

SUSTAINABLE PRODUCTION, GRADING AND MARKETING CHANNELS OF WOOL

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India is the 9th largest producer in the world contributing around 2 percent to the world's total wool production. The sheep population has increased from 65.06 million to 74.26 million, contributing 678.0 million kg mutton and 40.4 million kg of wool. Sheep husbandry is one of the valuable and important sources of income for small farmers and provides employment to nearly 6 million people in the Country. The demand for mutton and wool is growing in the country and the exiting woolen and carpet industry requires 100 million kg of wool annually. To meet the demand, India is importing 80-90 million kg of wool from Australia, New Zealand, and other countries (ICAR-CSWRI, 2019, Annual Report). In India, Rajasthan is the highest wool-producing state having around 70 wool processing units with a production of around 15 million tones of wool every year. About 12 lakh people are employed in organized wool sector and there are around 3.2 lakh weavers in carpet sector (Wool Division, 2018)

Table.1 Major wool producing states (2018-19)

Rank	State	Wool production (in 000kg)	% Share
1	Rajasthan	14880.57	36.81
2	Telangana	4800	11.88
3	Karnataka	4344	10.75
4	Gujarat	2300	5.69
5	Himachal Pradesh	1500	3.7

DAHD, 2020-21, Annual Report

Market and Export Destination of Wool

The wool industry in India is concentrated in Punjab, Haryana, Rajasthan, Uttar Pradesh, and Gujarat. Out of these states, Punjab has 40 percent of wool production units

followed by Haryana (27%), Rajasthan (10%), and the rest of the states (23%). In India, there are 718 existing wool production units and around 27 lakh people employed in the woolen industry and sheep rearing in the rural areas (woolboardnic.in). US and EU are the key export destinations for Indian wool and wool blended products. Export of USD 2.79 million was reported for raw wool while USD 108.52 million for woolen yarn, fabrics, madeups during the year 2020-21 (Directorate General of Commercial Intelligence and Statistics, 2020).

Wool

The fleece obtained from a sheep is called as grease wool or raw wool. It is the animal fiber which grows from the follicle in the skin and has greasy coating. Indian wool is known for its coarseness and presence of medulla. Medullated fibers are characterized by central canal containing cell residues and air pockets running continuous and fragmented along the length. They appear chalky white and appear unable to dye to the same shade as normal solid fiber. They make the fabric stiff. Wool is a protein fiber that has scales and crimps that make it easier to spin into the yarn because the fibers interlock with each other rather than slides loosely against each other. Crimp in the fiber allows wool fabrics to hold air and thereby retain heat. Wool fiber can absorb almost $1/3^{\text{rd}}$ of its weight in water making wool fabrics excellent for wicking moisture. Wool fibers are elastic, thus retains their shape over the life span of a garment. Some wool fibers are fine and wearable close to the skin such as Merino, Rambouillet, Corriedale, etc.

Common Characteristics of Wool

Some characteristics determine what it can be used for. These are as follows:

1. Diameter (micros)
2. Staple length
3. Uniformity of fleece
4. Elasticity
5. Strength/Durability
6. Luster
7. Felt-ability

Factors Affecting the Wool Quality

Several factors are contributing to the maintenance and improvement of the wool clip. There are as follows

1. Breed suitability to farm context
2. Feeder design that reduces neck, back & shoulder rubbing
3. Nutrition and its impact on fiber strength
4. Contamination of wool with vegetative matter from field grazing
5. Age (Increased kemp or hair which won't take dye and devalues the clip)
6. Housing and choice of bedding
7. Timing of shearing before lambing to avoid wool breaks

Properties of Wool

Wool surface repels water, so woolen fabrics tend to feel dry even in damp weather. Inner core does absorb moisture almost double of its weight in water and this absorbency gives wool its natural resistance to wrinkles.

Physical Properties of Wool

1. Crimp- Wool fiber is more or less wavy or has twisted. Waviness is termed as crimp.
2. Effect of friction- Helps in maintaining smooth, soft texture of fabrics.
3. Effect of Heat- Low heat has no effect, but strong heat weakens the fiber and destroys the color of the fiber
4. Effect of moisture- Wool is hygroscopic
5. Felting- Wool fibers interlock and contract when exposed to heat, moisture, and pressure. Fiber gets softened in weak alkaline solutions due to expansion of scale at their free edges, with friction and pressure they again interlock to form a felt.
6. Heat conductivity – Poor conductor of heat and fabrics made from the fiber are suitable for winter wear.
7. Resiliency- Wool is highly resilient and comes to its original shape when hanged after being wrinkled or created.
8. Strength- Wool is stronger than silk. Wet wool loses 25% of its strength. The longer the fiber, the greater will be the strength of yarn.
9. Stretchability – Wool is highly elastic.

10. Shrink ability- Wool is resistant to shrinkage, however long exposure to moisture may cause shrinkage.

Chemical Properties of Wool

Wool is resistant to acid. Cotton and cellulose is severely damaged if exposed to acid. Wool is treated with a solution of sulphuric/sulfuric acid and is then baked to destroy the impurities with only minimal damage to the wool.

1. Action of acids- Dilute acids has little effect but either hot or concentrated acids weaken or dissolve the wool fiber.
2. Action to alkalis- Alkalis tend to make white wool yellowish, strong solutions of sodium carbonate when heated destroys the fiber. Sodium hydroxide is highly injurious to the wool fiber. Borax and ammonia have no harmful influence on wool.

Table.2 Chemical composition of wool fiber

Content Name	Content (%)
Keratin	33
Dirt	26
Suint	28
Fat	12
Mineral matter	1

Grading of Wool

Grading- Grading refers to the average diameter or thickness of the fibers. It also means that placing entire fleeces in their grade piles according to fineness and length.

Systems of Grading of Wool

1. American system or Blood system
2. British system/Numerical system/Spinning count system
3. Micron System

1. American System or Blood system

This system is of American origin and based on the fineness of the wool. Fleeces of the same diameter shorn from fully blooded merino called 'fine'. Other grades such as half-

blood, 3/8 blood, 1/4 blood are described on the relative fineness of the wool obtained from sheep containing fractional amounts of merino blood.

2. Numerical System

It consists of the finest count to which it can be spun. This system is used in most of the countries of the world. It is based on the number of yarns or hanks that can be made from one pound of scored or combed wool. If fineness of the fiber is more, the length of yarn is greater. 1 hank is equal to 512m in length. A grade of 60's means that 60 hanks could be made from one pound and it will be superior/finer to the wool of 50's. Similarly, grade of 50's would be finer than 40's wool and so on.

3. Micron system

Increased emphasis on an exact and highly descriptive method of describing wool grade has produced a measuring system in which individual fibers are accurately measured. The unit of measure is micron, which is one millionth of a meter or 1/25000 of an inch. Fineness is expressed as mean fiber diameter.

Table.3 Grades of Wool by the Blood System

Fine wool	2½ inches in stable length	Very fine crimp
½ blood wool	3 inches in stable length	Medium fine crimp
3/8 th blood wool	3½ in stable length	Medium crimp
1/4 th blood wool	4 inches in stable length	Medium coarse crimp
Low 1/4 th wool	4½ inches in stable length	Coarse crimp
Common	5 inches in stable length	Very coarse
Braid	6 inches in stable length	Most coarse

Table.4 Grading based on diameter of merino wool

< 15.5 microns	Ultrafine
15.6 to 18.5 microns	Super fine
18.6 to 20 microns	Fine
20.1 to 23 microns	Medium
23 inches	Strong

Wool Marketing Channels

Marketing channels consists of people, organizations and activities necessary to transfer the ownership of goods from point of production to the point of consumption. It is

the route/path traced in the direct and indirect transfer of the product from a producer to an ultimate consumer. Marketing channels of wool can be as follows:

1. Farmer - Consumer
2. Farmer - Village Level - Textile dealer - Consumer
3. Farmer - Village Level - Textile dealer - Retailer - Consumer
4. Farmer - Village Level - Retailer - Consumer
5. Farmer - Village Level - Middle men - Textile dealer – Consumer
6. Farmer - Commission agent - Yarn manufactures - Textile dealers – Retailer - Consumer
7. Farmer - Middle men – Wholesaler - Retailer - Consumer
8. Farmer - Middle men - Textile dealer - Retailer - Consumer
9. Farmer - Village level - Middle men - Wholesaler - Retailer - Consumer

Conclusions

Sheep husbandry is one of the important livelihood alternatives that contribute significantly to boosting the economy of several smallholders in the developing world. Wool is the most reusable and recyclable fiber in the world. Due to its chemical structure, the fibers act as a spring when extended, allowing it to stretch and shrink back to its original size easily. These qualities make wool one of the most resilient, durable, and sustainable materials. Wool is graded for fineness and length. The length varies amongst sheep breeds. The world wool market is dominated by Australia, while China is the world's largest producer and consumer of wool. The dissemination of reliable market information to all segments of the marketing system is crucial for making it competent and efficient. Along with this it's necessary to provide good market channels to shepherds at domestic and international level for selling wool at satisfactory price.

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