of yarns.

Altex planned to export some quantity of wool products to Turkey. Problem they faced with was problem to obtain all necessary attests and certificates requested by Turkish ministries. On the local market they cooperate with BH Krafts Sarajeva, Stilla Sarajevo, Karadža Trejd Bugojno, Simpo Banja Luka, and different NGO and humanitarian organizations.

Constrains

The basic problem emphasized is unorganized greasy wool supply in the BiH market as well as its quality in terms of inadequate shearing, sorting and presence of too much dirt. This problem could be resolved trough organized collection and adequate training of farmers.

7.4.4. Fates Carpet Factory

Contact person, Miodrag Dupljanin, Manager

fates.sokolac@yahoo.com ,

057 448 133, 448 324,

fax 057 448 572

Sokolac

Fates Sokolac was founded in 1975 and currently employs 80 workers (75 women).

Production capacities

The main product of Fates is machine-woven carpets, with annual production of 46 thousand square meters. Also, they produce hand-made carpets, covers, pillows and bed linen. In 2007 they invested in the improvement of their technology and diversification of the production. This investment created new job opportunities and positive financial effects.

Company processes some 150 tons of raw wool which is mainly supplied from the area of Sokolac, Han Pijesak and Rudo. Fates purchase only Wuirterberg wool (finer wool) at the price of 0.80 KM per kilogram of greased wool. They complain on presence of the dirt in the wool. They would offer 1 KM for kilogram of greased wool if wool is cleaner.

They produce 50 tons of carpets and 8 tons of other final products.

In production of carpets they use 1.058 grams of wool for 1m² of carpet and some cotton and jute. The retail price of carpets is 35 KM per m².

Market and marketing strategy

According to manager, the basic precondition for a successful battle with the competition and penetration in new markets is quality of products.

The company mainly exports to the market of Serbia, Macedonia and Montenegro. Company achieved excellent business results 2007 and 2008. World economic crisis reduced demands in the market. Therefore, the company currently has a stock of goods in the amount of one million KM.

The most important partner of the company is Vitex Visoko. This firm performs services of washing and preparing of raw wool for machine processing. Company owns several retail stores in Sokolac but 95% of sales go through the organized wholesale supply chain. Share of export in the company's annual sales is 15% and which is insufficient to receive subsidies from the Ministry of Economy. The law requires exports share of minimum 30% of annual sales. Company currently operates at 25 % of installed capacities.

Constraints

The basic problem of the company is lack of marketing strategy and unpaid debts by their buyers. Second problem is export policy and the related subsidies which support companies whose share of exports is over 30% annually.

7.4.5. Washing and yarn production plant Kalinovik

Contact person Zeljko Djogo ,
mladensladoje@hotmail.com,
065 951 365,
Kalinovik bb

Plant was founded in 2005 as part of RS Ministry of Agriculture program to support rural development. All business operation are led by Association of agricultural producers Kalinovik. Currently, plant offers 3 part time jobs.

Production capacities

Plant can offer services of washing, carding and yarn production. Production capacity is 0.5 ton of washed wool a day (one shift) and 0.1 ton of carded wool and 0.1 tons of yarn in one shift. If necessary these quantities can be increased by 50%.

Plant washes 50 tons of wool annually and produces 2 tons of yarn.

When the plant is operating at its full capacity it needs 6 workers and one mechanic for maintenance. Operations can be organized in two shifts and in which case they would need 12 workers mainly women.

Plant possesses a baler used for compressing of wool for easier manipulation and transportation.

President of the Association stated that they would need an initial capital to organize and start continuous production.

Market and marketing strategy

They sell their products locally and in neighboring municipalities. Part of the yarn production goes to Altex from Breza. Sokolac carpet factory and Milici carding plant expressed their interest to cooperate.

Local market can take up 50 tons of washed wool annually. Capacity of the washing plant is 120 tons. They can collect up to 10 tons of wool from local farmers.

Purchase price of greasy wool is 0.5 KM per kilogram and 2 KM per kilogram for washed wool. Price of carded wool is 3.5 KM and price of yarn is 12 to 14 KM for 1 kilogram.

Production of yarn is organized only when it is ordered. Association is planning to upgrade production with final products such as mattresses, blankets, pillows. They think that this type of products can find its way to costumers. Partners are Alteks Breza, Carpet factory Fates Sokolac. Association has a group of five women who are very good knitters and some can train other if necessary.

Constrains

President of the Association stated that the biggest problem for continuous production is lack of startup capital, better knowledge of the market needs and weak links with other similar and complementary productions.

7.4.6. Washing and yarn production plant Rogatica

Contact person ,
Snezana Konostrevac,
skonostrevac@yahoo.com
Rogatica

Plant was founded in 2005 as part of RS Ministry of Agriculture program to support rural development. All business operation is led by Association of agricultural producers Rogatica. It has one part time staff.

Production capacities

Plan can offers services of washing, carding and yarning. Production capacity is 0.5 ton of washed wool a day (one shift) and 0.1 ton of carded wool and 0.1 tons of yarn in one shift. If necessary these quantities can be increased by 50%.

Plan washes 10 tons of greased wool annually.

When the plant is operating at its full capacity it needs 6 workers and one mechanic for maintenance. Operations can be organized in two shifts and in which case they would need 12 workers mainly women.

President of the Association stated that they would need an initial capital to organize and start continuous production.

Market and marketing strategy

Currently plant is offering washing service only. Purchase price of greased wool is 0.8 KM per kilogram and 2.5 KM per kilogram for washed wool. Production of yarn is organized only when it is ordered.

Constraints

President of the Association stated that the biggest problem for continuous production is lack of startup capital.

7.4.7. Wool processing plant Milici

Contacts person Sinisa Sekulovic ,
potrci.sekulic1@gmail.com,
Milici

Carding plant Milici is founded in 2003 as a part of UNDP Srebrenica program and employs 3 workers. The UNDP Srebrenica program donated carding machine.

Production capacities

Since 2003 until mid 2009 the company was providing service of carding and selling of carded wool. Initially, the company was cooperating with Alteks company from Breza. Since 2004 they cooperate with SZR Milan Pilipovic.

Company produces blankets, pillows, covers, woolen mattresses, sleeping bags, jackets stuffed with wool. Production process requires finer wool. Monthly production capacities are 0.3 to 05 tons of carded wool a month while installed capacities are 0.8 tons a month.

Annual quantity of wool processed amounts to 3 tons. However, company records decline of 15% in the segment of purchase of carded wool as a result of lower interest of younger generation in knitting. Selling of carded wool varies for 0.7 to 1 ton. Price of carding service is 3.5 KM per kg.

Since 2009 company started to produce beddings stuffed with carded wool. The entire production is based on natural materials such as wool and cottons. Company needs washing plant to have entire production cycle closed.

Market and marketing strategy

Manager of the company stated that his orientation from the very beginning was developing of products with natural materials. He sees this as long term successful marketing strategy. In his opinion more people recognize value of natural materials. Nevertheless, he thinks that his and similar company should join their marketing effort and popularize value of their products.

Constraints

Main barriers are lack of startup capital, weak links between similar businesses.

7.4.7. Stilla Sarajevo

Contact person Amila Smajlovic, Manager

www.stilla.ba, stila@bih.net.ba

033 214 060, 061 202 367

Vlakovo 131, Sarajevo

It is founded in May 2006 and currently employs 6 women.

It is a private art workshop that produces traditional Bosnian carpets, blankets, pillows, decorative items such as chair blankets, tapestry. All products are made of natural materials such as wool, cotton and leather. They also do revitalization of the old patterns made by old techniques of weaving – kneeling. Knitting is another type of operation performed by this company.

Production capacities

Company utilizes 0.3 to 0.5 tons of yarn annually and converts it into the same amount of final products. Although company owns a 2000 m² facility big they only use 100 m². Size of operation was reduced in the last 6 months.

Market and marketing strategy

Bearing in mind nature and cultural and traditional value of their products manager of the company is of the opinion that competent authorities should find interest in supporting this production. She proposed an idea of becoming partner of Ministry of Foreign Affairs which can use Stillas' products as gifts in diplomatic protocols. She said that state should register brand of Bosnian woolen products.

Partners of the company SZR Pilipovic Milan from Prijedor and Alteks from Breza.

Constrains

There are two main constrains identified by the owner. First is lack of interest of state to support this business. Second problem is quality of yarn that can be found in BiH. She stated that she need thinner yarn. Manager of the company is of the opinion that state should do more on protecting old crafts such as kneeling and weaving.

7.4.8. BH CRAFTS Sarajevo

Contact person Lejla Radoncic, manager

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Muhameda Hadzijahica 29, 71000 Sarajevo, +38733 551 535 / 551 536

It is the project of production of handmade clothing and decorative items, toys, carpets, which involves women from Bosnia and Herzegovina. They permanently employ 10 women and secure income to up to 500 craft producers in Bosnia and Hercegovina each year.

Nongovernmental humanitarian organization Norwegian People's Aid has started this project in 1995. In the beginning, the project has had humanitarian character, and today, it has developed into a successful and export-oriented business, which is still successfully developing. The result of that development is the enterprise BHCrafts, which is in charge of promoting and selling bosnian handicrafts in country and abroad.

Production capacity

BHCrafts needs 1.5 tons of yarn made of finer wool and some 0.12 tons of yarn coarse wool for carpets.

They also act as an umbrella organization for all associations of women dealing with traditional craft skills through Centre for Transfer of Traditional Craft Skills. The aim is to train women in traditional skills of knitting, weaving and other traditional techniques and make it commercial, sustainable and profitable business for both, the company and the trainee. As stated by the manager of the BHCrafts although they are open for new members there are strict rules and criteria which must be fulfilled in order to become part of the BHCraft network.

BHCrafts are reporting decrease of sales of 15% as a consequence of world recession in this year.

Market and marketing strategy

CRAFT products are mixture of traditional and modern design, made of chemically untreated wool and cotton, in the process which obeys the strict ecological standards.

They invest a lot in marketing activities, including market research, attendance at international trade fairs, maintaining and extending networks of sales representatives, developing retail shops in country, etc. Promotional activities, such as web site development, brochures, and post cards; Development of new products and the training of additional producers;

The BHcrafts has successfully cooperated with companies from France and USA Italy, Japan, Germany with the trend to expand within the regional markets, Slovenia, Croatia and Serbia.

The majority of local sales comes from the local market (83% from retail outlets, 5% from corporate gifts program and 12% from wholesale program). Of the total export sales, US market tops the list with 56%, following with France 30%, Japan 10%, UK and Germany 3%.

Constrains

Despite the fact that BHCRAFT provides over 500 jobs for women and export most of its production state does not recognize potential of this business and do not support in any way.

7.4.9. SZR Milan Pilipovic Prijedor

Contact person Milan Pilipovic
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Prijedor

Craft shop was founded in 1986 as a private family business. They currently employ 5 people.

Production Capacities

Annual wool consumption is 15 tons of greased wool. They produce some 6 tons of yarn and 2 tons of carded wool. Annual production of final products is 3 tons. Washing capacities are over 100 tons. They wash over 30 tons of wool annually.

Equipment that they use requires finer wool. Lack of such wool in the market causes problems. Manager of the shop said that he waste time and resources to find appropriate wool. Price that he pays for wool is 0.9 to 1 KM. He is ready to pay more if he would have stable supply.

Market and marketing strategy

Company is washing wool, processing it into carded wool and woolen yarn. They also produce blankets, covers, mattresses, carpets. They use natural materials only. Manager of the company believes that natural materials and especially are getting recognized by consumers as healthier products. This should be the bases for marketing approach for companies like this one. They have developed distribution network and they are able to sell all their products. Yarn is sold to Stilla Sarajevo and some women's associations less than a 1 ton.

Constrains

Lack of finer wool and weak links with similar companies