

Impact of grass-based diet on vitamin B content in cow milk

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Introduction

The content of B vitamins in cow milk can be altered by several factors and one of them is the diet of the cows ¹:

- Vitamin B₂ ² and B₉ ³ content in milk increase when cows have grass-based diet compared to corn-based diet
- B₅ level is improved in milk with a cow's diet richer in fodder ⁴
- B₁₂ content is increased with corn-based diet compared to grass-based diet ³

Materials and methods

40 dairy cows from Holstein and Montbéliarde breeds were split into 2 groups of 20 cows for 2 months: **AE**: pasture-based diet and **IN**: corn-based diet with limited access to pasture. For the next 2 months, each group was split again in 2 sub-groups of 10 cows differing in the amount of grass received in their diets:

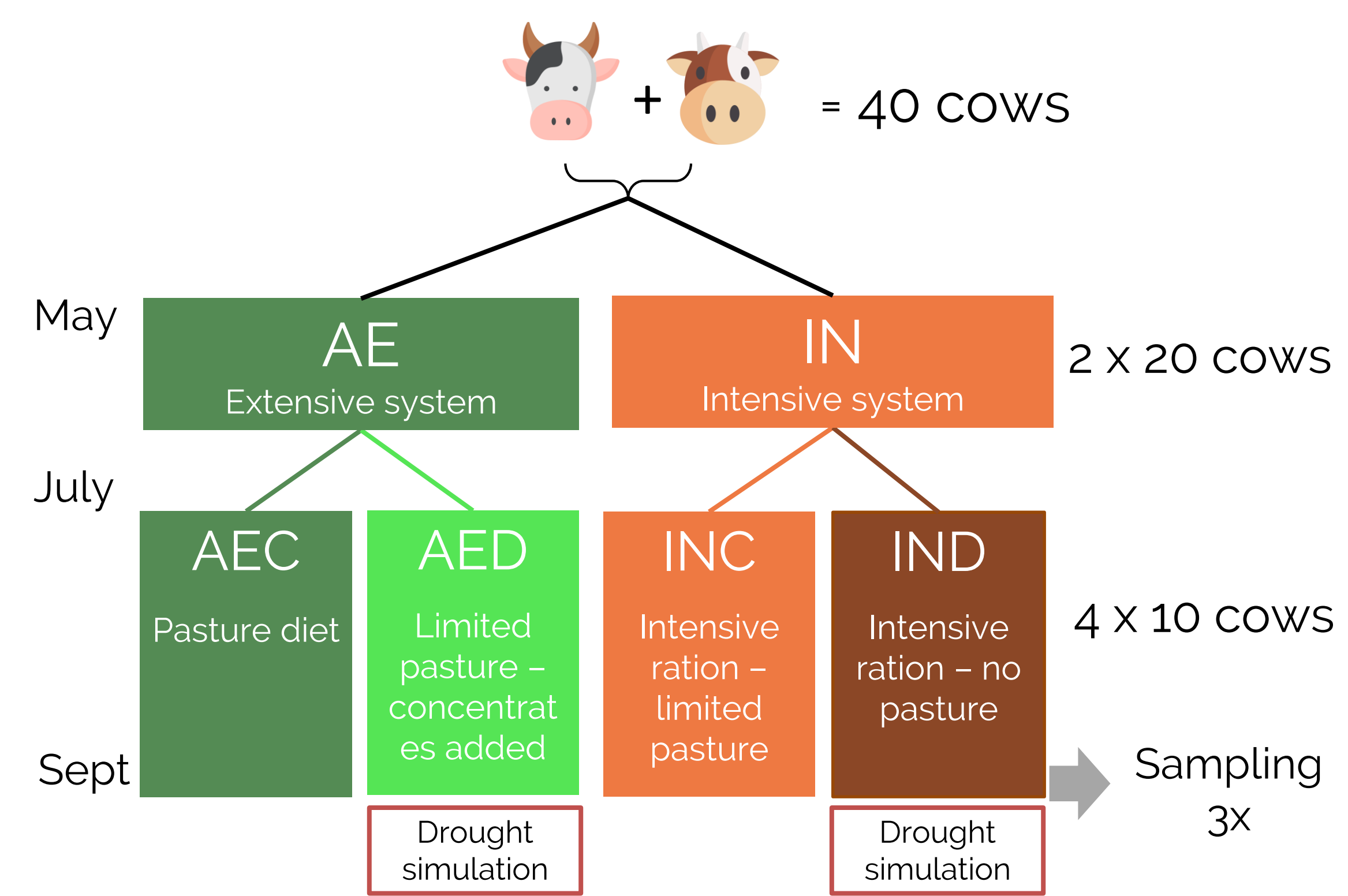
AEC: Pasture-based diet; **AED**: AEC with a reduced access to pasture
INC: corn based diet with a limited access to pasture; **IND**: INC but no access to pasture

Tank milks from each 4 groups were collected before the morning meal 3 times in September and the B vitamin content was analyzed by UPLC Fluorometer for vitamin B₂ and B₆ (pyridoxin, pyridoxal, pyridoxamine) ⁵, by UPLC MS for vitamin B₅ and B₁ ⁶ and by chemiluminescence for B₉ and B₁₂ (MP Biomedicals).

Anova and t-test statistical analysis were performed on R software.

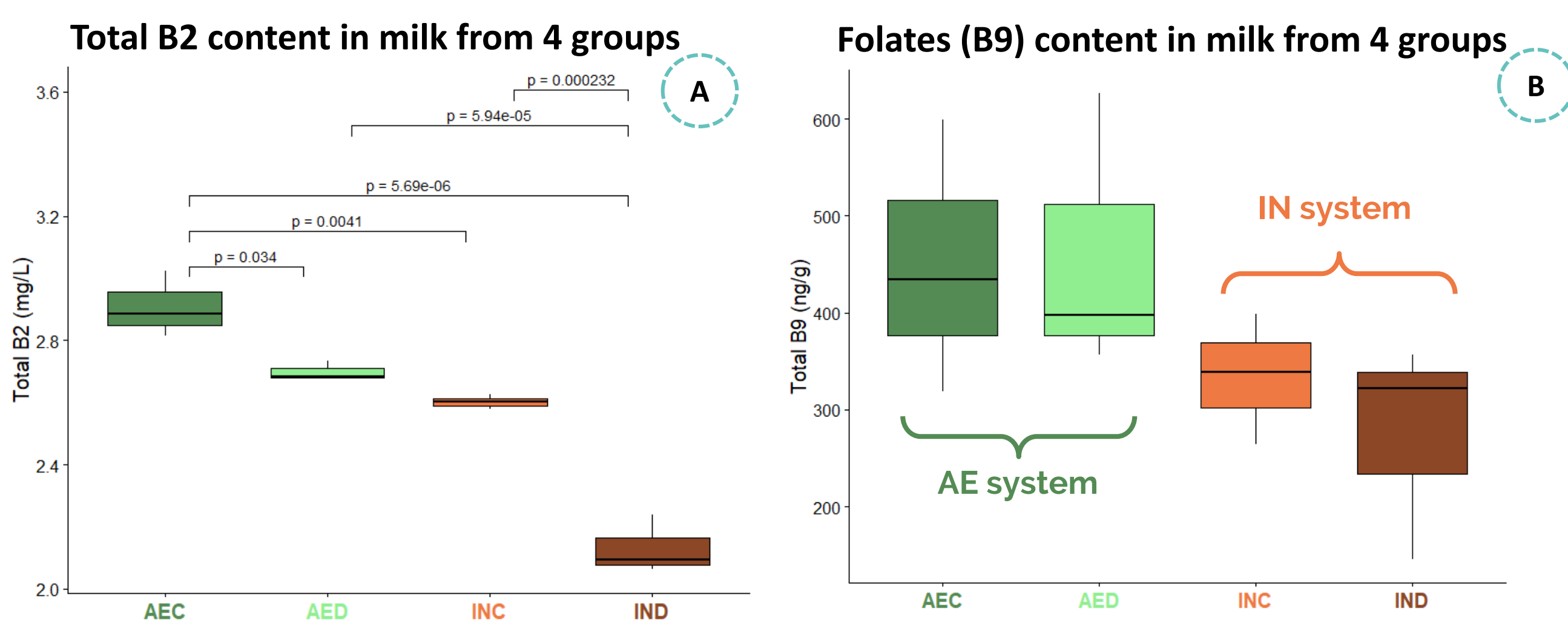
Objective of the study

Relate the breeding practices: grass-based VS corn-based diet to the B vitamins content of cow milk



Results

More B₂ and B₉ with grass-based diets



Milk was richer in total vitamin B₂ with more grass in the diet (p<0.05) when comparing the 2 systems **AE** and **IN** (p<0.01) (A).

- + **36.7%** B₂ in **AEC** compared to **IND**
- With a little access to pasture, **INC** milk was richer by + **22%** from **IND**.
- The drought simulation of **AED** decreased the content of milk by **-7%** compared to the diet with grass only **AEC**.

No significant results show the effect of the diet on vitamin B₉, but **trends** are visible (p=0.06). The milk from AgroEcological system (**AE**) seems to be richer in B₉ compared to the Intensive system (**IN**) (B).

B₆ follow the same trend pattern: Pyridoxal (B₆) content of milks show the same trend as B₉ (p=0.1). B₂ and pyridoxamine (B₆) are correlated (p<0.01) at r= 0.95, for raw and dry matter datas.

B₁ and B₁₂ trends show optimum with corn-based diet and access to pasture

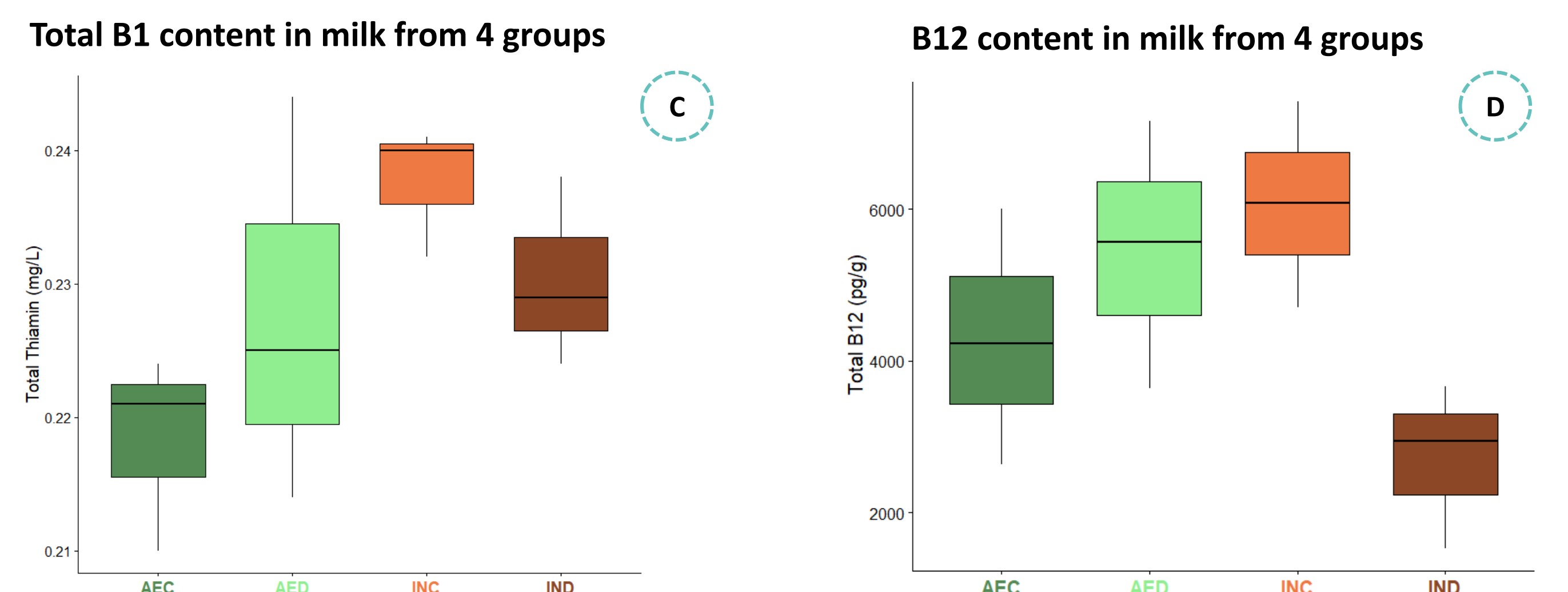


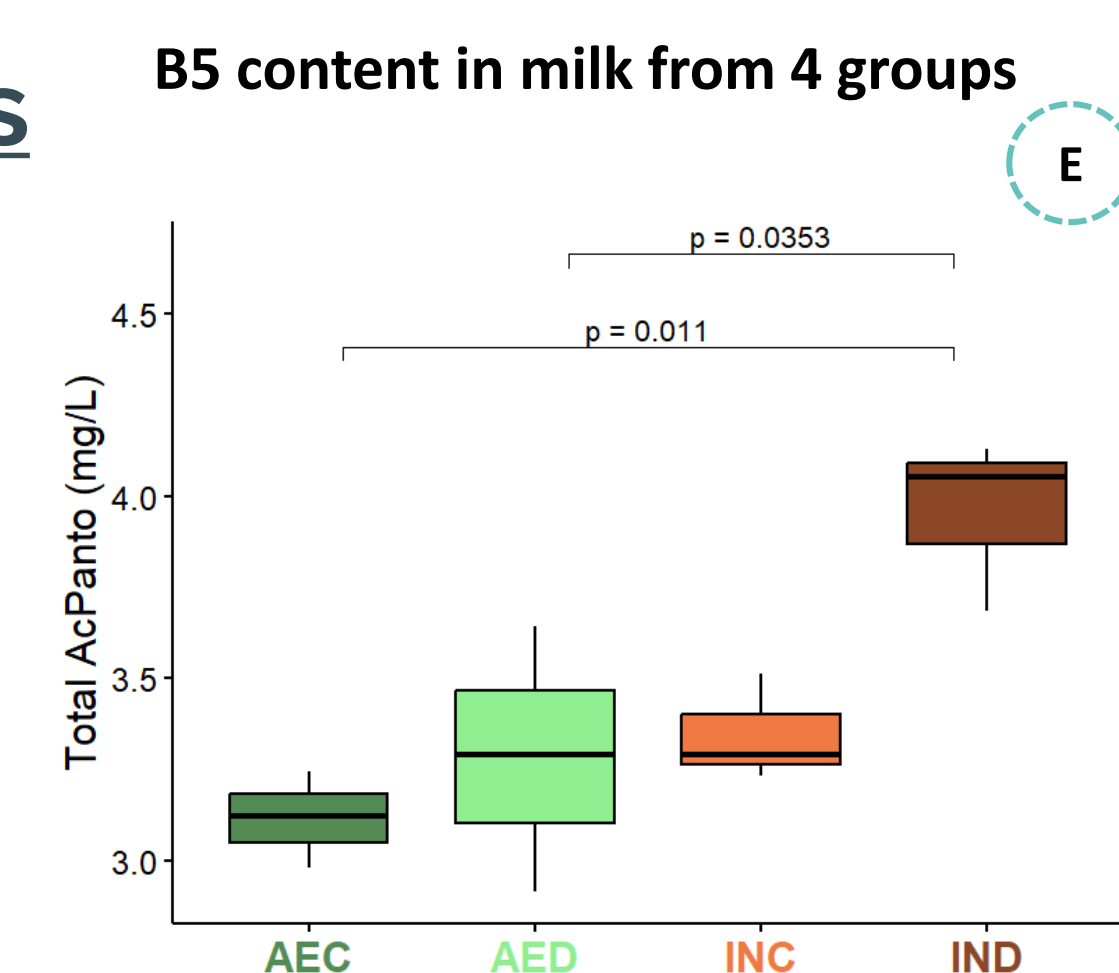
Figure 3: Effect of diet on vitamin B₁ (Thiamin) (p=0.2) (C) and B₁₂ (p=0.1) (D) content of milk from the 4 group of the study.

Trends (p>0.1) in vitamins B₁ (C) and B₁₂ (D) show that the content of the 2 vitamins seems to be higher in the milk of cows fed corn silage and having access to pasture for a small time of the day (**INC**). The **lowest content** was found in the grass-based diet (**AEC**) for **B₁**, whereas it was in corn-based diet (**IND**) for **B₁₂**.

More B₅ with corn-based diets

Diets have an impact on the vitamin B₅ content in milk (p<0.001) (E):

- The **higher content** was found in **IND** milk, richer by + **27%** compared to **AEC** (p<0.05)
- **Drought simulation increase** the vitamin B₅ content in milk (p<0.01)
- An **effect of the system** is also observed with a **higher content** in milks from **IN** systems (corn-based diets) compared to **AE** systems (p<0.01)



Discussion

Breeding practices seem to have an impact on the vitamin B content of cow milk and are in line with those found in the literature for B₂ and B₉ ^{2,3}:

- Pastoral systems would have milks richer in vitamin B₂ and B₉ (that could be partially explained by a concentration effect due to lower milk yield) but poorer in vitamin B₁, B₅ and B₁₂,
- Simulation of drought periods tends to decrease B₂ (B₁ and B₁₂ in intensive systems only) but to increase B₅ content.

➤ *Further studies on the vitamin B content of yogurts and cheeses produced from these milk will follow (Auzance et al. at EAAP, Florence, Italy, 2024).*

References:

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