

EAAP 2024 – Session n°6

2-methyloxolane can likely replace hexane for defatting soybean meal fed to dairy cows without notably affecting milk fatty acid profile

September 1st, 2024

ecoXTRACT[®] PROTÉINES

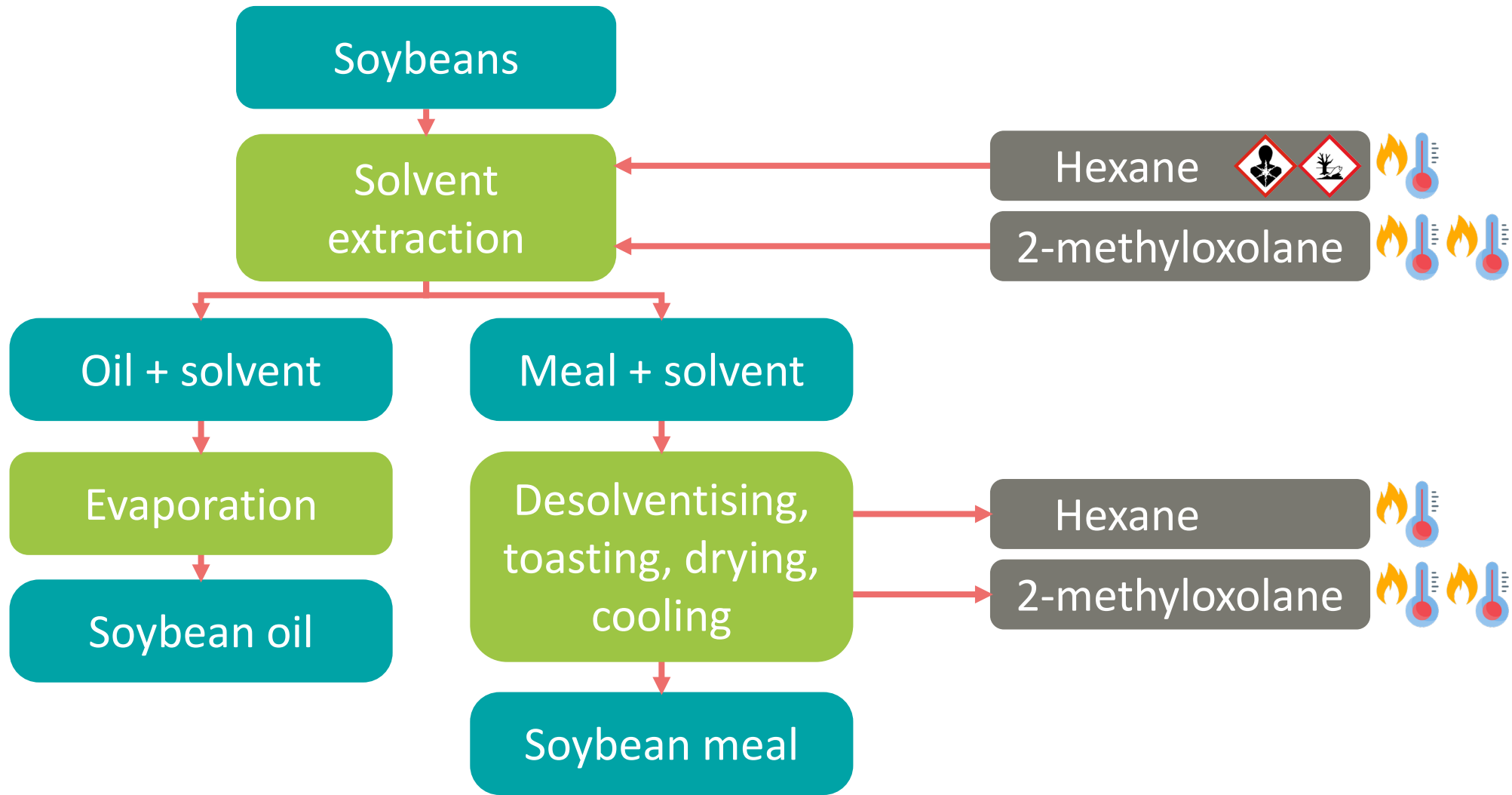
Valentin Menoury¹, Pierre Nozière¹, Gwenaël Leday², Jasper Engel², Anne Ferlay¹

¹ Université Clermont Auvergne, INRAE, VetAgro Sup, UMR Herbivores, 63122 Saint-Genès-Champanelle, France

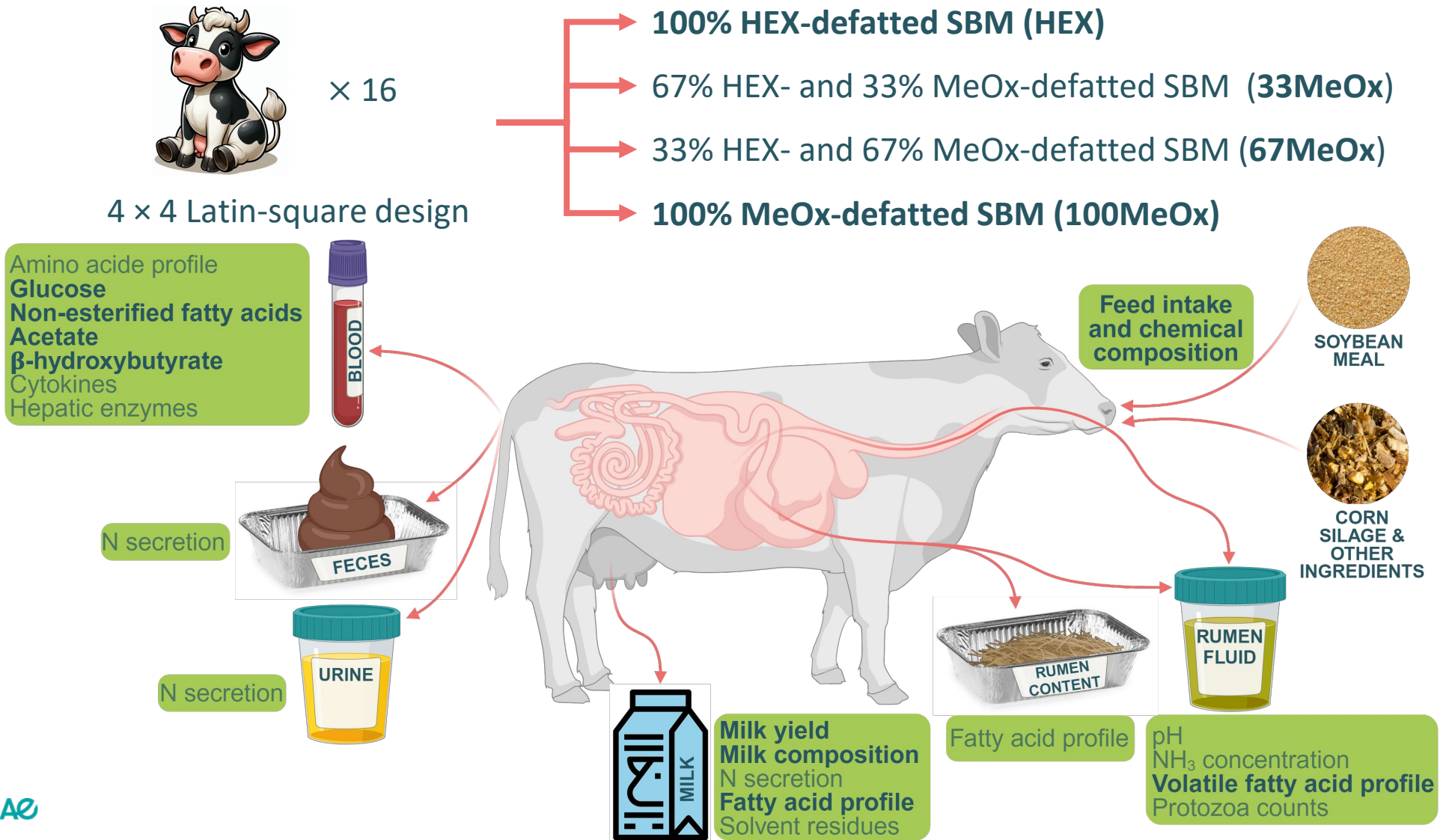
² Biometris, Wageningen University & Research, PO Box 16, 6700AA, Wageningen, The Netherlands.



> Context: soybean processing



➤ Material and methods



> Material and methods: difference or equivalence?

➔ Are HEX and 100MeOx equivalent?



A non-significant difference test ➔ mean HEX = ~~mean 100MeOx~~

Justice system



« There are enough evidences to judge the defendent guilty »

« There are not enough evidences to judge the defendent guilty »



It does not prove innocence!

« It is better to risk saving a guilty person than to condemn an innocent one. »

Voltaire



Difference test



« There are enough evidences to conclude that there is a difference »

« There are not enough evidences to conclude that there is a difference. »



It does not prove equivalence!

« It is better to do an equivalence test rather than a difference test. »

Valentin



INRAE

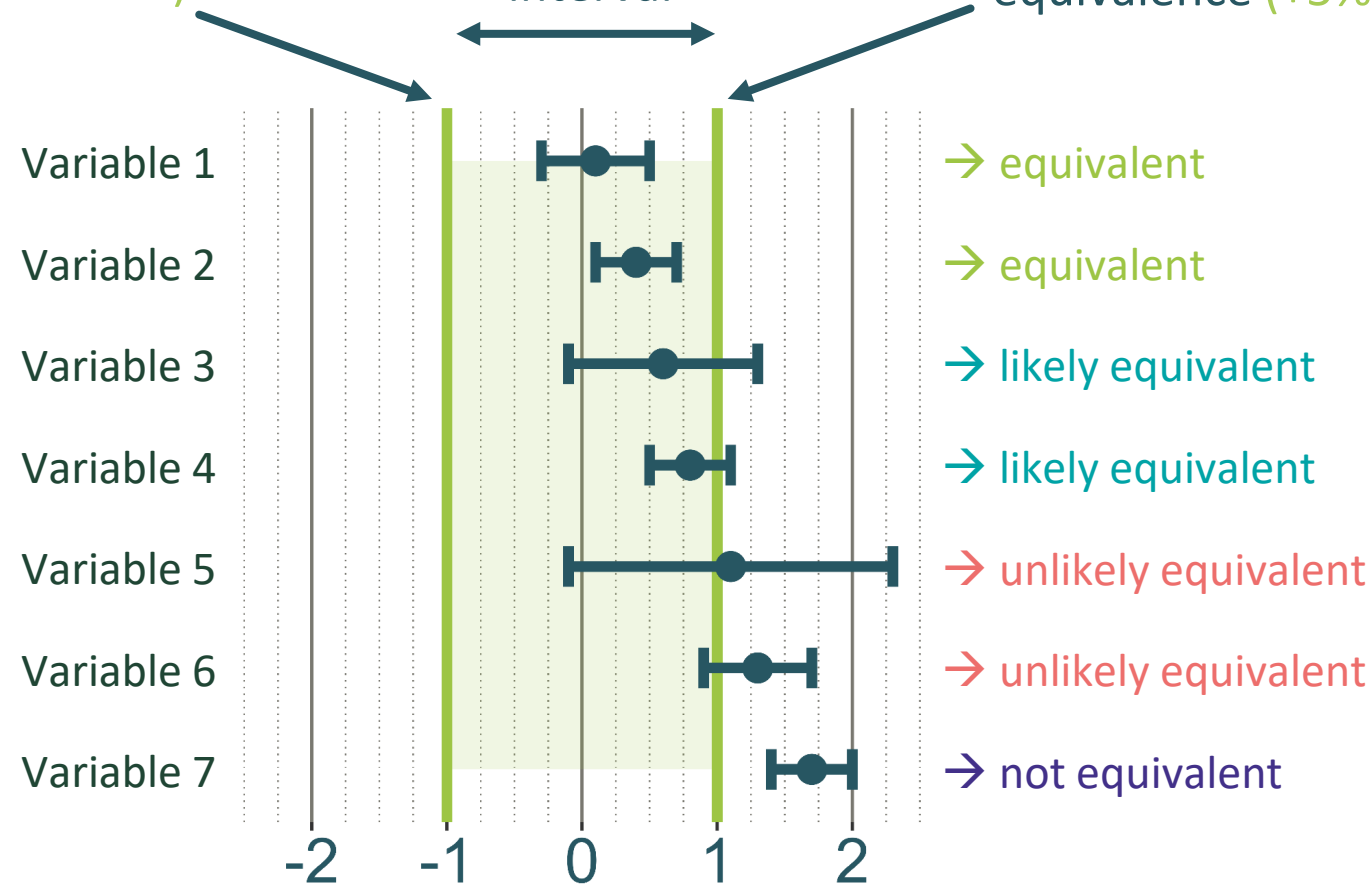
EAAP

September 1st, 2024 - Valentin Menoury

HEX: hexane; MeOx: 2-methyloxolane

➤ Material and methods: equivalence tests

Inferior margin of equivalence (-5% HEX)
Equivalence interval
Superior margin of equivalence ($+5\%$ HEX)



Scaled difference between treatments
100MeOx and HEX
(100MeOx minus HEX)

● Estimated difference
— 90% confidence interval



INRAE

EAAP

September 1st, 2024 - Valentin Menoury

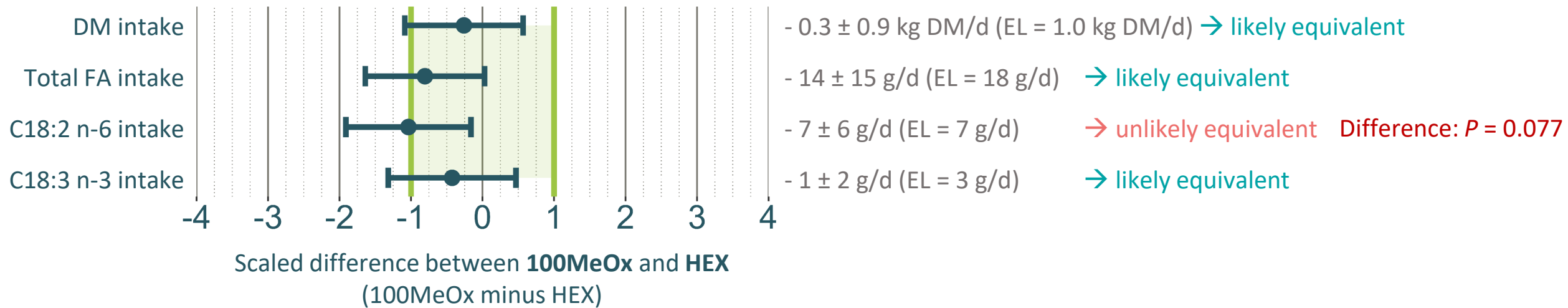


Objectives

Studying the impacts of replacing HEX- by MeOx-defatted SBM on

- dairy performance
- milk fatty acid profile

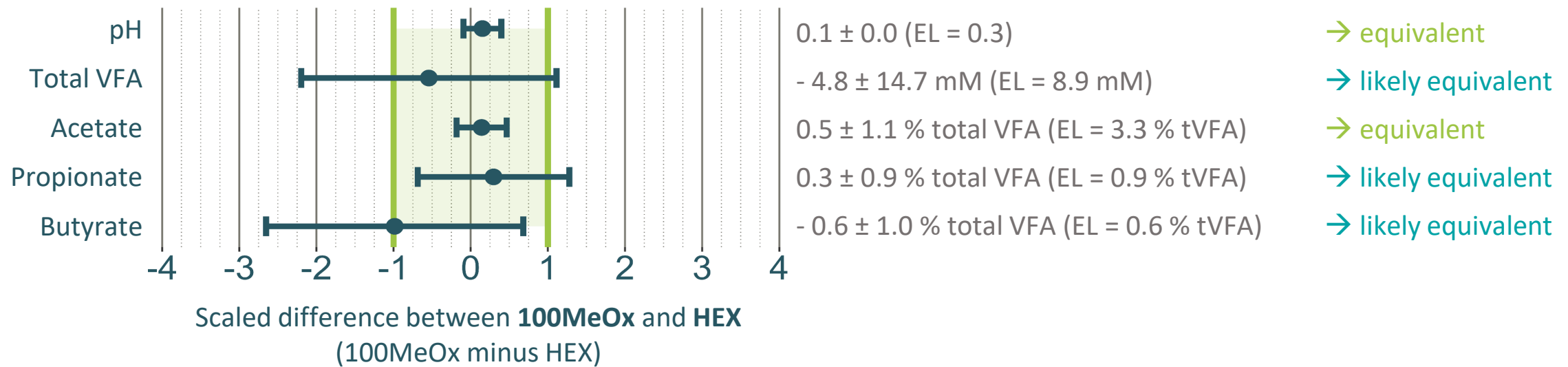
➤ Results: fatty acid intake



- Likely equivalent intake of total FA, except C18:2 n-6 intake which tended to $\downarrow$ with MeOx vs. HEX
- Both SBM have $\approx$ FA profile but $\downarrow$ crude fat content for MeOx vs. HEX (22 vs 26 g/kg DM), thus $\downarrow$ FA intake

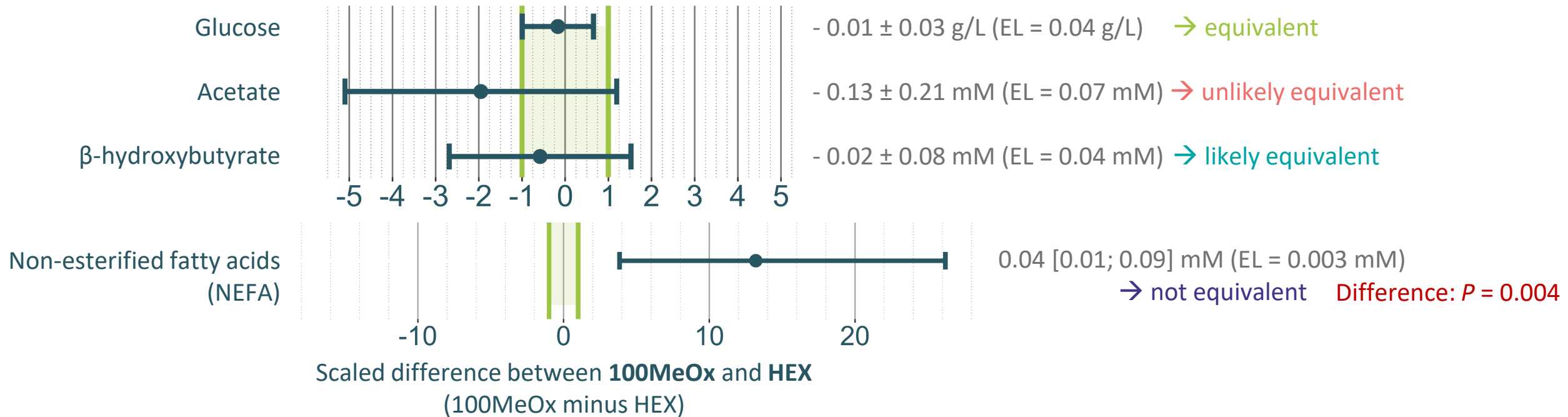
> Results: rumen fermentations

Esophageal sounding
(5h post-prandial,
composite sample from
2 sampling days)



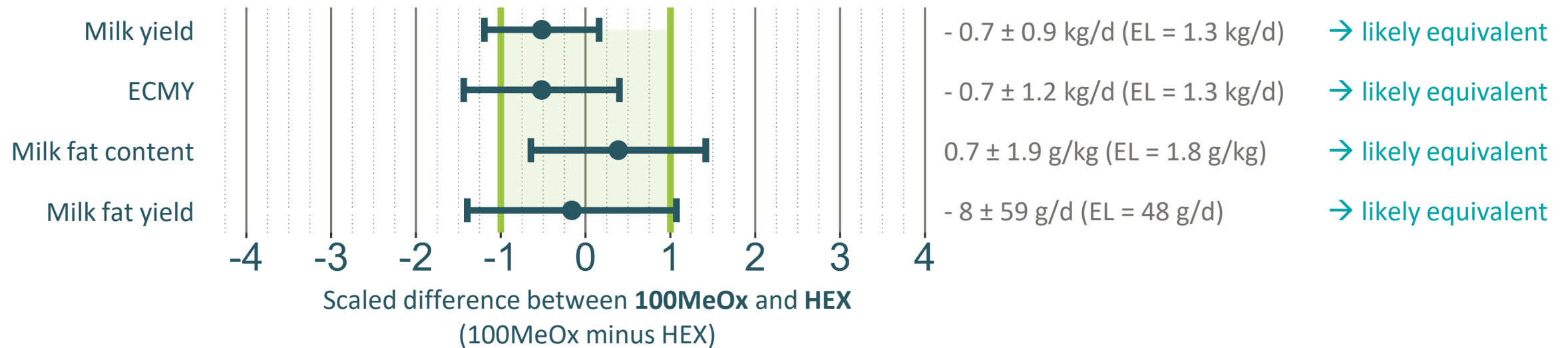
- Likely equivalent rumen fermentations

➤ Results: plasma parameters



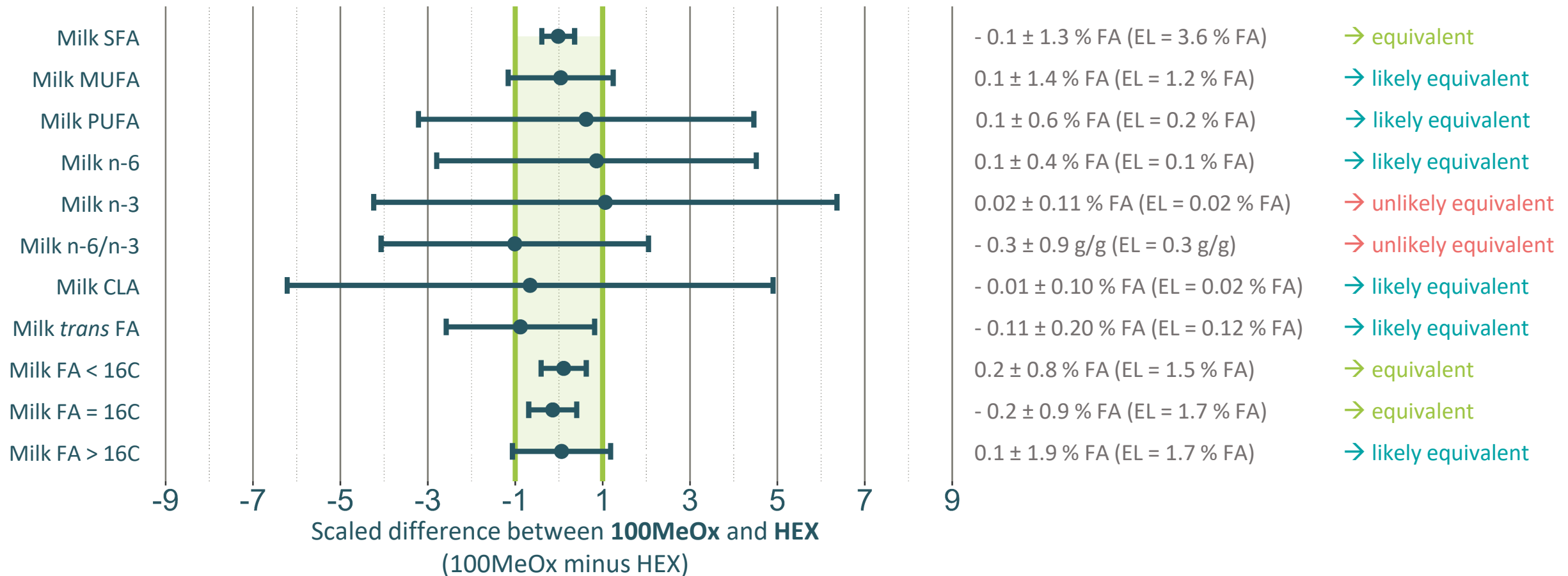
- More NEFA may indicate more mobilization of body fat reserves with 100MeOx vs HEX
 - However,
 - ✓ Body weight and body condition score of cows fed 100MeOx increased over time
 - ✓ NEFA concentration for 100MeOx was 0.11 mM vs 0.07 mM for HEX → low NEFA concentrations
- ➔ **Thus, if there was more body fat mobilization with 100MeOx vs HEX, the amount of fat mobilized was low**

➤ Results: milk fat secretion



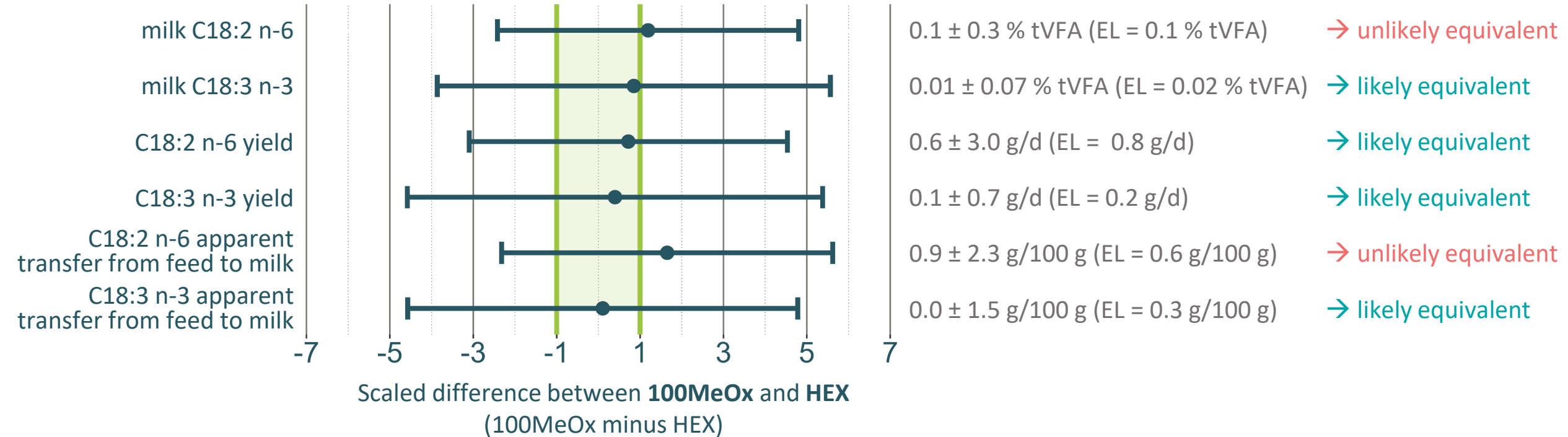
- Likely equivalent milk fat content and yield

➤ Results: milk sums of fatty acids



- Overall likely equivalent FA profile, except n-3 FA which was unlikely equivalent toward ↑ proportion with 100MeOx

➤ Results: milk C18:2 n-6 and C18:3 n-3



- Unlikely equivalent C18:2 n-6 apparent transfer rate from feed to milk, toward ↑ values for 100MeOx vs. HEX due to ≈ yield while tendency for ↓ intake

> Conclusions: 100MeOx vs. HEX



- MeOx-SBM was **more defatted** than HEX-SBM, thus ↓ C18:2 n-6 intake
- **Likely equivalent** rumen fermentations and dairy performance
- **Likely equivalent** milk fatty acid profile, **except** n-3 FA (↑ proportion with 100MeOx)
- **Likely equivalent** transfer rate of C18:3 n-3
- **Unlikely equivalent** transfer rate of C18:2 n-6 (↑ with 100MeOx): due to ↓ C18:2 n-6 intake but ≈ C18:2 n-6 yield in milk



- We can likely replace HEX by MeOx for defatting SBM fed to dairy cows without notably affecting dairy performance and milk fatty acid profile

Thanks for your attention!

Any question?



Valentin Menoury

valentin.menoury@inrae.fr

INRAE – UMRH

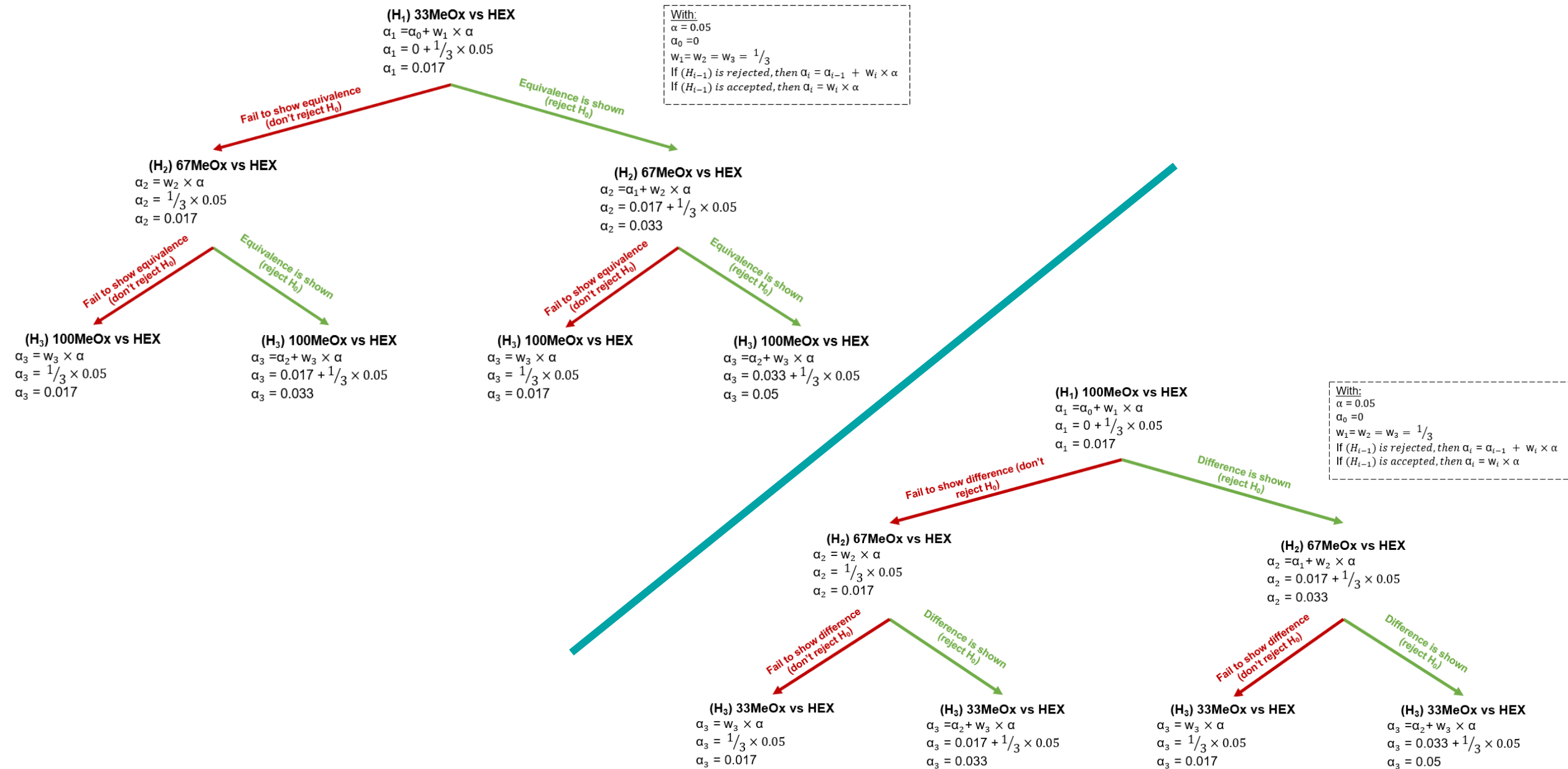
Theix

63122 Saint-Genès-Champanelle, France



INRAE





➤ Material and methods: soybean meals

Item	Hexane-defatted SBM	MeOx-defatted SBM
Proximate composition (g.kg DM ⁻¹)		
OM	932	932
CP	555	552
NDF	83	115
Ether extract	26	22
Fatty acid profile (g/100 g total fatty acids)		
C16:0	17.42	17.05
C18:0	4.73	5.15
cis-9 C18:1	17.37	17.98
C18:2n-6	51.00	50.17
C18:3n-3	5.89	5.69
C18:2n-6/C18:3n-3 (g.g ⁻¹)	8.67	8.81
Other fatty acids	3.58	3.95
Solvent residues (mg.kg DM ⁻¹)		
N-hexane	11.2	0.0
MeOx	4.4	977.4
Maillard reaction products		
Furosine (mg.kg DM ⁻¹)	95.5	1509.5
CML (mg.kg DM ⁻¹)	47.6	57.7
Lysine (g.kg DM ⁻¹)	35	40.7