

How may drinking water be use to increase milk yield?

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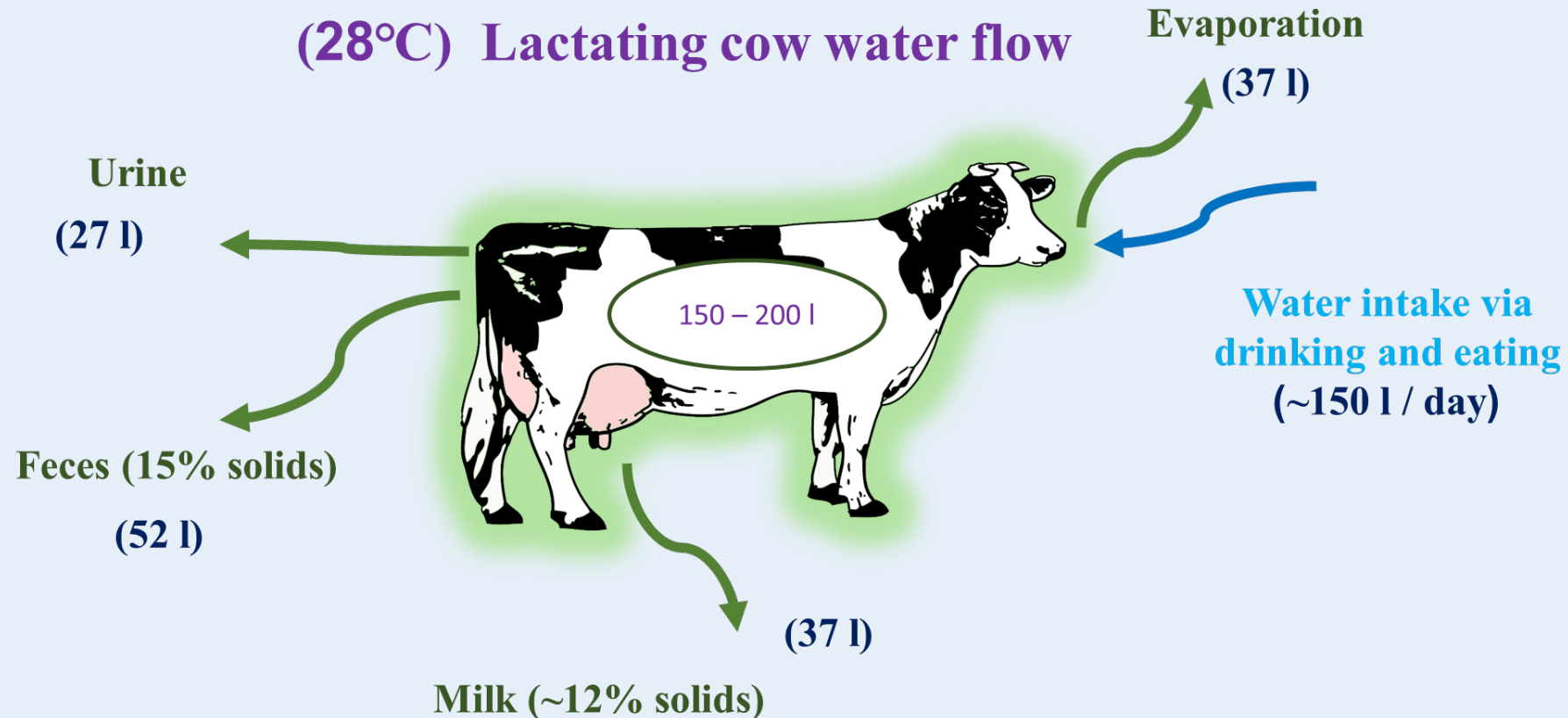
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Abs #2214009

Introduction:

1. Lactating cows drinks water (~150 l/ day) and replace it fast.



NASEM 2021

Introduction:

2. Water can differ in their composition. Example use of desalinated seawater.

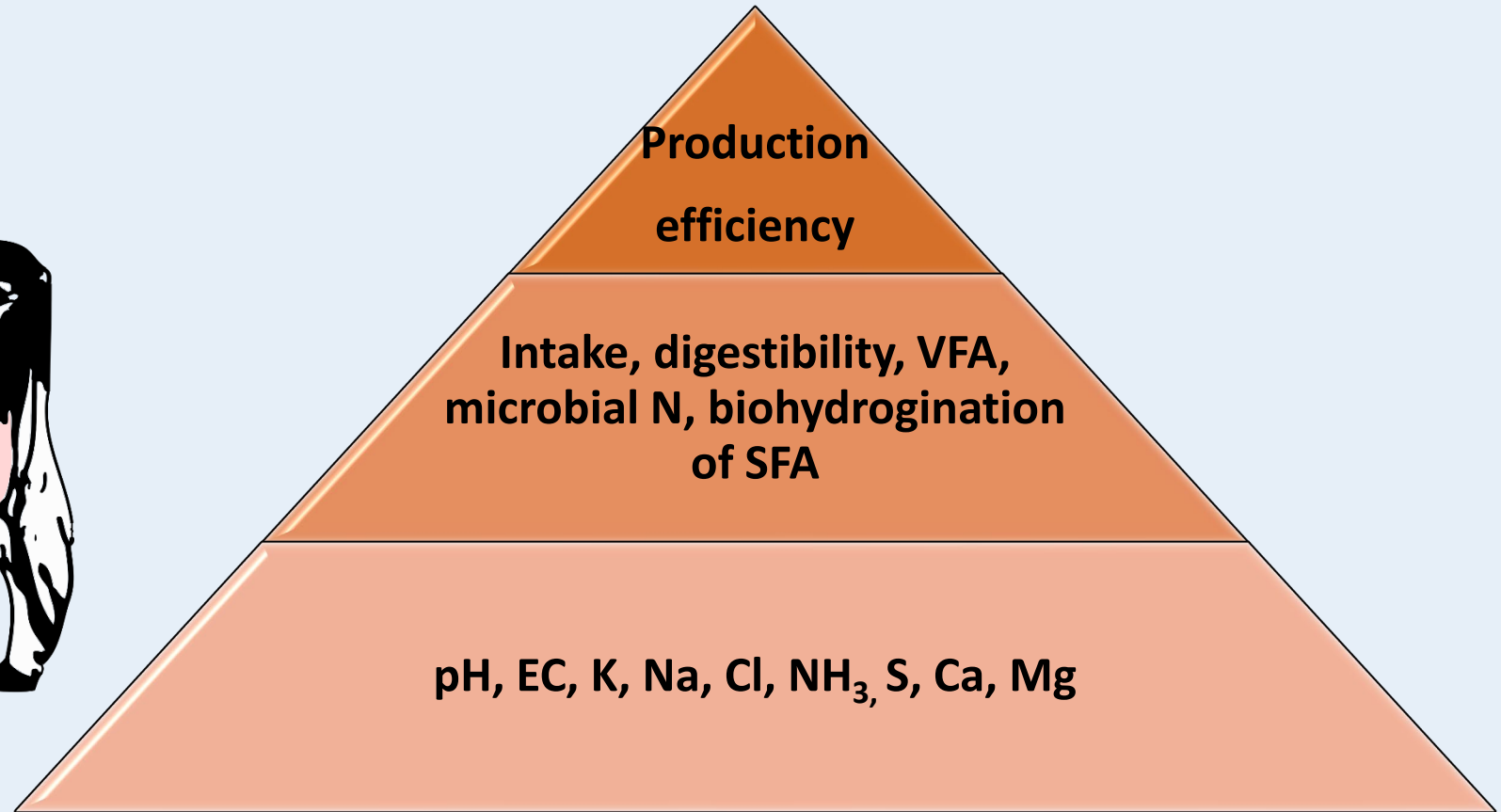
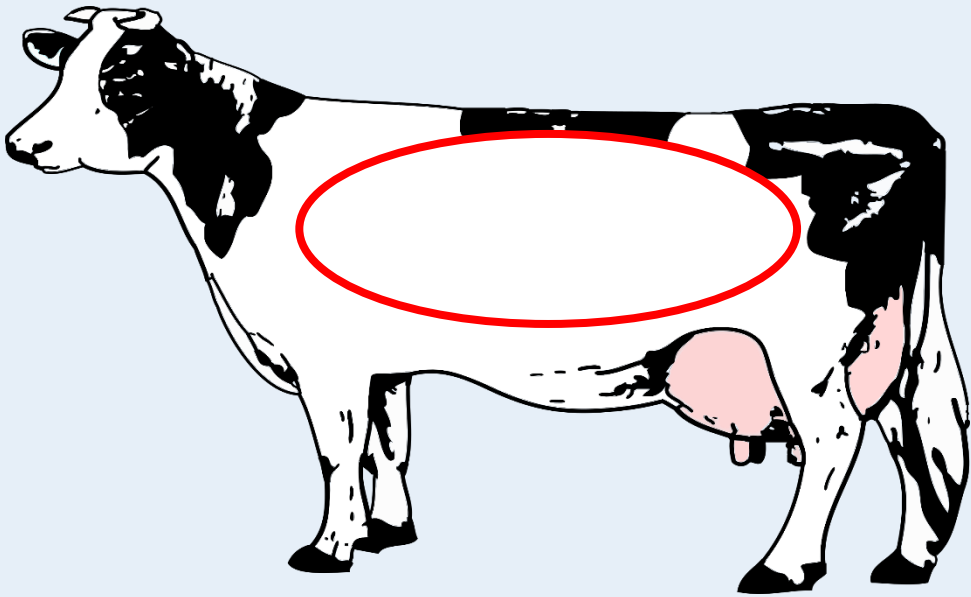
Component PPM	Well water	Desalinated seawater
TDS	610	300
Cl ⁻	225	20 >
Hardness (Ca + Mg)	256	80 >
EC	800	400

TDS = total dissolved solids; EC = electrical conductivity



Reverse osmosis

Introduction:



Can control rumen condition via manipulation of drinking water profile (?)

Hypothesis:

Drinking water composition affect lactating cows intake, milk yield and rumen physiology.

Objectives:

1. Measure the effect of drinking water salinity on intake, milk and milk components yield and rumen physiology.
2. Measure the effect of adding Ca and Mg to drinking water on intake and yield.

Methods:



Designing the individual troughs – 45 l (refilled in 4 minutes)

Methods:

Trials – Latin square design 4 lactating cows offered (and limited to) drinking water with 4 salinity/ hardness levels for 4 periods (5 d washout + 12 d observation + 3 d samplings)



*The model included trt, period & period*trt (block) as fixed and cow as a random effects.
Dose responds for linear and quadratic by contrast, RM (AR(1))*

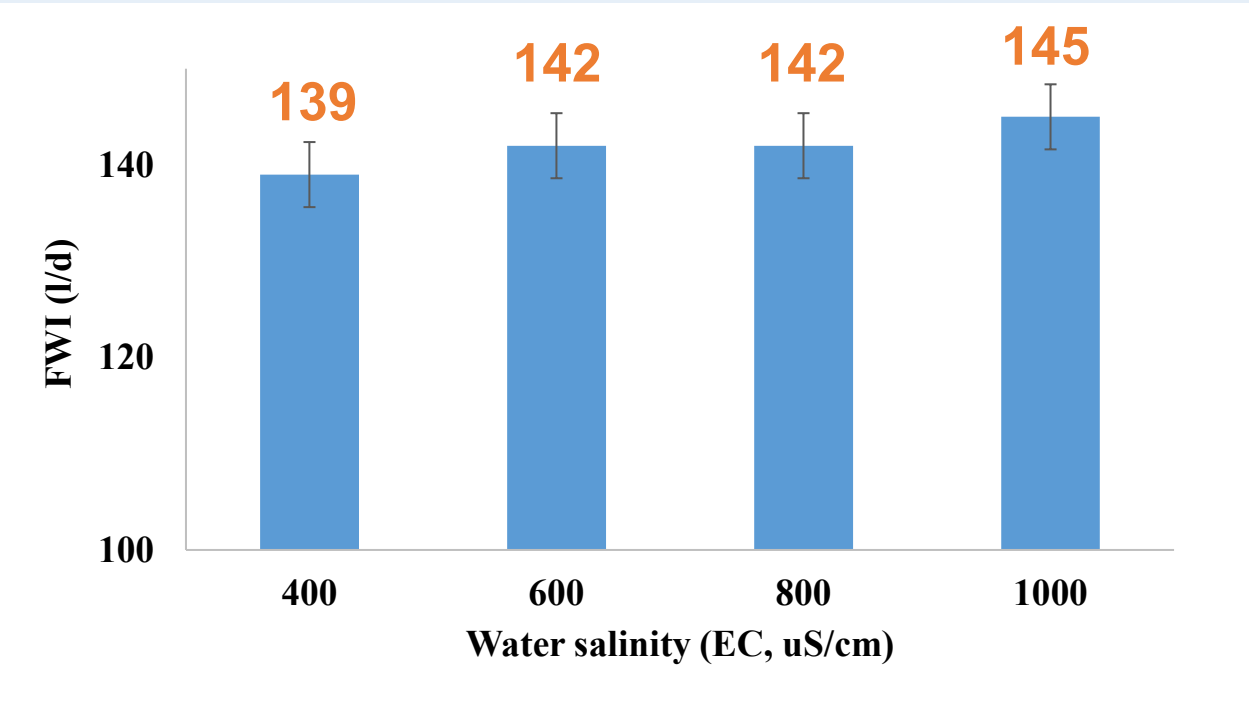
Methods:

Trial 1 – effect of water salinity – EC of 400, 600, 800, and 1000 $\mu\text{S}/\text{cm}$ by adding concentrated NaCl solution.

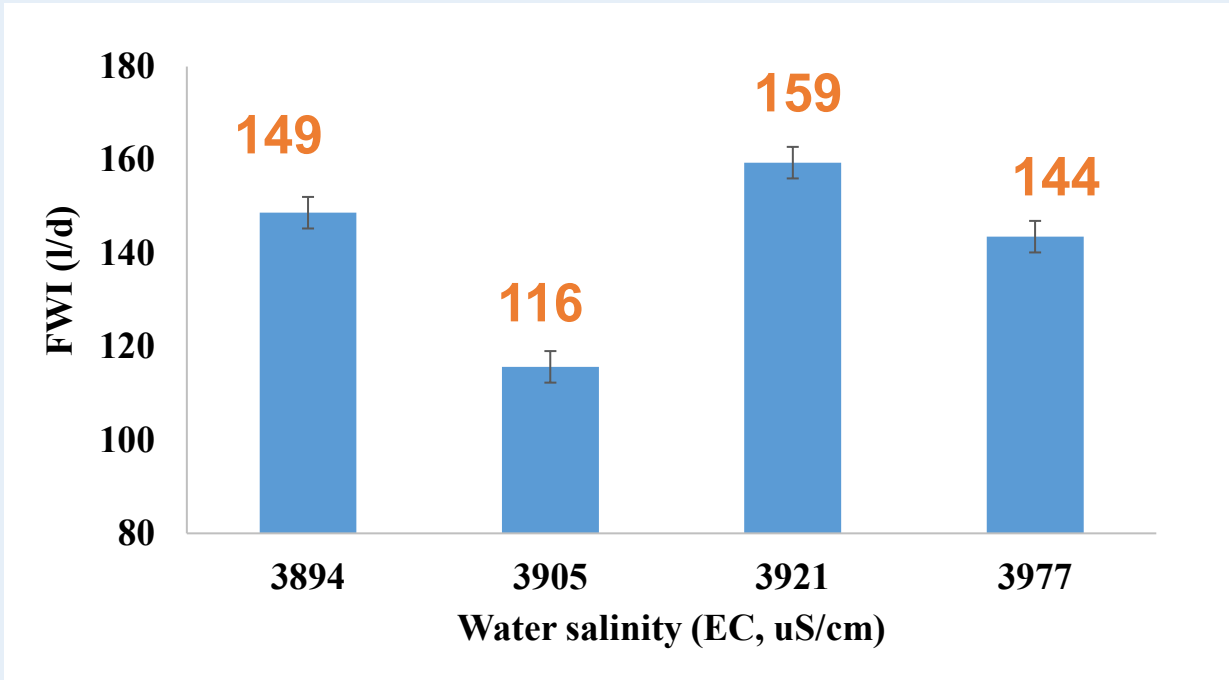
Trial 2 – effect of water hardness (Ca + Mg) – 80, 160, 240, 320 ppm (CaCO_3 equivalent) by adding concentrated CaCl_2 and MgSO_4 solutions (ratio Ca:Mg 2:1).

Results – trial 1 – effect of water salinity on water intake:

By treatment



By cow

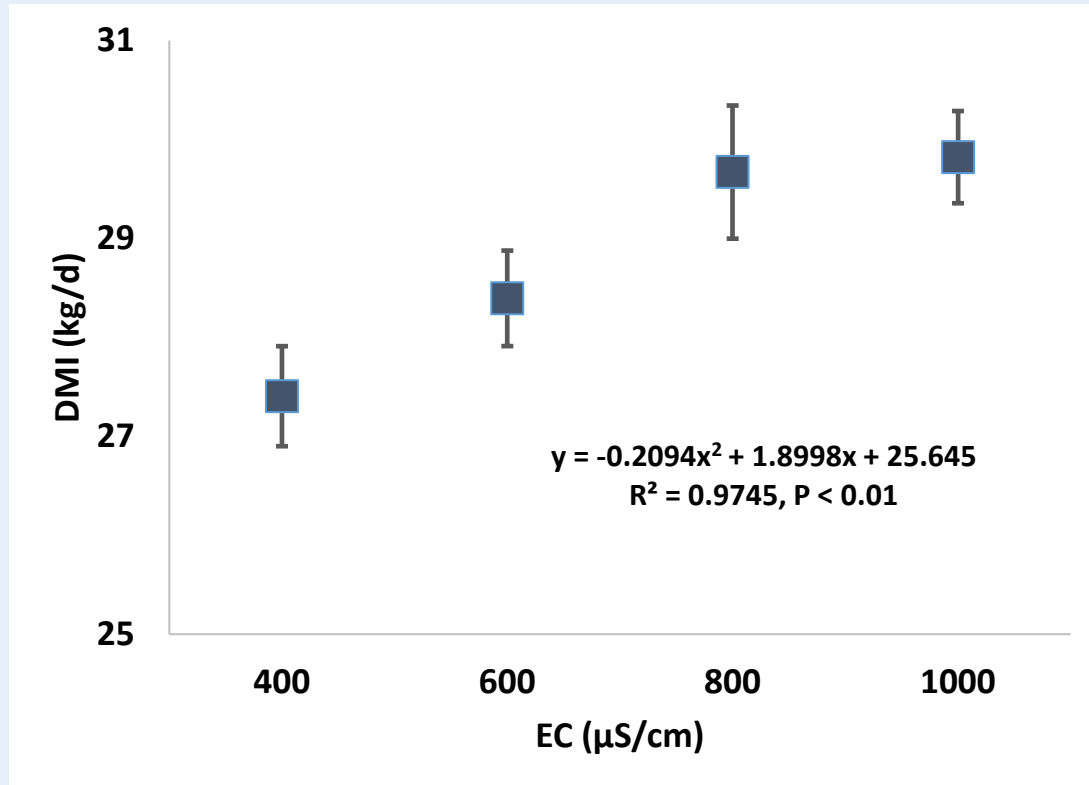


p = 0.26, Bars = SD; FWI = free water intake

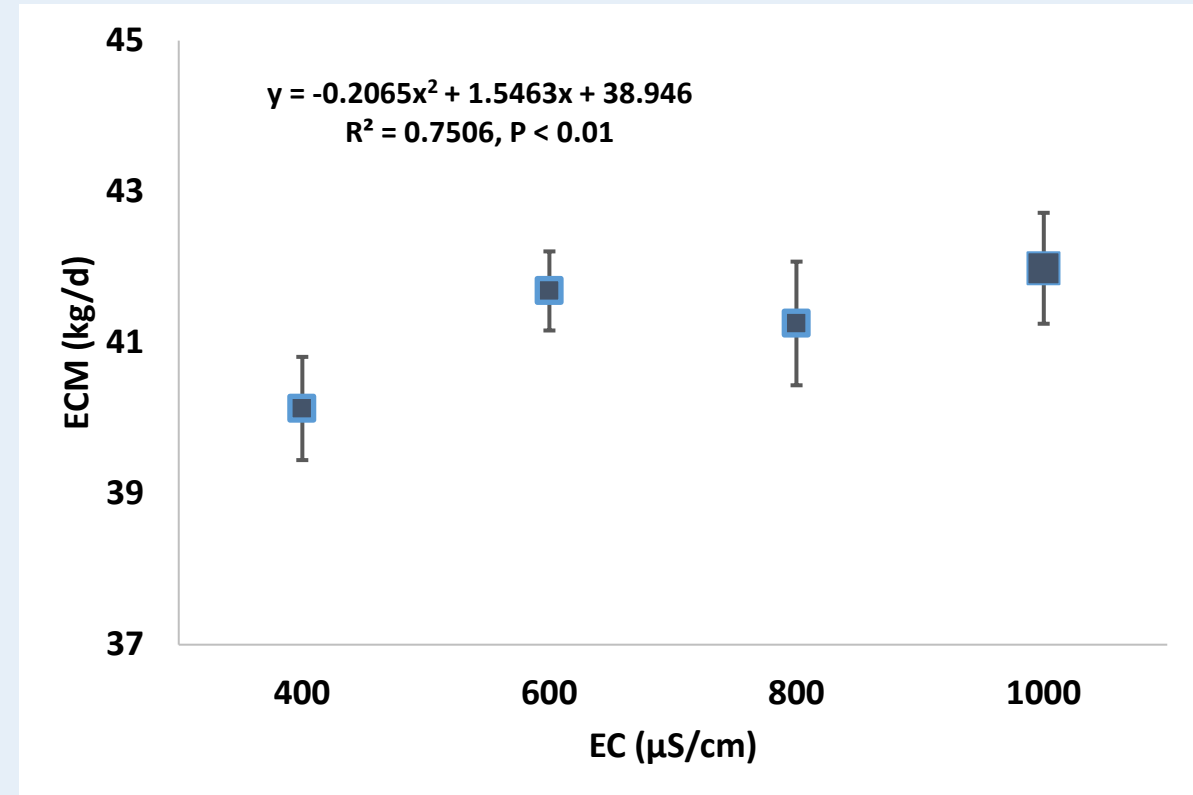
No effect of salinity on FWI – each cow drink differently

Results – trial 1 – effect of water salinity on feed intake and ECM yield:

DMI



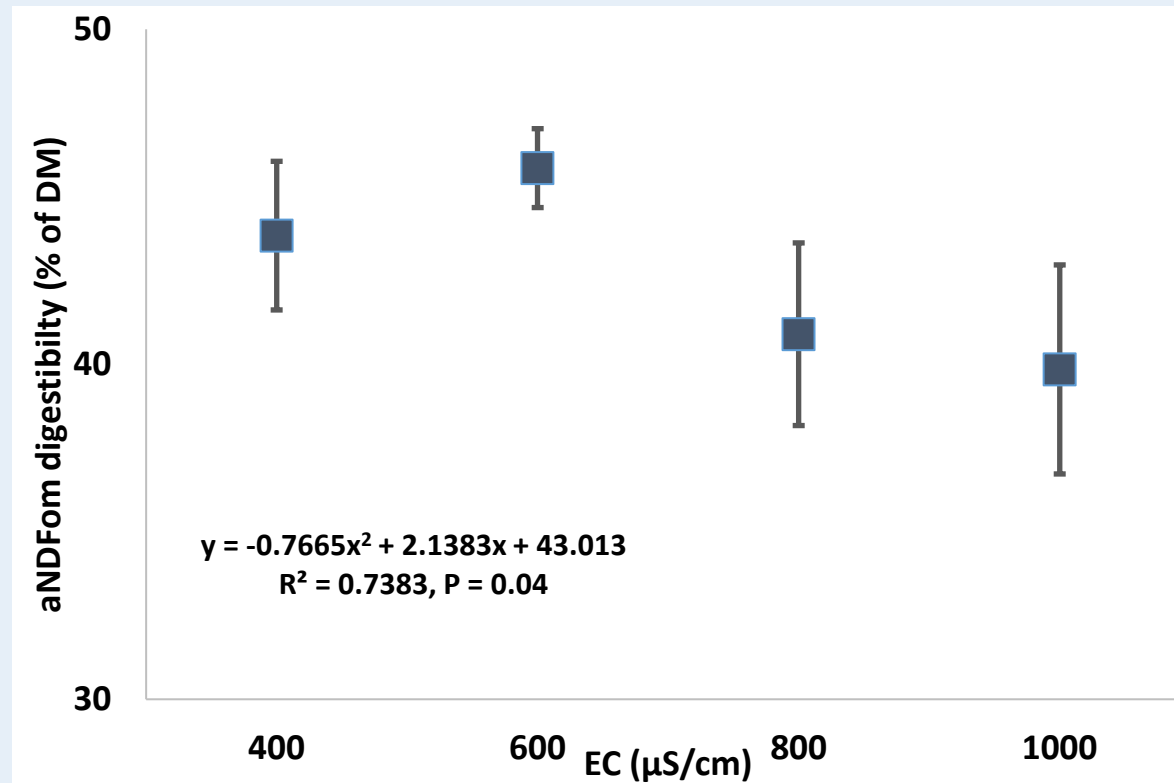
ECM yield



Bars = SE; ECM = energy corrected milk; DMI = dry matter intake

We found positive relation between drinking water salinity to DMI and ECM yield

Results – trial 1 – effect of water salinity on aNDFom digestibility:

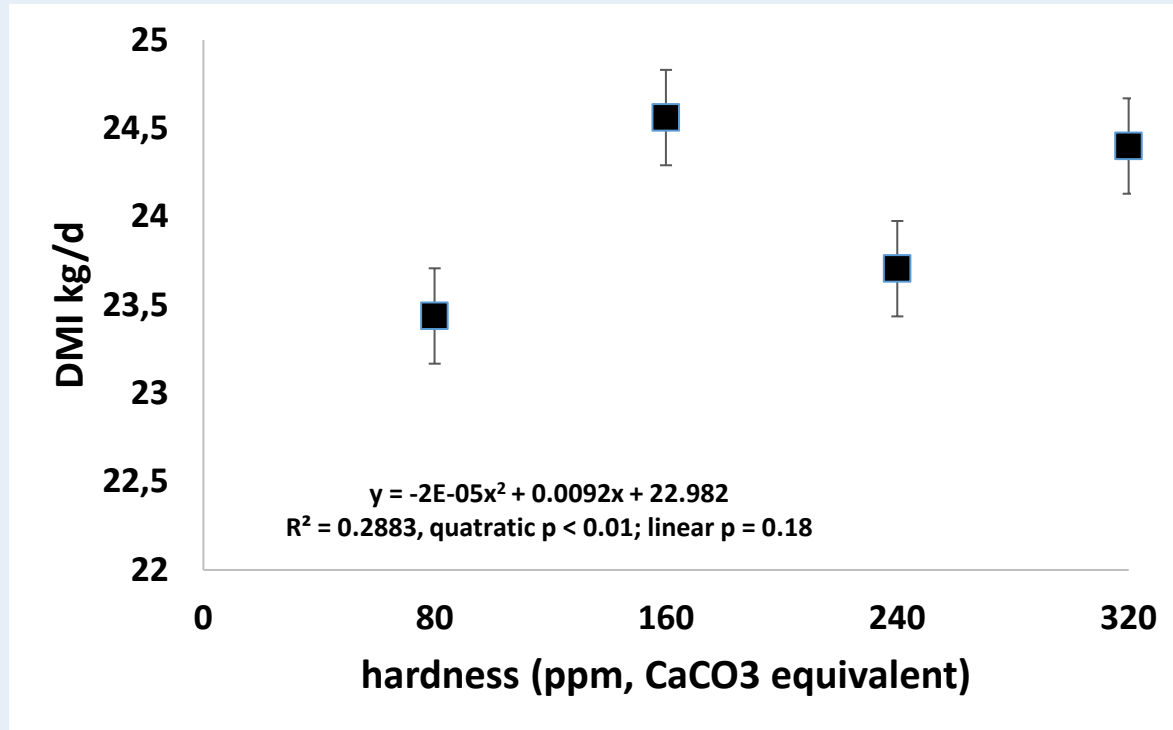


Bars = SE;
NDF = neutral detergent fiber

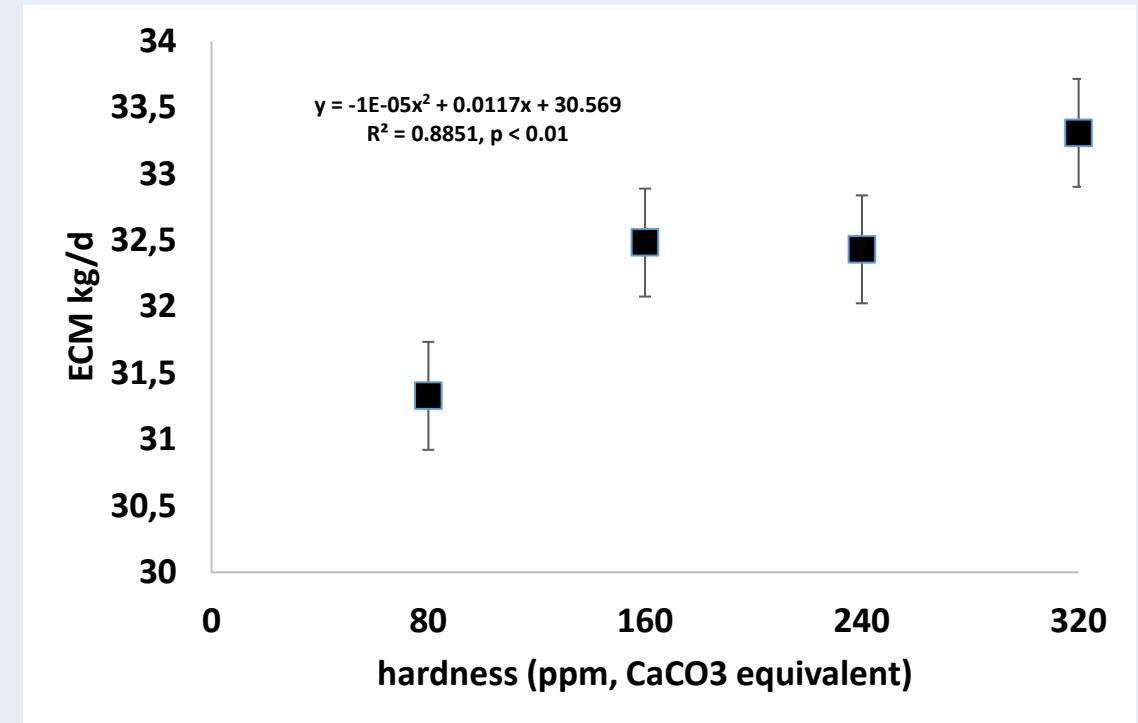
As aNDFom digestibility reflects true digestibility in the rumen – this result provide evidence for the effect of water salinity on rumen physiology

Results – trial 2 – effect of water hardness on feed intake and ECM yield:

DMI



ECM yield



Bars = SE; ECM = energy corrected milk; DMI = dry matter intake

We found positive relation between drinking water hardness to DMI and ECM yield

conclusion:

Results from these two trials provide evidence that the composition of drinking water, within the safe range of consumption, plays a role in essential economic factors for lactating cows, such as feed intake and milk yield.

Additional research on this topic is warranted to enhance the dairy industry by optimizing the mineral composition of drinking water.

Funds: Israeli Dairy Board and Ministry of Agriculture

Lab members and guests:

Dr. Yehoshav Ben Meir

Adi iris (trial leader)

Daniel Espinoza

Fadi Salhab

Molla Garama Tye

Logan Rosenberg

Thank you!

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