

# DESIGN AND PRODUCTION OF CERTIFIED REFERENCE CIGARS

Orlando Chambers<sup>1</sup>, Matt Craft<sup>1</sup>, Huihua Ji<sup>1</sup>, Stacey Slone<sup>1</sup>, Ruth McNeas<sup>1</sup>, Anne Fisher<sup>1</sup>, Colin Fisher<sup>1</sup>, Ling Yuan<sup>1</sup>,  
Salome Bhagan<sup>2</sup>, Delshanee Kotandeniya<sup>2</sup>, Jikun Liu<sup>2</sup> and Jeannie Jeong-Im<sup>2</sup>;

<sup>1</sup>University of Kentucky, Lexington, KY USA and <sup>2</sup>U.S. Food and Drug Administration, Center for Tobacco Products,  
Calverton, MD USA

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# University of Kentucky Reference Products History

- The tobacco reference products program at the University of Kentucky was established as a service to support the tobacco research community and was located within the Tobacco and Health Research Institute between 1968 and 2002, which was then renamed the Kentucky Tobacco Research and Development Center (KTRDC)
- In 2014, the University of Kentucky was awarded a Cooperative Agreement with the FDA Center for Tobacco Products (CTP) to develop a cigarette tobacco reference products program and produce the 1R6F certified reference cigarette
- The reference tobacco program was renamed the University of Kentucky, College of Agriculture, Food and Environment, Center for Tobacco Reference Products (CTRP)
- In 2016, the University of Kentucky was awarded a second Cooperative Agreement with the CTP to develop four certified smokeless reference products
- In 2019, the University of Kentucky was awarded a third Cooperative Agreement with the CTP to develop three certified cigar reference products

# Cigar Tobacco Reference Products Program

- **Project Aim 1**

- To produce and characterize cigar tobacco reference products representative of machine-made, sheet wrapped cigars:
  - Filtered or Unfiltered Cigar Products with dimensions and characteristics of little cigars (brown cigarettes)
  - Small Cigars (cigarillos)
  - Large Cigars (processed leaf filler, non-premium cigars)
- Each manufactured in a single manufacturing run for product uniformity and certifiable physical and chemical characteristics

- **Project Aim 2**

- Enhance the services of CTRP to meet the needs of stakeholders and CTRP researchers
- Collaborative studies on cigar tobacco product analysis
- Work with organizations to develop new analytical methods
- Train technical personnel/students
- Add cigar reference products to the CTRP proficiency testing program
- Establish the CTRP as a sustainable program for supplying certified cigar tobacco reference products

# Available Test Articles

	Cigarettes	Smokeless	Cigars
<b>Smoking Monitor</b>	CM9 IP2 1R6F Small Batch*	NA	None
<b>Smoking Reference Products</b>	1R6F 2R5F 3R4F	NA	1C1 – Large machine-made cigar 1C2 – Machine-made filtered cigar 1C3 – Small machine-made cigarillo 1C4 – Large machine-made cigar, natural wrapper
<b>Tobacco Reference Products</b>	RT1/RT7 American blend RT2 Flue-cured RT3 Oriental RT4 Burley RT5/RT9 Dark-Air Cured RT10 Dark Fire-Cured RT11 2R5F	CRP1.1 Swedish snus CRP2.1 Amer loose moist snuff CRP3.1 Amer dry snuff powder CRP4.1 Amer leaf chewing tobacco 3S1 Amer leaf chewing tobacco 3S3 Amer loose moist snuff 1S4 Swedish snus 1S5 snus	RT6 Flavored RT8 Unflavored

\* 1R6F cigarettes manufactured in 3 consecutive shifts and selected for consistency.

# CORESTA Cigar Smoke Analysis 14<sup>th</sup> Collaborative Study 2019-2020

April 2021

Table 3: Repeatability (r) and reproducibility (R) estimations

## WEIGHT [mg/cigar]

Sample	Nb of Lab.	Mean	r	R	CVr	CVR
K	9	6520.77	1007.578	1502.986	15.5%	23.0%
L	10	1337.85	55.200	59.993	4.1%	4.5%
M	9	2747.41	231.307	244.362	8.4%	8.9%
N	9	3132.20	245.842	316.17	7.8%	10.1%

## TPM [mg/cigar]

Sample	Nb of Lab.	Mean	r	R	CVr	CVR
K	9	77.93	26.074	46.091	33.5%	59.1%
L	10	21.99	5.254	8.707	23.9%	39.6%
M	9	59.41	9.098	17.672	15.3%	29.7%
N	9	57.99	18.821	25.896	32.5%	44.7%

## NICOTINE [mg/cigar]

Sample	Nb of Lab.	Mean	r	R	CVr	CVR
K	9	2.06	0.915	1.893	44.4%	91.8%
L	10	1.06	0.221	0.687	20.9%	64.9%
M	9	1.67	0.223	1.000	13.4%	60.0%
N	9	2.67	1.102	2.013	41.3%	75.4%



# Commercial Cigar Product Analysis

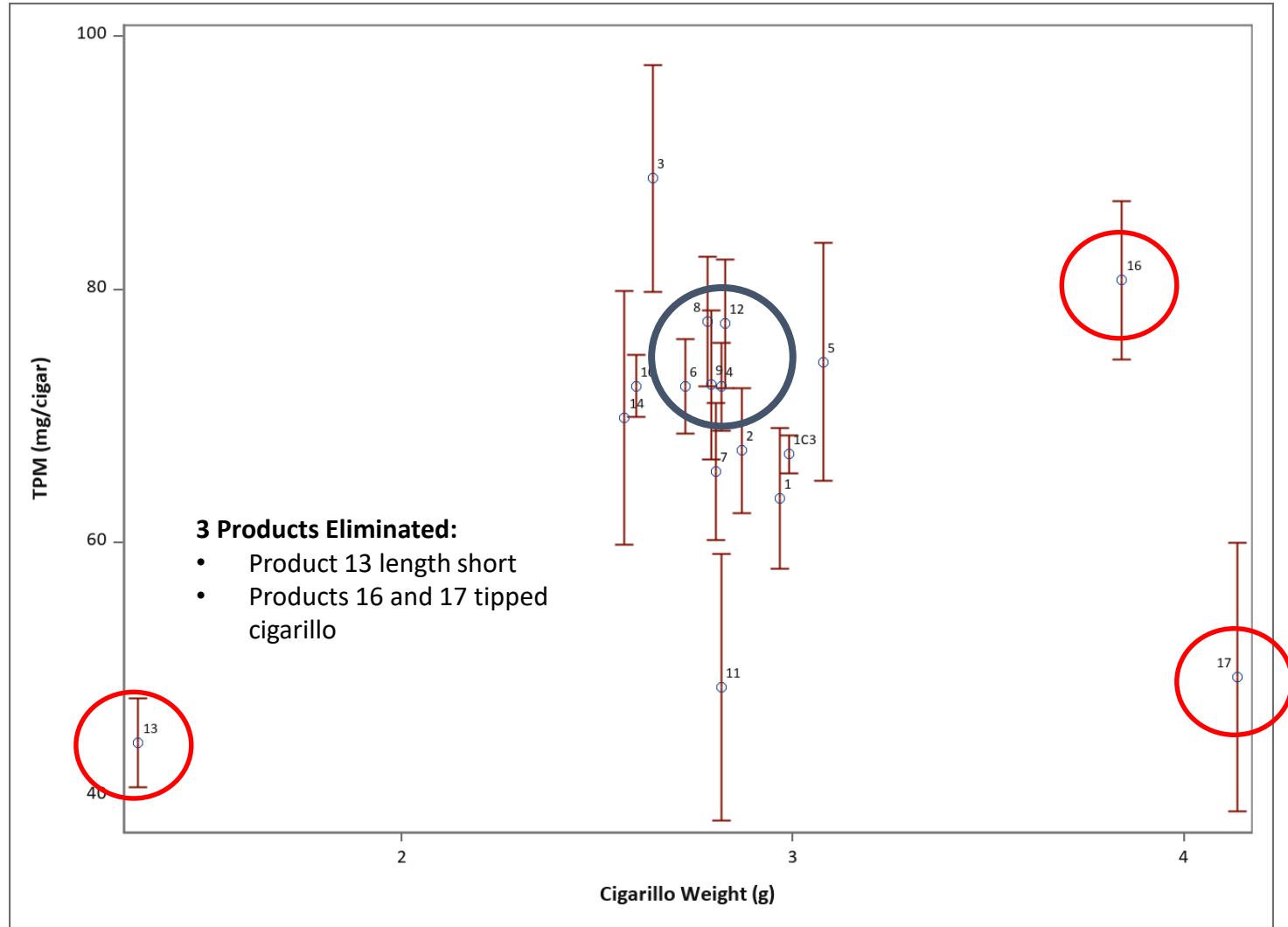
Large Cigar Analysis
<b>Physical Parameters</b>
Cigar Length
Filter Length (if applicable)
Tipping Paper Length (if applicable)
Cigar Weight
Filler Weight
Wrapper + Binder Weight
Binder Weight (if applicable)
Wrapper Weight (if applicable)
Cigar Diameter
Pressure Drop (PD)
Ventilation
Hardness
<b>Tobacco Analysis (Unburned Tobacco)</b>
Oven Volatiles
pH
Alkaloids (nicotine, nornicotine, anatabine, TSNAs (NNN, NAT, NAB, and NNK)
Ammonia
BaP
Carbonyls
Metals
<b>Tobacco Analysis (Smoke)</b>
TPM
H <sub>2</sub> O
CO
Puff Count
Alkaloids (nicotine, nornicotine, anatabine, TSNAs (NNN, NAT, NAB, and NNK)
Volatile Organics
Aromatic Amines

- CTRP worked with FDA to identify commercial cigar products that are representative of the market
- The three cigar product categories included:
  - Filtered Cigars – 25 products
  - Cigarillos – 17 products
  - Large Cigars – 11 products (pictured)
- Commercial products analyzed in accordance with the CTRP Research Plan



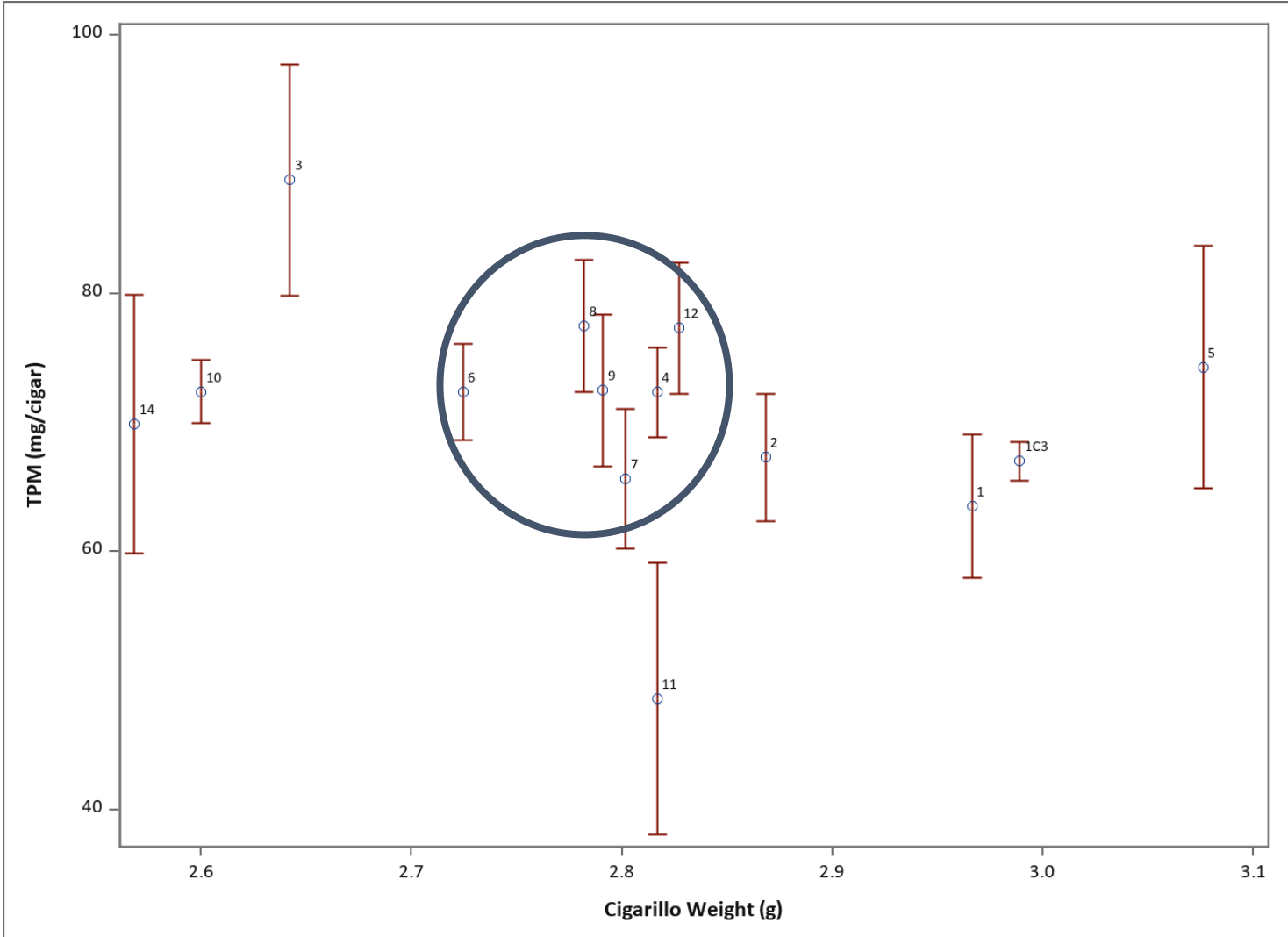
# Commercial Cigarillo TPM Relative to Weight

Product	Wrapper Type
1	Natural
2	Natural
3	Natural
4	HTL
5	Natural
6	HTL
7	HTL
8	HTL
9	HTL
10	HTL
11	Natural
12	HTL
13	Natural
14	HTL
15	HTL
16	HTL (tipped)
17	HTL (tipped)



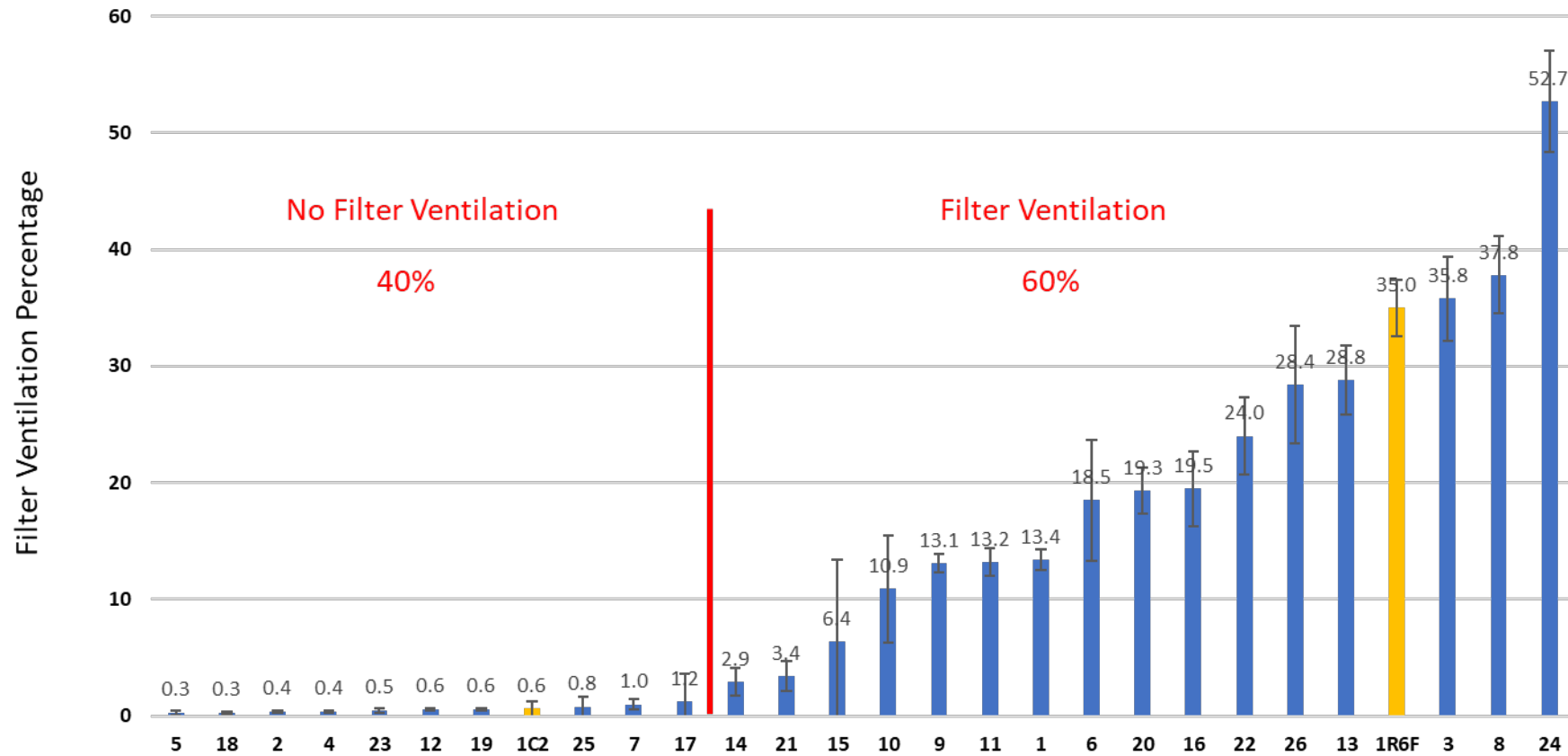
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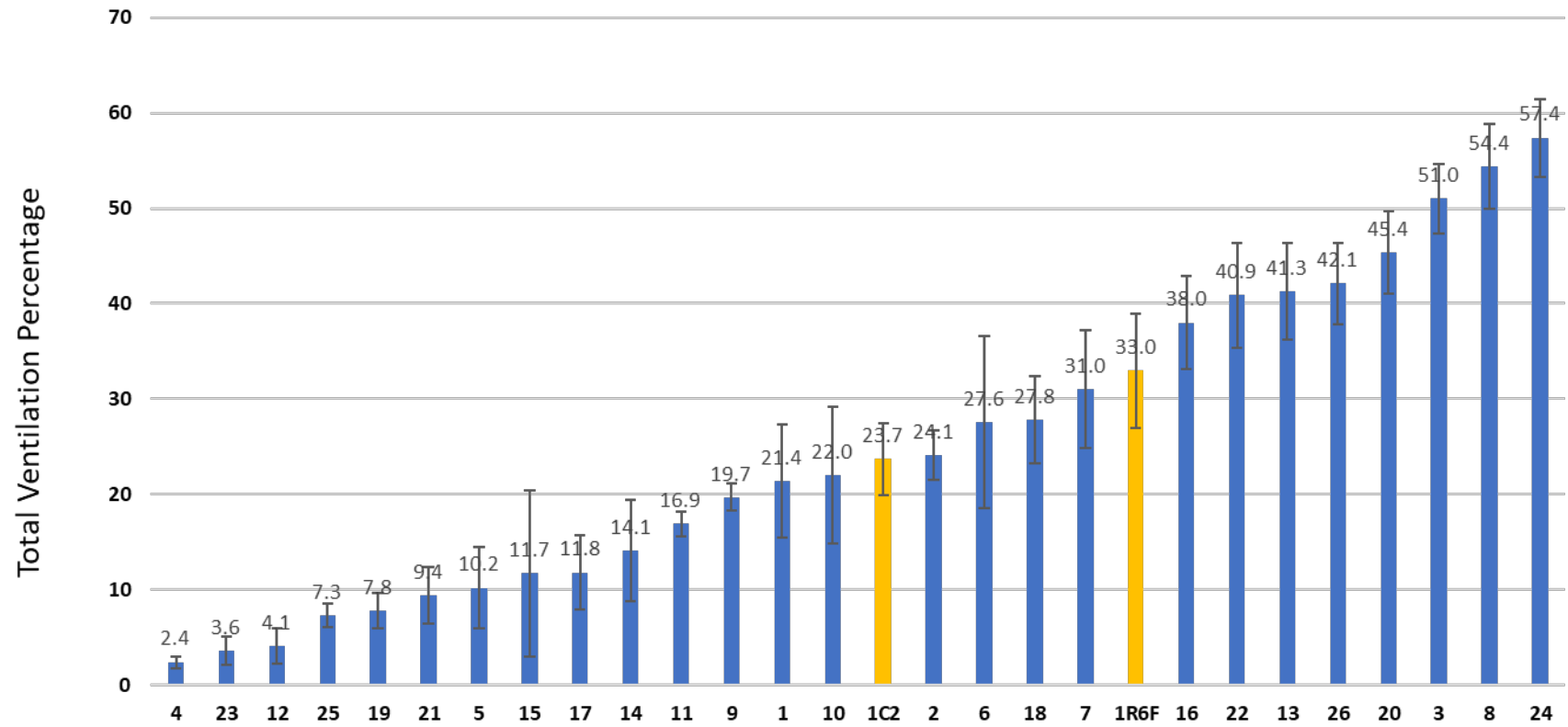


# Filter Ventilation Percentage for Commercial Filtered Cigars



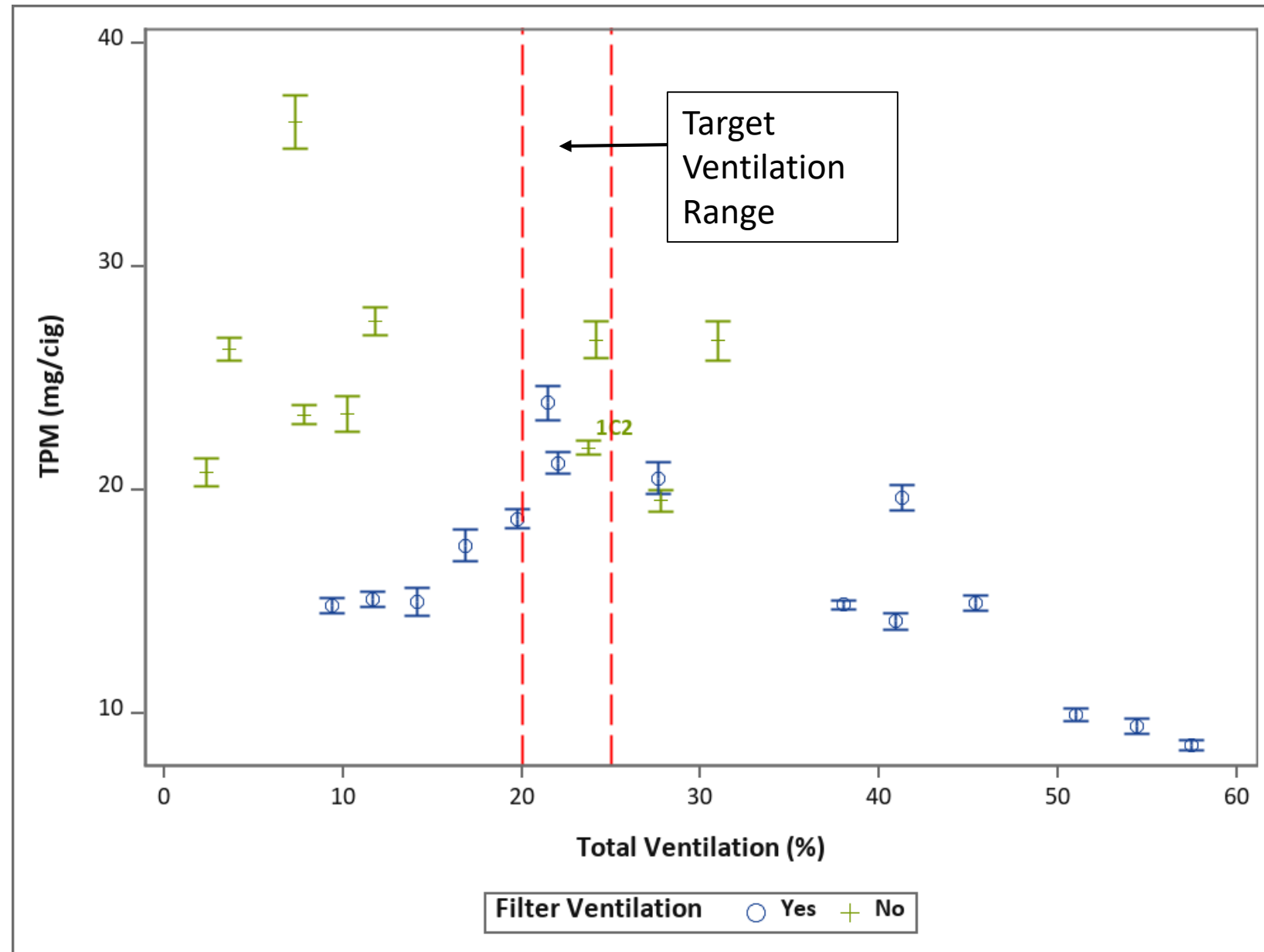
Orange Bars - CTRP reference products

# Total Ventilation Percentage for Commercial Filtered Cigars



Orange Bars - CTRP reference products

# TPM Relative to Total Ventilation Percentage



# Preliminary Design Specifications for Certified Reference Cigars

Large Cigar		Cigarillo		Filtered Cigar	
Parameters	Preliminary Specifications	Parameters	Preliminary Specifications	Parameters	Preliminary Specifications
Diameter	14.5 - 16.0 mm	Pressure Drop		Ventilation	
Cigar Length	130 - 145 mm	Diameter	10.5 mm	$V_f = \text{Filter Ventilation}$	$V_f = 10 - 15, V_T = 20 - 25$
Filler Tobacco Weight	5.5 - 7.1 g	Cigar Length	109 mm	$V_T = \text{Total Ventilation}$	
Finished Cigar Weight	6.5 – 8.0 g	Filler Tobacco Weight	2.2 – 2.5 g	Diameter	7.9 mm (circumference 24.8 mm)
Wrapper Type	HTL (Homogenized Tobacco Leaf)	Finished Cigar Weight	2.7 – 3.0 g	Total Cigar Length	99 mm
Binder Type	HTL	Wrapper Type	HTL (Homogenized Tobacco Leaf)	Tobacco Rod Length	72 mm
Flavored (Yes/No)	No	Binder Type	HTL	Filter Tip Length	27 mm
Humectant	TBD	Flavored (Yes/No)	No	Filler Tobacco Weight	0.95 – 1.00 g
Tobacco Composition	TBD	Humectant	TBD	Finished Cigar Weight	1.30 – 1.40 g
Filler Moisture	TBD	Tobacco Composition	TBD	Wrapper Type	HTL (Homogenized Tobacco Leaf)
		Filler Moisture	TBD	Binder Type	NA
				Flavored (Yes/No)	No
				Humectant	TBD
				Tobacco Composition	TBD
				Filler Moisture	TBD

# Next Steps

- Finalize design specifications
- Initiate contract manufacturing
  - Establish production contracts--initial discussions with manufacturers for large cigar production and cigarillo production
  - 200,000 large machine-made cigars
  - 700,000 cigarillos
  - 700,000 filtered cigars (need to identify a manufacturing partner)
- Characterization and certification
  - Three certified labs
  - Certified reference cigars planned availability in 2022
- Add cigars to proficiency program scope





Questions?

Orlando Chambers  
ochamb@uky.edu  
859 218-4974