HEAT INCREMENT OF FEEDING IN THE COMMON BOTTLENOSE DOLPHIN

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Background

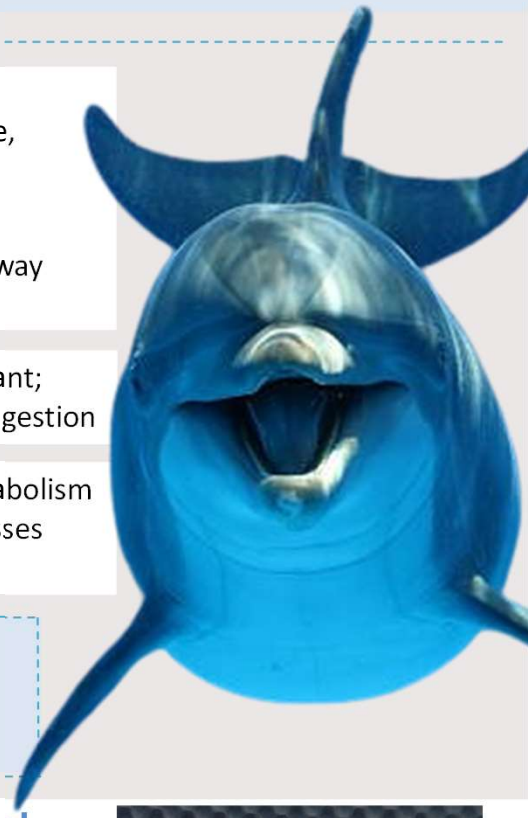
Why is energy important?
Offers insights into limits of survival, foraging efficiency, dive performance, ecological impact on prey

Why marine mammals?
Life of double constraints: O_2 at the surface but food underwater, so the way they utilize their O_2 stores is important!

Basal metabolic rate → **Field metabolic rate** more ecologically relevant; basal metabolism + locomotor cost + cost of digestion

basic physiological costs associated with survival; measurement requires specific criteria to be met

Heat increment of feeding increase in metabolism due to the mechanical and biochemical processes associated with digestion



In bottlenose dolphins, the basal metabolic rate and the locomotion cost have been measured but what about the cost of digestion?

Materials & Methods

Where?
Kolmården Zoo & Oceanogràfic Aquarium

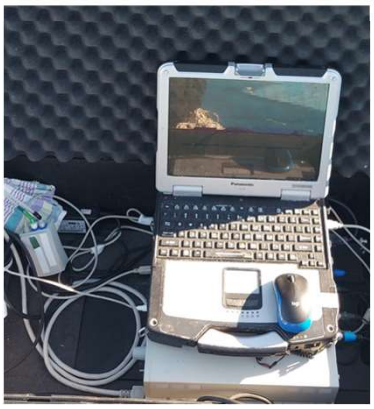
When?
June – December 2023

How?
Breath-by-breath respirometry: measurement of O_2 consumption to estimate the metabolic rate

A custom-made pneumotachometer was used to sample breathing for 5-7 minutes

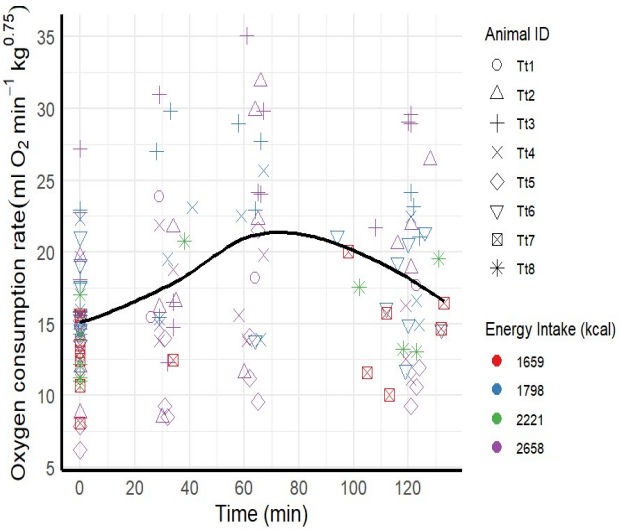
Experimental process:

Comparison of postprandial & postabsorptive metabolic rates 30, 60, 90, 120 minutes after feeding



Respiratory flow and exhaled gas concentrations were displayed on a computer using the software Labchart

Results & Discussion



Rate of mass corrected oxygen consumption in relation to time since last feed

The metabolic rate increased by 21% 30 minutes after feeding, peaked at 33% at 60 minutes and decreased to pre-feeding levels at around 120 minutes.

Depending on the amount of calories consumed, the increase in metabolic rate was between 31-61%.

Conclusion

The data can help improve estimates from bioenergetics models and contribute to the understanding of how a changing environment may alter survival in this species.