

SOCIETY FOR EXPERIMENTAL BIOLOGY PRESENTS:

MONTPELLIER
2022

2022 ANNUAL CONFERENCE
MONTPELLIER
5 - 8 JULY 2022

SEBIOLOGY.ORG
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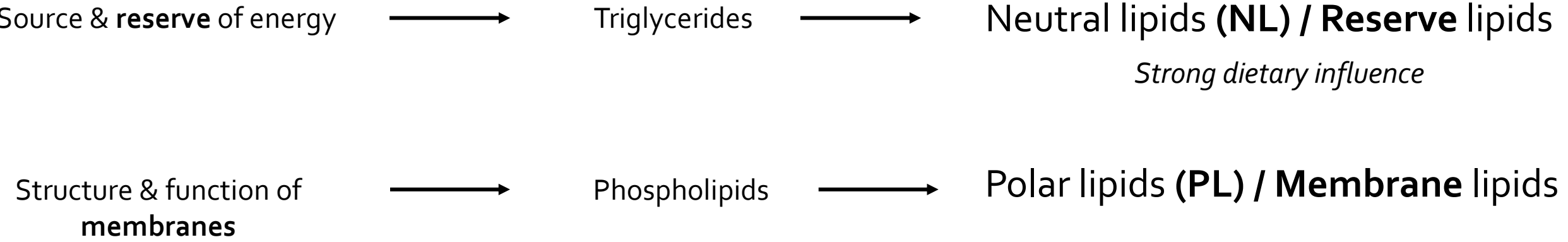


Relation between fatty acid profile, growth rate and condition factor using a non-lethal sampling method in European sea bass.

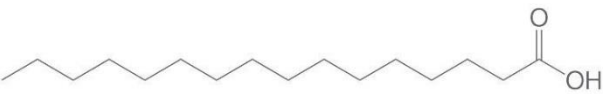
Mickaël PERON, Fabienne LE GRAND, Victor SIMON, Jean-Baptiste
QUEMENEUR, David MAZURAS, Philippe SOUDANT, Marie VAGNER



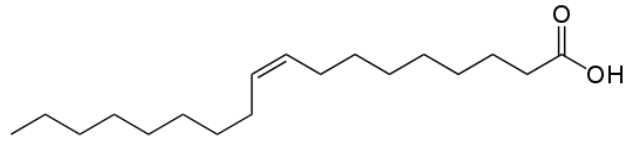
Lipids



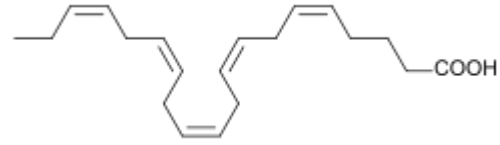
Fatty acids



Saturated
(e.g Palmitic acid)

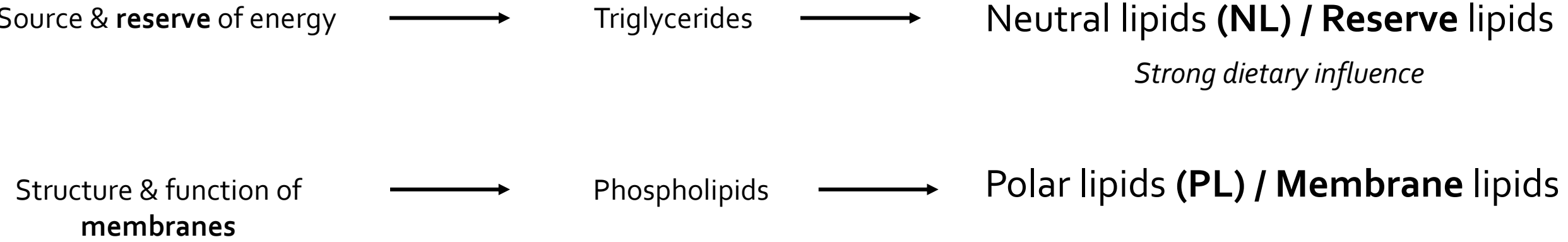


Mono-unsaturated
(e.g Oleic acid)

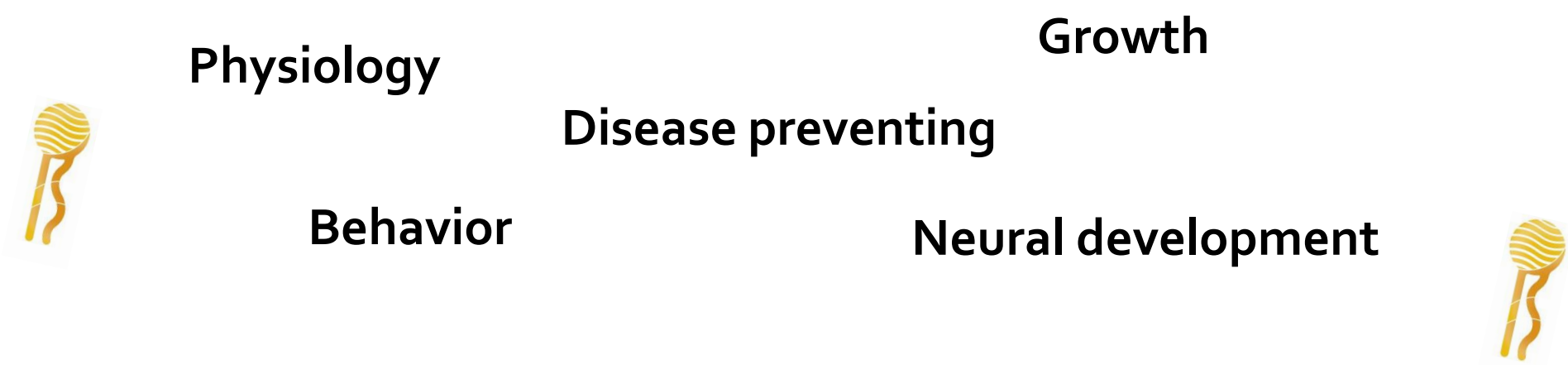


Poly-unsaturated
(e.g Ecosapentaenoic acid)

Lipids



Essential fatty acids



Lipids

Source & **reserve** of energy



Triglycerides



Neutral lipids (NL) / Reserve lipids

Strong dietary influence

Structure & function of **membranes**



Phospholipids



Polar lipids (PL) / Membrane lipids

Essential fatty acids



Growth



Measuring growth in fish

- Essential in experimental conditions : Nutritional conditioning, study of external parameters (T°C, pH...)
- Various tools for measuring growth (SGR, RGR....)
 - **Thermal Growth Coefficient (TGC)** : Takes temperature into account

$$w_t^{0.33} = w_i^{0.33} + \left(\frac{T}{1000} \right) t$$

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$$w_t^{0.33} = w_i^{0.33} + \left(\frac{T}{1000} \right) t$$

- **Condition Factor (Fulton's K)** : Proxy of stoutness of fish

$$\left(\frac{W}{L^3} \right) * \mathbf{100}$$

Monitoring growth overtime : Good developement of fish, well being of the animal

- Regular biometry to assess this growth : Easy and not harmful



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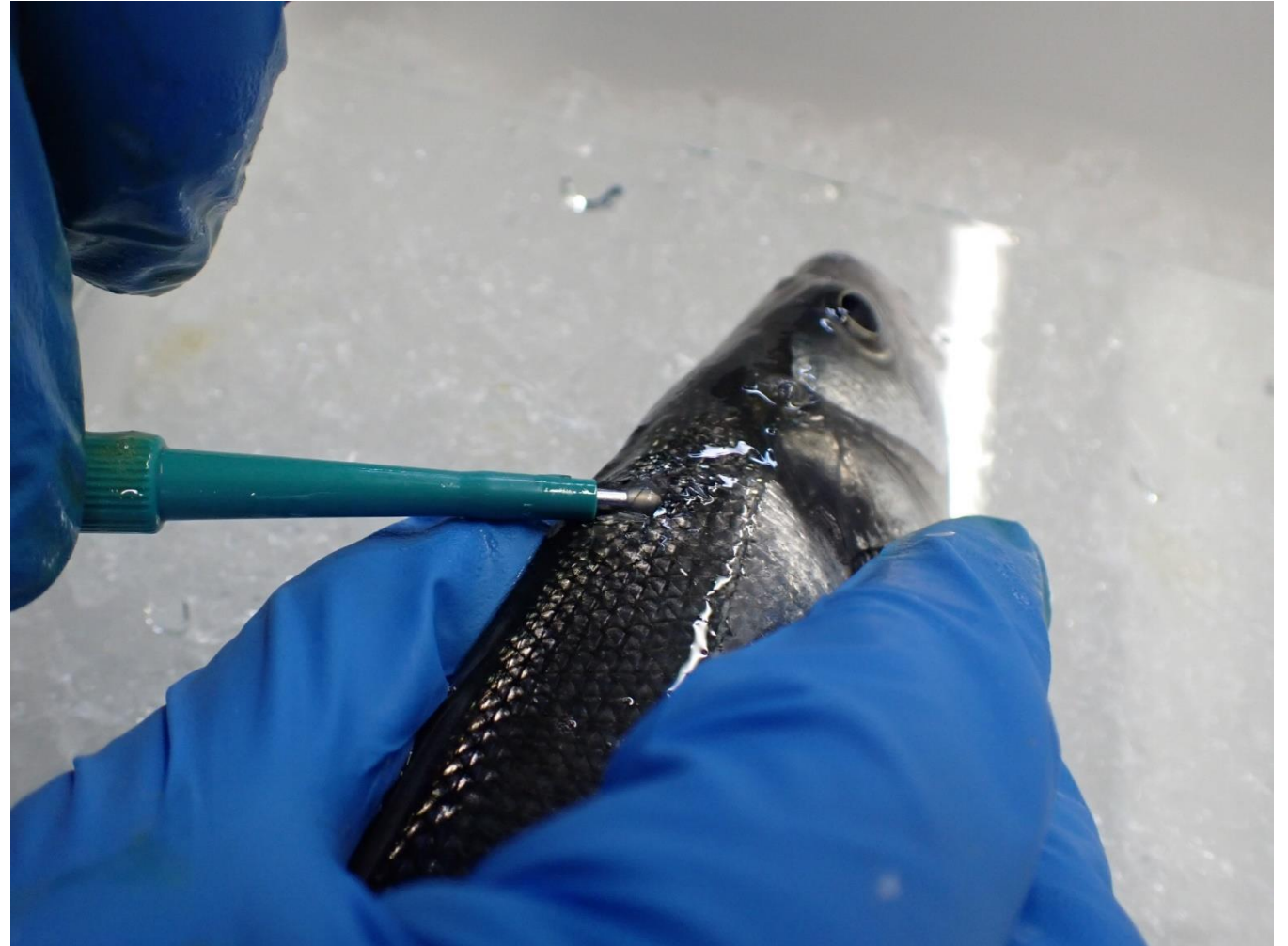
Monitoring FA profiles overtime : Evolution of membrane lipids, behavior of FA in tissues, experimental conditions shaping FA profile

- Sample of fresh tissue : lethal most of the time



The subcutaneous biopsy

- Non-lethal method
- Sampling of white muscle
- Feasible on various fish size



Major questionings :

- Subcutaneous biopsy allow recovery of fish over time ?
- Can we observe difference in FA between biopsied tissue
- Can we link fish growth performance with FA ?

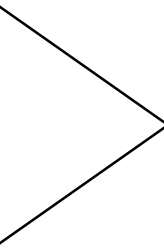


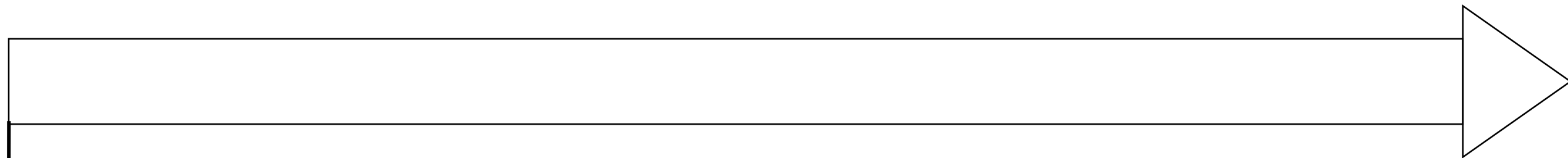
Material and Methods





Wild sea bass from
Seine arrive to lab





Wild sea bass from
Seine arrive to lab

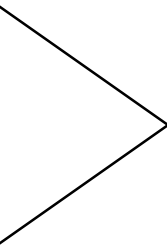


1 month in quarantine

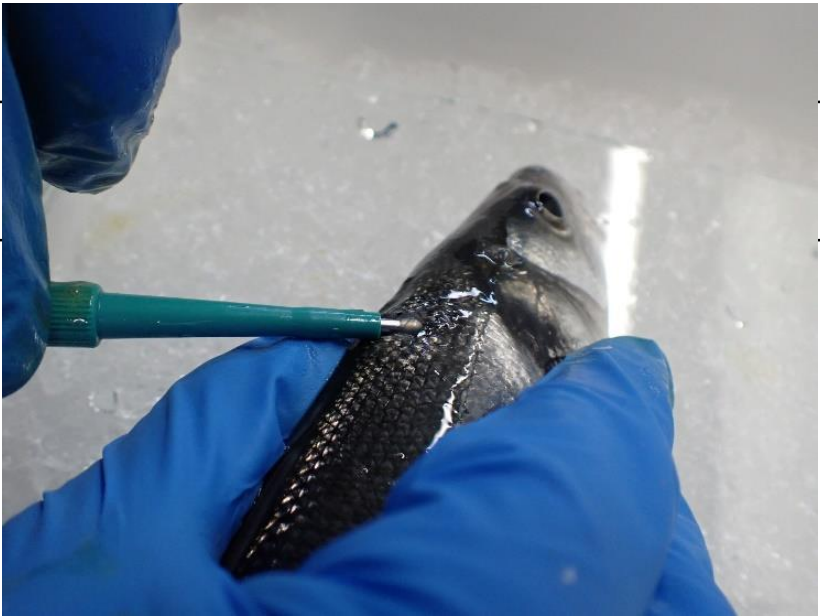
**T_0 : First Biopsy
Tagging**



Commercial Feed



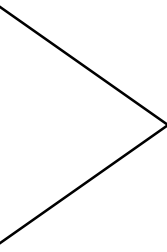
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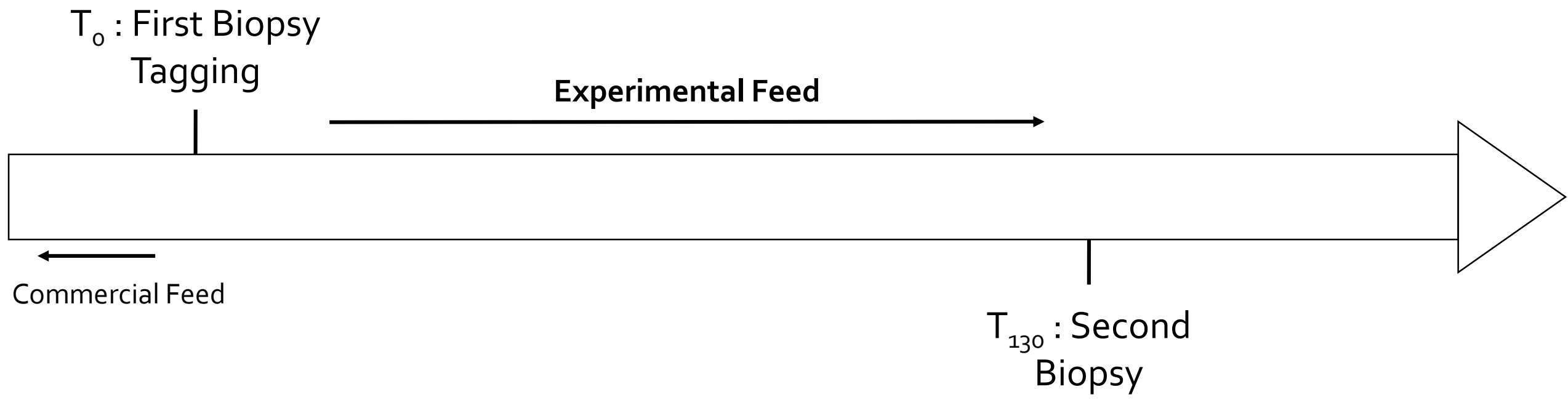


**T_0 : First Biopsy
Tagging**



Commercial Feed





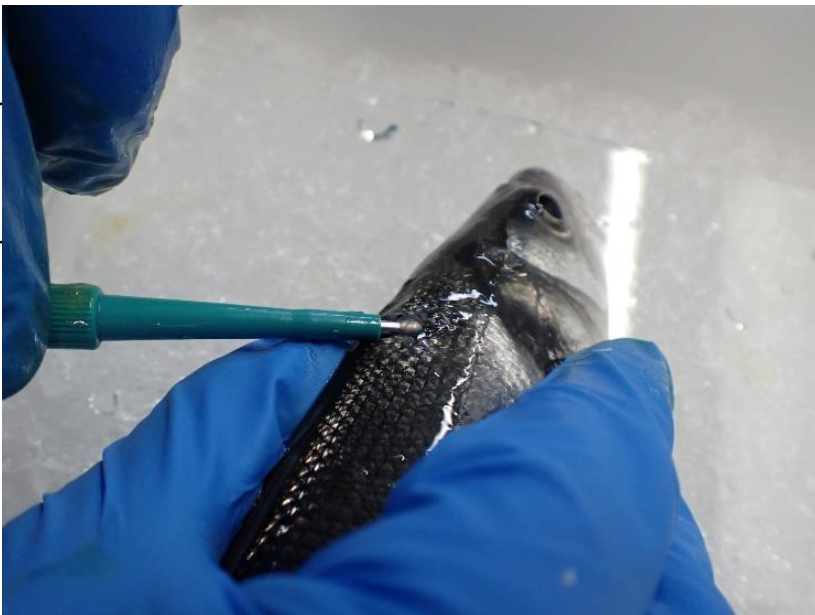
T₀ : First Biopsy
Tagging

Experimental Feed

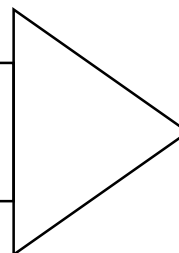
Commercial Feed

T₁₃₀ : Second
Biopsy

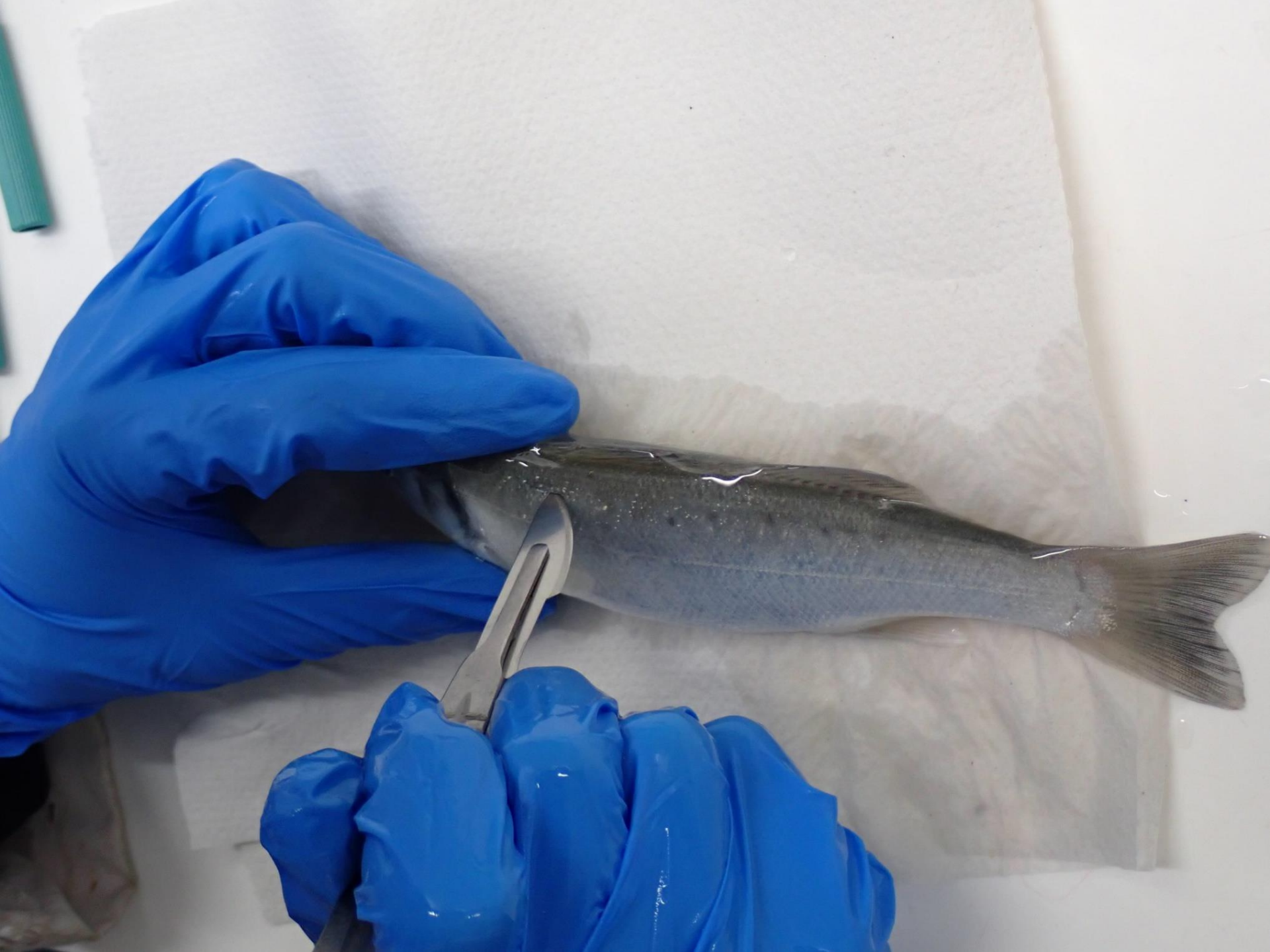
T_0 : First Biopsy
Tagging



T_{130} : Second
Biopsy



Step 1 : Small cut on the skin





Step 1 : Small cut on the skin

Step 2 : Inserting biopsy punch



Ø 2 mm

Used for human medicine (sterile)



Step 1 : Small cut on the skin

Step 2 : Inserting biopsy punch

Step 3 : Pushing in and turning the punch

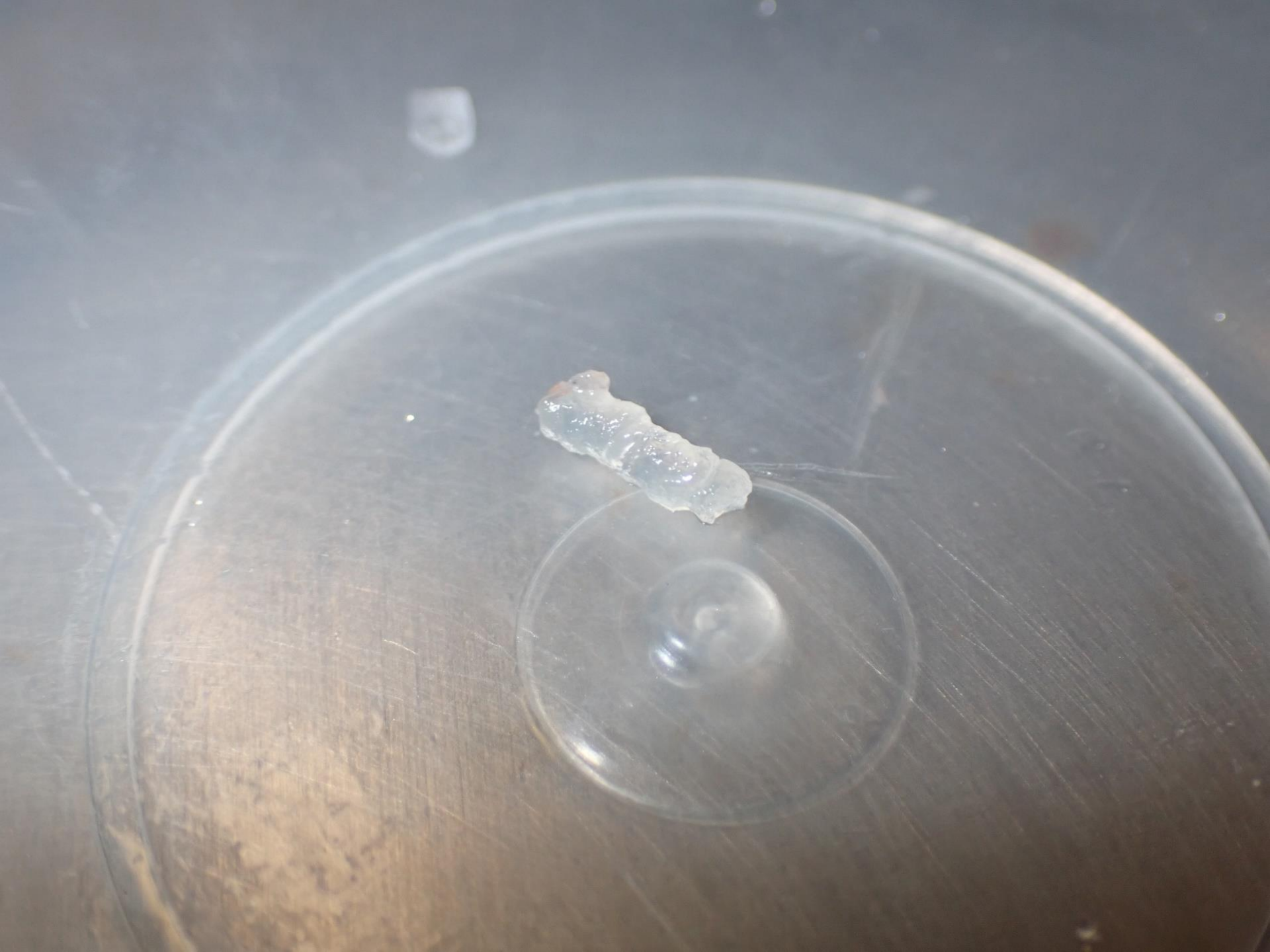


Step 1 : Small cut on the skin

Step 2 : Inserting biopsy punch

Step 3 : Pushing in and turning the punch

Step 4 : Lifting and removing the punch



Step 1 : Small cut on the skin

Step 2 : Inserting biopsy punch

Step 3 : Pushing in and turning the punch

Step 4 : Lifting and removing the punch

Step 5 : Extracting tissue



Step 1 : Small cut on the skin

Step 2 : Inserting biopsy punch

Step 3 : Pushing in and turning the punch

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Step 6 : Applying antiseptic



Step 1 : Small cut on the skin

Step 2 : Inserting biopsy punch

Step 3 : Pushing in and turning the punch

Step 4 : Lifting and removing the punch

Step 5 : Extracting tissue

Step 6 : Applying antiseptic & surgical glue



→ **6mL Solvent (CHCl₃-MeOH)** →



← **4 mL for lipid extraction and separation**

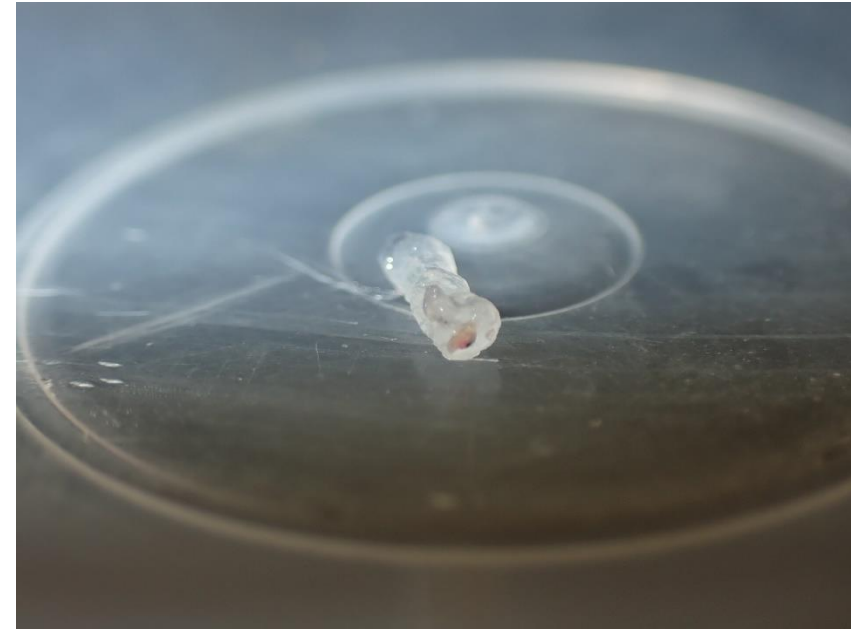


Fatty acid profiles
with GC-FID

- Quantity of tissue :

Mean sample weight with biopsy was **6,1 (± 2,7) mg.**

Minimum weight was **1,4 mg** and maximum was **13,8 mg.**



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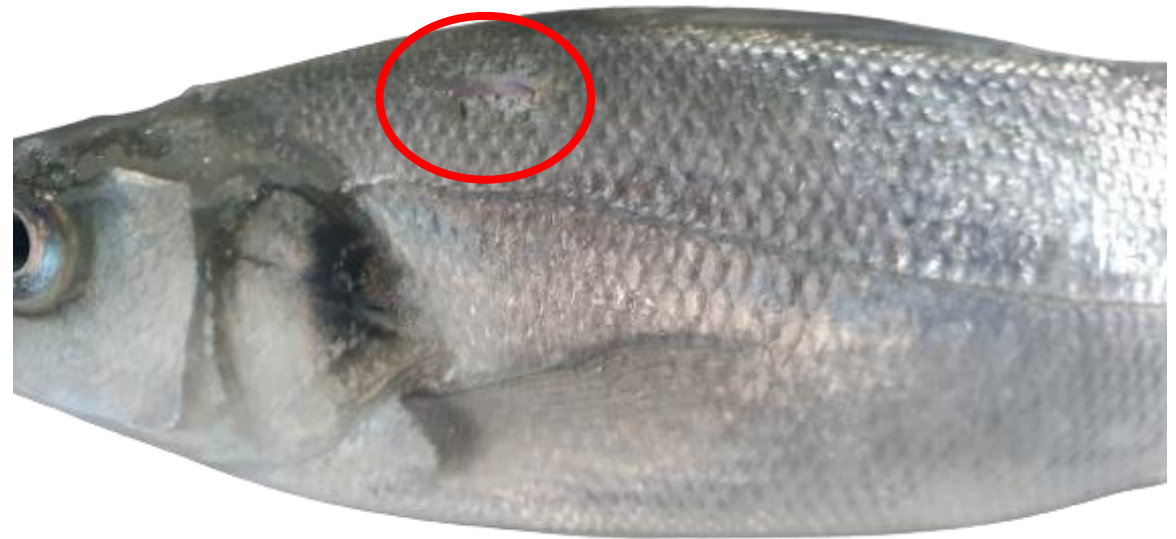
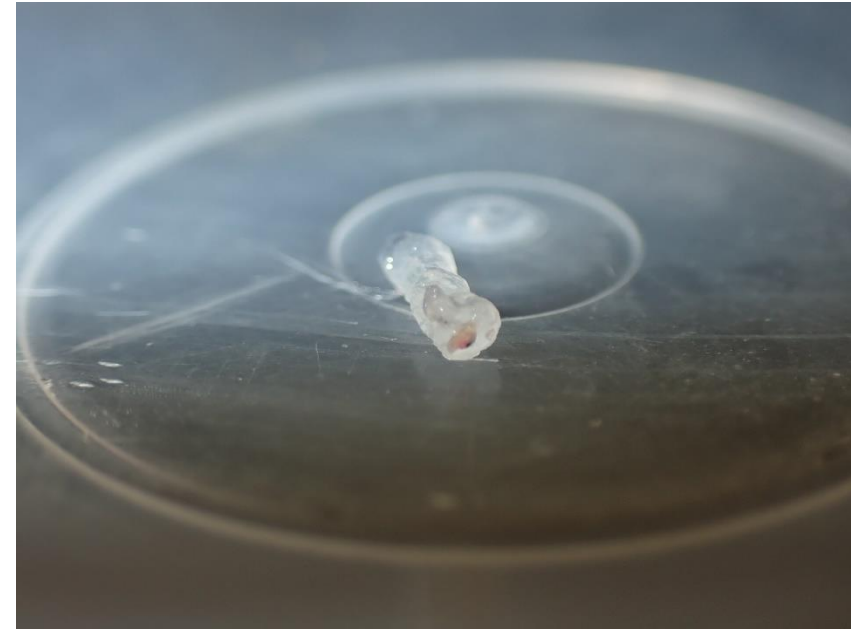
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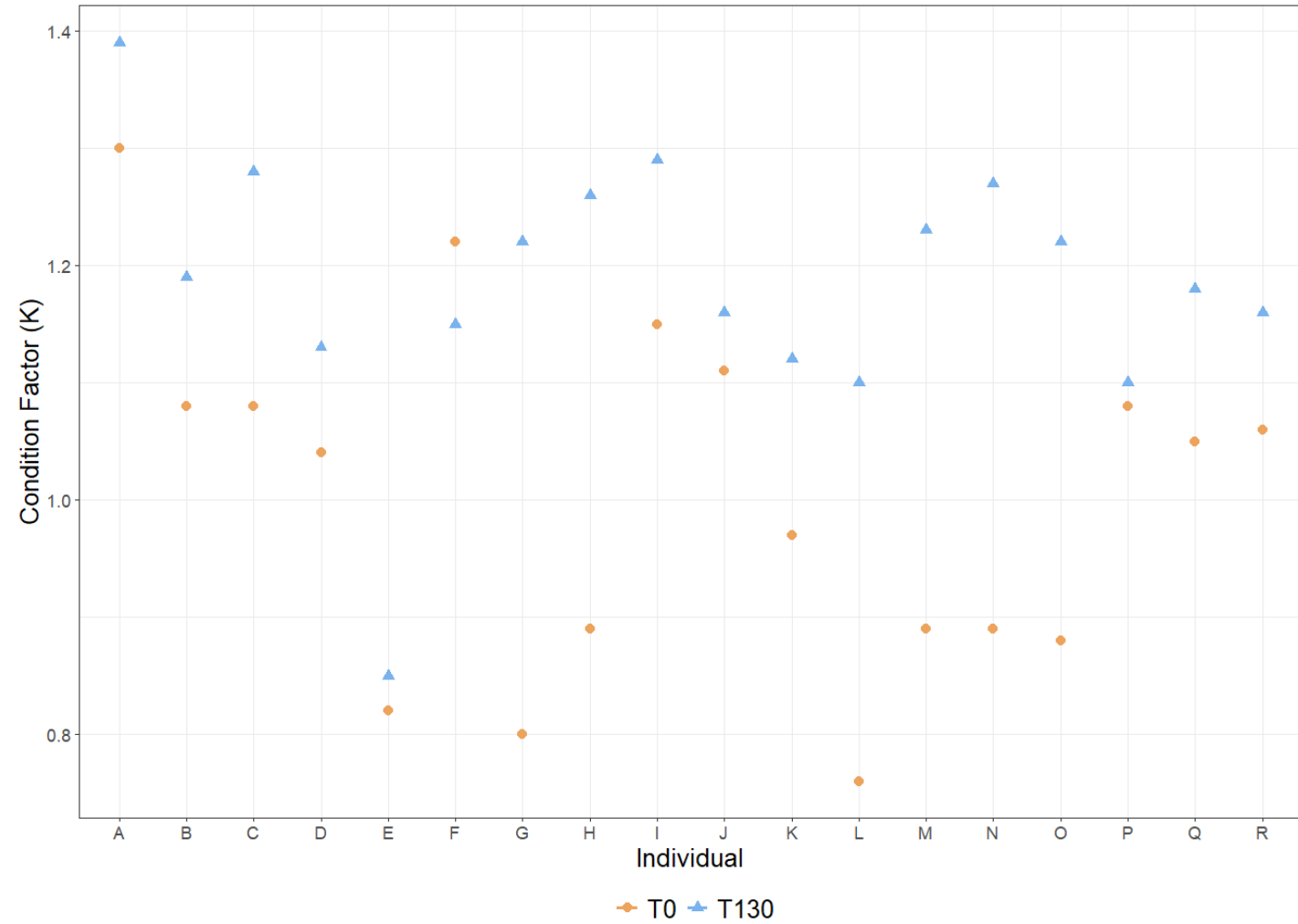
Mean sample weight with biopsy was **6,1 (\pm 2,7) mg.**

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- Condition factor (Fulton's K) :

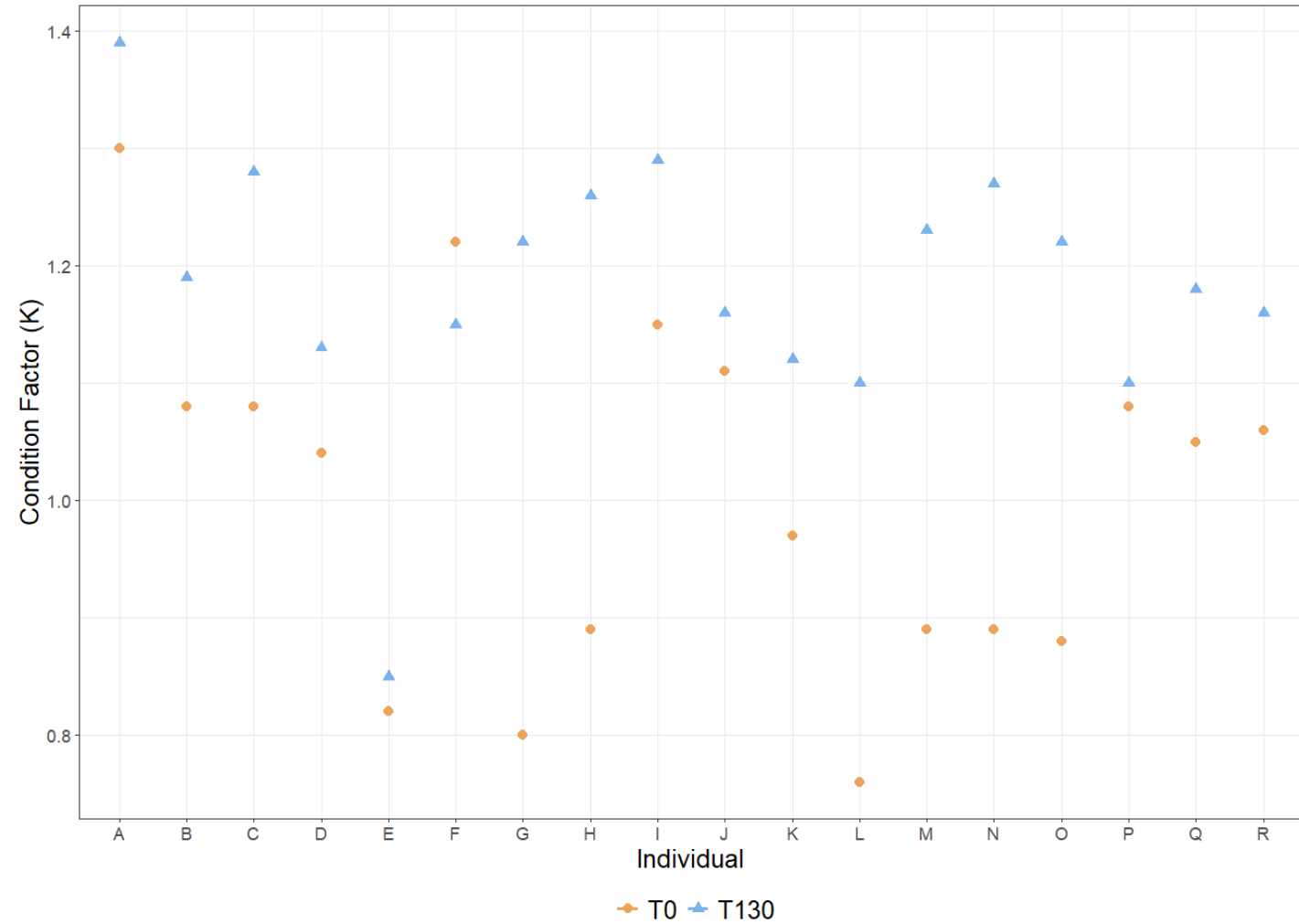
● Mean IC at **T₀** was **1,0 (± 0,13)**.
Max was **1,3** and min was **0,76**



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▲ Mean IC at **T₁₃₀** was **1,18 (± 0,11)**.
Max was **1,39** and min was **0,85**.

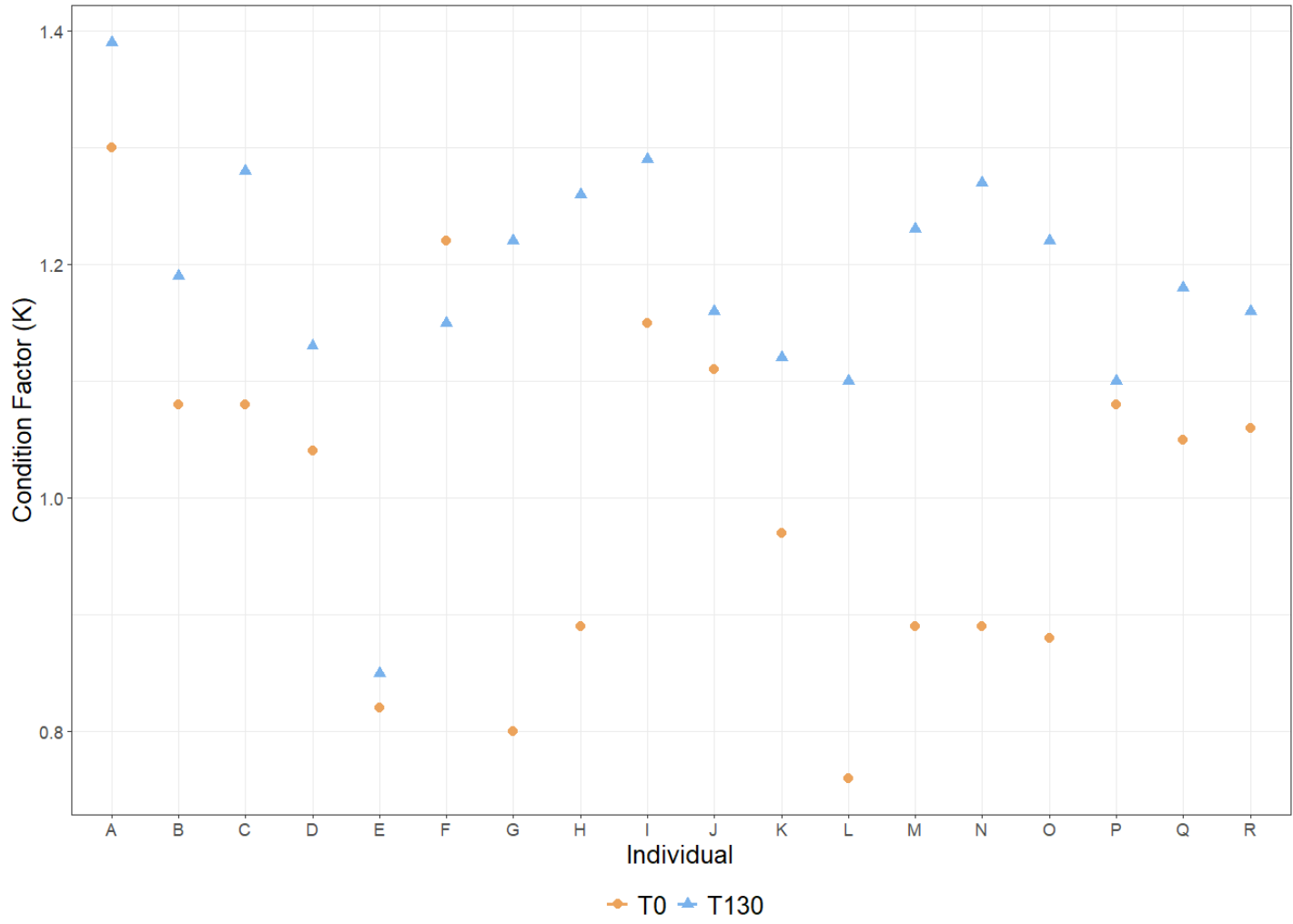


• Condition factor (Fulton's K) :

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Max was **1,39** and min was **0,85**.

17 out of 18 fish showed increase in K



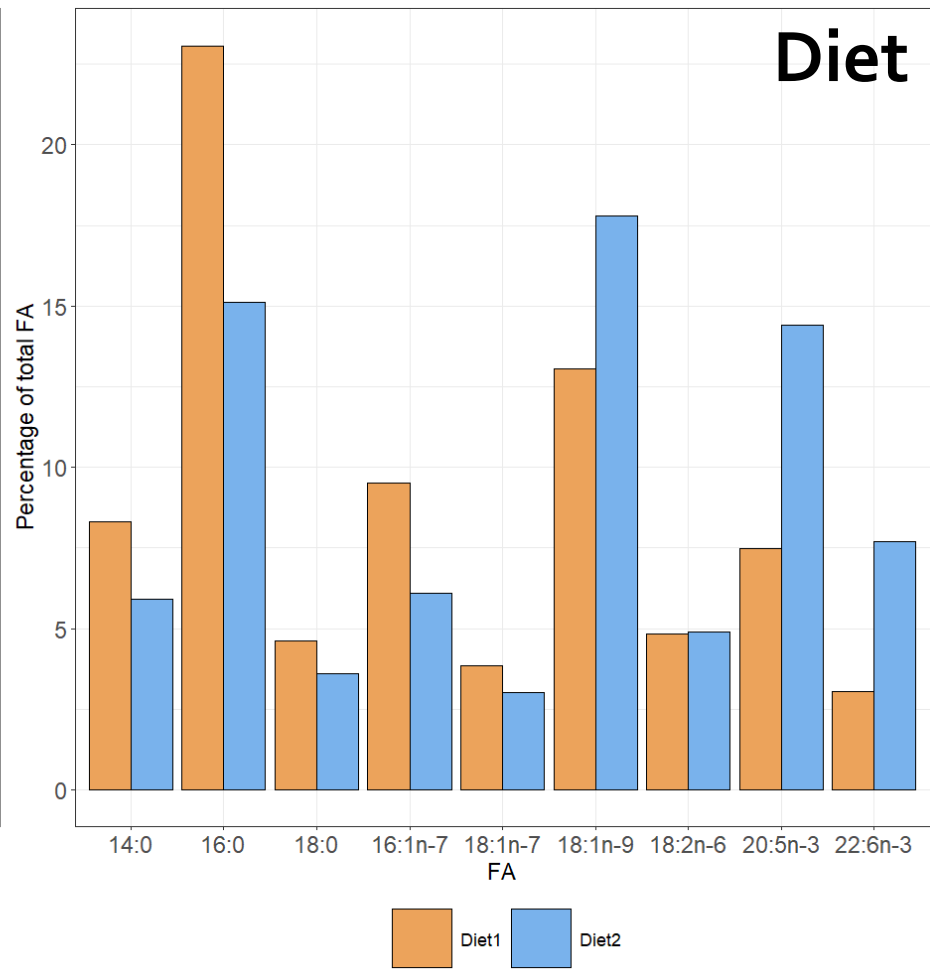
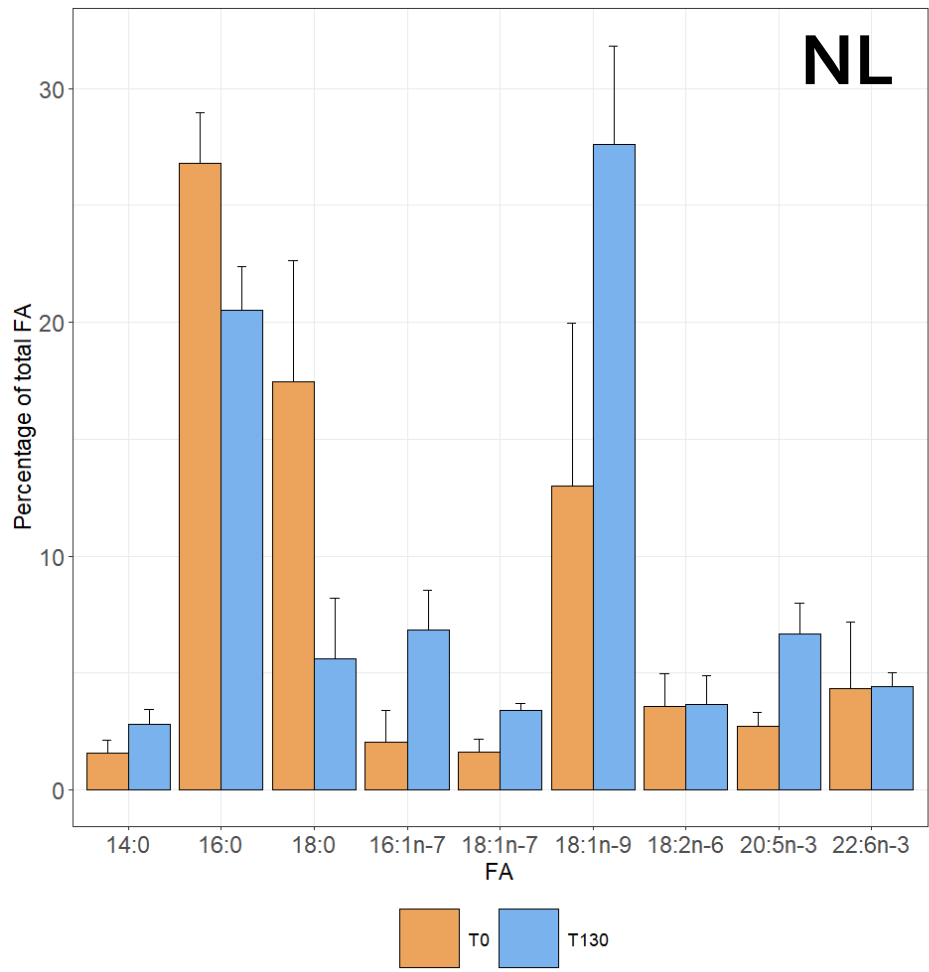
No negative impact on stoutness of fish with biopsy

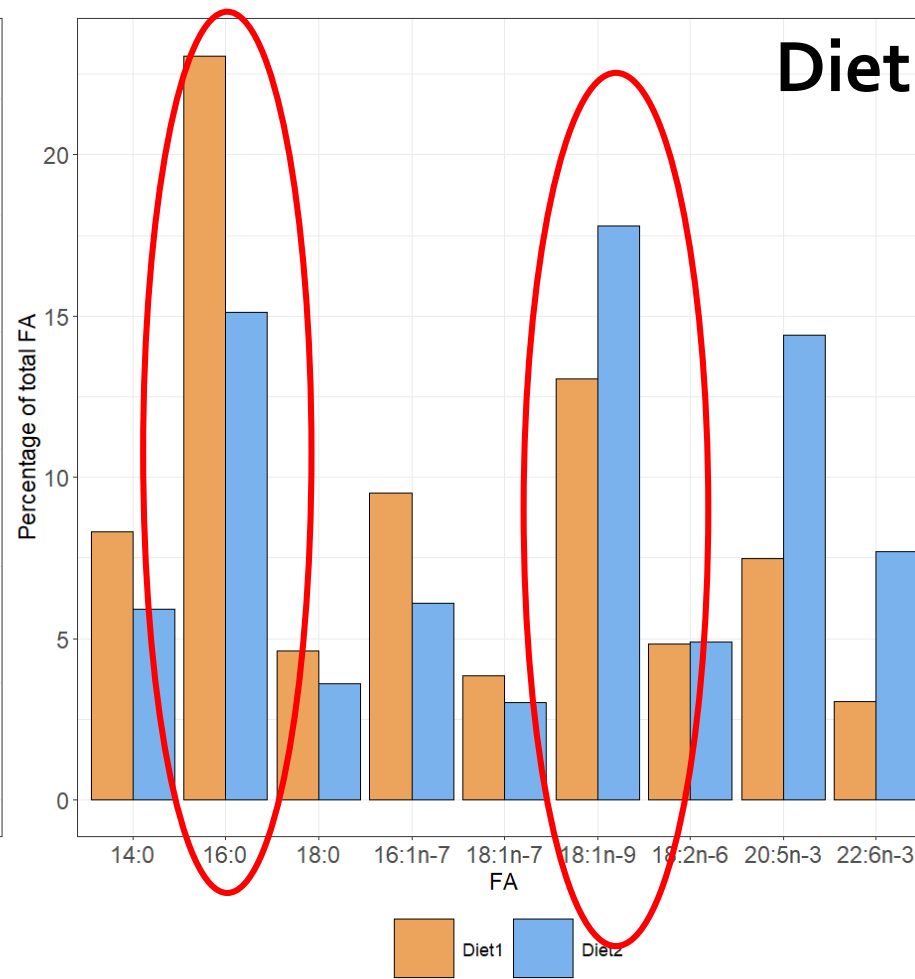
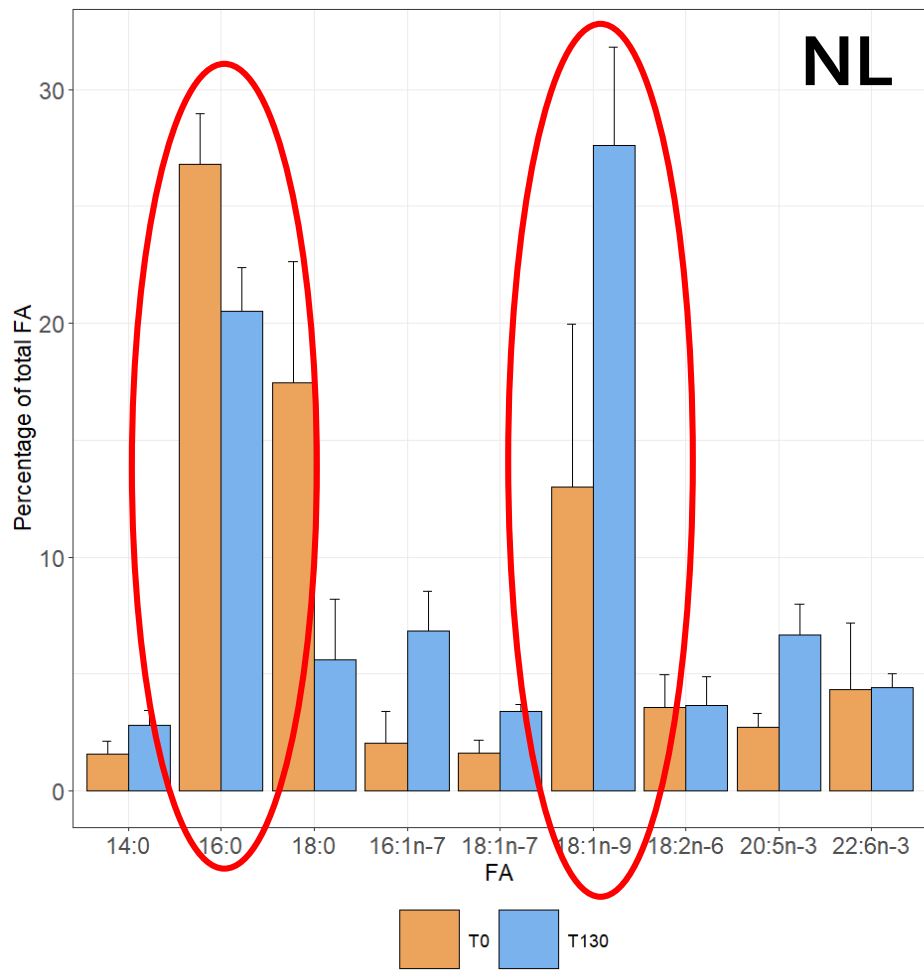
- Thermal Growth Coefficient after 130 days :

Mean TGC was **1,78 ($\pm 0,8$)**

Minimum TGC was **0,41** and maximum was **2,85**.

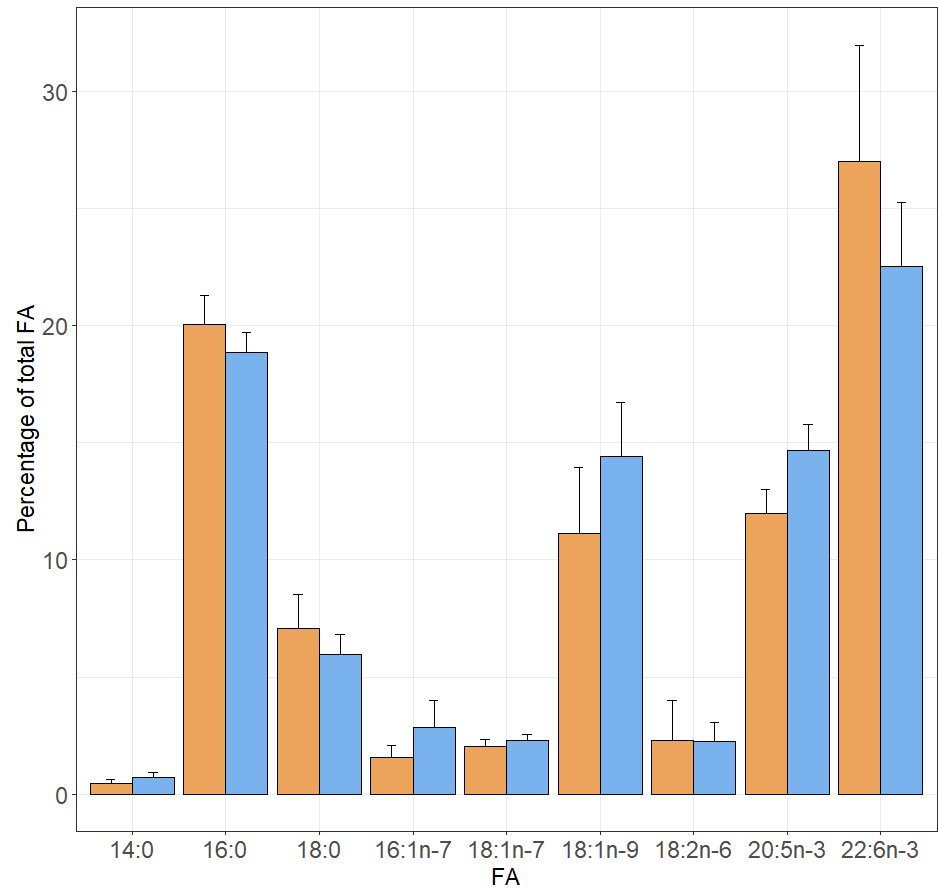
→ No negative TGC after 130 days and a biopsy



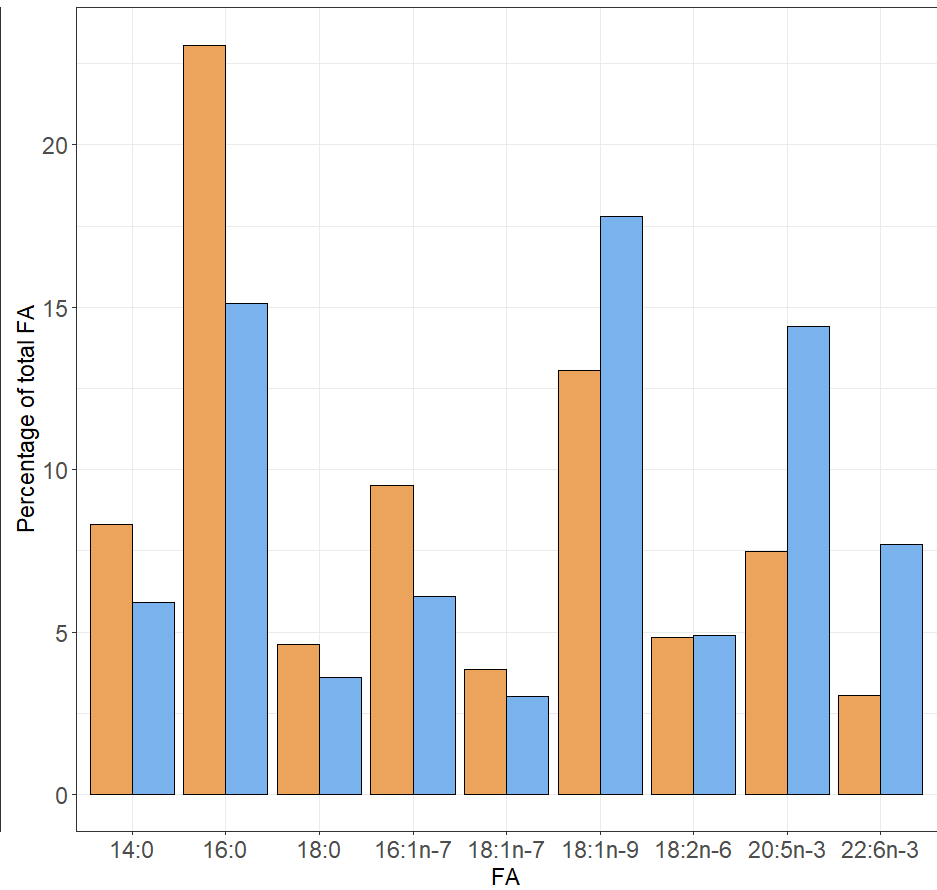


Neutral lipids vs Diet :

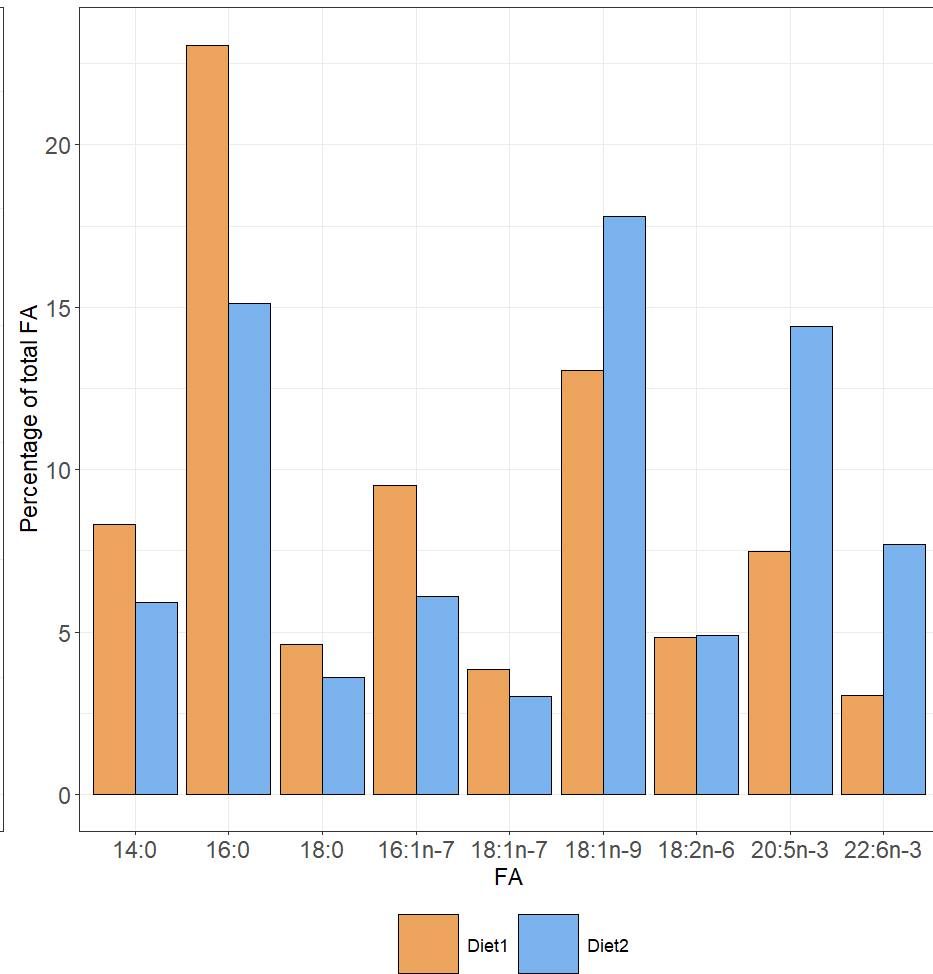
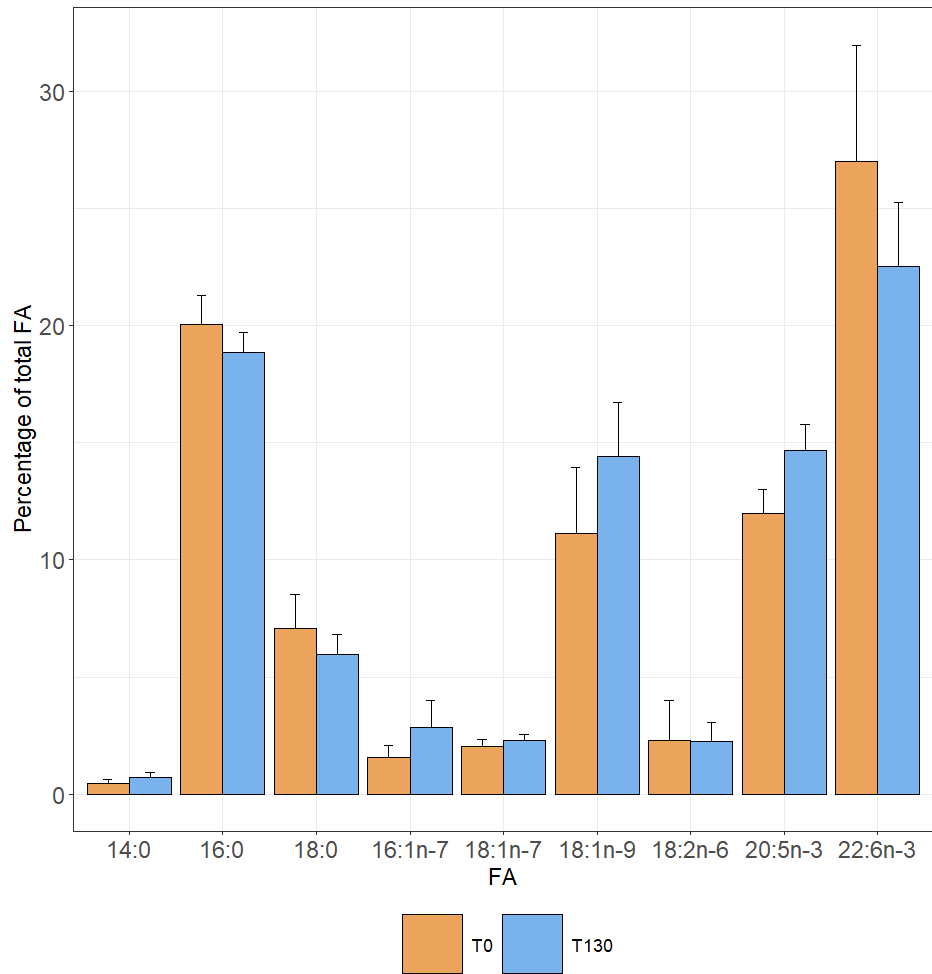
- Change is most used reserve lipids (16:0, 18:1n-9)
- Some FA weren't impacted by the change in diet



T0 T130

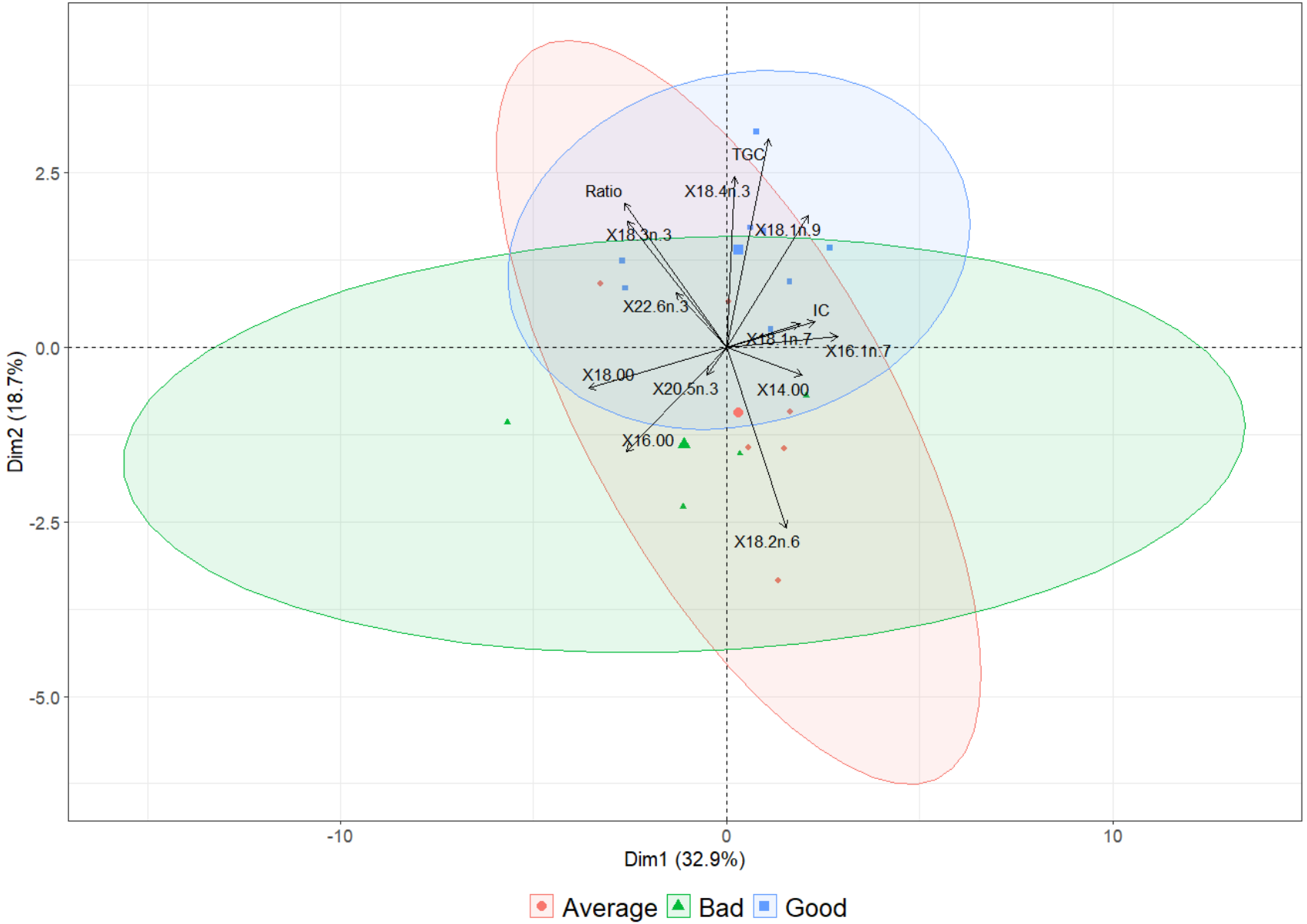


Diet1 Diet2



Polar lipids vs Diet :

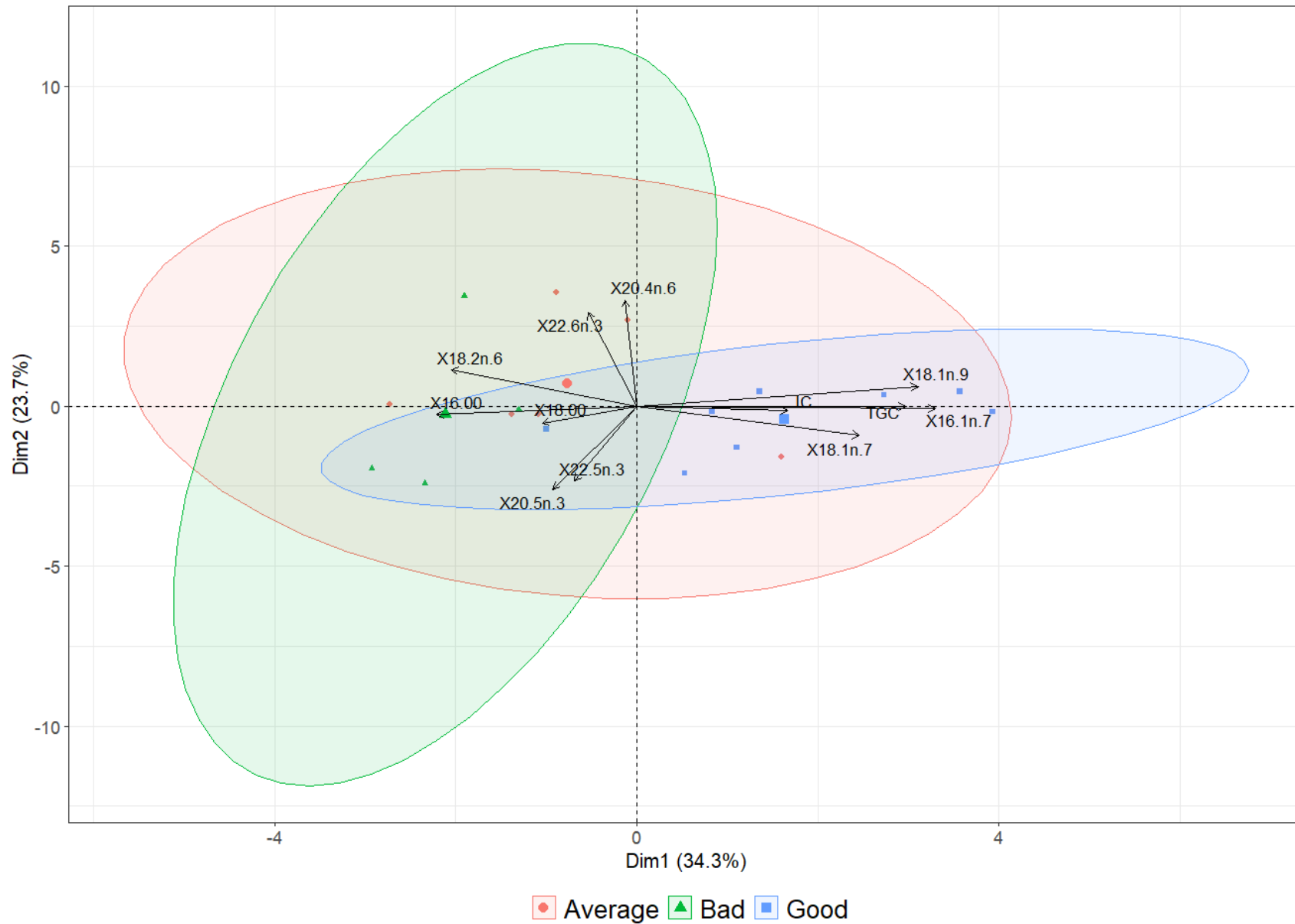
- Less change in FA (Higher integration time in membranes)
- Modification of membrane lipids visible after 130 days with biopsy



NL and performance

- Overlapping of ellipses
- No apparent FA discriminating performance

Hard to link NL FA with performance



PL and performance

- Overlapping of ellipses
- No apparent FA discriminating performance

Hard to link PL FA with performance

