Sourcing Series

SOURCING COTTON: How Fiber Quality Impacts Your Final Product

Webinar presented by COTTON UNIVERSITY™

COTTON UNIVERSITY™

COTTON UNIVERSITY™

YOUR ULTIMATE TEXTILE RESOURCE

COTTON UNIVERSITY™

BUSINESS CENTER

YOUR ULTIMATE TEXTILE RESOURCE

MARKETING & SOURCING STRATEGIES

PRODUCT INNOVATION

EFFECTIVE TOOLS FOR SUCCESS

COTTON UNIVERSITY™

WEBINARS

YOUR ULTIMATE TEXTILE RESOURCE

MARKET SERIES

LAB SERIES

SOURCING SERIES

Stay connected with us through CottonUniversity.org!

Today's Webinar

Q&A
Type your questions in the Q&A window at any time during the webinar.

Twitter
@Cotton_Univ
#CottonUniversity
Ask questions.
Join the conversation.

Website
Find the presentation slides and more at CottonUniversity.org later this week!

Please **turn off your pop-up blocker** to participate in this webinar.

Information presented is from several sources. Some information is Cotton Incorporated's interpretation. No responsibility is assumed for the use of this information and no express or implied warranties nor guarantees are made.

Sourcing Series

SOURCING COTTON: How Fiber Quality Impacts Your Final Product

Webinar presented by COTTON UNIVERSITY™

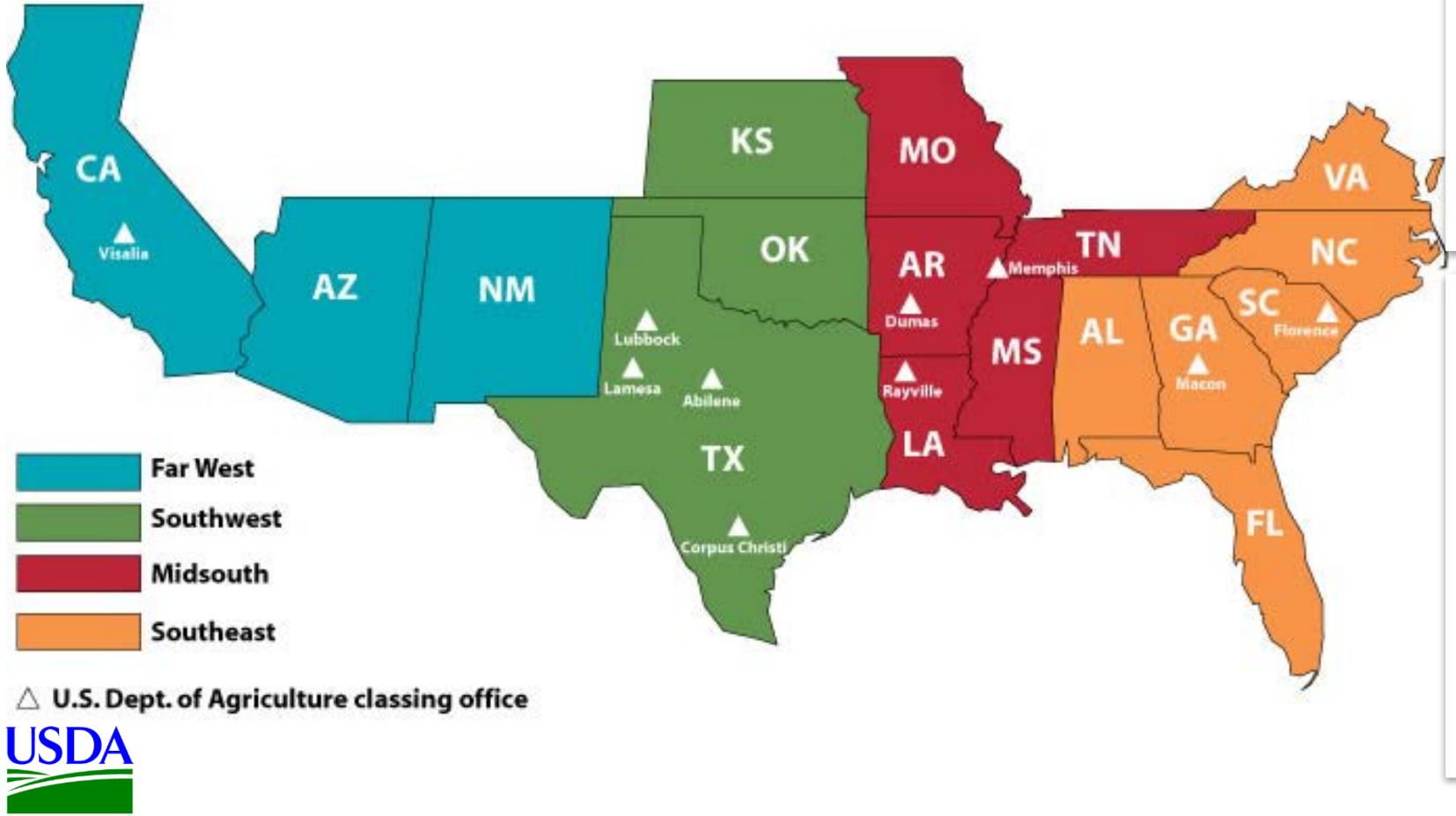
COTTON UNIVERSITY™

Cotton Fiber Qualities

- Every bale of cotton is different.
- Every bale of cotton has an appropriate application.
- Cotton is purchased based on fiber properties.
- Processing is also important.
- Quality does cost.

- Species
- Variety
- Environment
  Location
- Growing Season

Every individual bale of cotton produced in U.S. is instrument tested & graded by the USDA.



USDA

Classification of Upland Cotton

- Fiber Length
- Length Uniformity
- Fiber Strength
- Micronaire
- Color Grade
- Trash / Leaf Grade

Fiber Length

The average length of the 50% longest fibers (upper half mean length)
Reported in 32nds or 100ths of an inch

Inches	32nds	Inches	32nds
0.79 & Shorter	24	1.11 – 1.13	36
0.80 – 0.8	26	1.14 – 1.17	37
0.86 – 0.8	28	1.18 – 1.20	38
0.90 – 0.9	29	1.21 – 1.23	39
0.93 – 0.95	30	1.24 – 1.26	40
0.96 – 0.98	31	1.27 – 1.29	41
0.99 – 1.01	32	1.30 – 1.32	42
1.02 – 1.04	33	1.33 – 1.35	43
1.05 – 1.07	34	1.36 & longer	44
1.08 – 1.10	35		

Impacts:

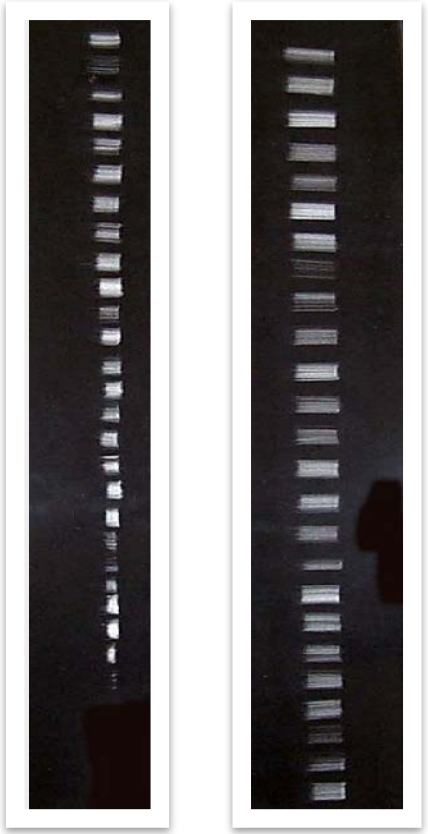
- Yarn strength
- Yarn evenness
- Spinning efficiency
- Influences the fineness of yarn that can be successfully produced

Length Uniformity

The ratio between the mean length and the upper half mean length of the fibers, expressed as a percentage.

Impacts:

- Yarn strength
- Yarn evenness
- Spinning efficiency



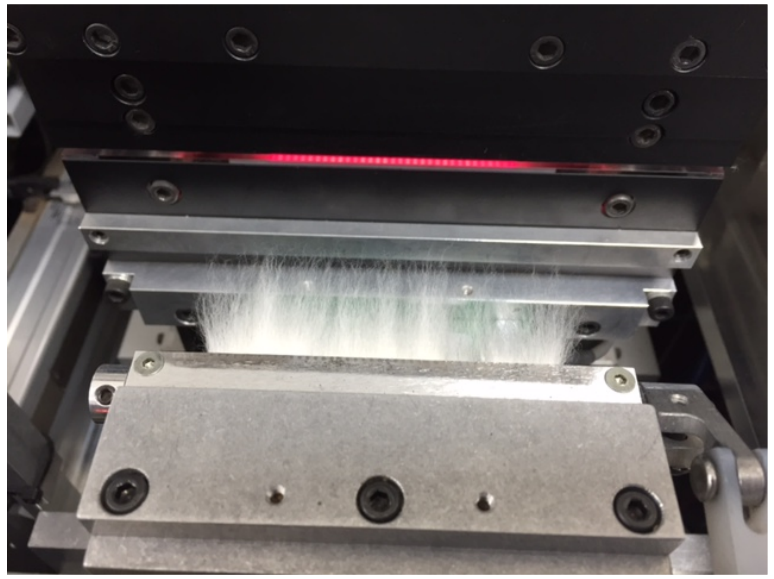
Description of Degree of Uniformity	Length Uniformity Index (percent)
Very High	Above 85
High	83 - 85
Intermediate	80 - 82
Low	77 - 79
Very Low	Below 77

Fiber Strength

The amount of force required to break a bundle of fibers. Reported in grams force per tex.

Impacts:

- Yarn and fabric strength
- Most cotton varieties have ample strength for apparel applications



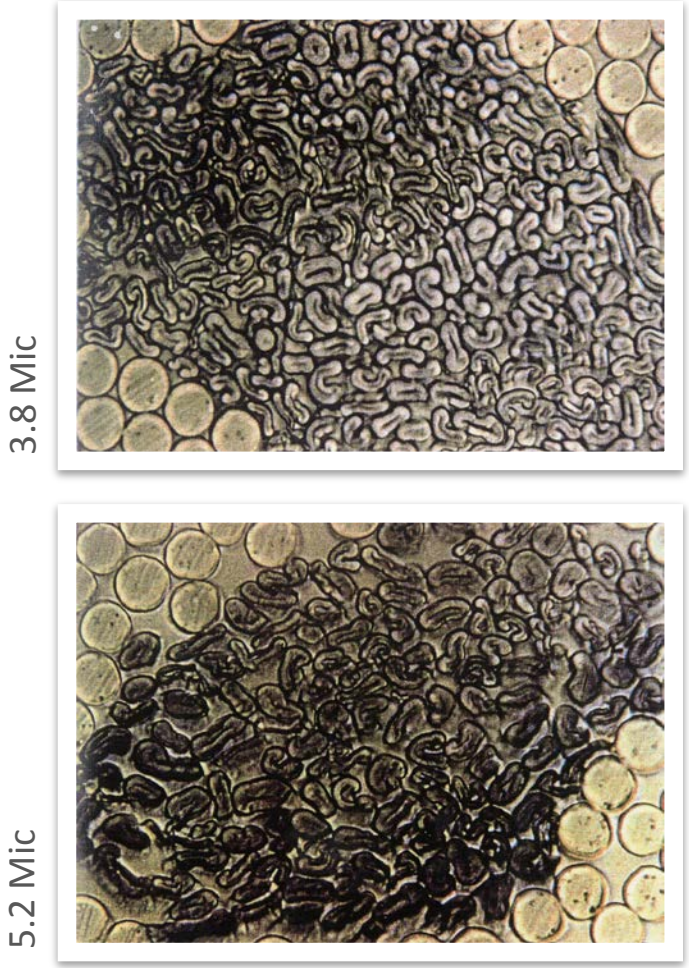
Description of Degree of Strength	Strength (grams per tex)
Very Strong	31 & above
Strong	29 – 30
Average	26 – 28
Intermediate	24 – 25
Weak	23 & below

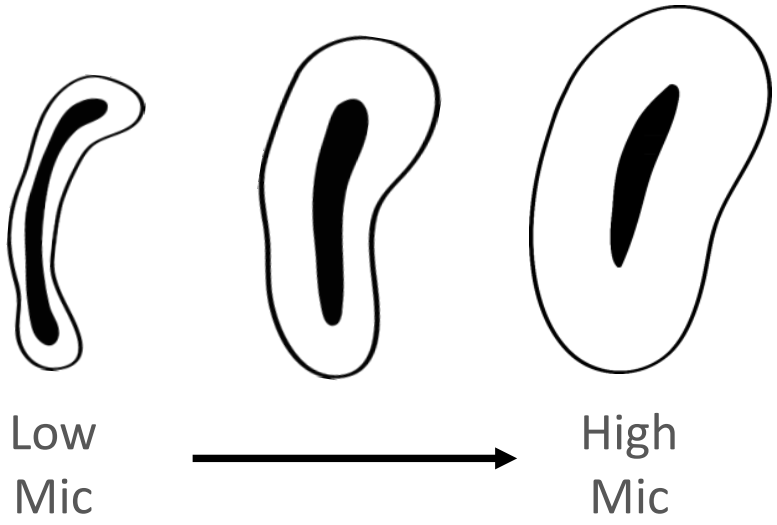
Micronaire

Measure of fiber fineness and maturity.

Impacts:

- Yarn strength
- Yarn evenness
- Spinning efficiency
- Dye absorbency and retention in fabric



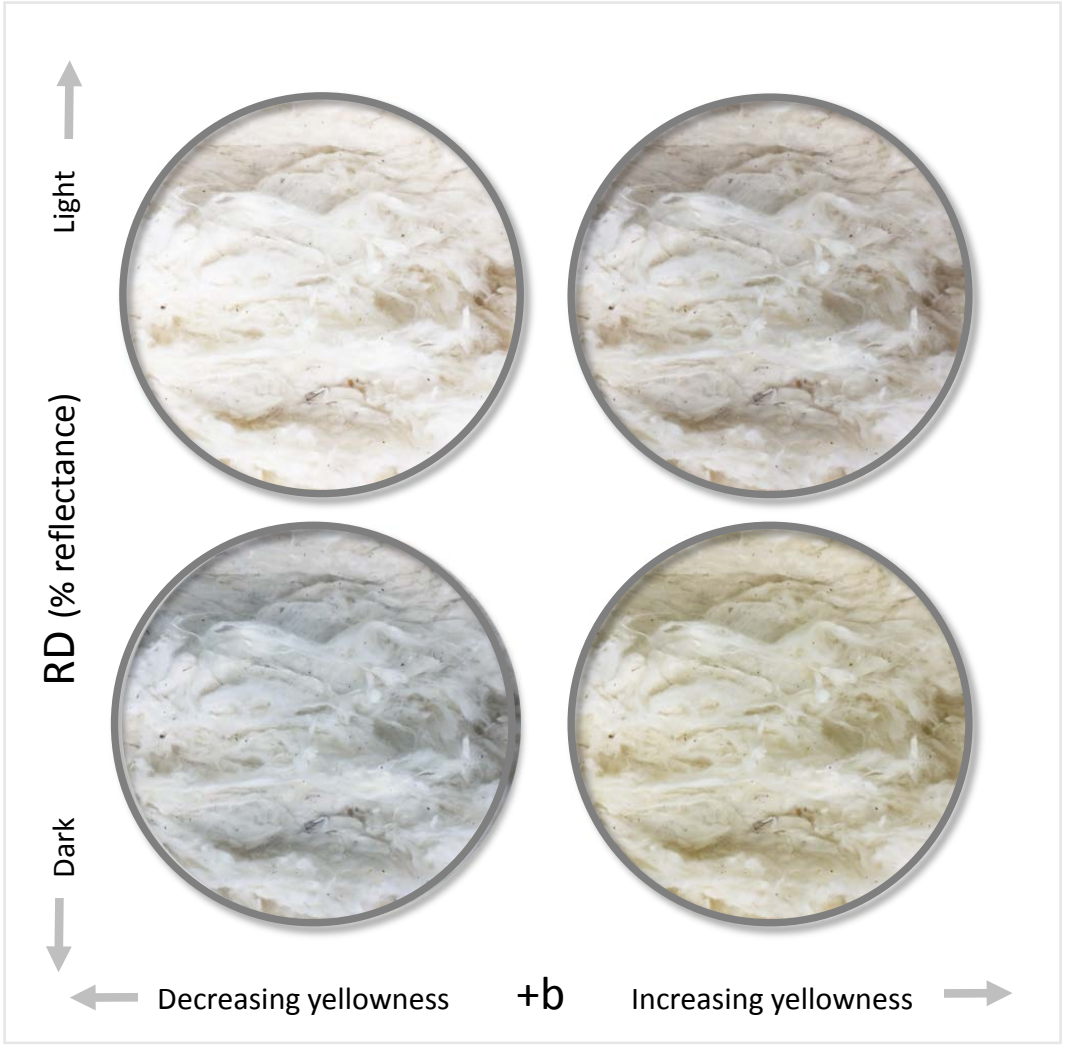


Color Grade

Measure of fiber reflectance (Rd) and Yellowness (+b).

Impacts:

- Bleaching / Preparation of fabric
- Dyeability
- Color can be managed by spinning mill as long as output is consistent



Trash & Leaf Grade

Amount of leaf, plant, and other non-lint material in the cotton

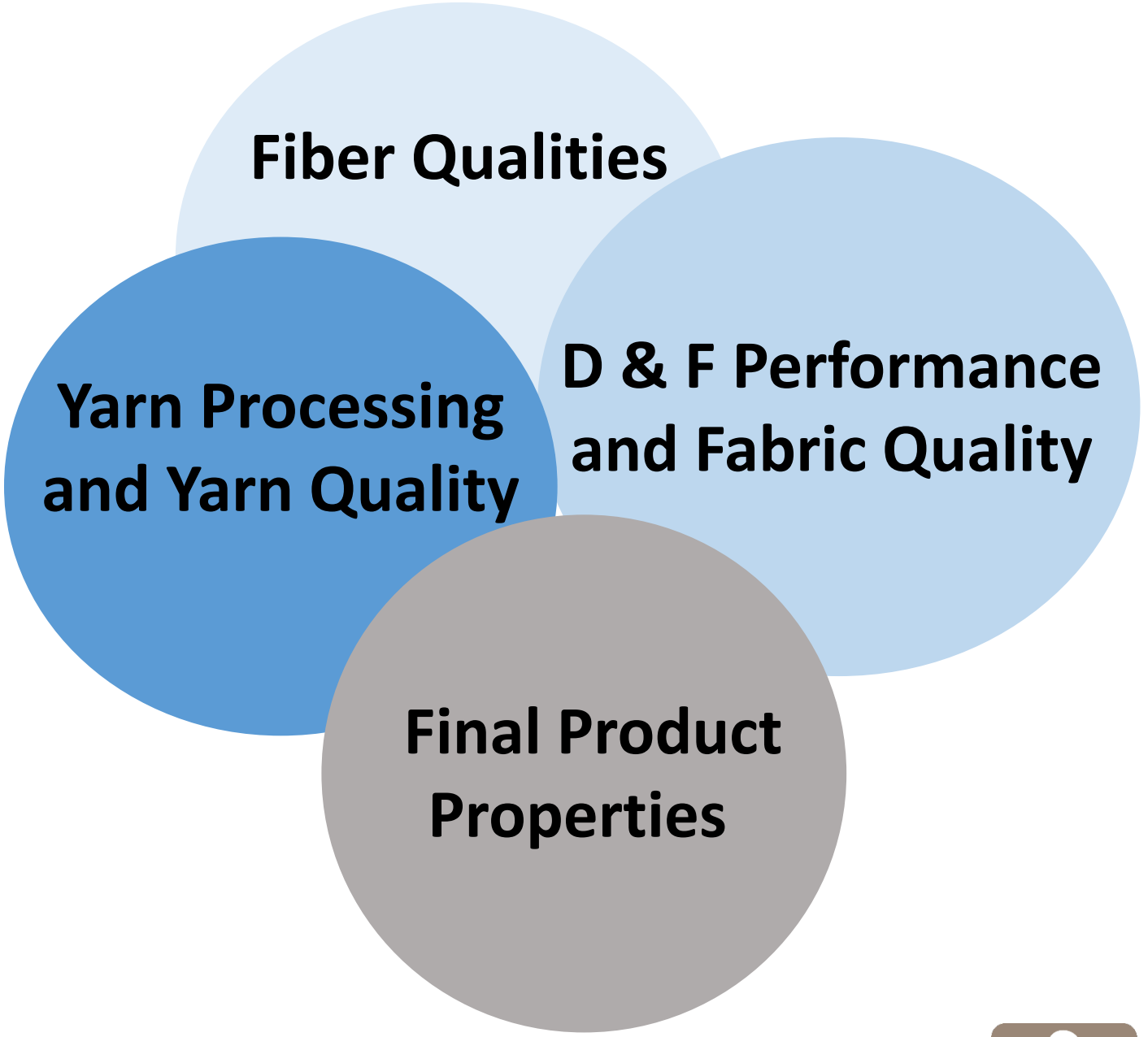
Impacts:

- Cleaning efficiency at the mill
- Spinning efficiency
- Fabric appearance

Strength
Length
Micronaire
Length Uniformity
Color Grade
Leaf Grade

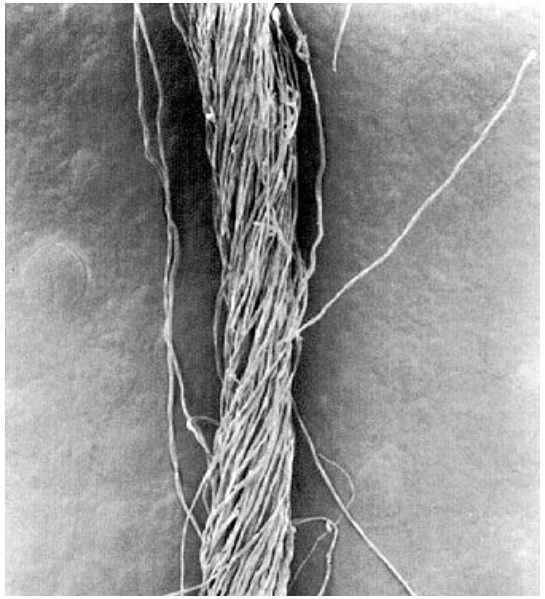
Cotton Fiber Qualities Impact on Yarns and Fabrics

Interrelated Functions



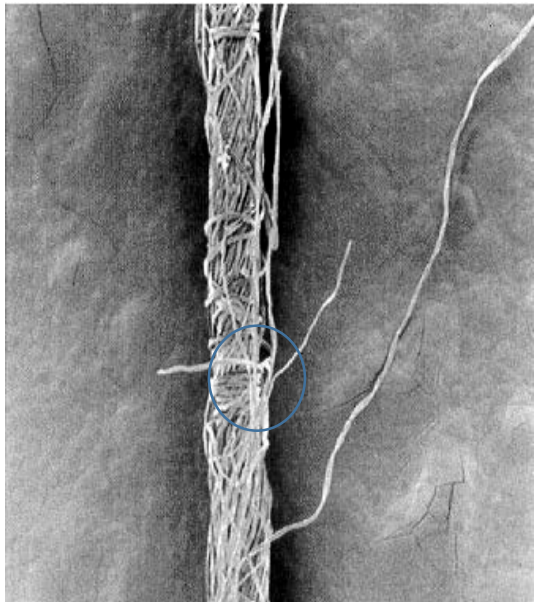
Spinning Systems and Yarn Structure

Ring



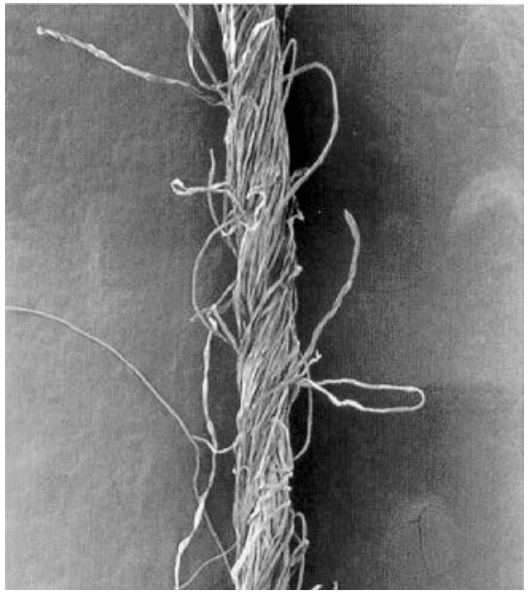
Uniform Fiber Arrangement

Open End



Random Fiber Arrangement with Wrapper Fibers

Vortex

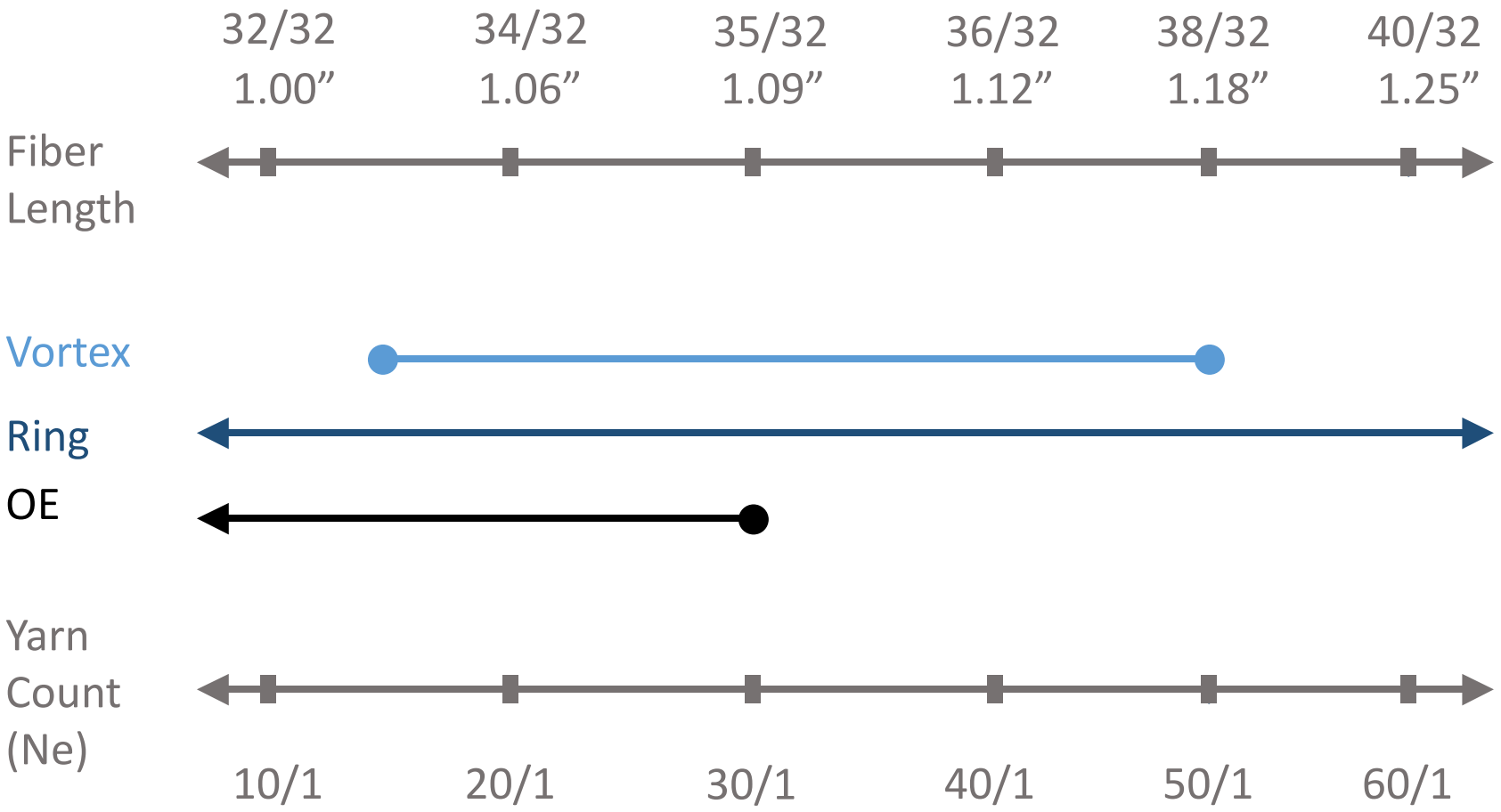


A More Ring-Like Yarn

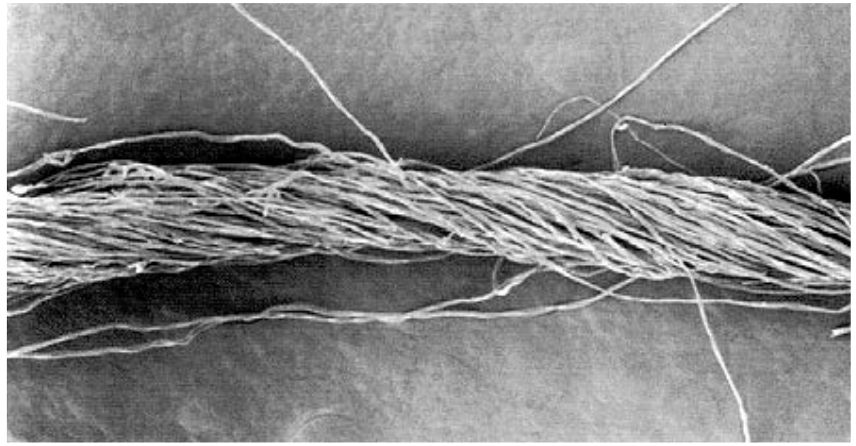
Selection of Fiber Properties to Optimize Yarn Processing and Yarn Quality

Rank	RING	ROTOR	AIR JET
1	Length	Strength	Length
2	Fineness	Fineness	Cleanliness
3	Strength	Length	Fineness
4	Cleanliness	Cleanliness	Strength

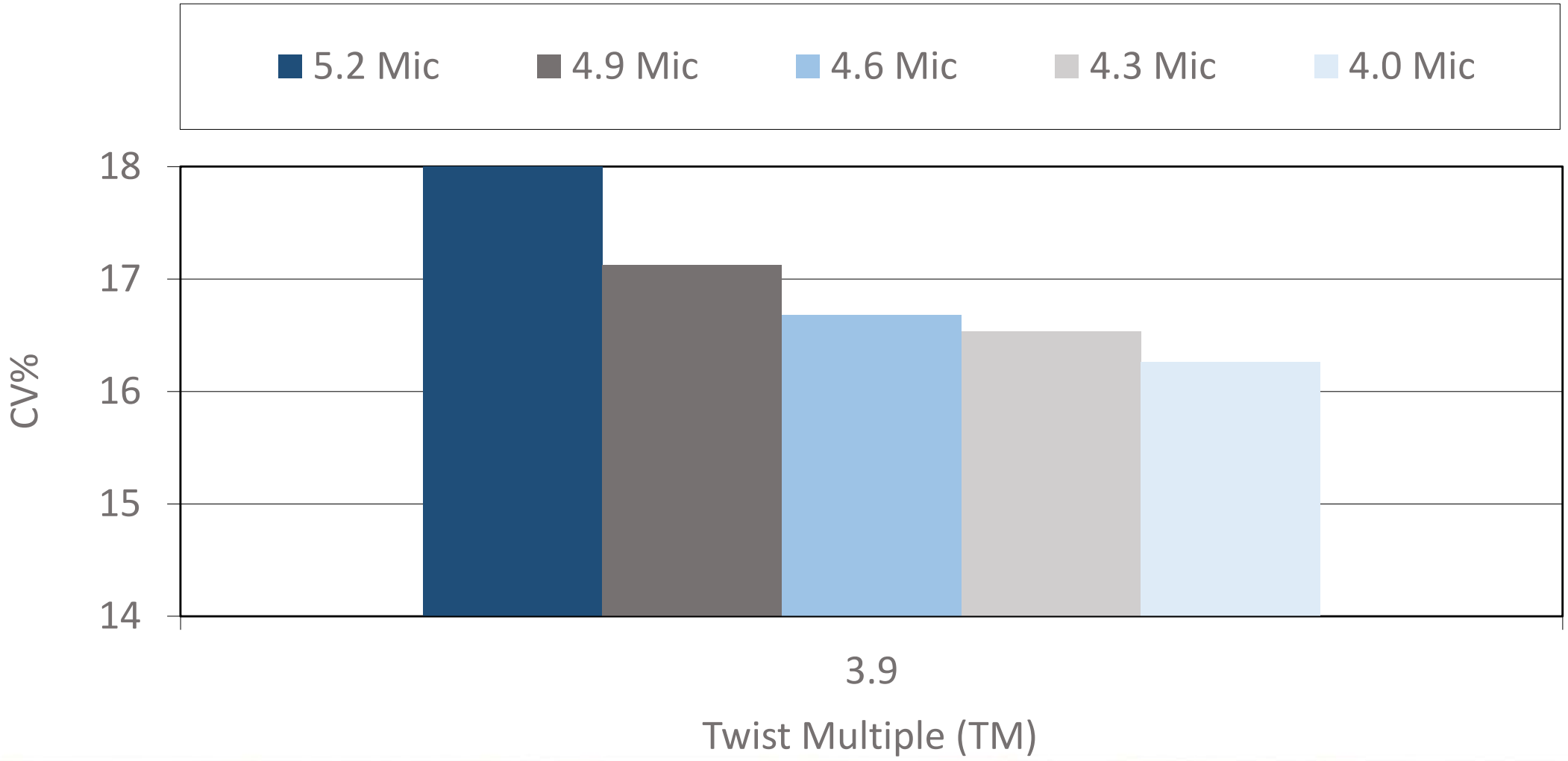
Fiber Length/Spinning System/Yarn Count



Hairiness	Strength	Imperfections	Spinning Efficiency
Micronaire	Micronaire	Micronaire	Micronaire
Length	Length	Length	Length
Length Uniformity	Length Uniformity	Length Uniformity	Length Uniformity
	Strength		Strength
			Trash

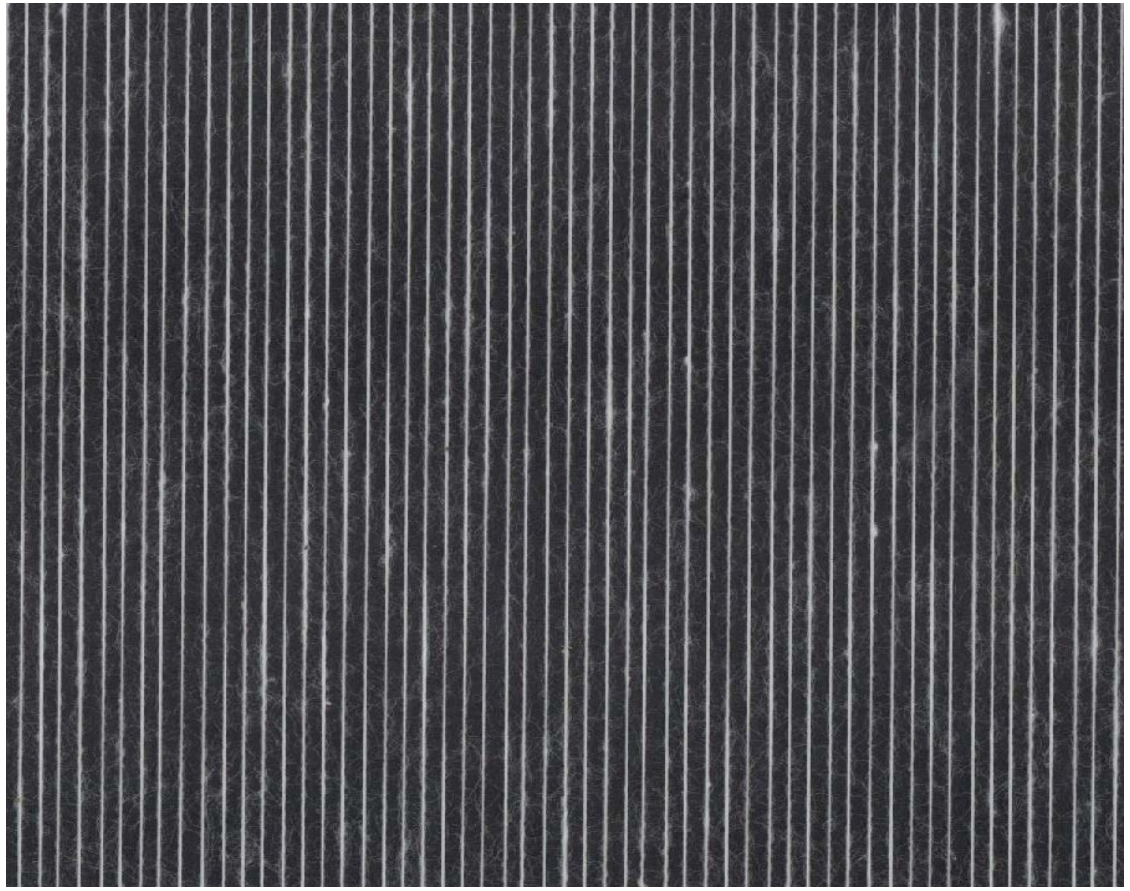


Yarn Evenness (C.V. %) | 30/1 Ring Yarn



Appearance of Neps in Cotton Yarns

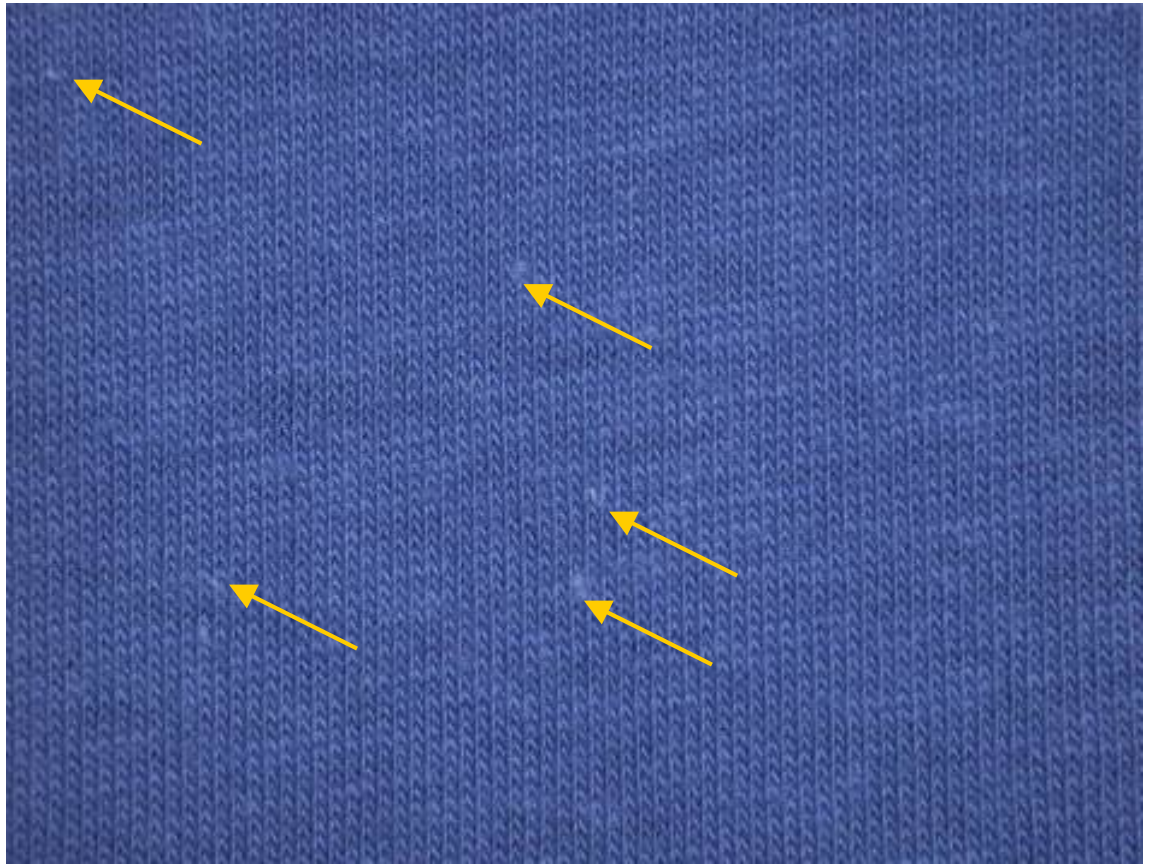
Carding Machine



Cotton Yarn Board

Comparison:
Well-Carded Fiber Fabric and Poorly-Carded Fiber Fabric

Single Jersey Dyed Fabric
Laydown 3 – 10/10/10/10 Flat Setting



Single Jersey Dyed Fabric
Laydown 3 – 17/17/17/17 Flat Setting

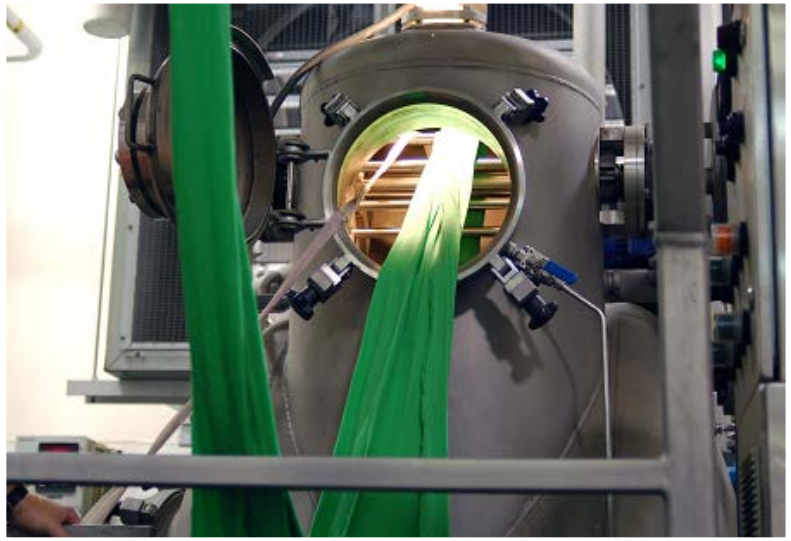
Functions of Combing

- Removal of Trash
- Removal of Neps
- Removal of Short Fibers
- Greater Fiber Parallelization

For optimum performance in combing and cost effectiveness, longer fiber length and higher length uniformity is desirable.

Carded and Combed Yarn Comparison		
Property	**Carded**	**Combed**
Staple Length	Shorter	Longer
Evenness	Less Even	Even
Neps	More	Less
Trash	More	Less
Fiber Orientation	Less	More
Strength	Lower	Higher
Range of Counts	Coarser	Finer
Yarn Surface	Hairy	Smoother
Diameter	Thicker	Thinner
Luster	Less	More
Processing Cost	Less	More

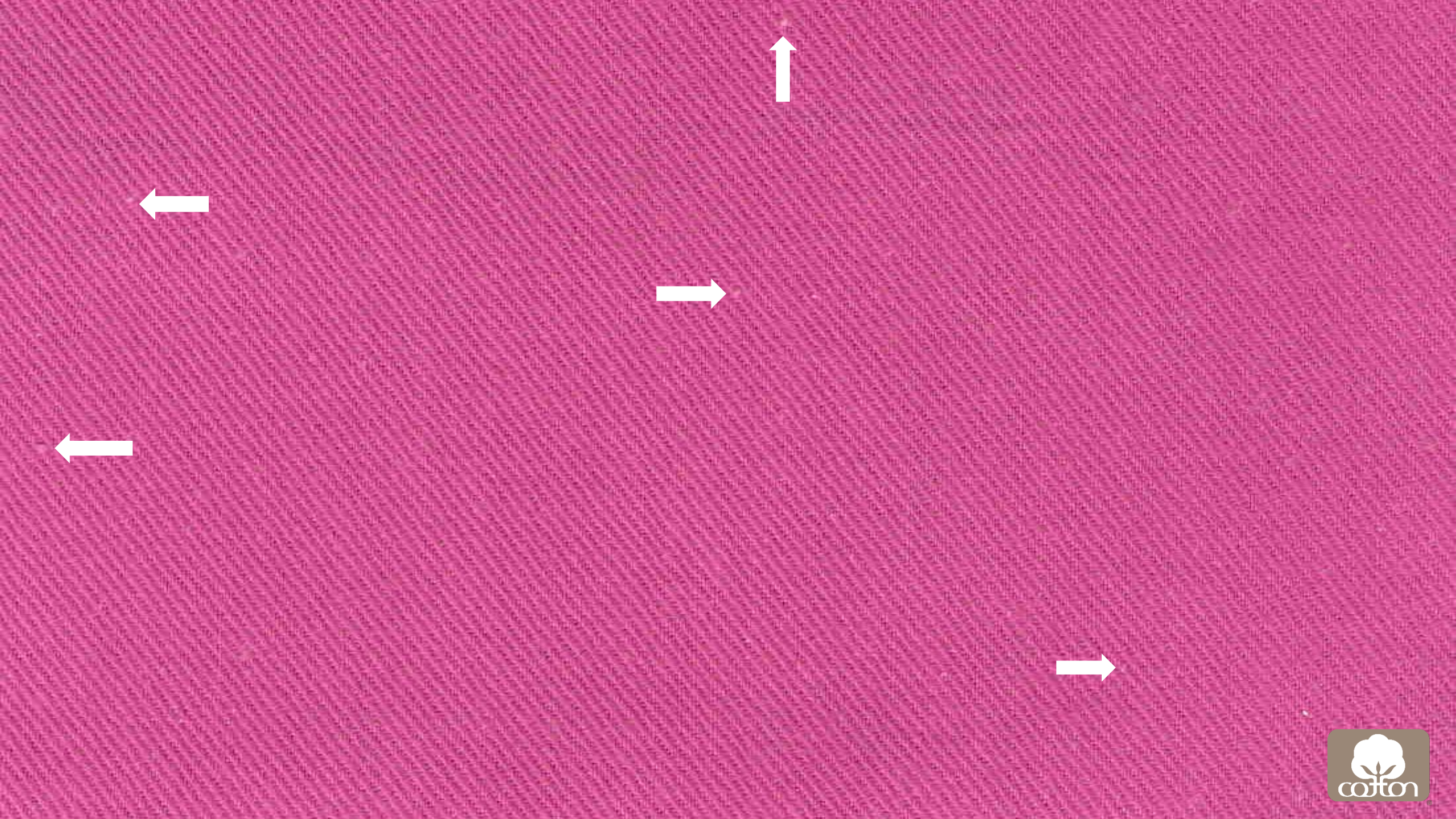
Dyeability	Appearance	Strength	Pilling
Micronaire	Micronaire	Micronaire	Length
Color Grade	Length	Length	Length Uniformity
Trash Grade	Length Uniformity	Length Uniformity	
	Color Grade	Strength	
	Trash		



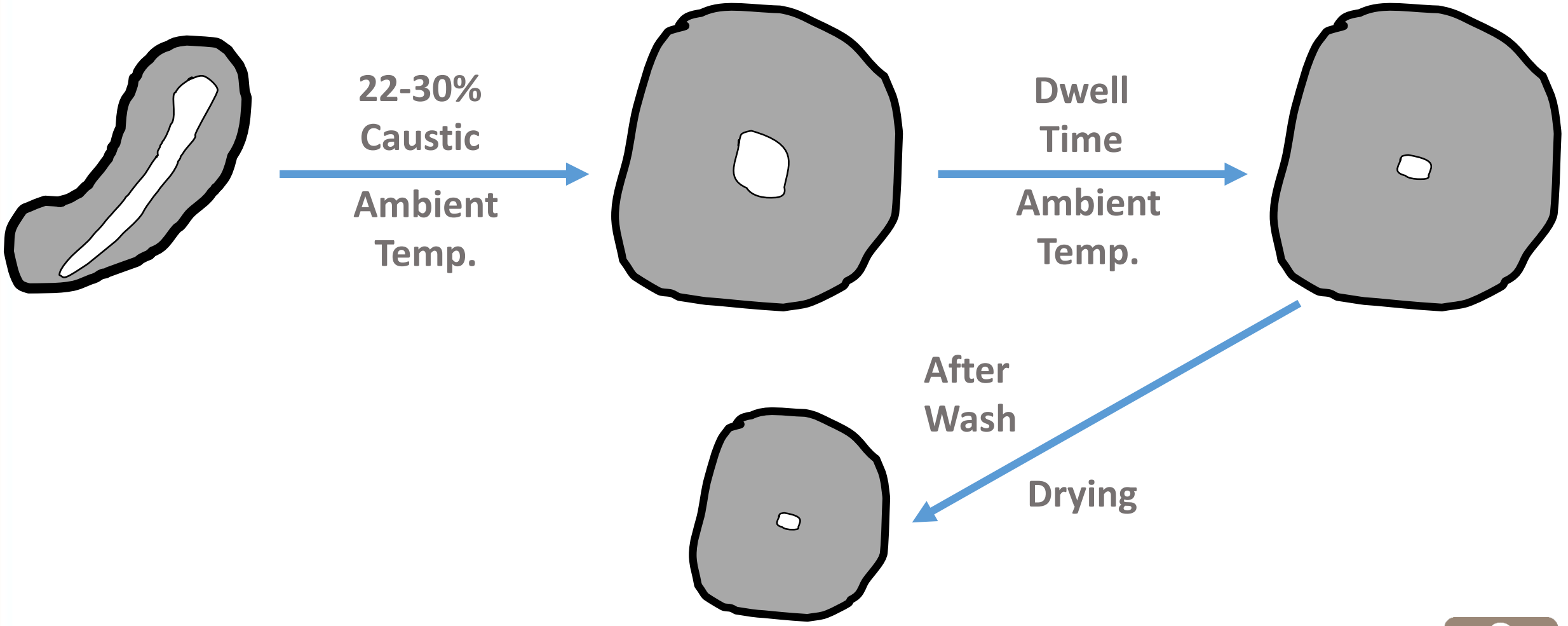
Micronaire Barré Fabric
(Influence of Micronaire on Dyed Fabrics)

20 feeds – 5.2 Mic

40 feeds – 4.0 Mic



Mercerization



Mercerized cotton

25 NaOH

@ 120°F

Influence of Trash Content on Fabric Appearance

Fabric Containing Uneven Yarns

Production Mill Scenario

Purchase lower grade and shorter length cotton at lower cost.

At spinning many yarn breaks occur and spinning efficiency suffers.

To increase spinning production and efficiency more twist is added to the yarn.

More twist in the yarn leads to the following changes in the fabric and garment:

- Harsher hand (feel)
- Less drape (stiffer fabric)
- More garment torque (skew)
- Change in luster

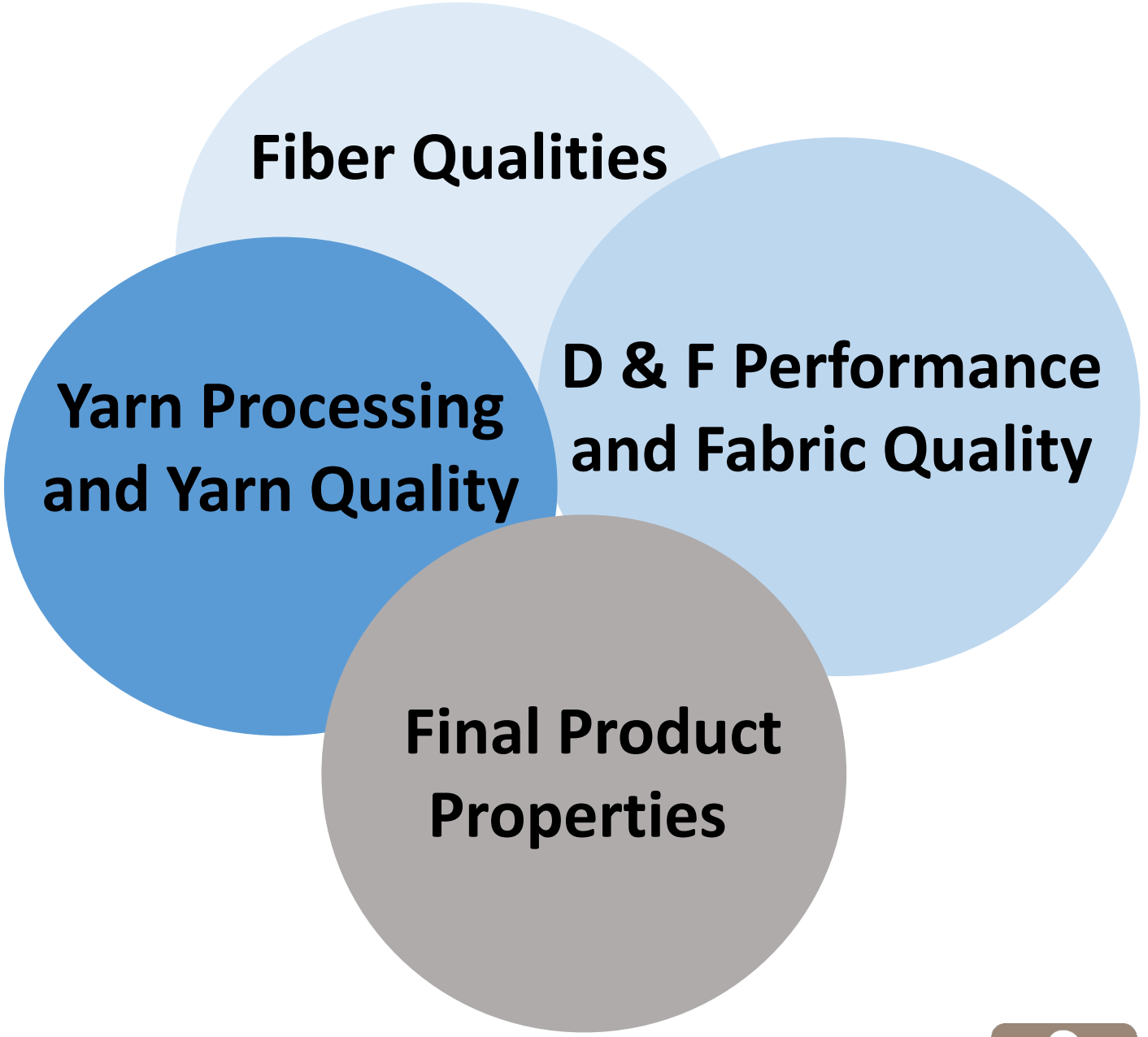
End product is not the same.

Selection of Fiber Qualities for Specific End Product Properties

Fiber Properties to Enhance Fabric/Garment Softness

- Cotton Fiber – the NATURAL choice
- Lower Micronaire Cotton
- Longer Length Cotton Fibers
- Lower Trash Content Cotton
- Higher Strength Cotton

Interrelated Functions



Sourcing Series

SOURCING COTTON: How Fiber Quality Impacts Your Final Product

Webinar presented by COTTON UNIVERSITY™

COTTON UNIVERSITY™

Want to share this presentation with a colleague? Find this webinar and more fiber resources in the **College of Fiber Science**.

Sourcing Series

SOURCING COTTON: How Fiber Quality Impacts Your Final Product

Please submit all final questions now.

Questions may be submitted through the Q&A box on your screen or by tweeting to **@Cotton_Univ.**