

CONTROL ODOR NATURALLY WITH COTTON



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COTTON UNIVERSITY™



Cotton
Incorporated



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Learn. Connect. Grow.

COTTON UNIVERSITY™

LEARN. CONNECT. GROW.



Q & A

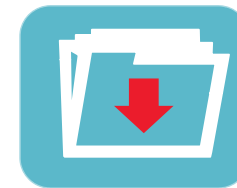
TYPE YOUR QUESTIONS
IN THE Q&A WINDOW
AT ANY TIME DURING
THE WEBCAST.



SOCIAL MEDIA

@Cotton_univ

FACEBOOK.
LINKEDIN.
TWITTER.



RESOURCES

ARTICLES,
RESEARCH METHODOLOGY
AND MORE

TO PARTICIPATE IN WEBCAST... **TURN OFF POP-UP BLOCKER!**

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.

IN THE HEADLINES....

Polyester shirts bad summer choice, say U of A smell testers

With the first weekend of the summer upon us, it might be time to start thinking of ways to stay cool and keep body odour at bay.

HEALTH

Your Fancy Non-Cotton Workout Clothes Stink

By **Melissa Dahl**  Follow @melissadah

NEWSWIRE



Synthetic Workout Gear Smells Worse Than Cotton Gear

Featured Research

Polyester clothes stink after exercise; cotton, not so much

Stinky T-Shirt? Bacteria Love Polyester In A Special Way

EVENTS | **HEALTH** | HOMES | FOOD | HOROSCOPES | EDUCATION | COMICS | GAMES | LIVING PICS | FASHION

Cotton could be the best weapon in fight against BO: study

My Sweaty Valentine

PICK COTTON OVER POLYESTER TO PREVENT B.O.

CONSUMER PERSPECTIVE
ODOR IN ACTIVEWEAR



COTTON INCORPORATED'S

CONSUMER & RETAIL INSIGHTS



100,000+
INTERVIEWS
CONDUCTED



900,000+
GARMENTS
AUDITED

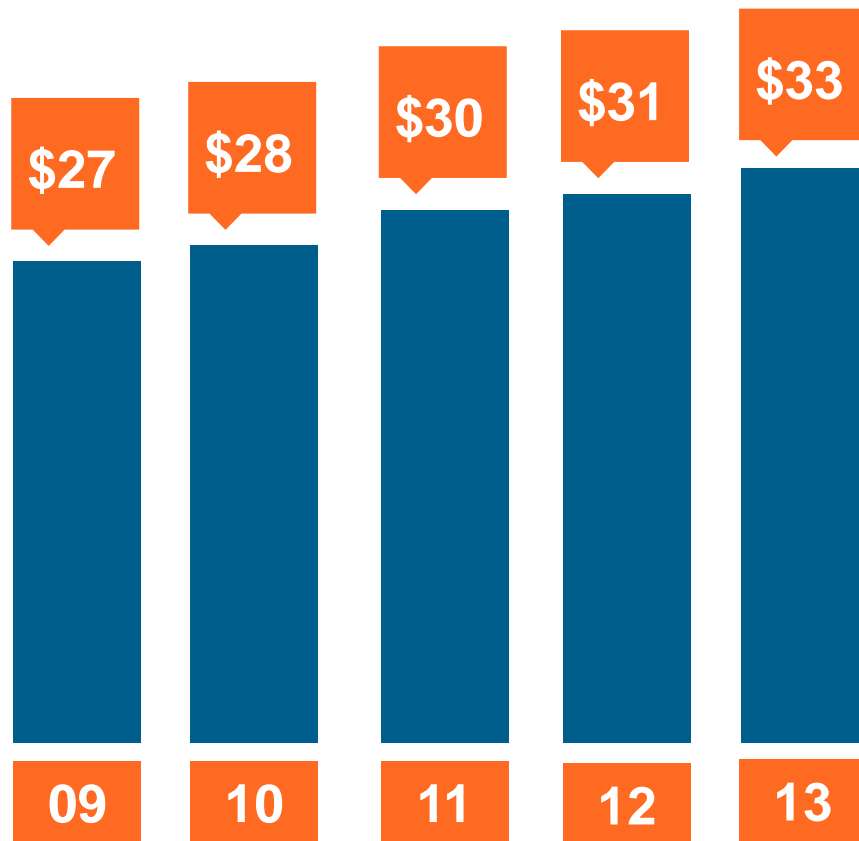


500,000+
REVIEWS
ANALYZED



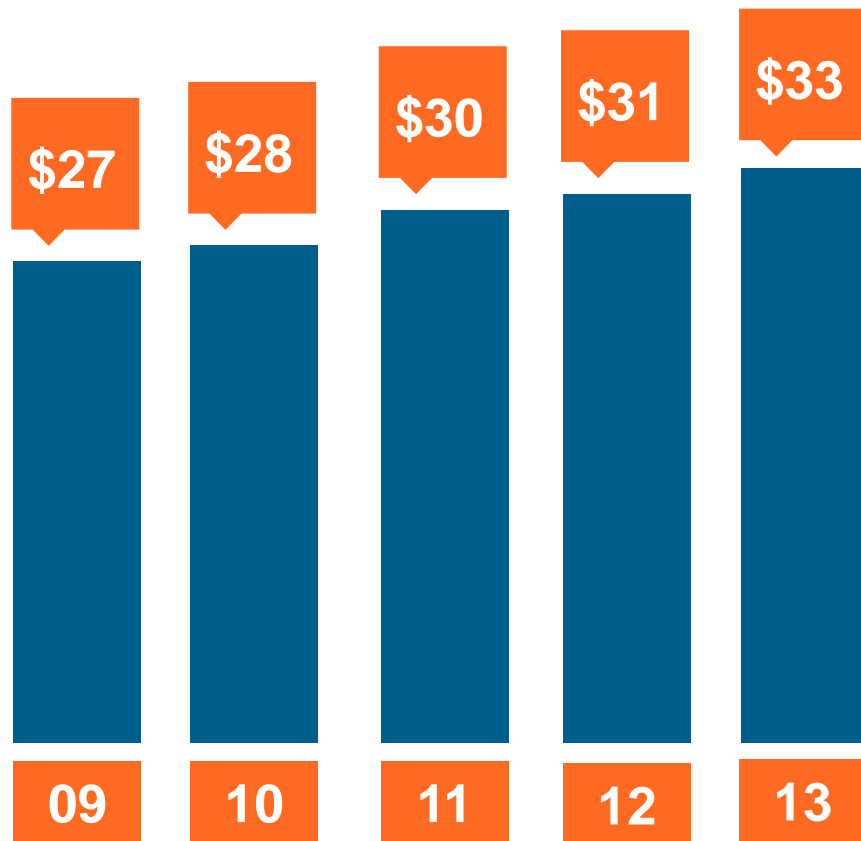
GROWTH IN

ACTIVEWEAR



U.S. ACTIVEWEAR SALES (\$ billion)

GROWTH IN ACTIVEWEAR



U.S. ACTIVEWEAR SALES (\$ billion)



HEALTH & WELLNESS



WOMEN & MILLENNIALS

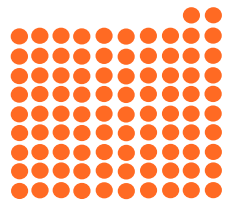


NON-ACTIVES



ATHLEISURE

GROWTH IN ATHLEISURE



92%

wear activewear
for purposes
beyond exercise

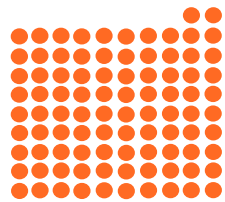


52%

more likely to shop
at stores offering
athleisure styles

GROWTH IN

ATHLEISURE



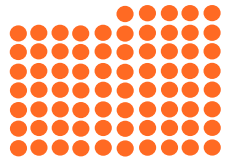
92%

wear activewear
for purposes
beyond exercise



52%

more likely to shop
at stores offering
athleisure styles



75%

likely to wear
active underwear
all day



23%

likely to
purchase active
denim in 2015

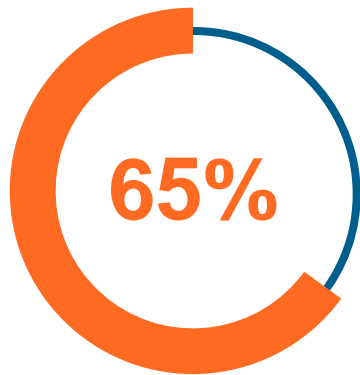
IMPACT OF ODOR ISSUES



I like how this shirt fits, but after you sweat in it and wash it, it smells horrible! I have tried washing it with vinegar to get rid of the smell, but it will smell fine until I sweat. Then, the smell comes back in full force! I am too embarrassed to wear this shirt to the gym anymore. I know if I can smell it, everyone around me can as well!

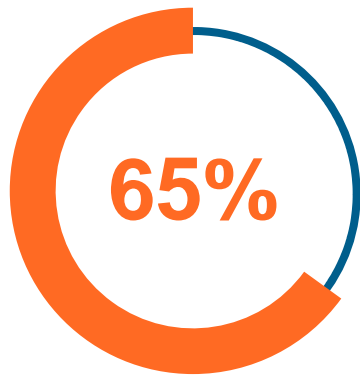
CUSTOMER REVIEW | WOMEN'S NYLON/POLYESTER ACTIVE TOP |
SPORTS SPECIALTY STORE | 2 OUT OF 5 STARS | NOVEMBER 2014

IMPACT OF ODOR ISSUES

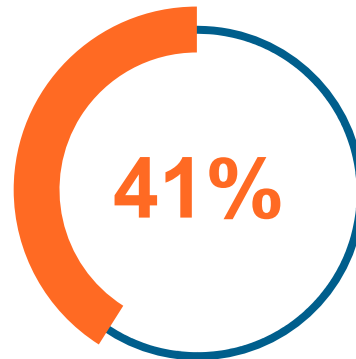


washing clean or
being odor free is
very important in
activewear
purchases

IMPACT OF ODOR ISSUES

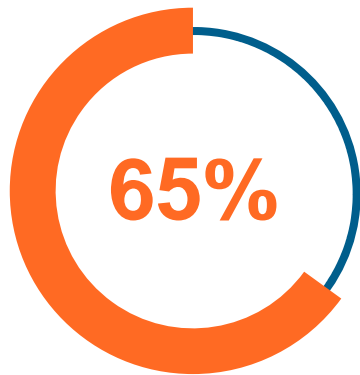


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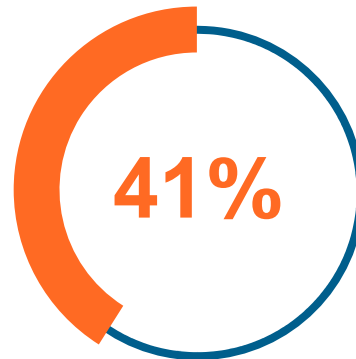


experience odor
issues in
activewear

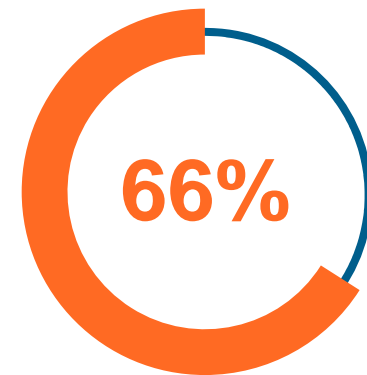
IMPACT OF ODOR ISSUES



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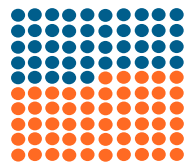
experience odor
issues in
activewear



odor & sweat
prevents
activewear from
becoming
athleisure

CONSUMERS BLAME

SYNETHICS FOR ODOR



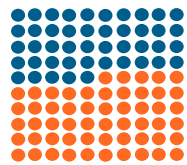
55%

**SYNETHICS BLAMED
FOR ODOR**

majority of those experiencing
odor issues blame synthetics

CONSUMERS BLAME

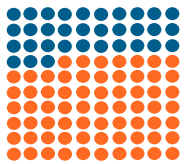
SYNETHICS FOR ODOR



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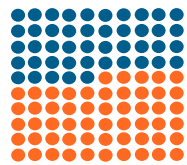
**ACTIVEWEAR
MOSTLY SYNTHETIC**

67%

2 in 3 activewear items at
retail are synthetic

CONSUMERS BLAME

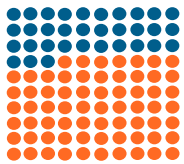
SYNETHICS FOR ODOR



SYNTHETICS BLAMED FOR ODOR

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ACTIVEWEAR MOSTLY SYNTHETIC

67%

2 in 3 activewear items at retail are synthetic



COTTON WASHES CLEAN

74%

nearly 3 in 4 say cotton does not retain odor or washes clean

CONSUMER PERSPECTIVE

ODOR IN ACTIVEWEAR



IMPACT

POTENTIAL TO
STIFLE
ACTIVEWEAR
SALES



BLAME

CONSUMERS
BLAME
SYNTHETICS
FOR ODOR



SOLUTION

CONTROL
ODOR
NATURALLY
WITH COTTON

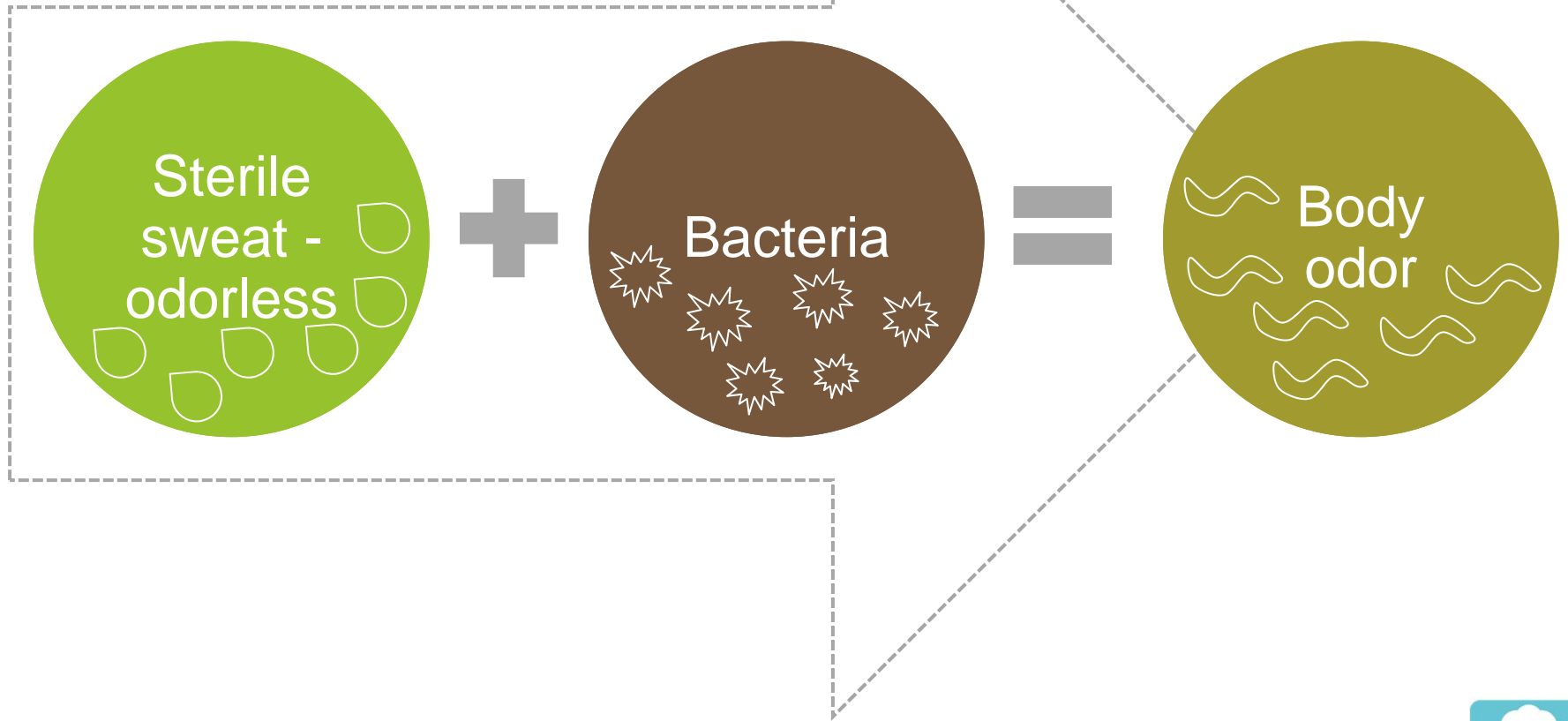




THE SCIENCE OF ODOR

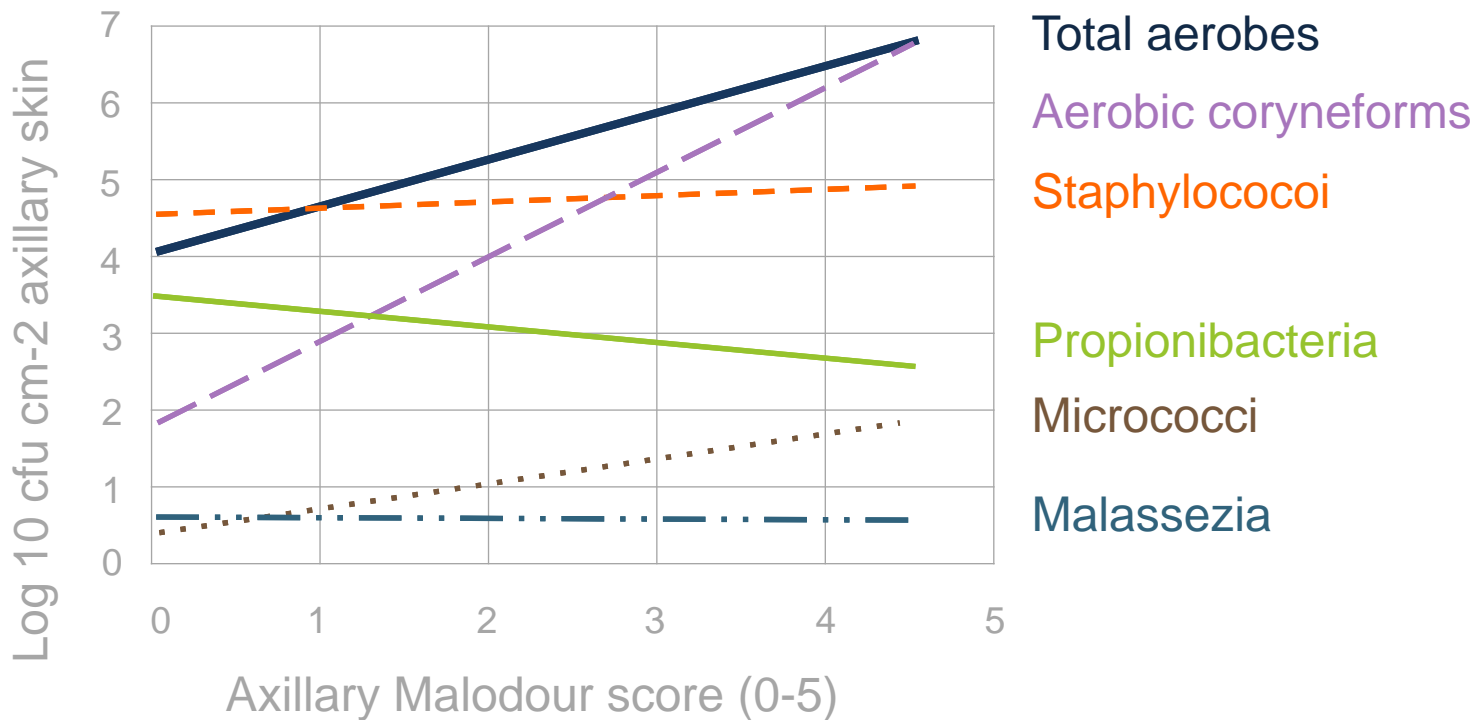
INTRODUCTION

ODOR SCIENCE



INTRODUCTION

ODOR SCIENCE

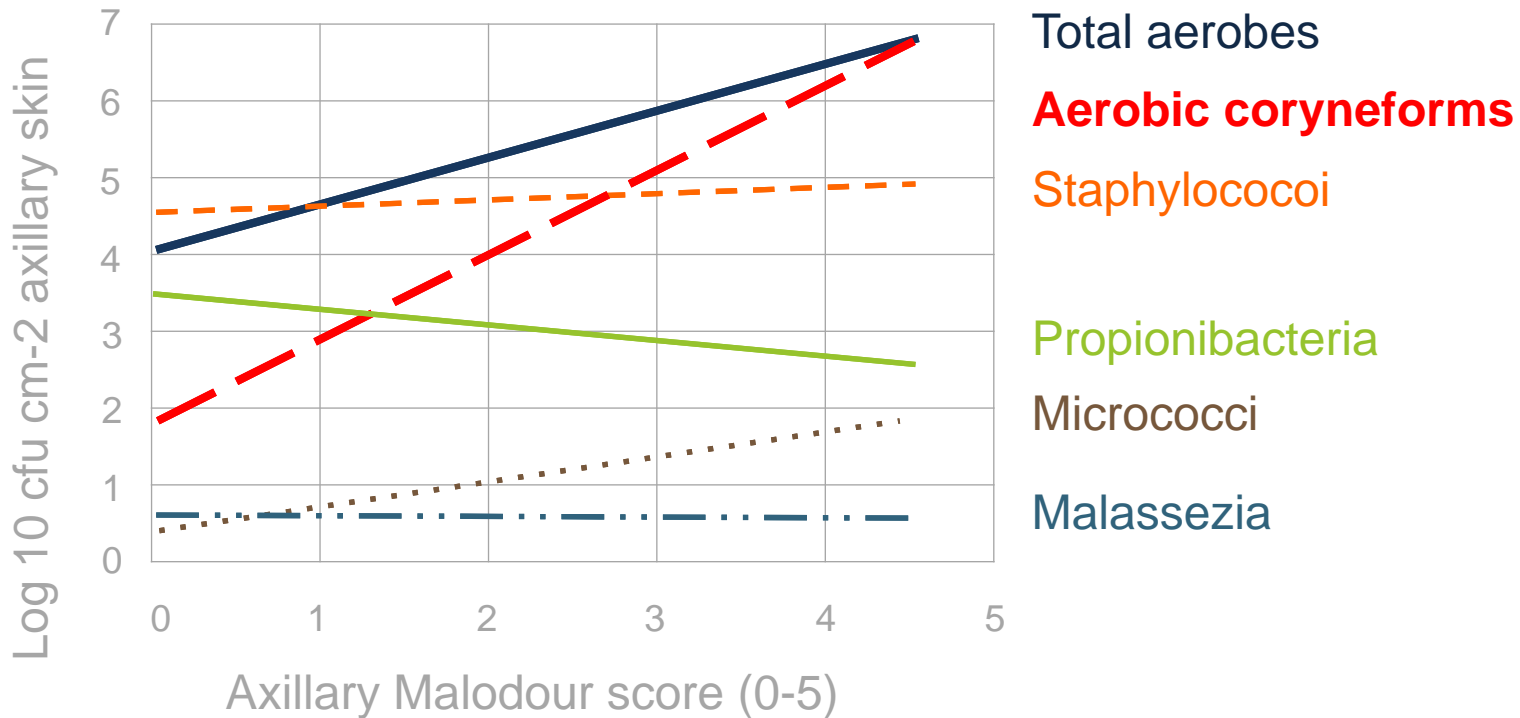


(Taylor et al., 2003)



INTRODUCTION

ODOR SCIENCE

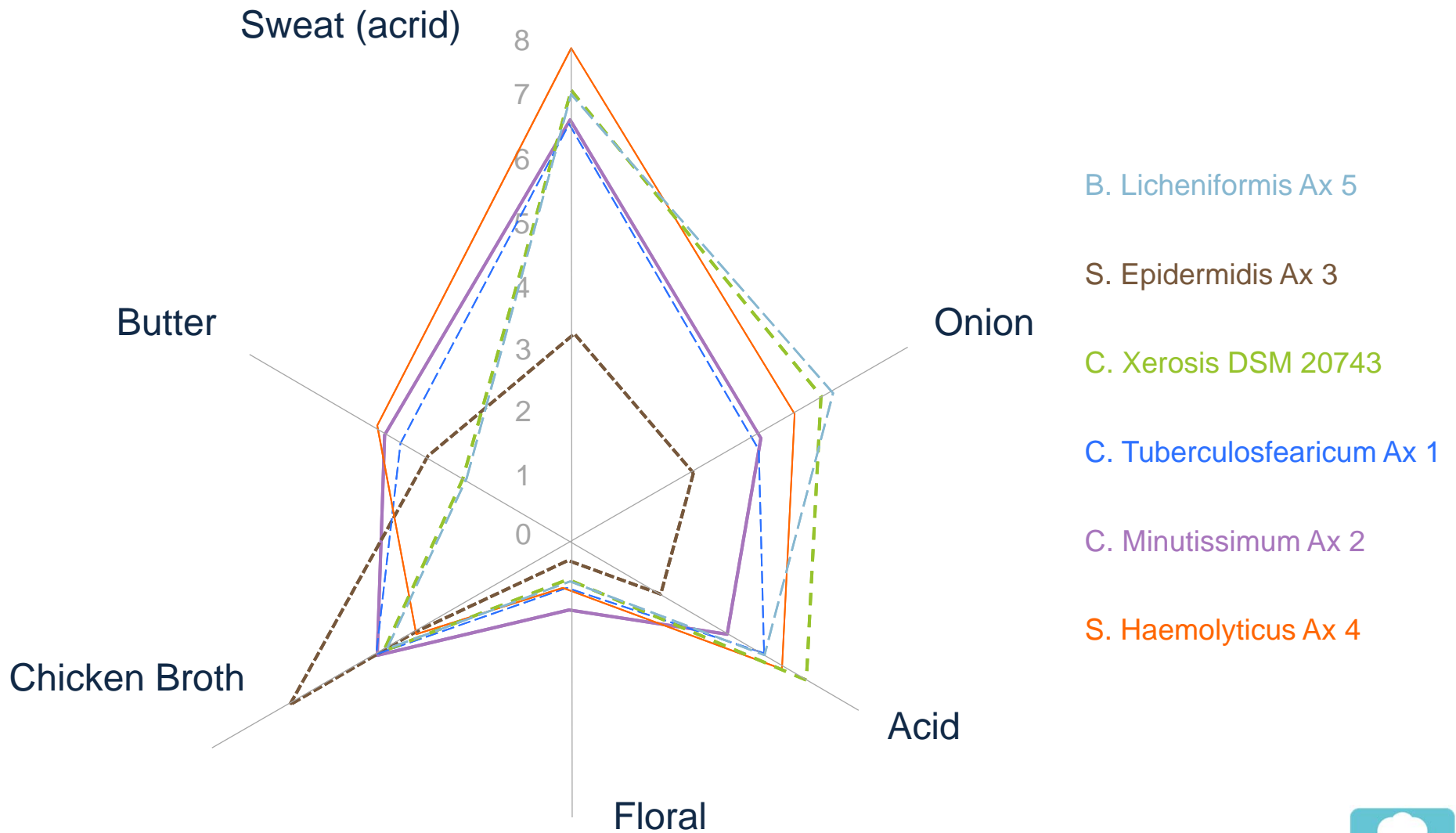


(Taylor et al., 2003)



INTRODUCTION

ODOR SCIENCE



B. Licheniformis Ax 5

S. Epidermidis Ax 3

C. Xerosis DSM 20743

C. Tuberculosfearicum Ax 1

C. Minutissimum Ax 2

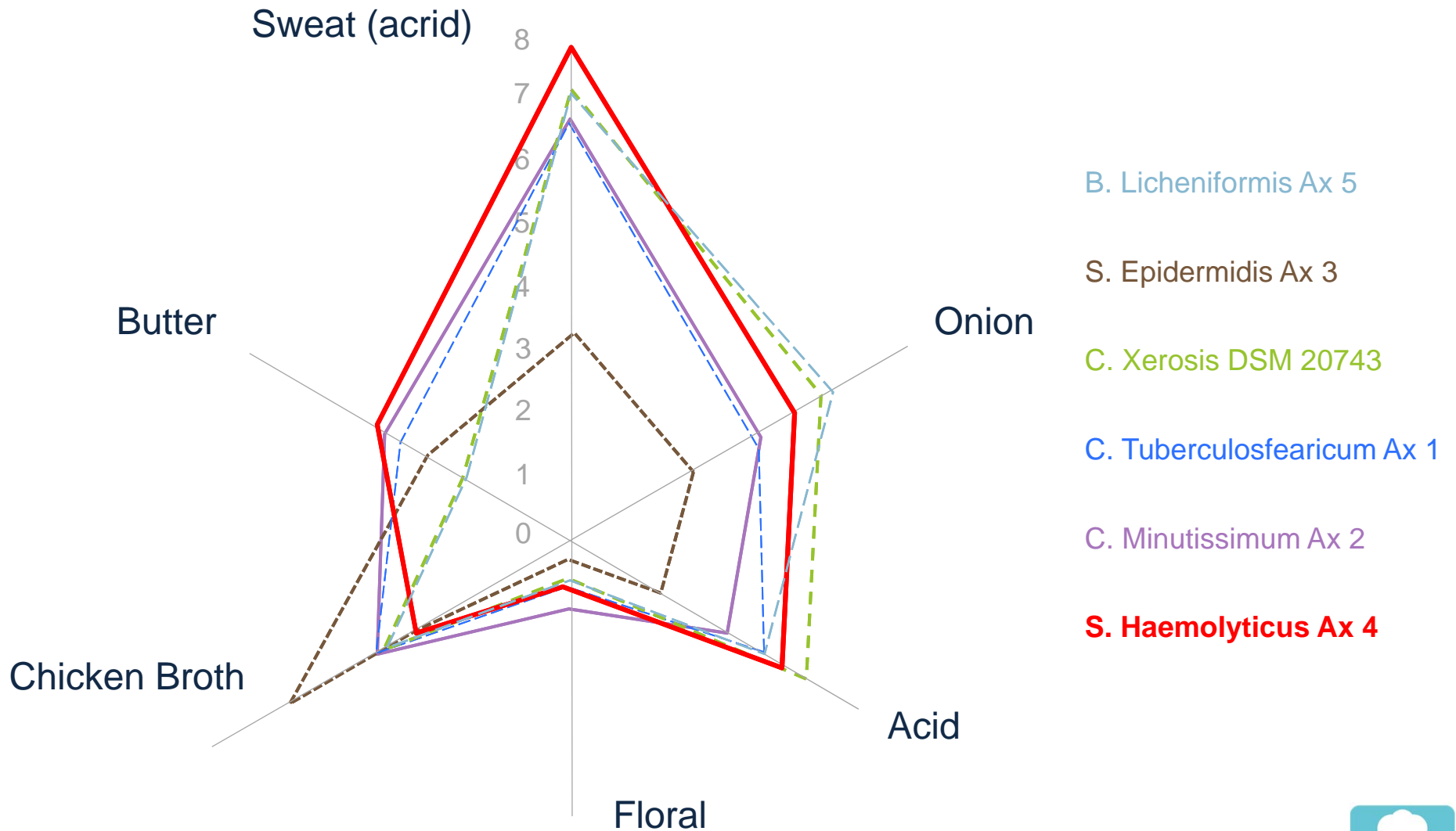
S. Haemolyticus Ax 4

(Troccaz et al., 2004)



INTRODUCTION

ODOR SCIENCE



(Troccaz et al., 2004)



INTRODUCTION

SWEAT GLANDS

- underarm has a high density of sweat glands
- eccrine = wet sweat encourages bacterial growth
- apocrine sweat offers nutrients for bacteria → odor

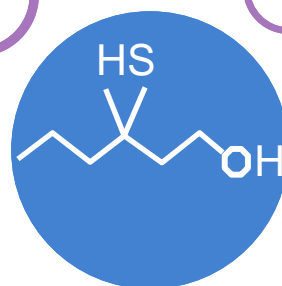
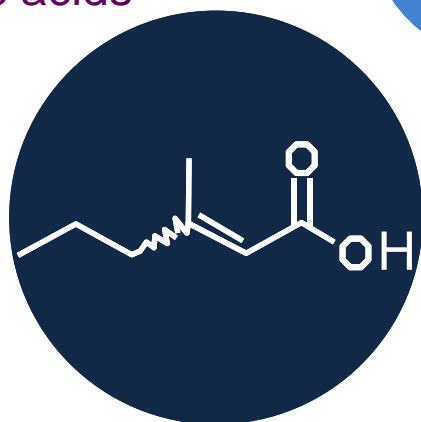


INTRODUCTION

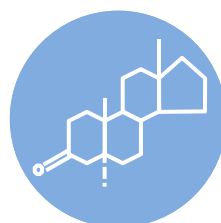
ODOROUS COMPOUNDS

Many compounds make up the total axillary odor “bouquet”

short- & mid-chain
carboxylic acids



Volatile sulfur
compounds



16-androstene steroids

INTRODUCTION

ODOR IMPACTS



INTRODUCTION

ODOR & FIBER

- Natural fibers are perceived to be less smelly than synthetic
- This was largely anecdotal but now supported by the research:

Polyester had a greater number of high-odor volatiles than cotton fabrics

Munk et al., (2000; 2001)



INTRODUCTION

ODOR & FIBER

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Munk et al., (2000; 2001)

Polyester was found to be the most odorous and continued to emit intense odor even up to 4 weeks after being worn

McQueen et al., (2007)



INTRODUCTION

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Munk et al., (2000; 2001)

Polyester was found to be the most odorous and continued to emit intense odor even up to 4 weeks after being worn

McQueen et al., (2007)

“Polyester t-shirts smelled significantly less pleasant and more intense, compared to the cotton t-shirts”

Callewaert et al., (2014)



INTRODUCTION

FIBER CHEMISTRY

- sorption of odorous molecules
- sorption precursors to odor
- selective growth of certain types of bacteria (e.g., micrococci on polyester)



INTRODUCTION

STUDY PURPOSE

- To determine how cotton and polyester compare in odor following exercise.
- Odor and volatile odorous compounds were evaluated on t-shirts worn multiple times, before and after laundering.



METHODS

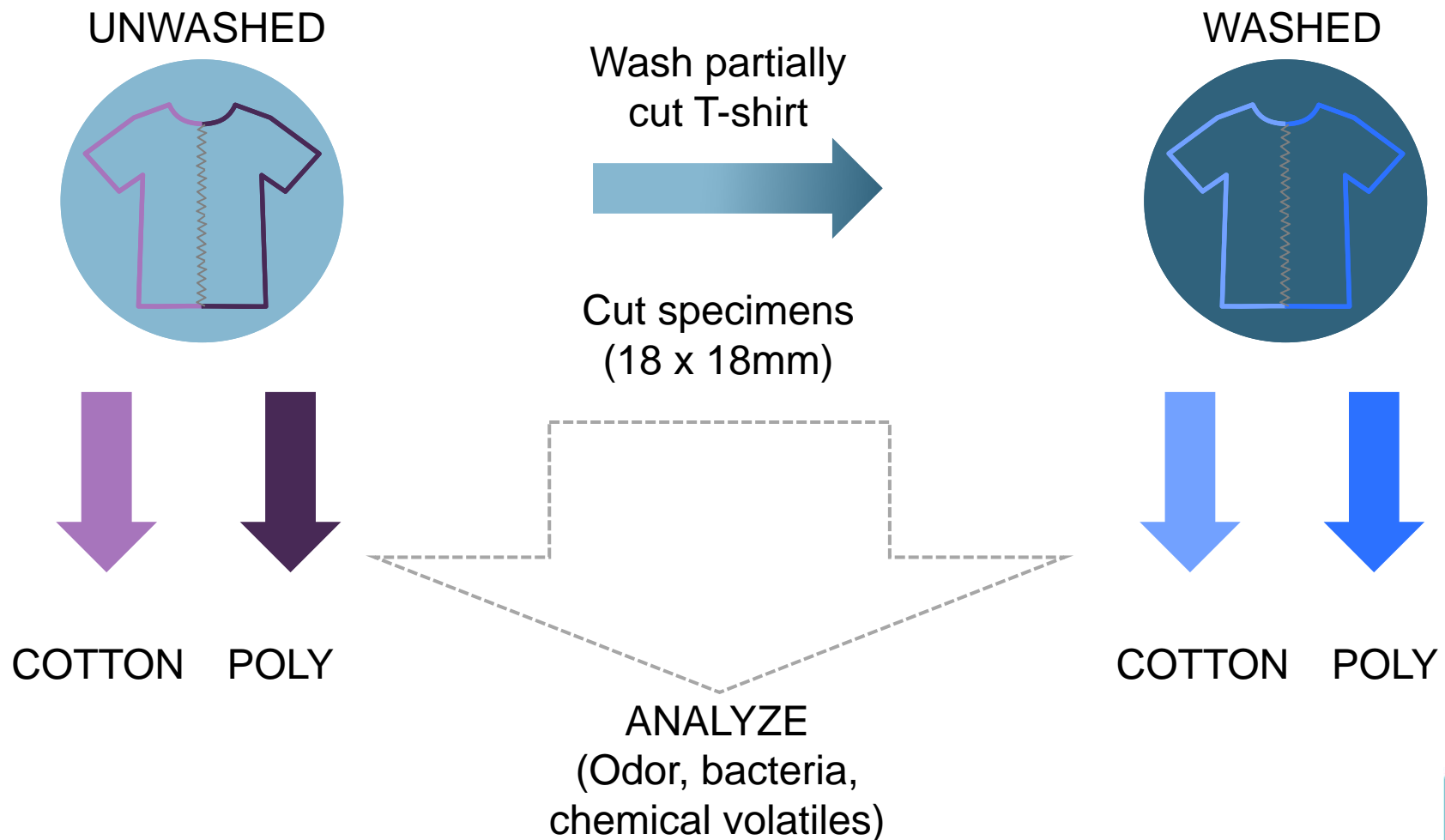
OVERVIEW

- 95% cotton (COT) OR polyester (POL) fiber content with 5% spandex; Single knit jersey fabrics
- 10-week field trial – each t-shirt worn 20 times
- 8 participants (2 t-shirts each)
- Exercise in test t-shirt for ~1 hour
- Washed t-shirts at home
- Recorded activities in log-book
- Following 20th wear – returned unwashed t-shirts



METHODS

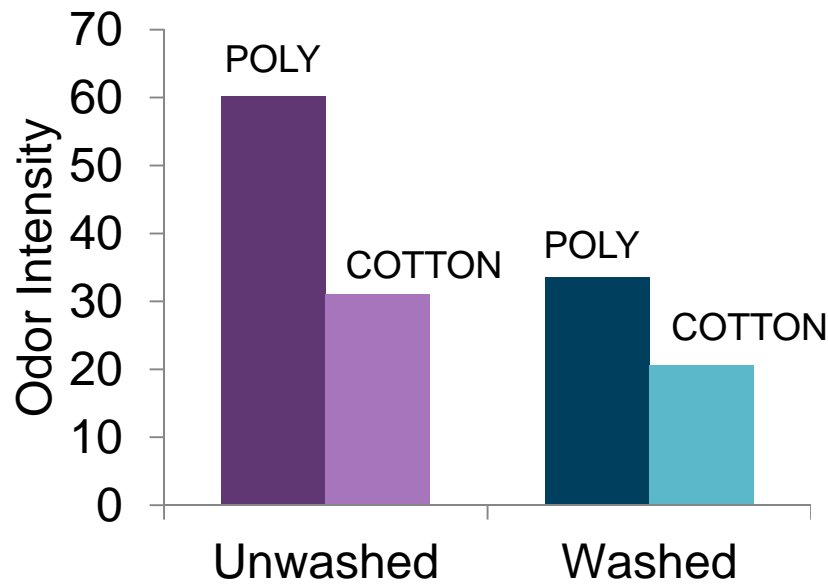
SAMPLE PREPARATION



RESULTS

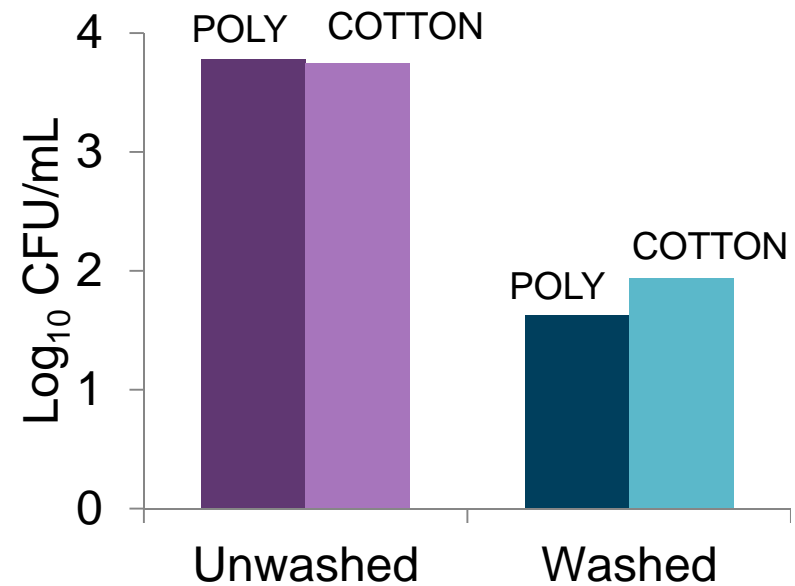
ODOR INTENSITY

- Laundering decreased odor
- Polyester had higher odor than cotton before and after laundering



BACTERIAL COUNTS

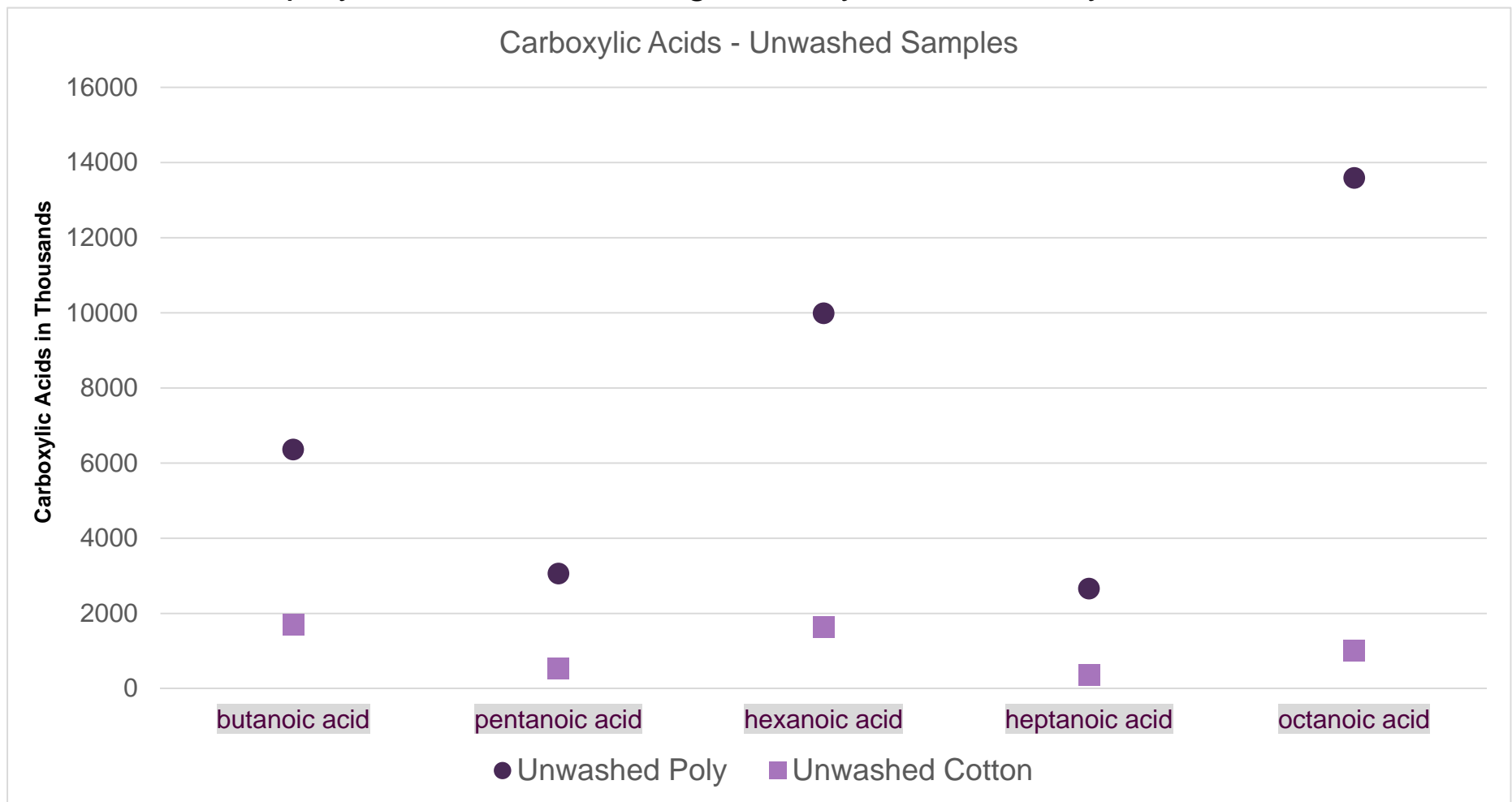
- Laundering reduced bacteria
- No difference between bacterial counts between fabrics



RESULTS

CARBOXYLIC ACIDS

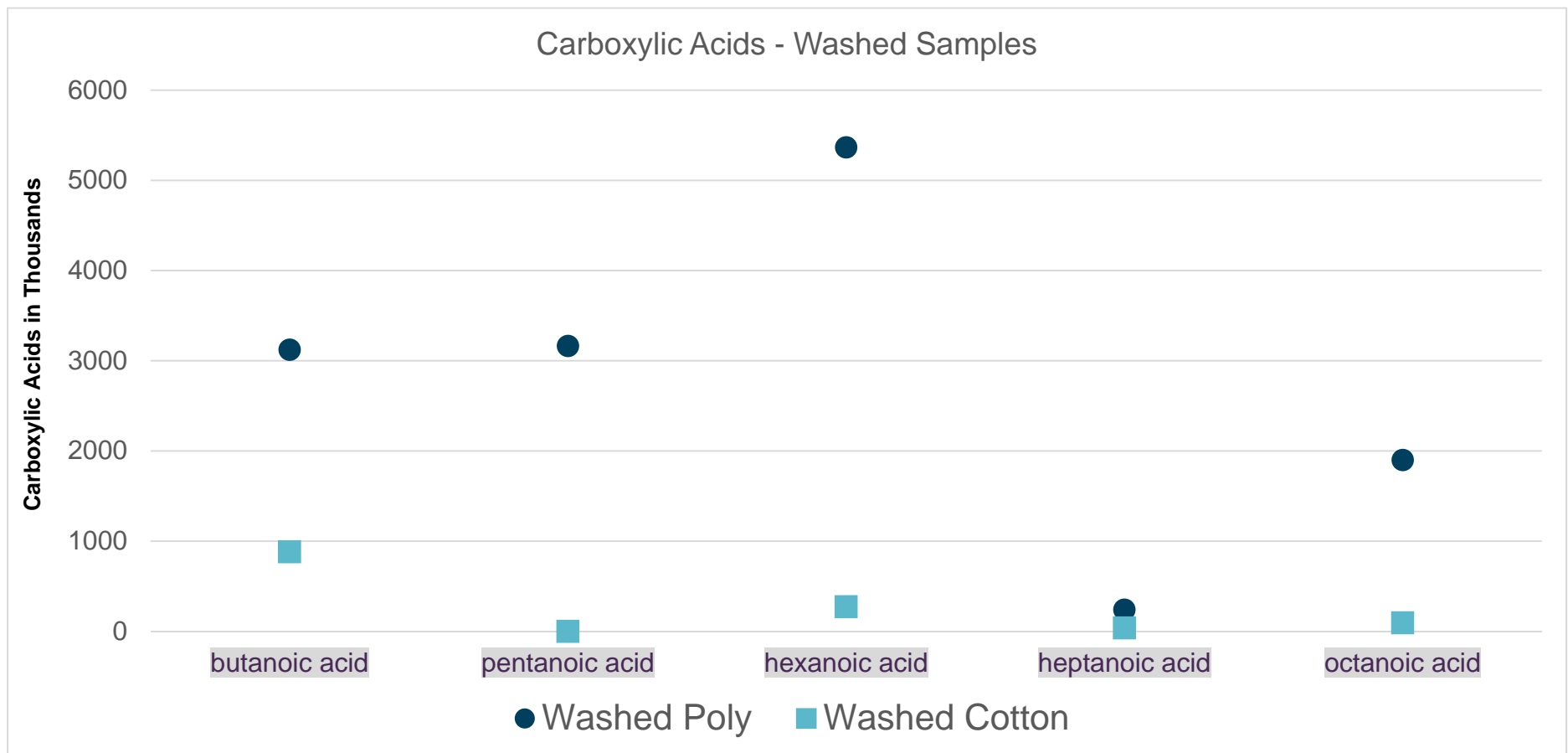
- Unwashed polyester t-shirts had significantly more carboxylic acids than cotton



RESULTS

CARBOXYLIC ACIDS

- Washed polyester t-shirts had significantly more carboxylic acids than cotton
- Carboxylic acids were more effectively removed from cotton by laundering



CONCLUSIONS

- Polyester significantly more odorous following exercise than cotton, both before and after washing
- Cotton is a preferable fiber of choice for consumers concerned with odor
- The build-up of odor in polyester fabrics may be cumulative as important odorants such as carboxylic acids are not as effectively removed from polyester compared to cotton
- Carboxylic acids tend to be retained by polyester in greater quantities than in cotton even before washing.

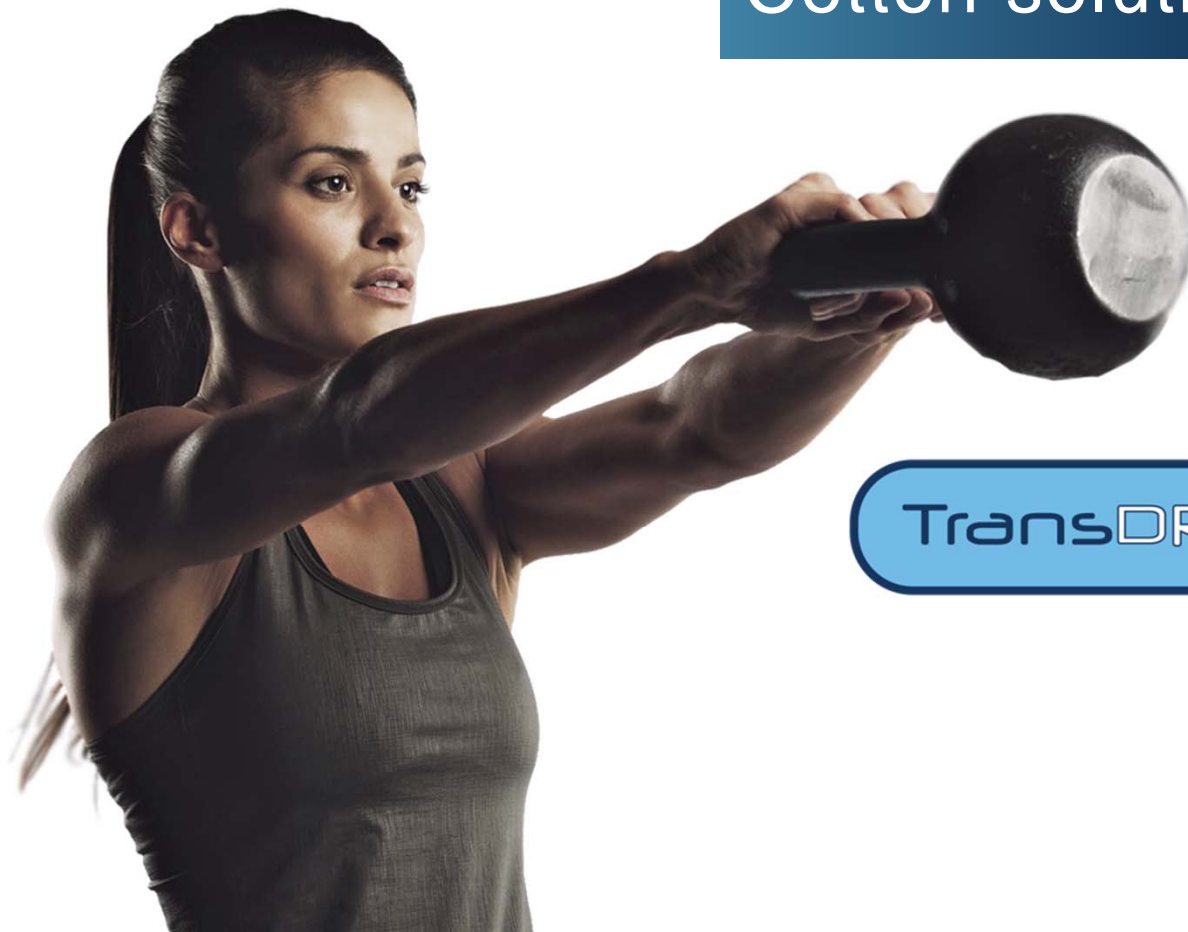
Visit CottonUniversity.org for References



DISCOVER WHAT

COTTON CAN DO.SM

Cotton solutions for activewear.



TransDRY[®]

WICKING
WINDOWS[™]



TransDRY®

**ENGINEERED
PERFORMANCE
STAY COOL.
STAY DRY.
STAY COMFORTABLE.**



— Natural cotton yarn wicks and spreads moisture.

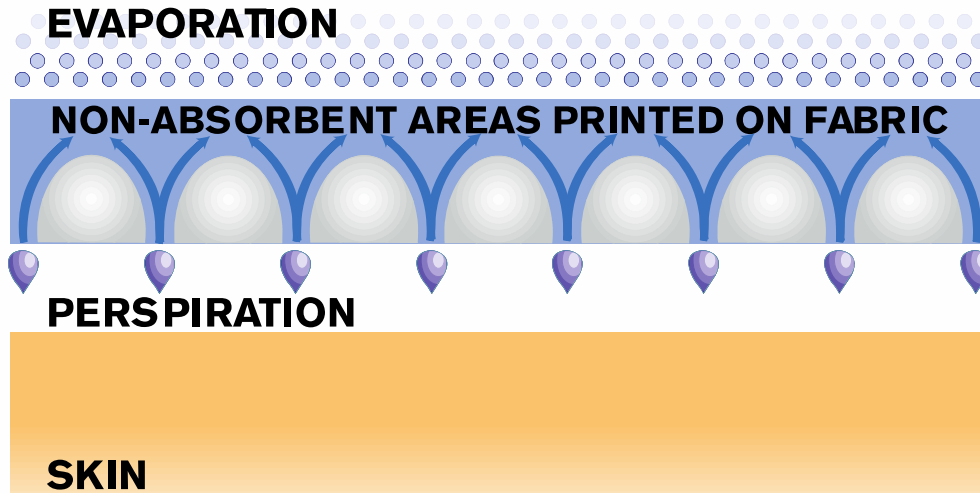
— TransDRY® treated yarn repels moisture to improve drying rate and transfer moisture directionally.

When they demand more.
Advanced Cotton Technology.



WICKING
WINDOWS™

UNIQUE MOISTURE MANAGEMENT APPLICATION



Print pattern
moves moisture

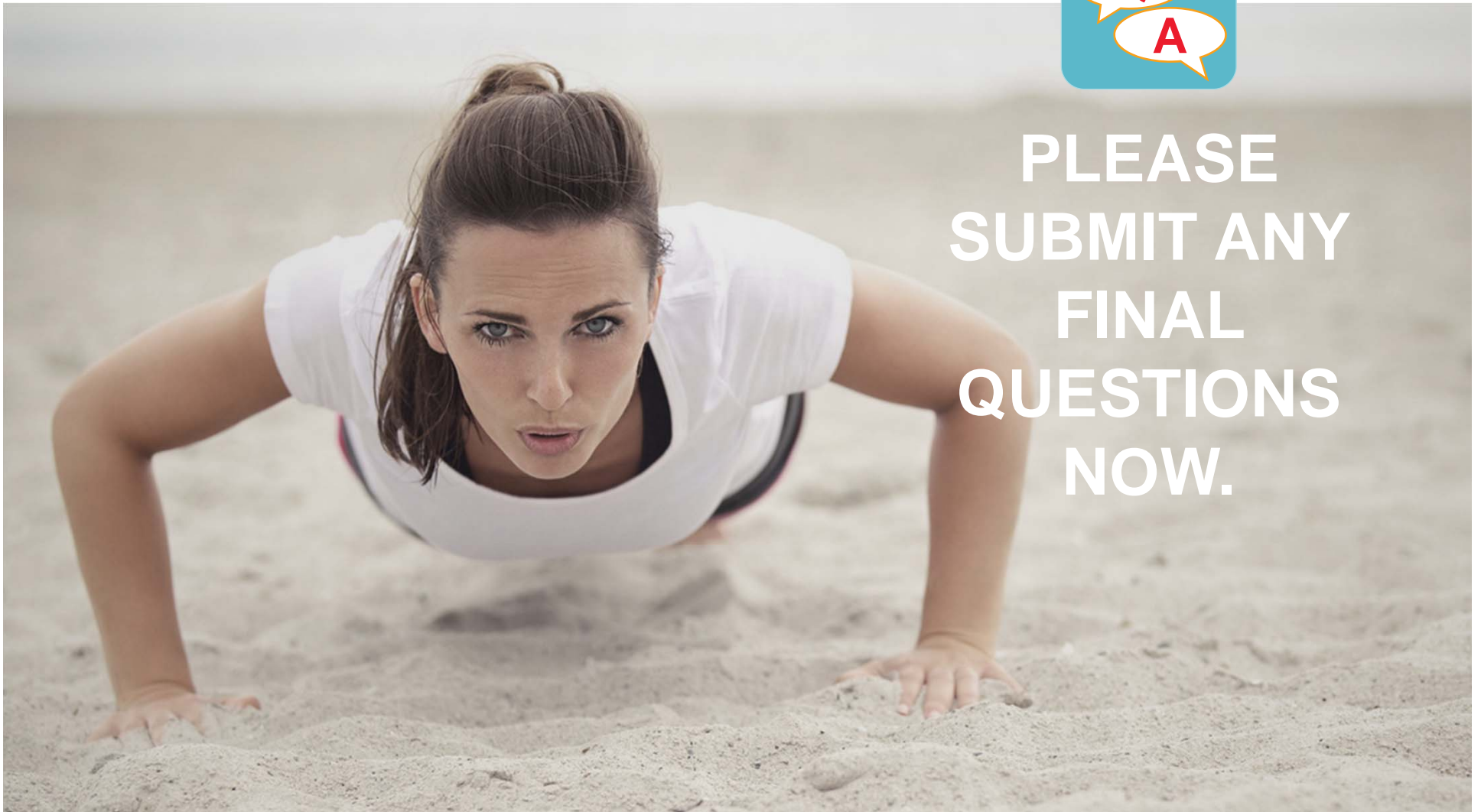
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Advanced Cotton Technology.



QUESTION AND ANSWER



PLEASE
SUBMIT ANY
FINAL
QUESTIONS
NOW.



VISIT US ONLINE

COTTONUNIVERSITY.ORG

The screenshot shows the Cotton University website interface. At the top, there is a navigation bar with links for MY COTTON U, COLLEGES, COURSES, LIBRARY, PROJECTS, CONNECT, and DIRECTORY. A search bar is located on the right. The main header features the Cotton University logo and the text "My COTTON UNIVERSITY™".

On the left side, there is a user profile for MEGAN PETERSON with options to manage settings, log out, and follow. Below this are sections for MY COLLEGES, MY GROUPS, and MY COTTON U, which includes links for Profile, Edit Profile, and Course/Library History.

The main content area is divided into several sections:

- MY COURSES AND LIBRARY ITEMS:** Lists courses such as "Farm Tours 2012", "Major Factors Affecting Demand for Apparel and Home Textiles", and "Linda DeFranco – Trend at Cotton Incorporated". A button for "MY COURSES AND LIBRARY HISTORY" is also present.
- SPOTLIGHT:** Features a webcast titled "Webcast: Control Odor Naturally with Cotton" with a registration link for Wednesday, March 18 at 2:00 PM EDT.
- FROM THE COMMUNITY:** Includes "COTTON UNIVERSITY HEADLINES" and "COTTON MAKERS" with a quote: "All around the country, people are crafting with cotton. Come meet the Cotton Makers and see what's possible." and an image of cotton fabric.
- ON INSTAGRAM:** Displays two images related to cotton, one showing people at a display and another showing people in a clothing store.

- Webcast slides for download
- Research methodology
- Additional Q&A