



Flavor in Higher Solids Milk from another perspective.

We are looking at you sheep

By Robert Aguilera

March 2024



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Agenda

1. What We Hear about High Solids
2. Sheep Milk vs Cow Milk
3. Initial Tasting & Pathway to flavor in Sheep Milk
4. Back to Higher Solids Cow Milk.
5. Final Tasting & Future considerations

- This presentation is meant to start a conversation.
- Ask Questions, Dream, Discuss.
- Let's come away with a call to action for the future of our industry.

"We need our conversion window to be longer"

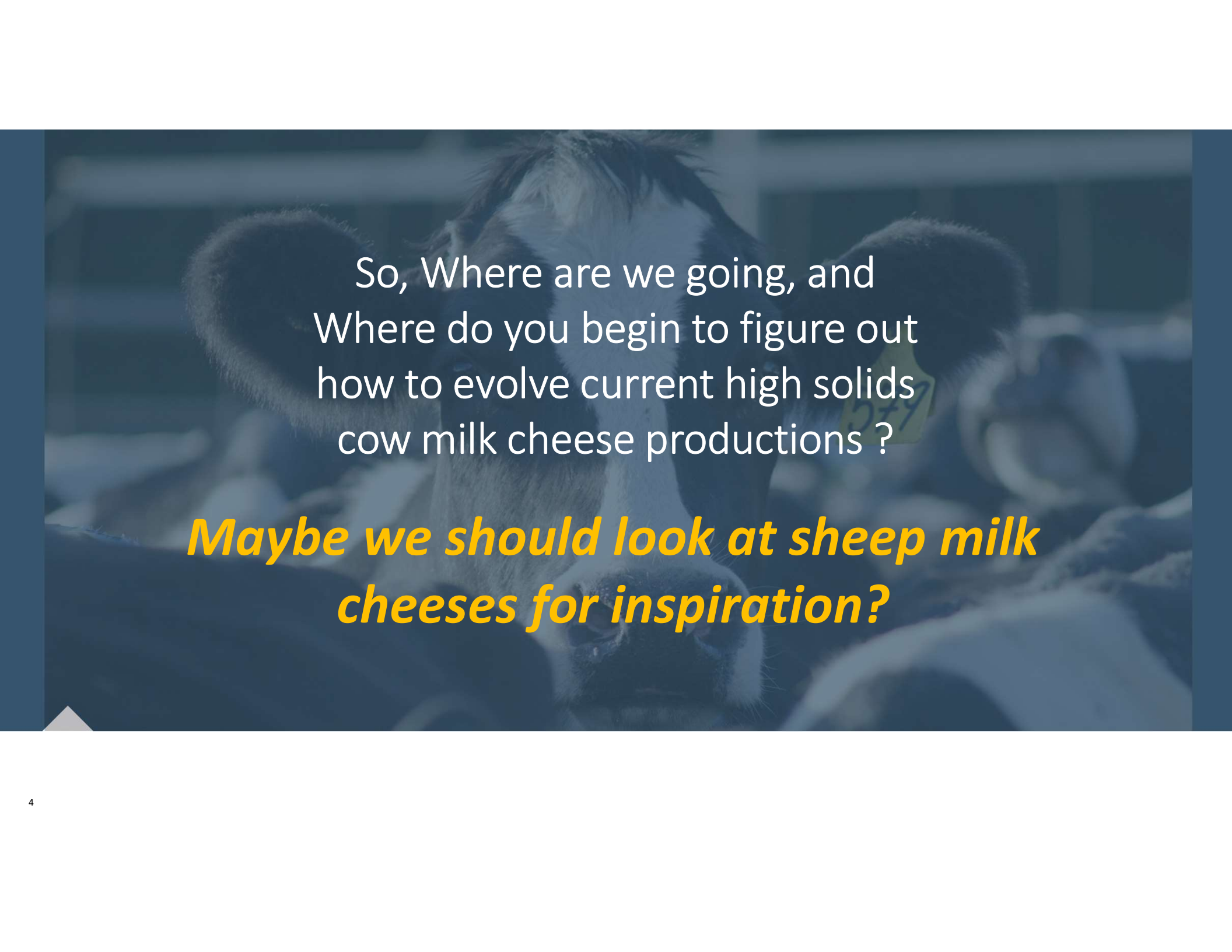
"We need consistency in our products functionality"

"We want improved recoveries of the milk components"

"We need higher flavored Premium products in shorter periods of time than normal"

"Breeding on farms is creating higher solids milk for longer duration"





So, Where are we going, and
Where do you begin to figure out
how to evolve current high solids
cow milk cheese productions ?

***Maybe we should look at sheep milk
cheeses for inspiration?***

6.2%



IF Cow milk Protein% is 2.7 to 3.2,
what is sheep milk?

IF Cow milk Water% is 87.4,
what is sheep milk?

IF Cow milk Lactose% is 4.6,
what is sheep milk?

IF Cow milk Fat% is 3.6 to 3.9,
what is sheep milk?



80.1%

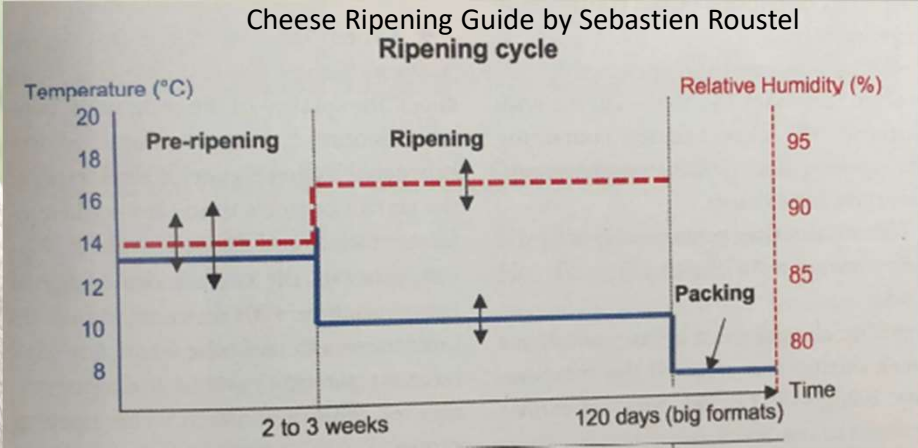
4.9%



9%

Cheese Milk

Comparison of milk from different mammals					
Species	Scientific name	Water	Fat	Protein	Lactose
% IN MILK					
Cow	<i>Bos taurus</i>	87.4	3.6	3.2	4.7
Goat	<i>Capra hircus</i>	87.3	3.8	3.4	4.1
Sheep	<i>Ovis aries</i>	80.1	7.9	6.2	4.9
Water buffalo	<i>Bubalus bubalus</i>	82.8	7.4	3.8	4.8



The Science of Cheese by Michael H. Tunick

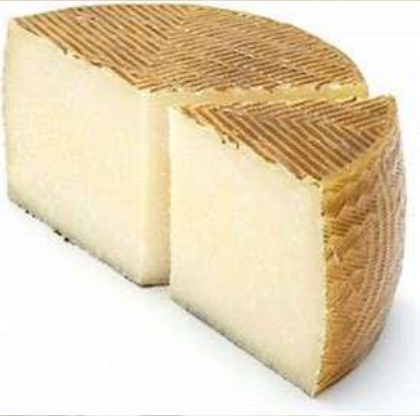


Leuconostoc



Ripening Room conditions were mastered over time to create consistent flavor and texture in classic sheep milk cheeses. It took centuries.

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Manchego



**Pecorino
Toscano**

Time to Taste.

1. Hold your nose to taste
2. Breath in after your first few chews
3. What Flavor dominates?

Which of these 4
Sheep Milk Cheeses is
your favorite?

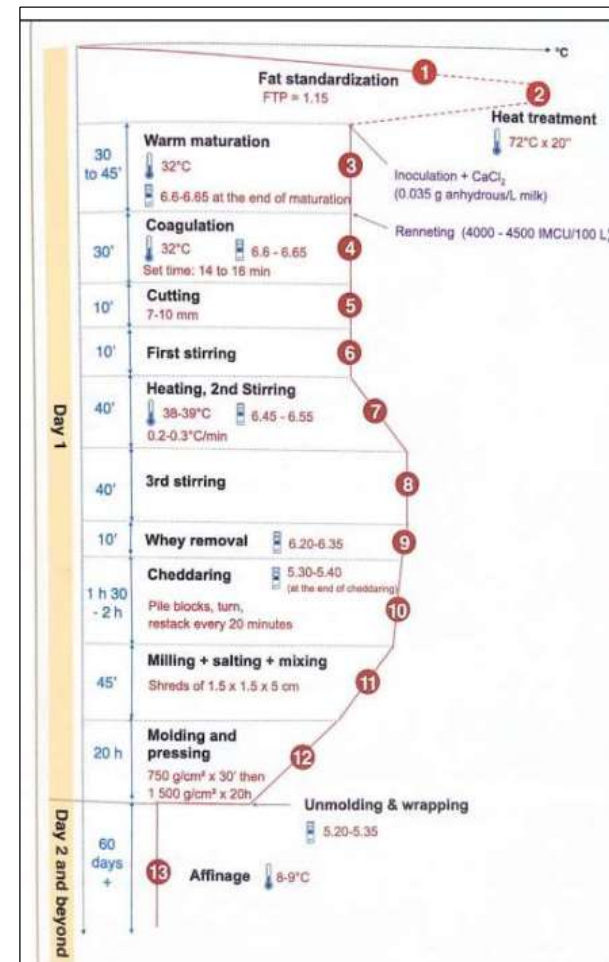
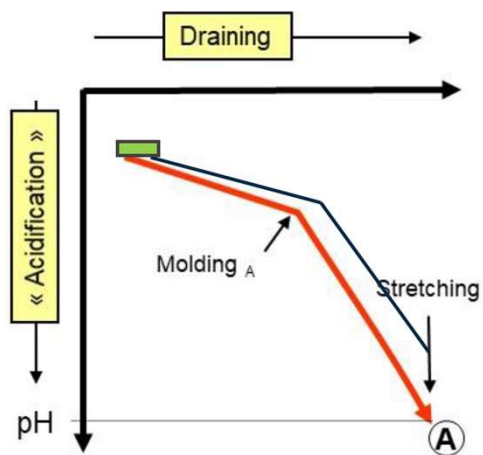
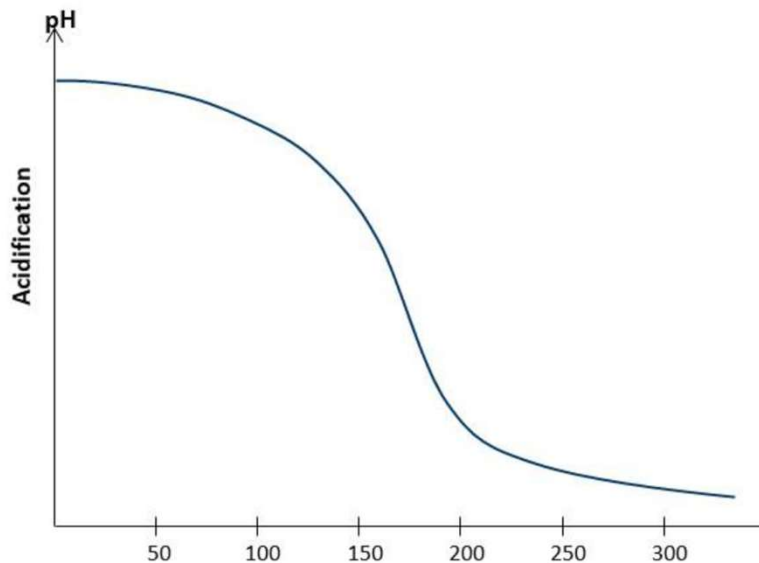


**Lamb
Chopper**



**P'Tit
Basque**

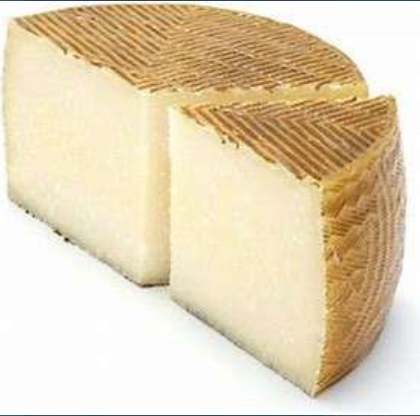
Higher Solids Cow



Cheese Ripening Guide
Sebastien Roustel
 Director-Cheese&Phage application
 DK- Food & Beverage Biosolutions

Final Tasting
Rate flavor and texture
& future considerations

On to the results





NYSCMA2024 (Sheep Milk) Tasting Results & Comments

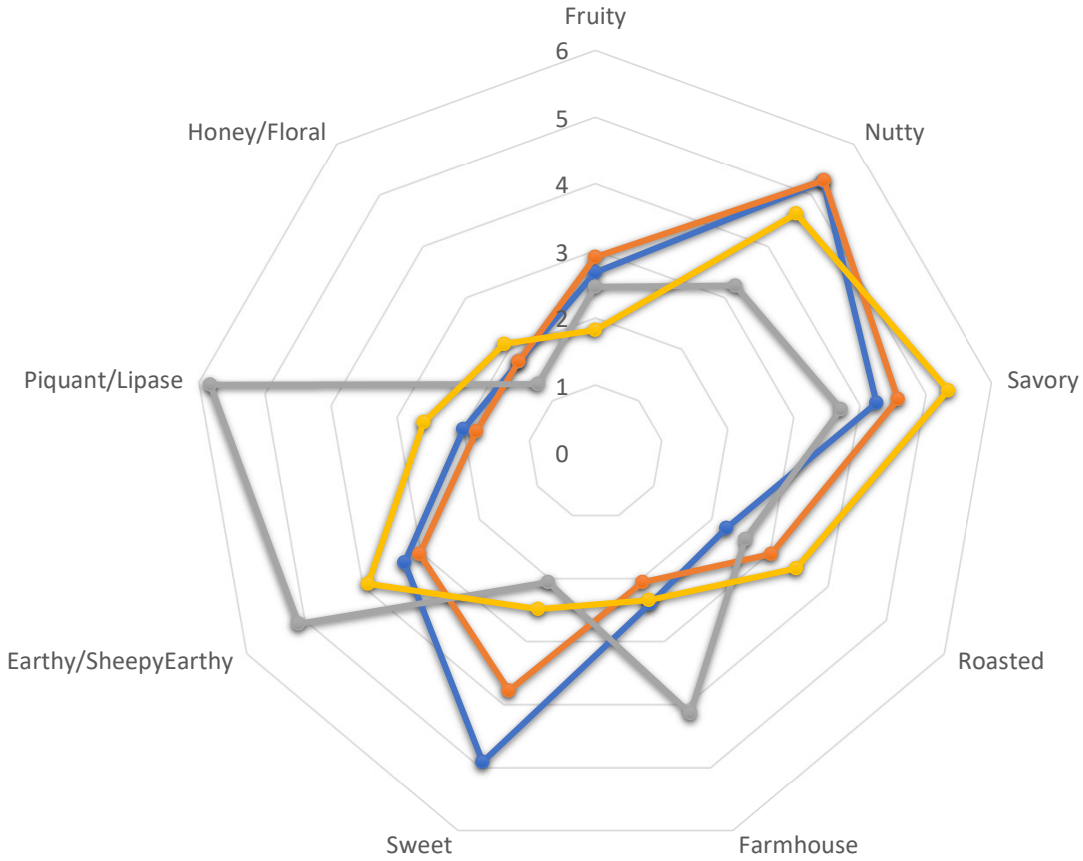
March 03, 2024

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Flavor Rating Combined
 Total respondents: 35

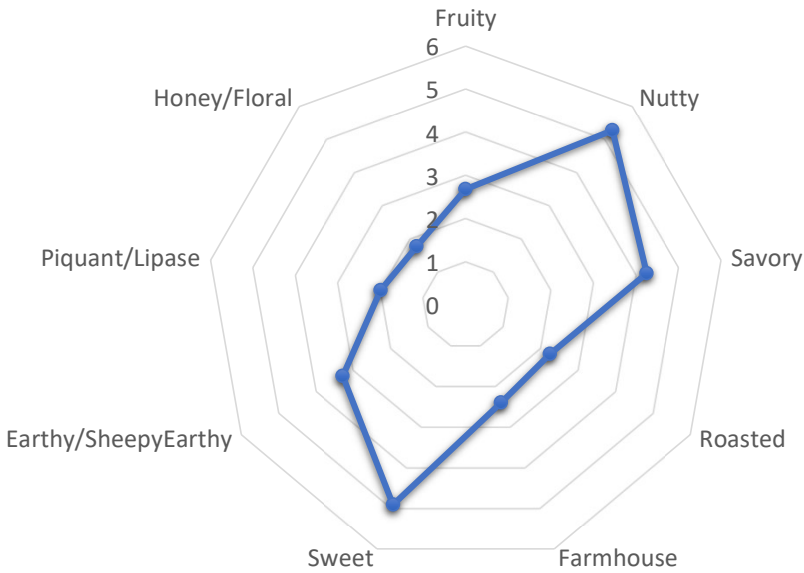
● Manchego
 ● Lamb Chopper
 ● Pecorino Toscano
 ● P'tit Basque



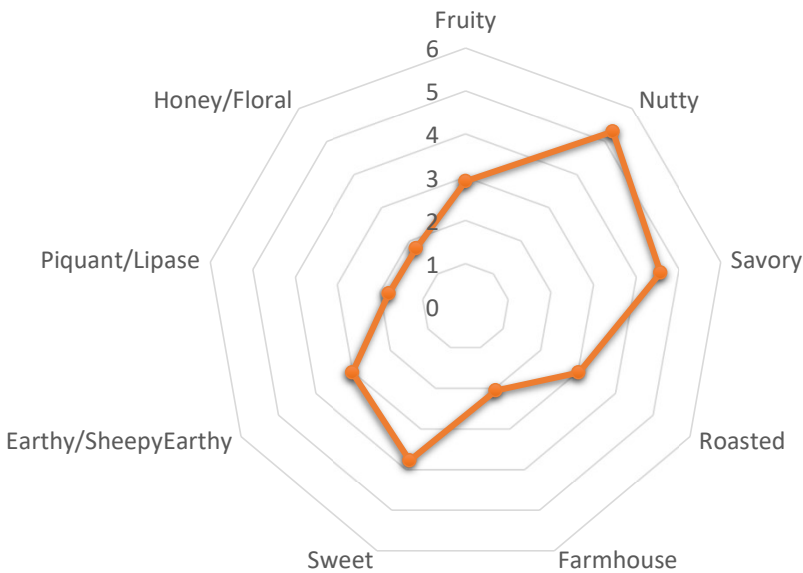
Flavor Rating by Individual Cheese

Total respondents: 35

—●— Manchego



—●— Lamb Chopper

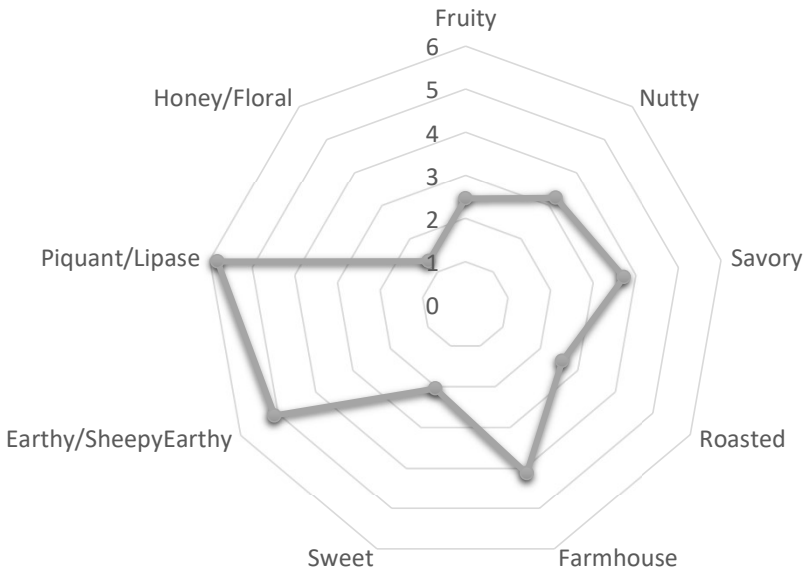


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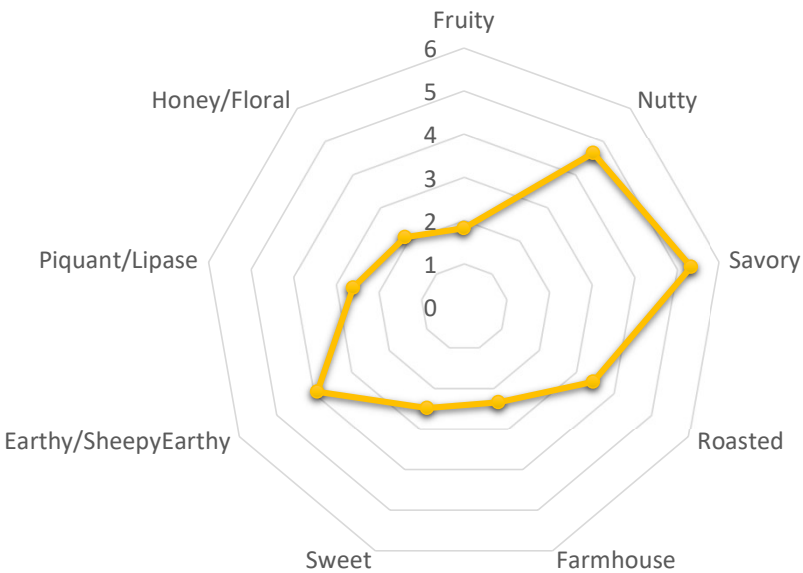
Flavor Rating by Individual Cheese

Total respondents: 35

— Pecorino Toscano



— P'tit Basque



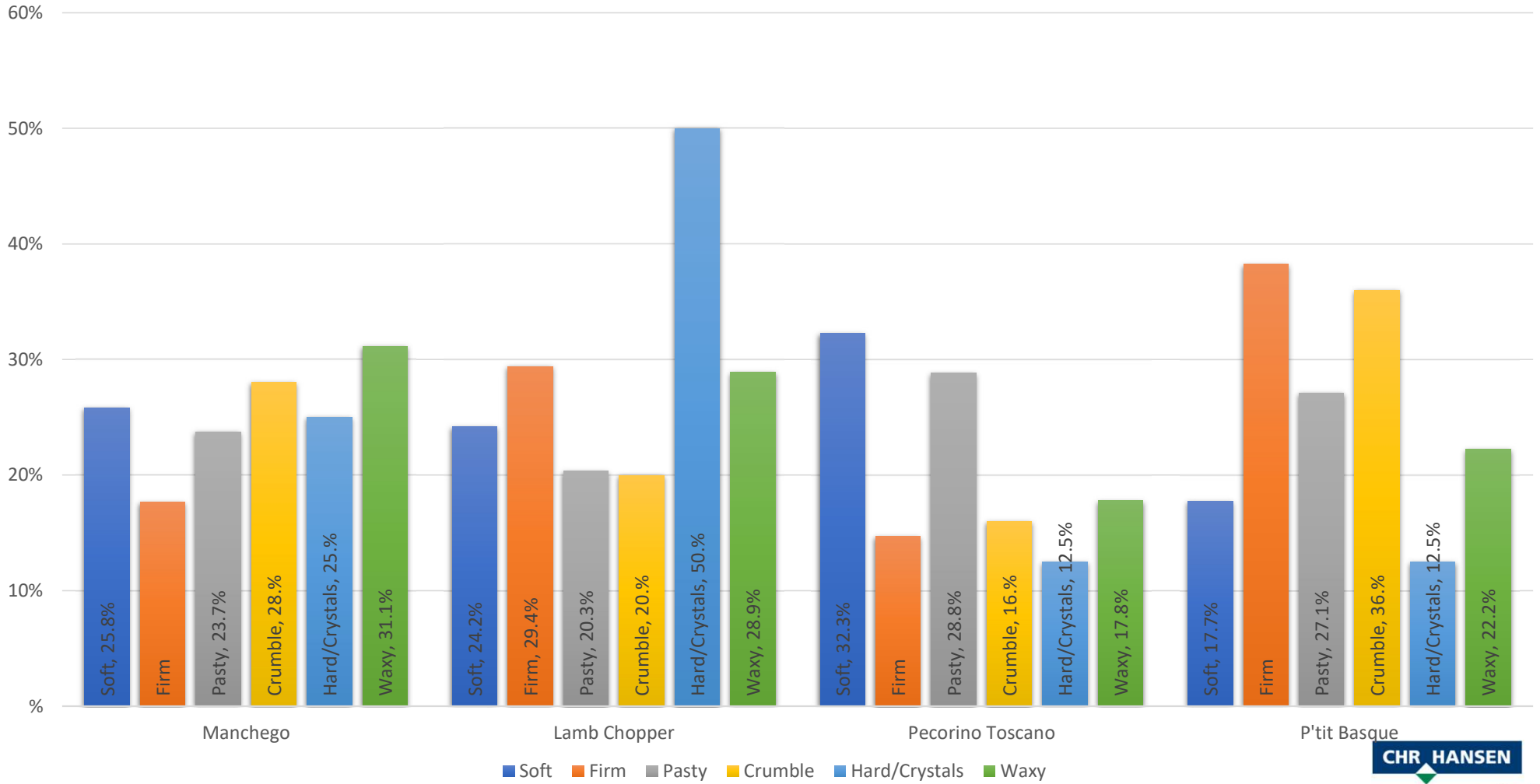
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Flavor Rating by Individual Cheese

Attribute	Manchego	Lamb Chopper	Pecorino Toscano	P'tit Basque
Fruity	2.7	2.9	2.5	1.8
Nutty	5.3	5.3	3.3	4.7
Savory	4.3	4.6	3.7	5.3
Roasted	2.3	3.0	2.6	3.5
Farmhouse	2.4	2.1	4.1	2.3
Sweet	4.9	3.8	2.1	2.5
Earthy/SheepyEarthy	3.3	3.0	5.1	3.9
Piquant/Lipase	2	1.8	5.8	2.6
Honey/Floral	1.8	1.8	1.3	2.1

Texture Rating

Total respondents: 35



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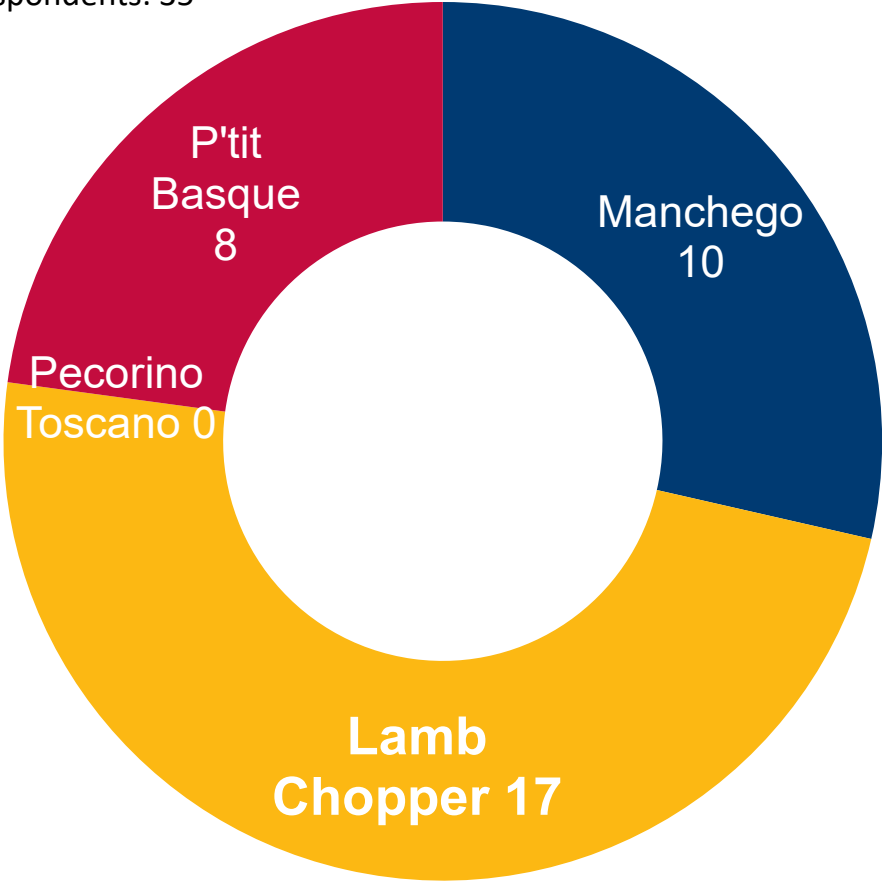
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Texture Rating by cheese

Answer	Manchego	Lamb Chopper	Pecorino Toscano	P'tit Basque
Soft	16	15	20	11
Firm	6	10	5	13
Pasty	14	12	17	16
Crumble	7	5	4	9
Hard/Crystals	2	4	1	1
Waxy	14	13	8	10
Total	59	59	55	60

Overall Preference

Total respondents: 35



Answer	Value
Manchego	10
Lamb Chopper	17
Pecorino Toscano	0
P'tit Basque	8
Total	35

■ Manchego
 ■ Lamb Chopper
 ■ Pecorino Toscano
 ■ P'tit Basque

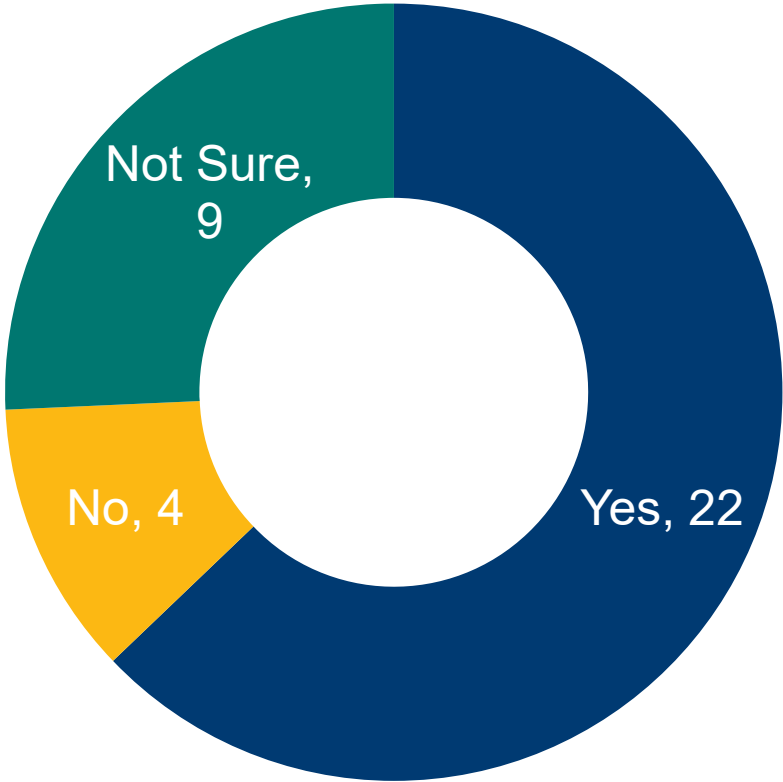
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Do you see these Sheep Milk Cheeses as future high solids COW MILK cheese options?

Total respondents: 35



Answer	Value
Yes	22
No	4
Not Sure	9
Total	35

■ Yes ■ No ■ Not Sure

Future thoughts on: What types of technology (equipment, ingredients, data collection/analysis workshops) do you think are needed to continue to evolve high solids milk cheeses? Dream big and explain.

Total respondents: 35

Consistent, expansive data collection

Flavor and how AI can be used to improve it

More experimentation and development with different factors

Testing equipment

AI

Data analysis!

I love the idea of analysis workshops

The use of big data and technology

UF/RO

Process Data.

Workshops

Big question

All listed

Data collection

Ingredients

Understanding base line data.

Protein concentration to match extremely high fats

Ingredients amounts

Data collection and analysis workshops

Need to understand how to use split lactose into its mono components. Then how we do we deal with the galactose so that it does not bind to the remaining protein. Finally, is all protein created the same and how do we measure in our raw milk?

Can't begin to imagine

Experience

Make milk chemistry and aging profile related to alpha and beta casein degradation as well as fatty acid profiles with lower milk fat

Sensory panels, clearly!

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