ARISTOTLE UNIVERSITY OF THESSALONIKI

Role of fat & muscle mass and mobilization of transition dairy cows on milk yield & reproduction

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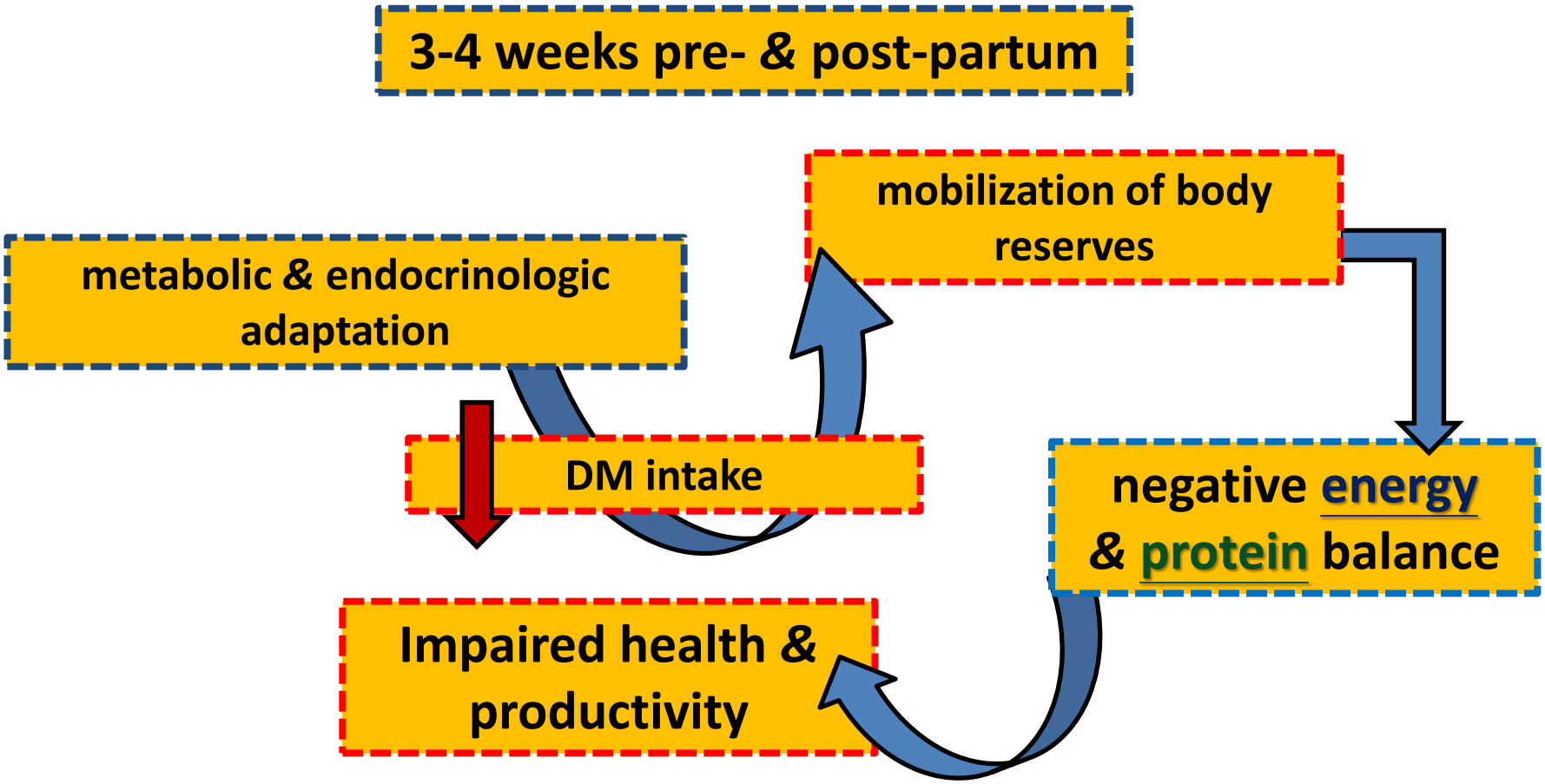
Introduction

✓ **Transition period**



Objective

✓ **to assess the role of body fat & muscle reserves and mobilization during the transition period on milk yield & reproduction of Holstein dairy cows**

Materials & Methods

- ✓ **85 Holstein cows - 2 herds**
  - ***n= 32 & n= 53***

Study design: 250 cows – 8 herds

- ✓ **Different parities**
  - ***1st: n= 14***
  - ***2nd: n= 35***
  - ***≥ 3rd: n= 36***

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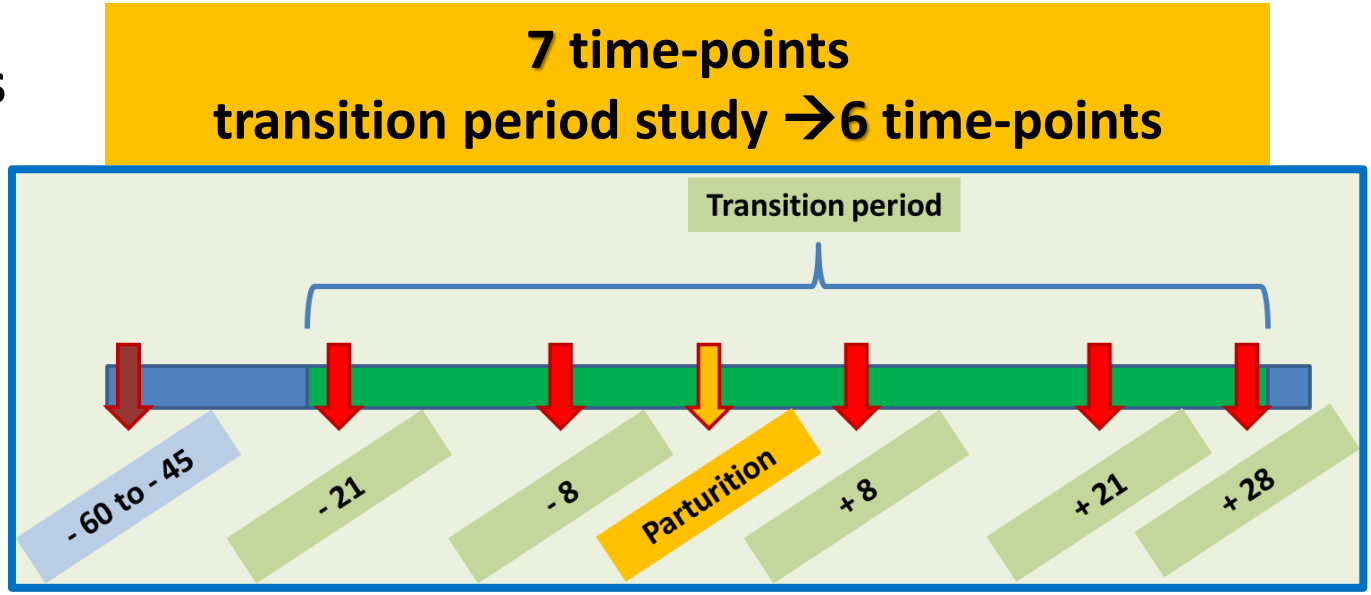

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  - ***1-5 scale / 0.25 (Ferguson et al., 1994)***

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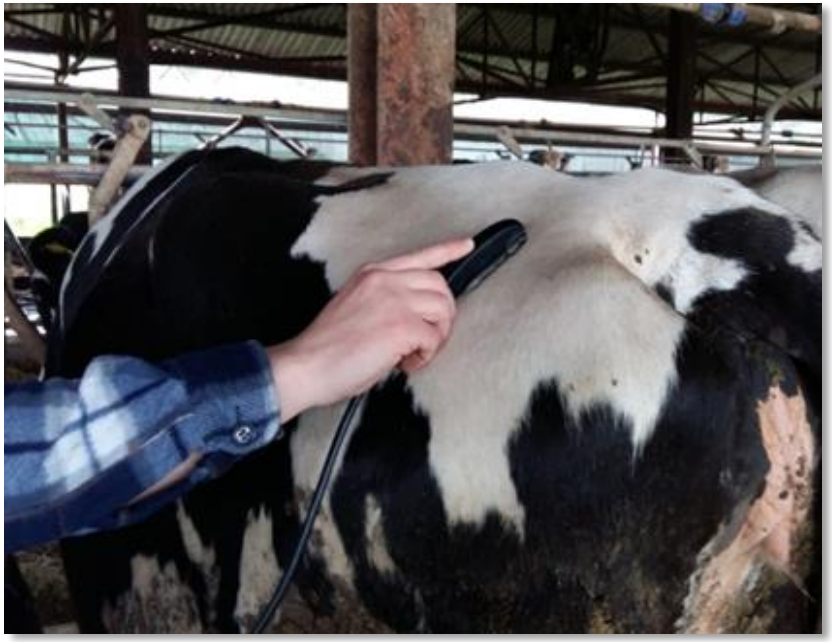
- ✓ **U/S measurements** *(5-7.5 MHz linear)*
  - ***Backfat thickness*** **(BFT)**



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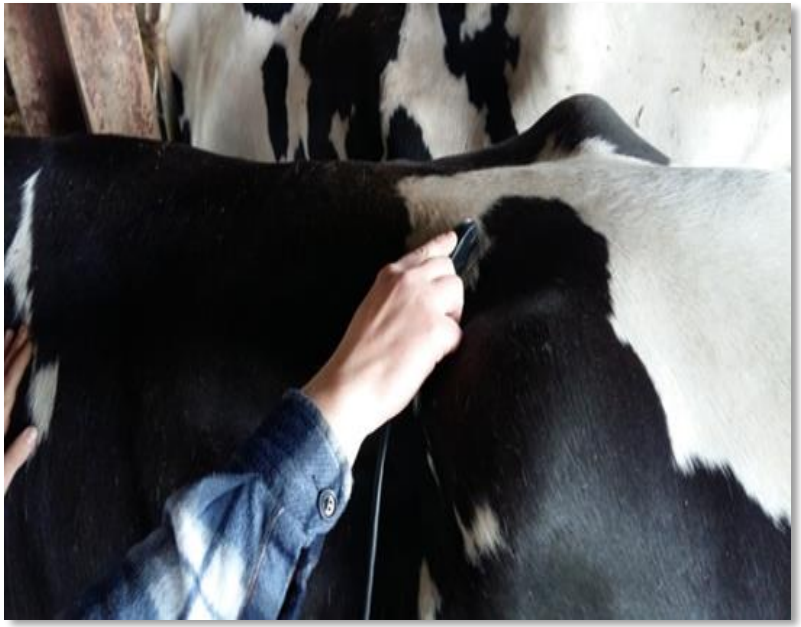

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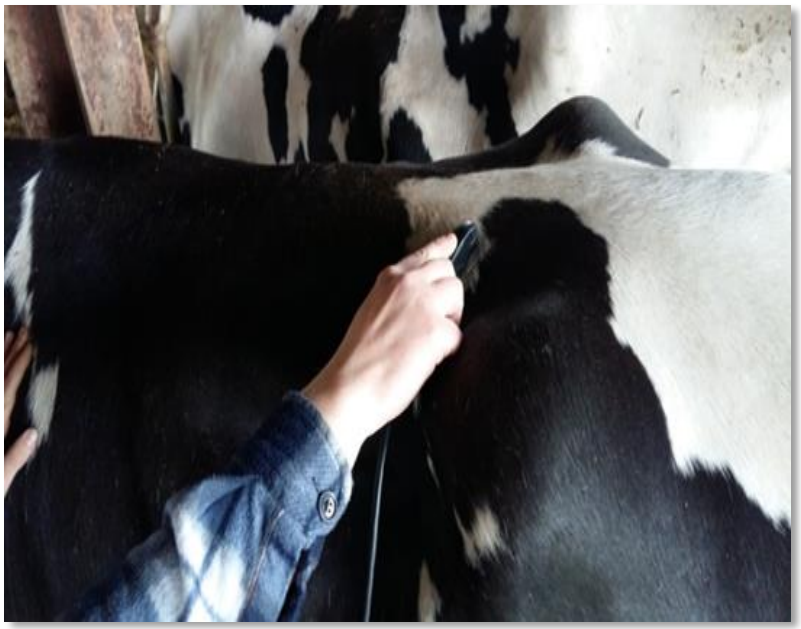

A total of 488 measurements

Materials & Methods

- ✓ **Milk yield up to 100 DIM**

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- ✓ **Calving – 1st A.I. interval**
- ✓ **Calving – conception interval**

Materials & Methods

- ✓ **Pairwise linear correlation & regression for BCS, BFT & LDT**

Statistical analysis
IBM SPSS v.22

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Materials & Methods

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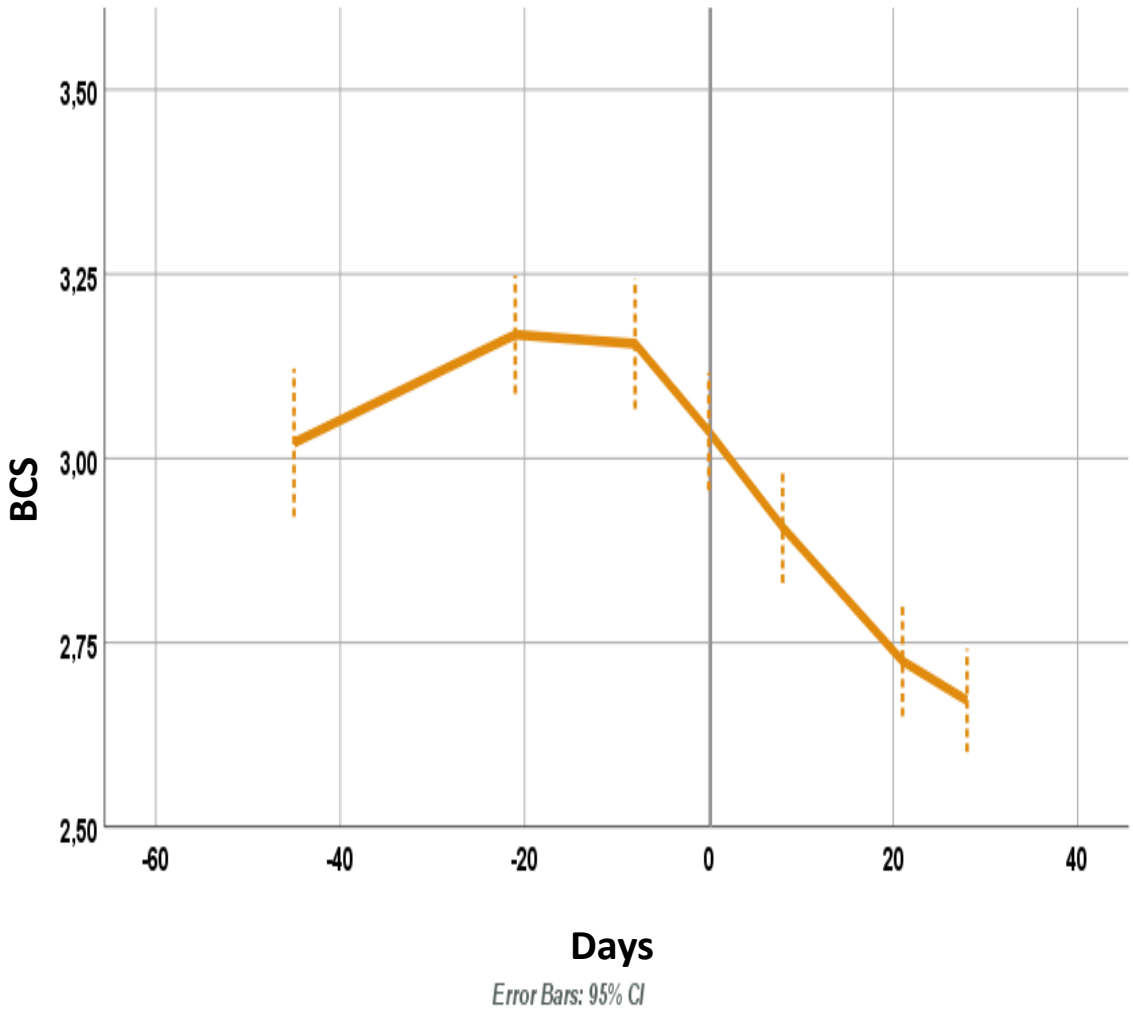
- ✓ **Multivariable linear regression → effect of BFT & LDT on BCS**
- ✓ **Linear & quadratic regression → relations of BFT & LDT with MY & reproduction**

Statistical analysis
IBM SPSS v.22

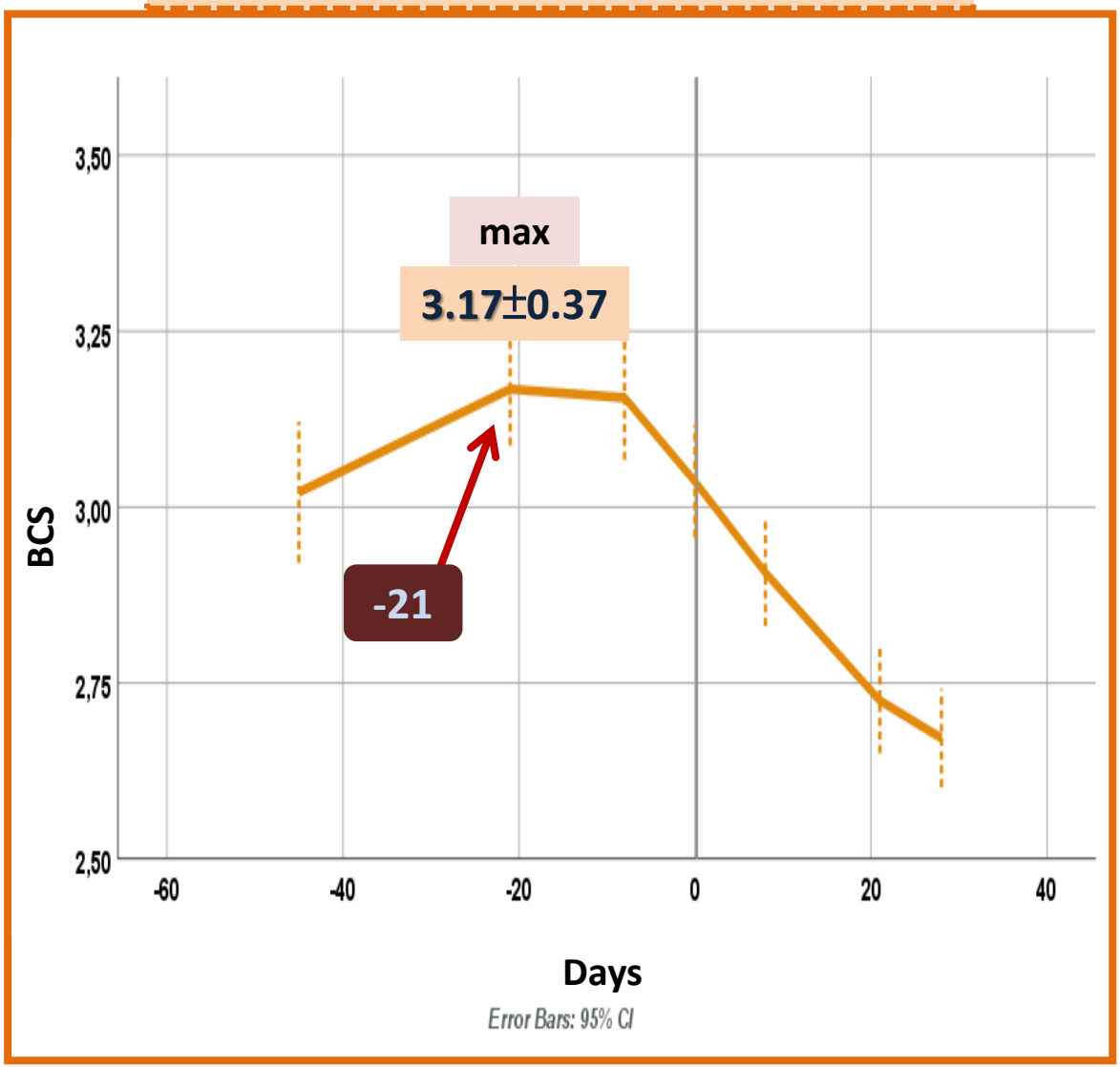
Results

Body Condition Score



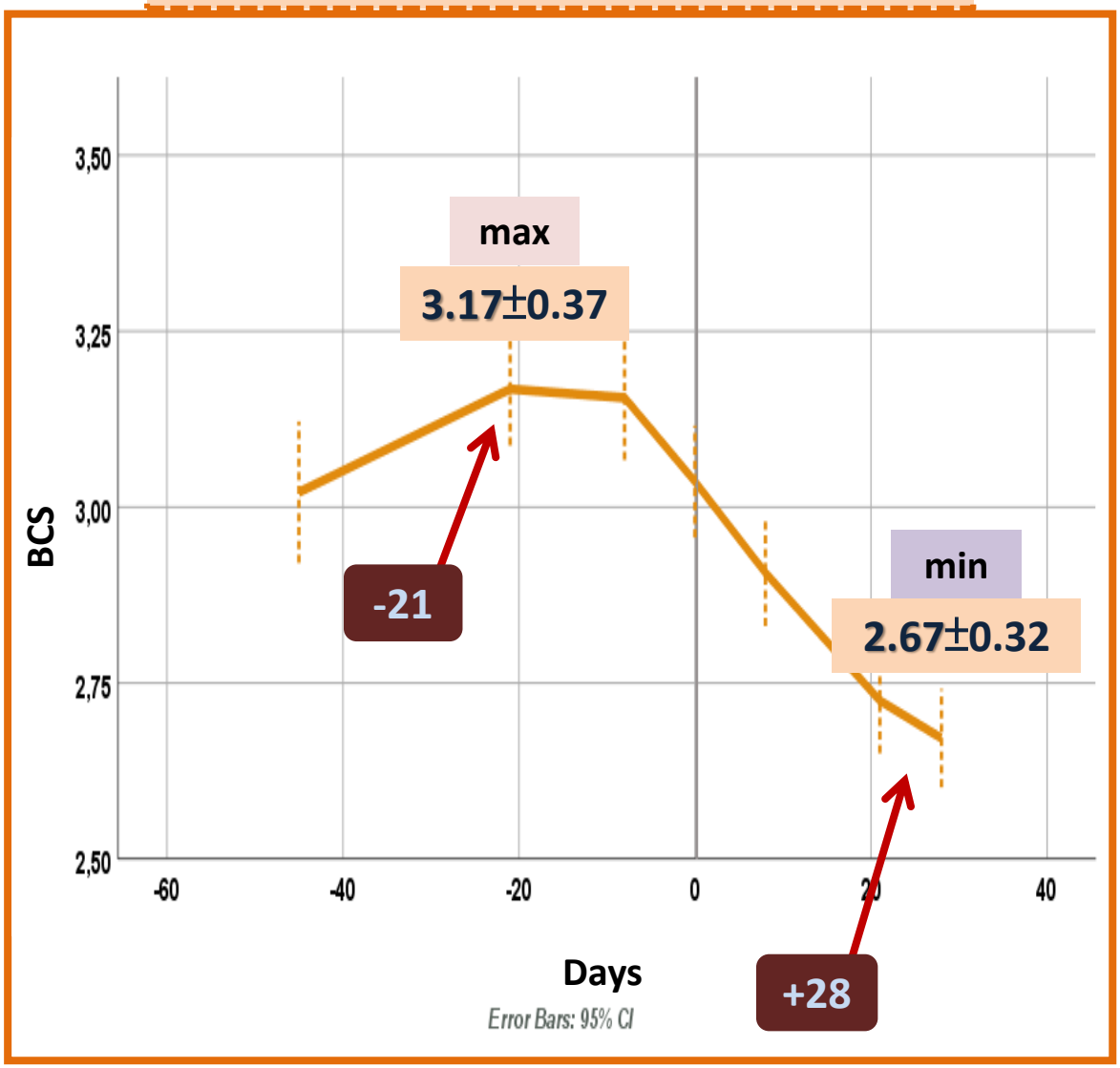
Results

Body Condition Score



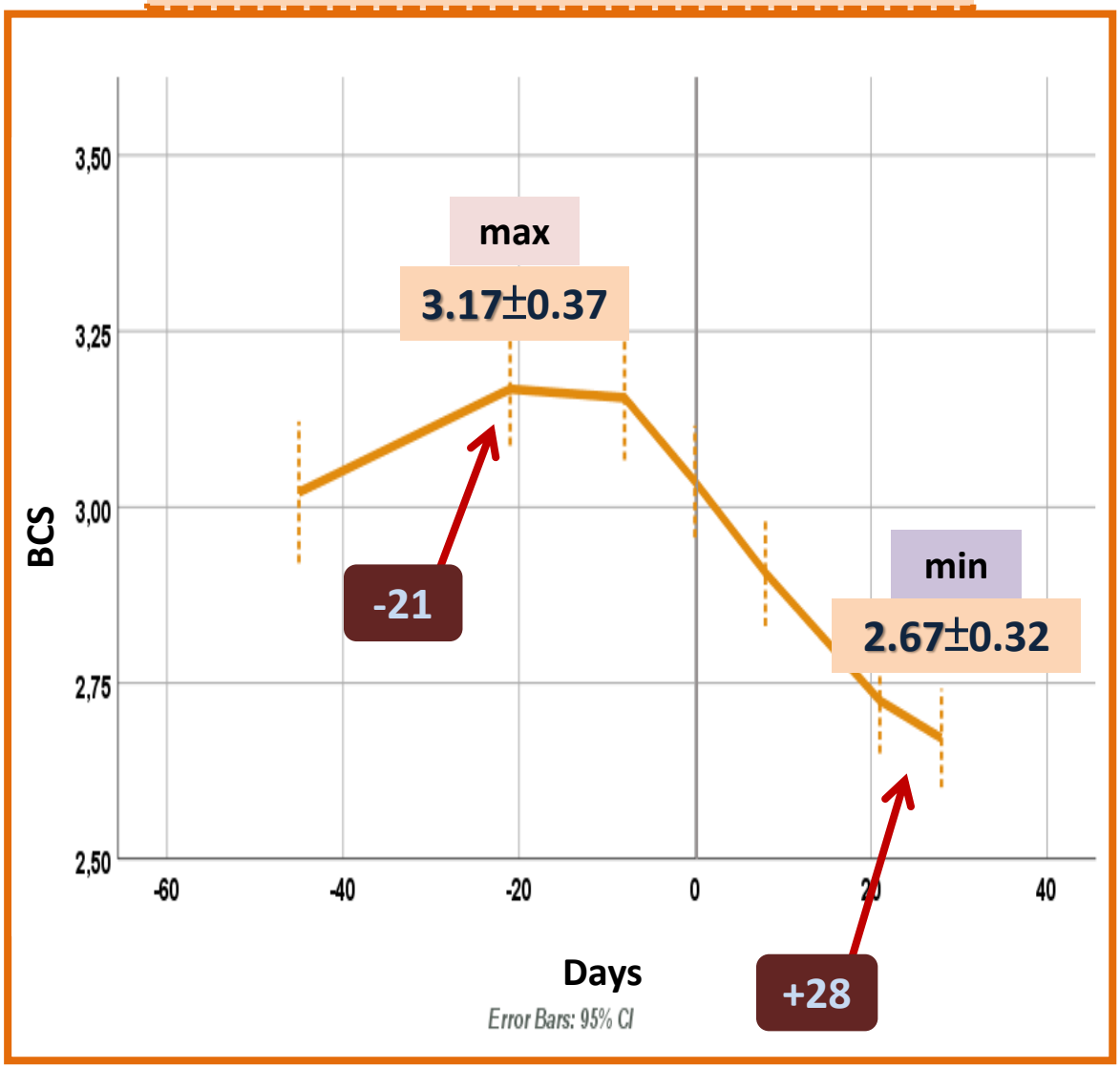
Results

Body Condition Score



Results

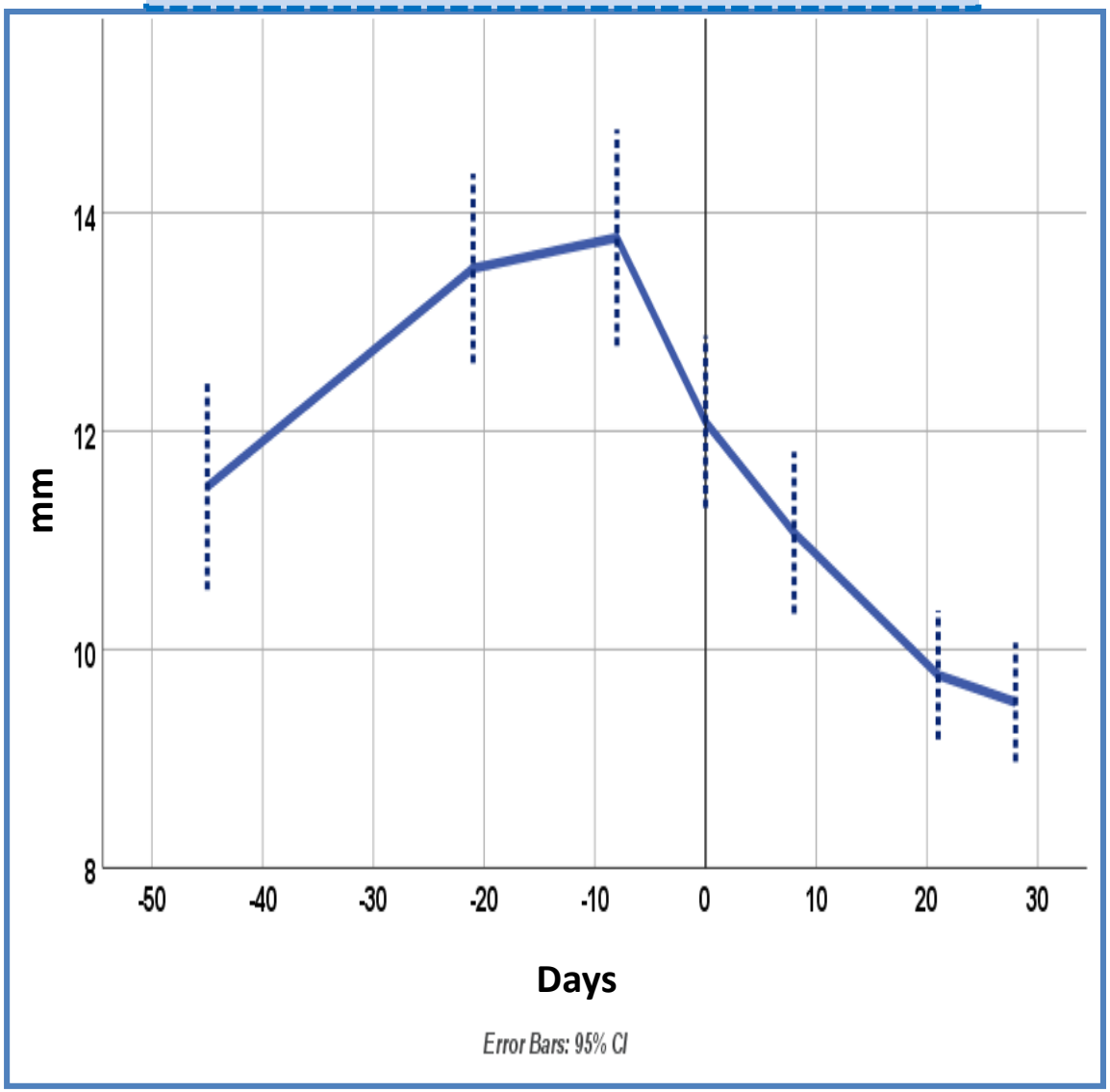
Body Condition Score



0.56

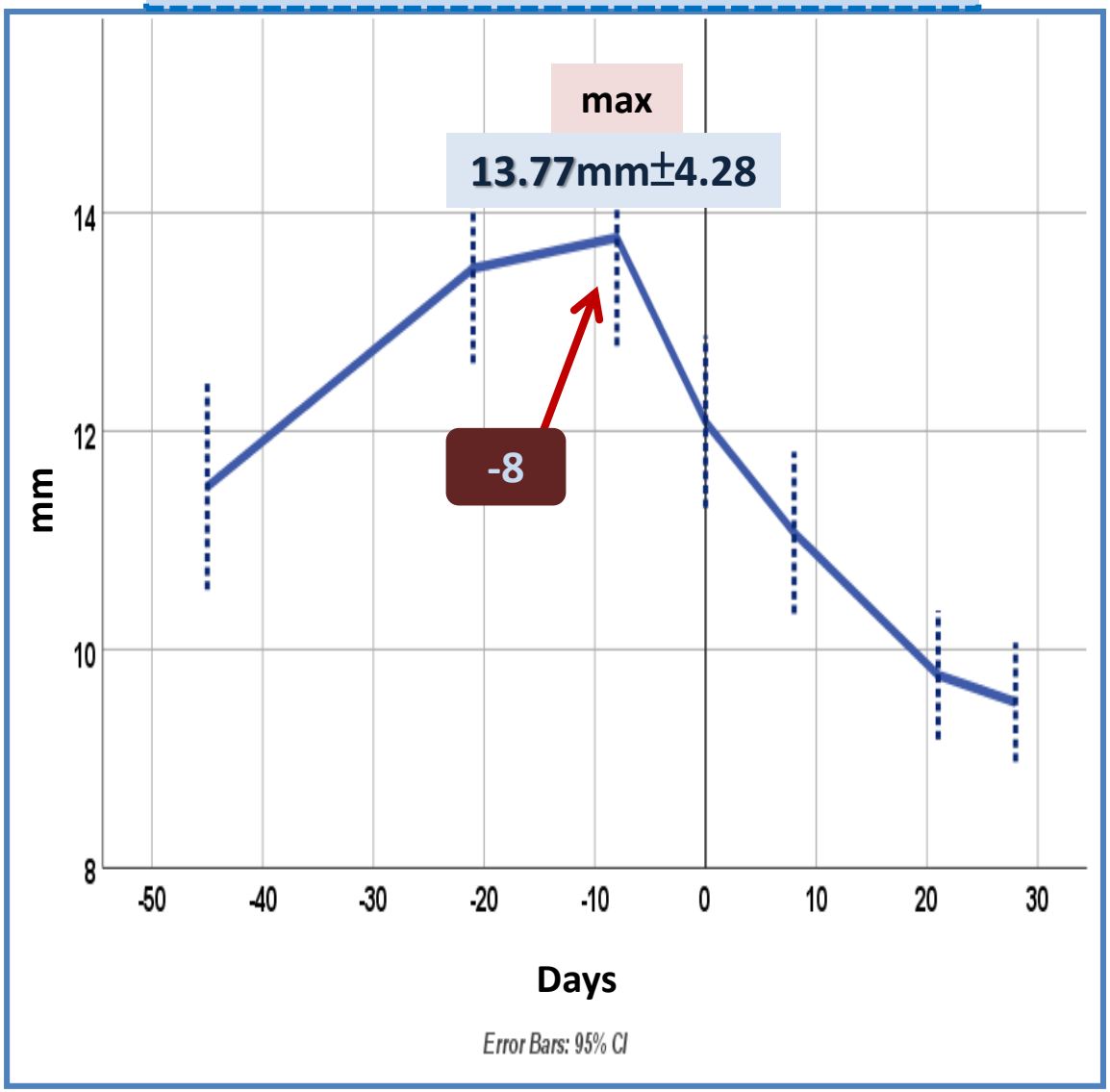
Results

Backfat thickness

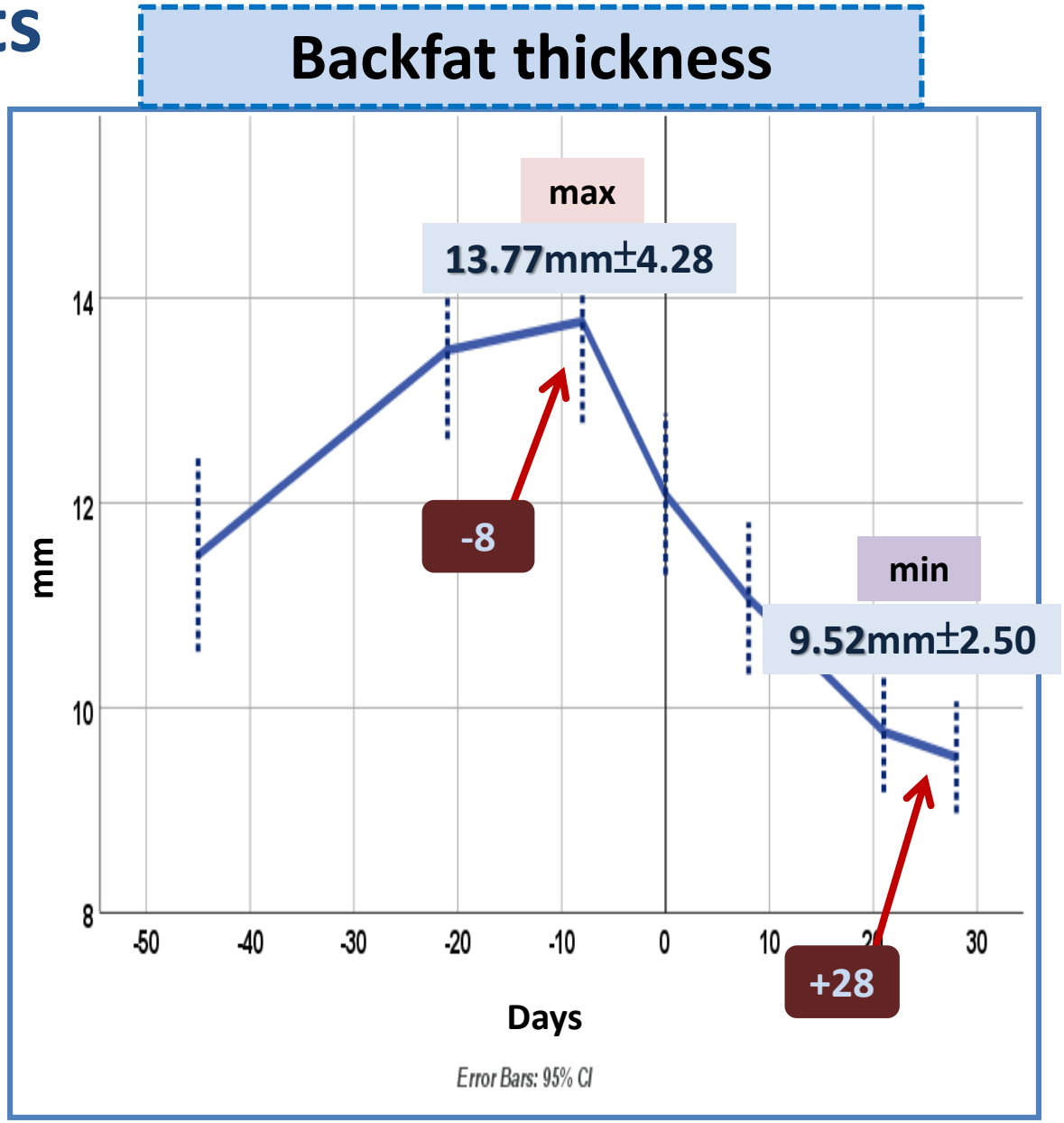


Results

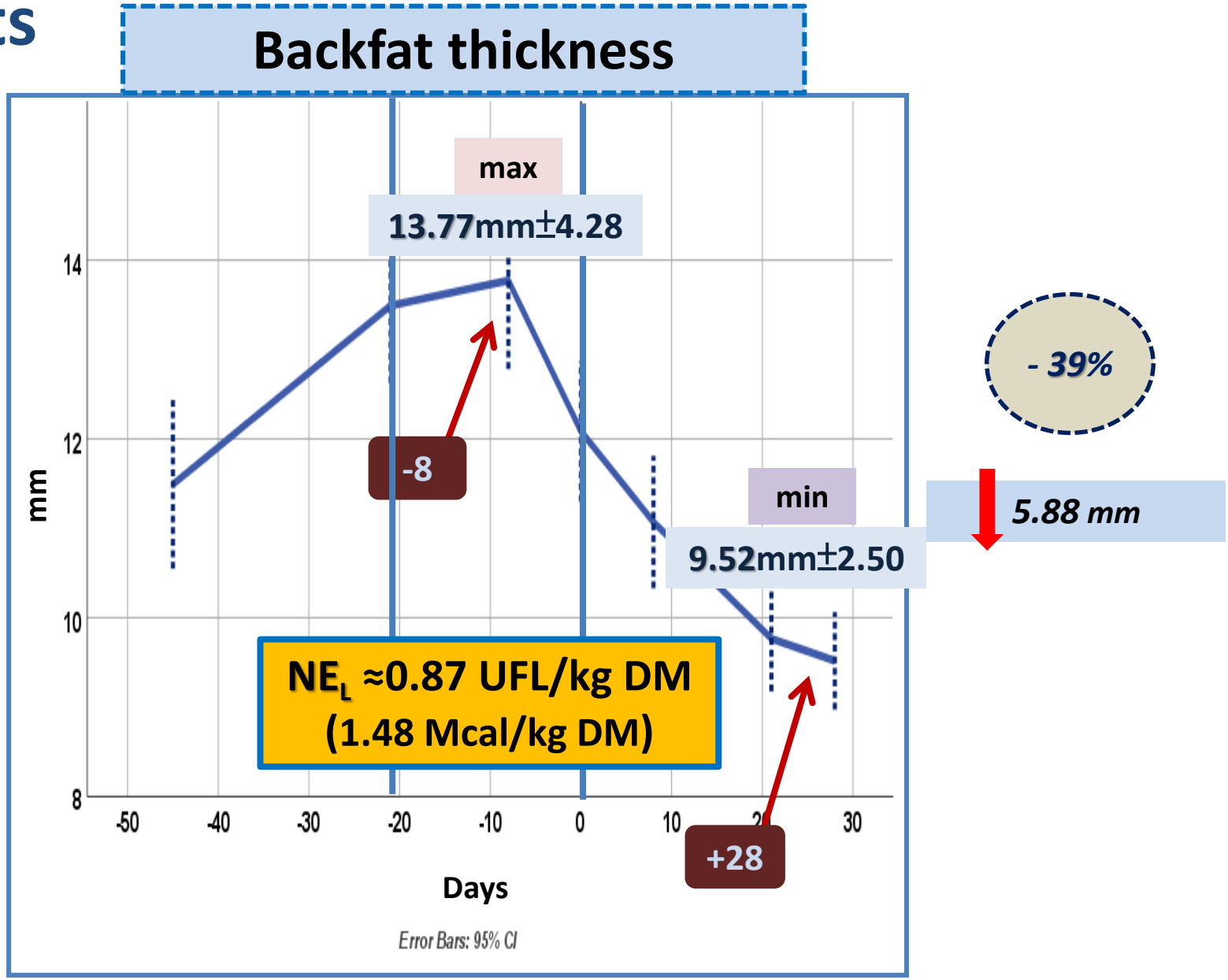
Backfat thickness



Results

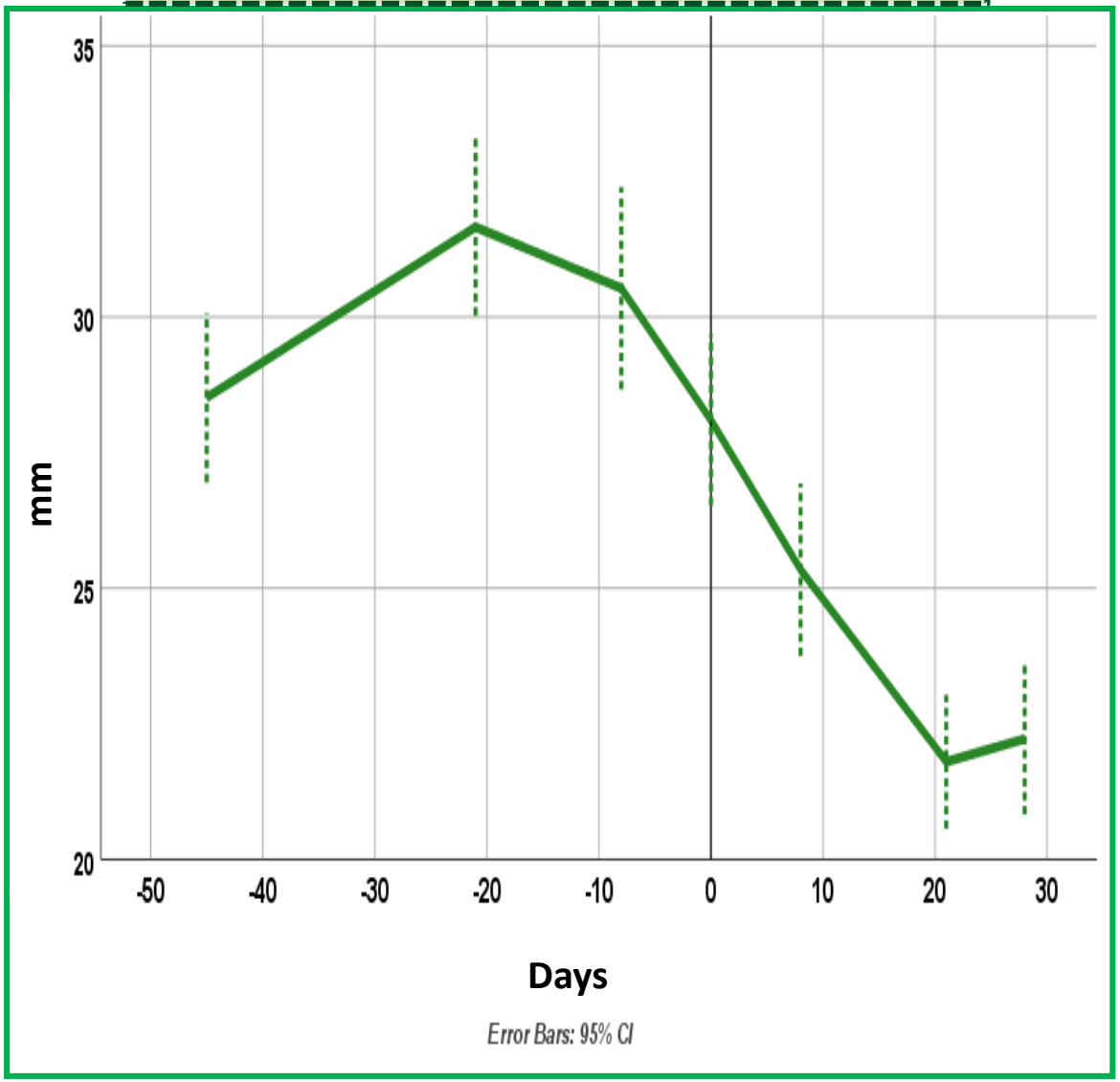

Backfat thickness
max
13.77mm±4.28
-8
min
9.52mm±2.50
+28
mm
14
12
10
8
-50
-40
-30
-20
-10
0
10
30
Days
Error Bars: 95% CI

Results


Backfat thickness
max
13.77mm±4.28
-8
min
9.52mm±2.50
5.88 mm
- 39%
NE$_L$ ≈0.87 UFL/kg DM
(1.48 Mcal/kg DM)
+28
mm
Days
Error Bars: 95% CI
14
12
10
8
-50
-40
-30
-20
-10
0
10
30

Results

Longissimus dorsi thickness



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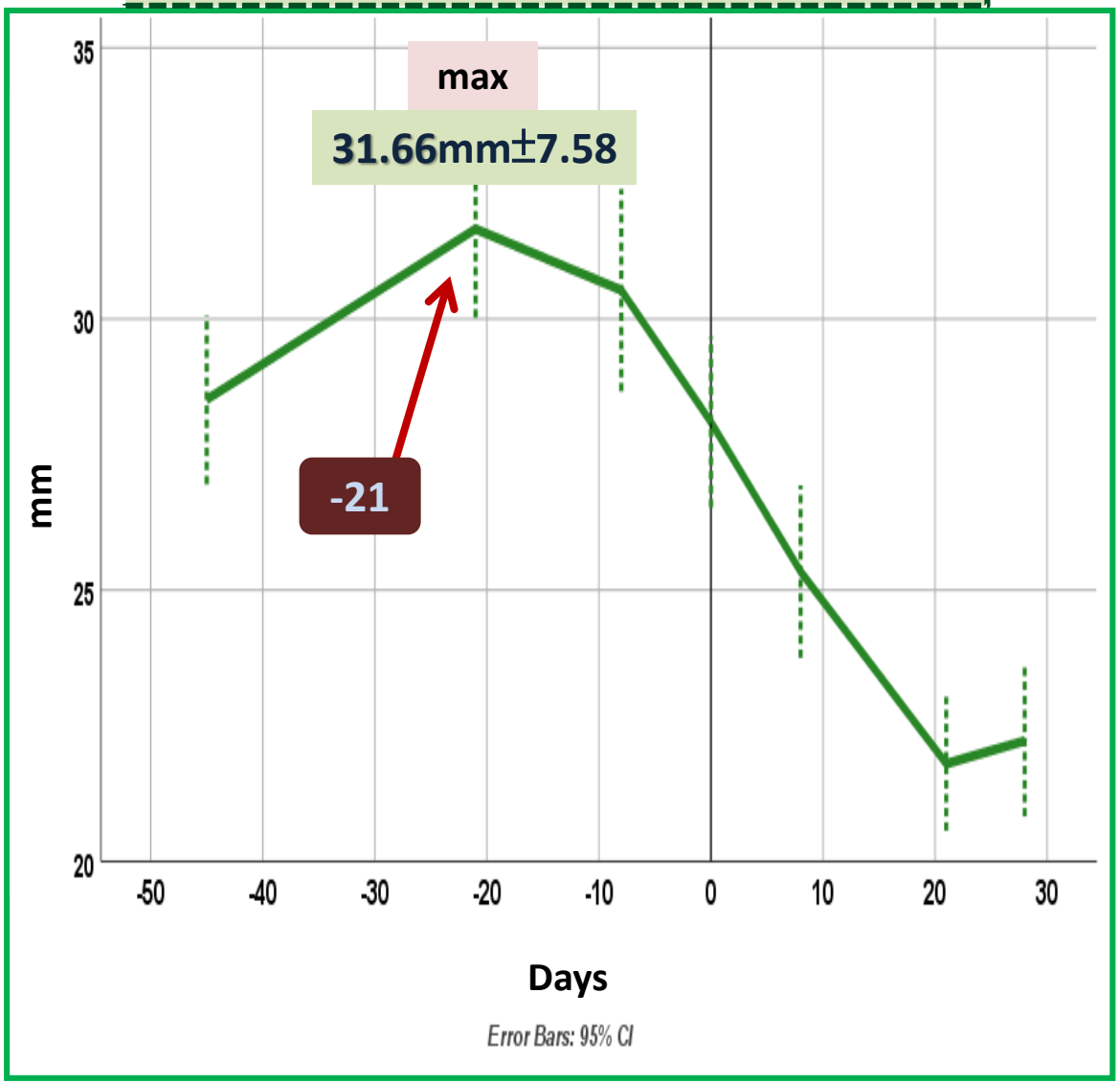

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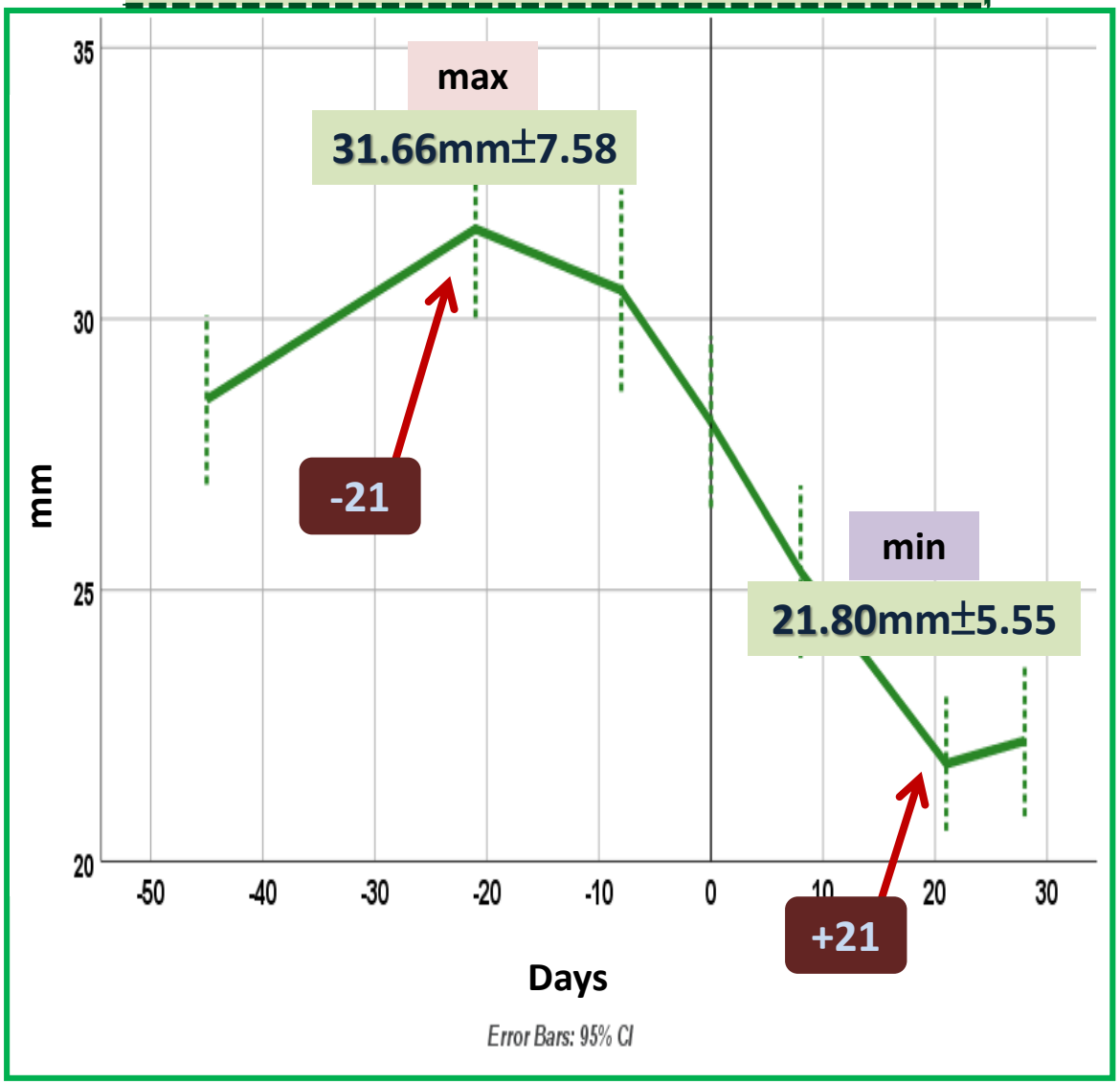
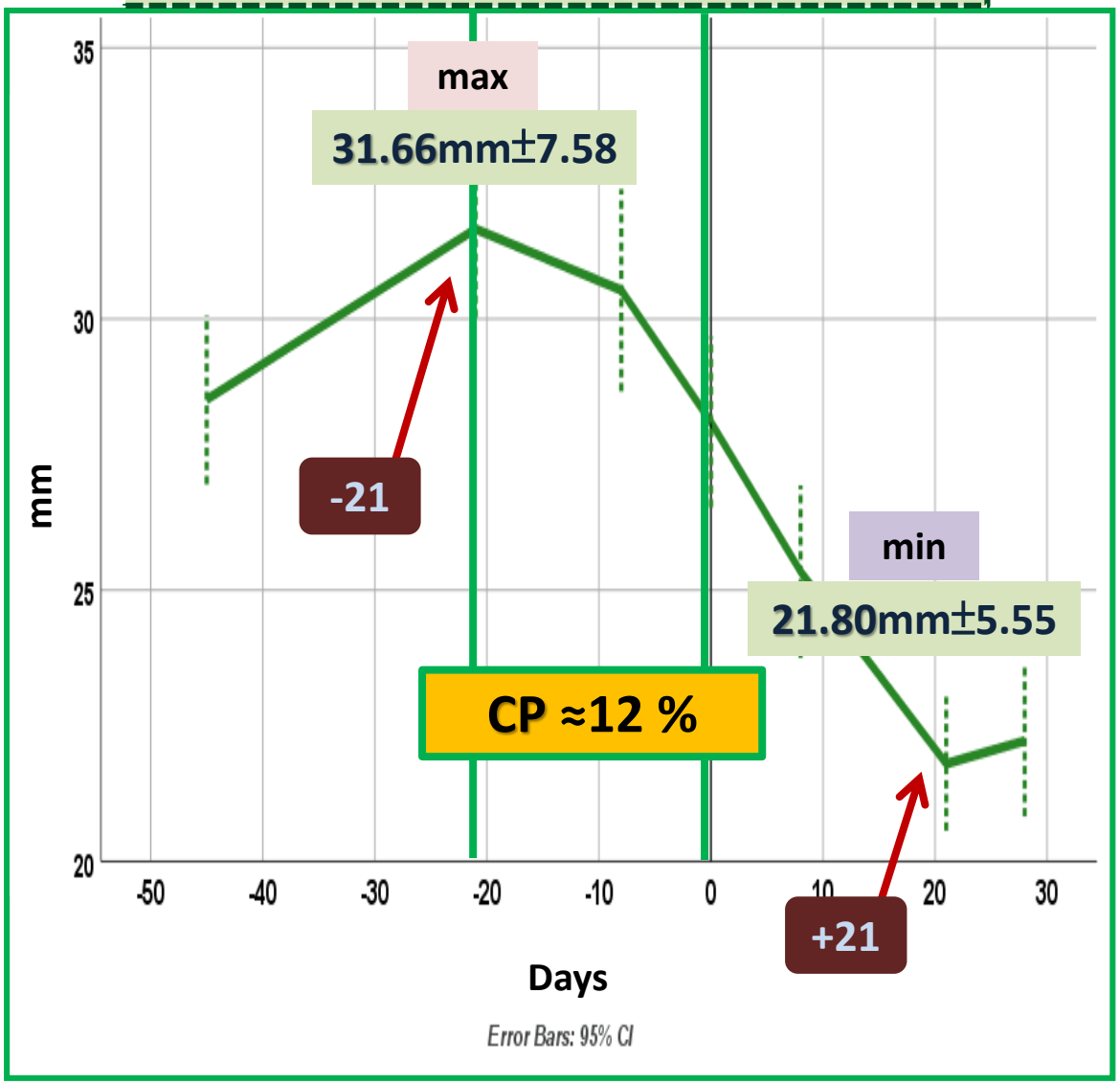


Results

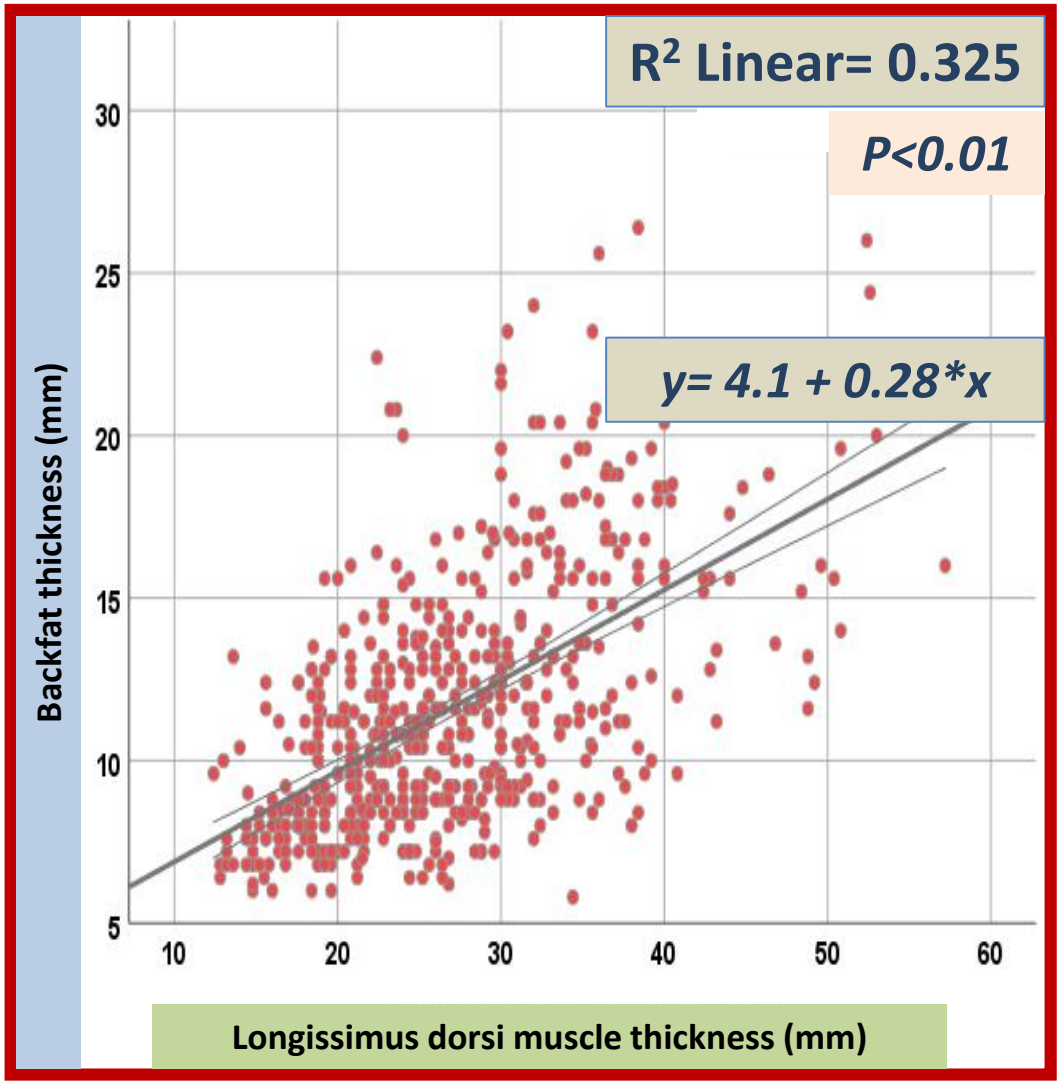
Longissimus dorsi thickness



- 37%

12.48 mm

Results

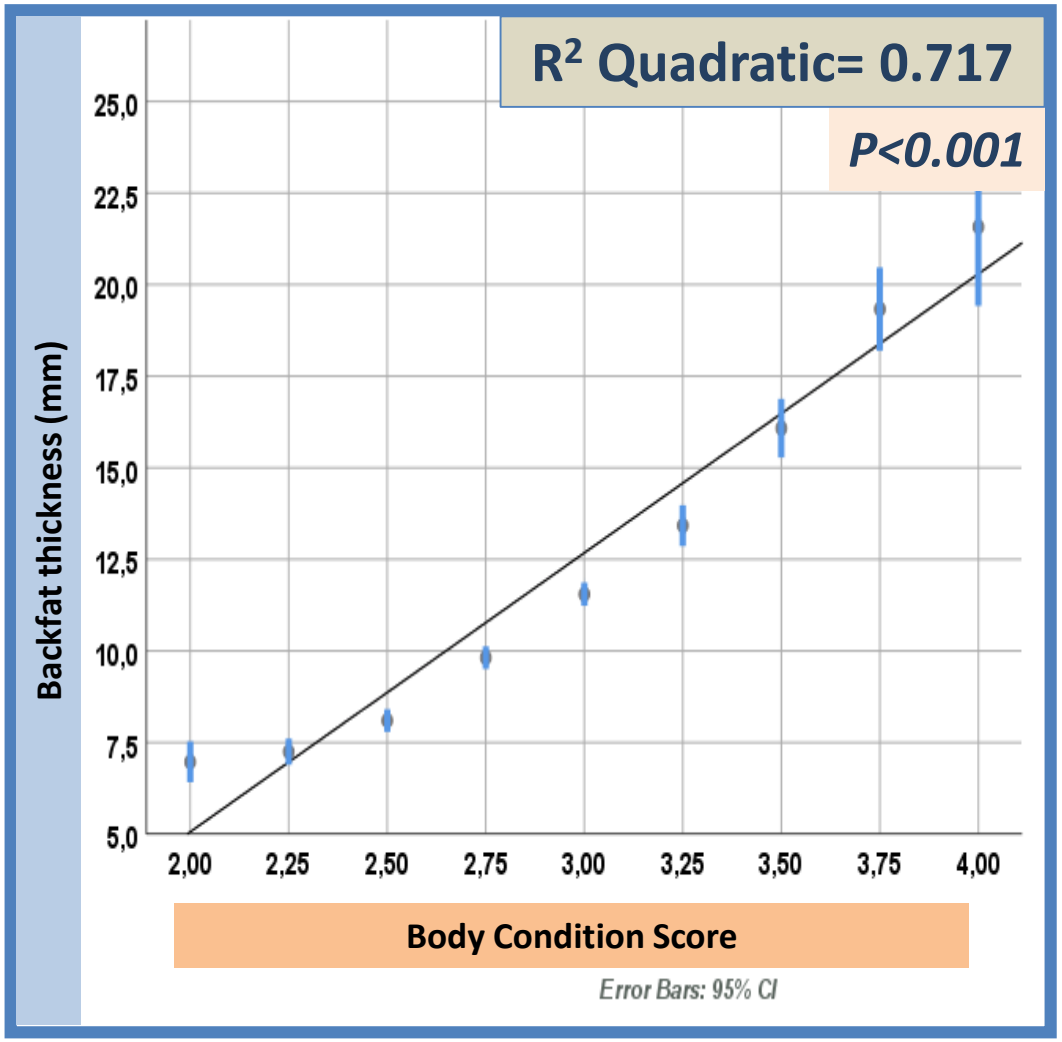


Correlations

In total

- **BFT/LDT: *r*= 0.570**

Results

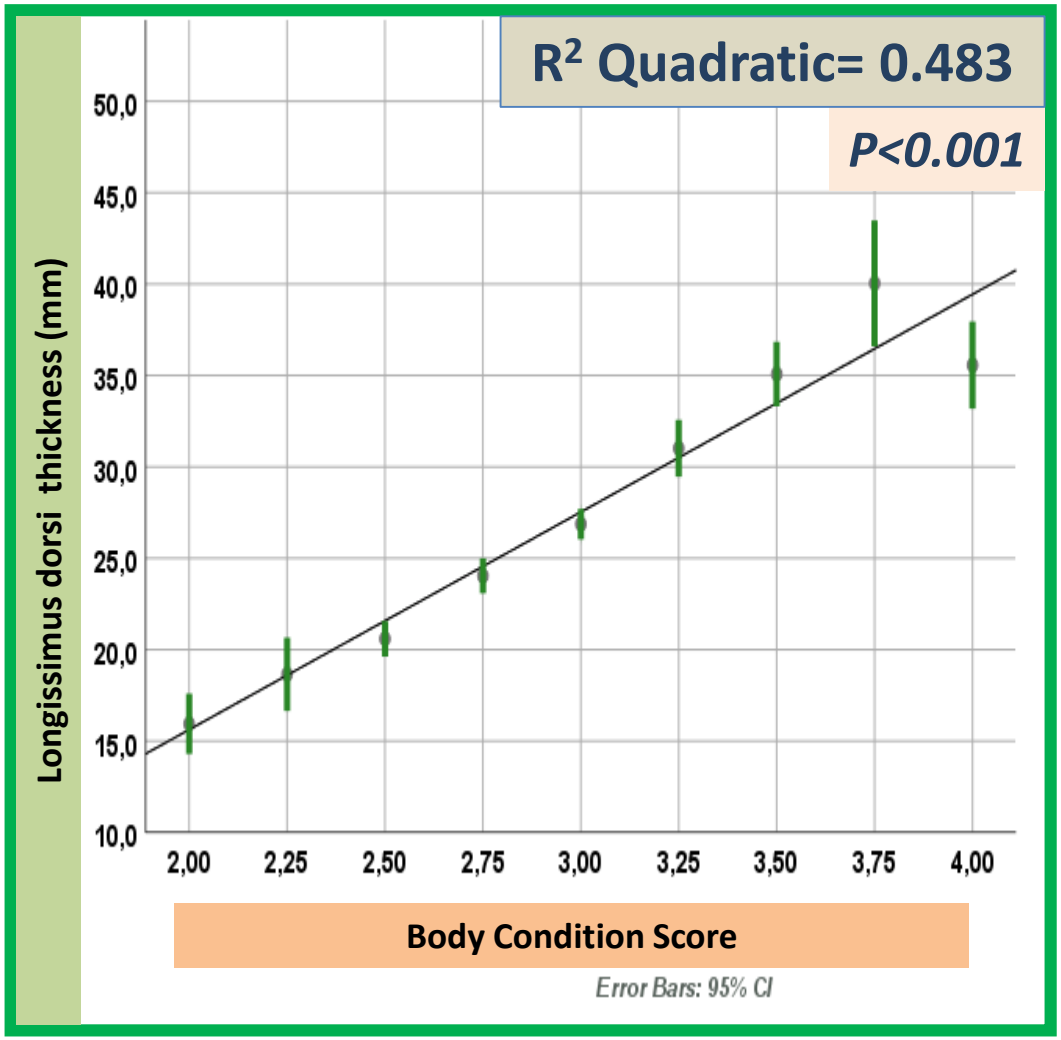


Correlations

In total

- BFT/LDT: *r*= 0.570
- BCS/BFT: *r*= 0.831

Results

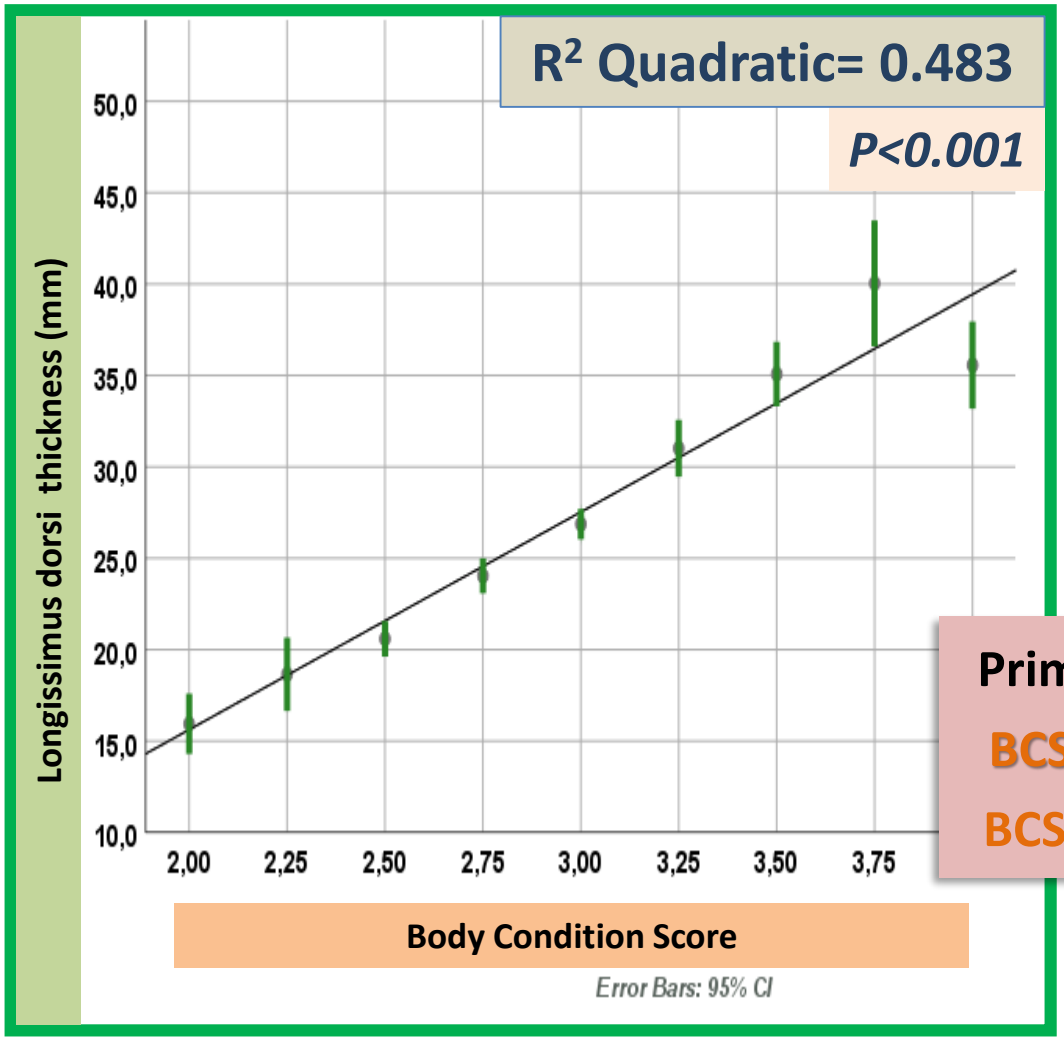


Correlations

In total

- BFT/LDT: *r*= 0.570
- BCS/BFT: *r*= 0.831
- BCS/LDT: *r*= 0.695

Results



Correlations

In total

- BFT/LDT: *r*= 0.570
- BCS/BFT: *r*= 0.831
- BCS/LDT: *r*= 0.695

Primiparous cows

BCS/LDT: *r*=0.789

BCS/BFT: *r*=0.698

Multiparous cows

BCS/LDT: *r*=0.702

BCS/BFT: *r*=0.848

Results

Model with BFT & LDT combined explained better BCS variance

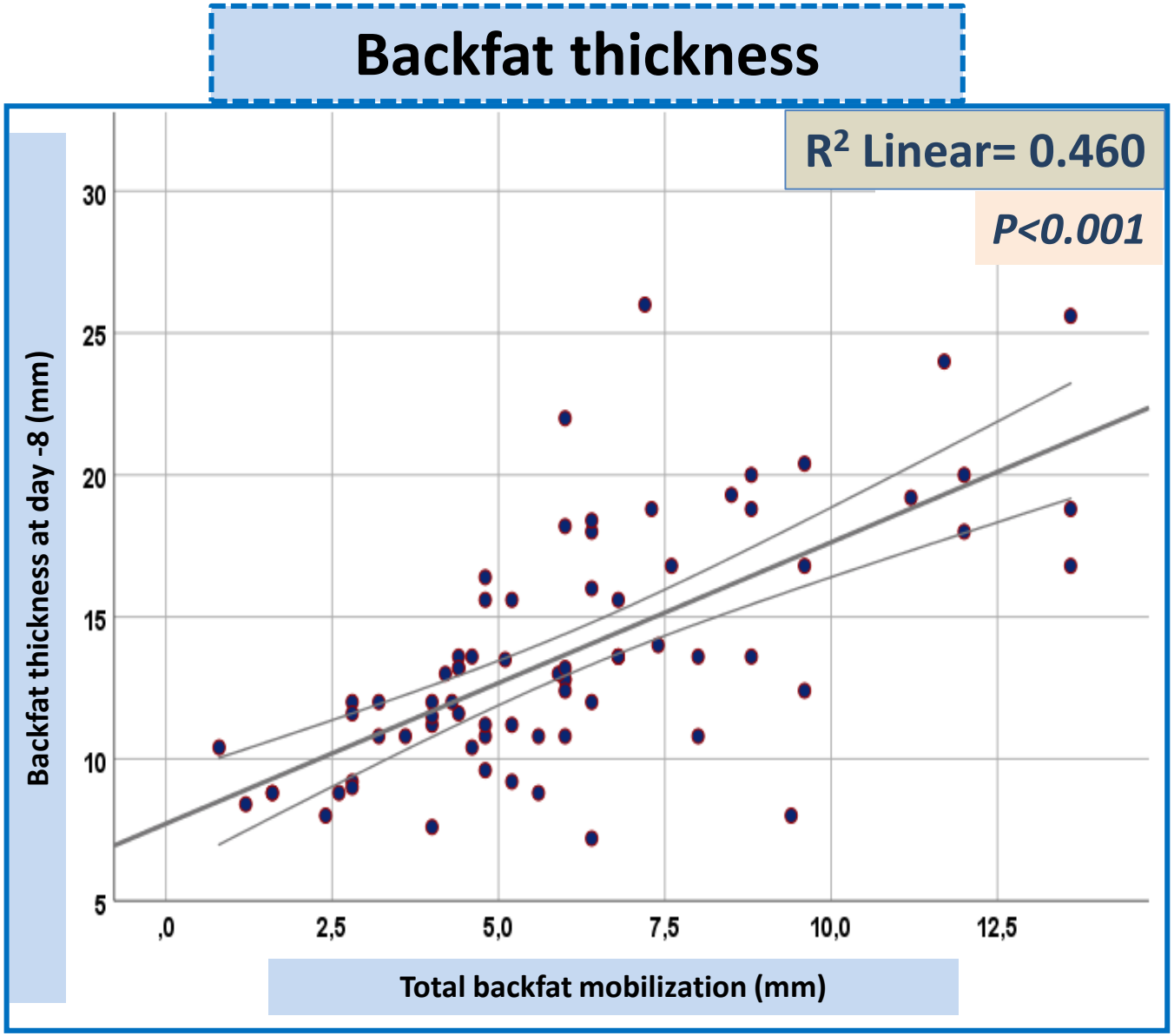
R^2=0.768 P<0.001

BFT: R^2 Quadratic= 0.717

LDT: R^2 Quadratic= 0.483

Results

Relationship of max fat thickness & total fat mobilization



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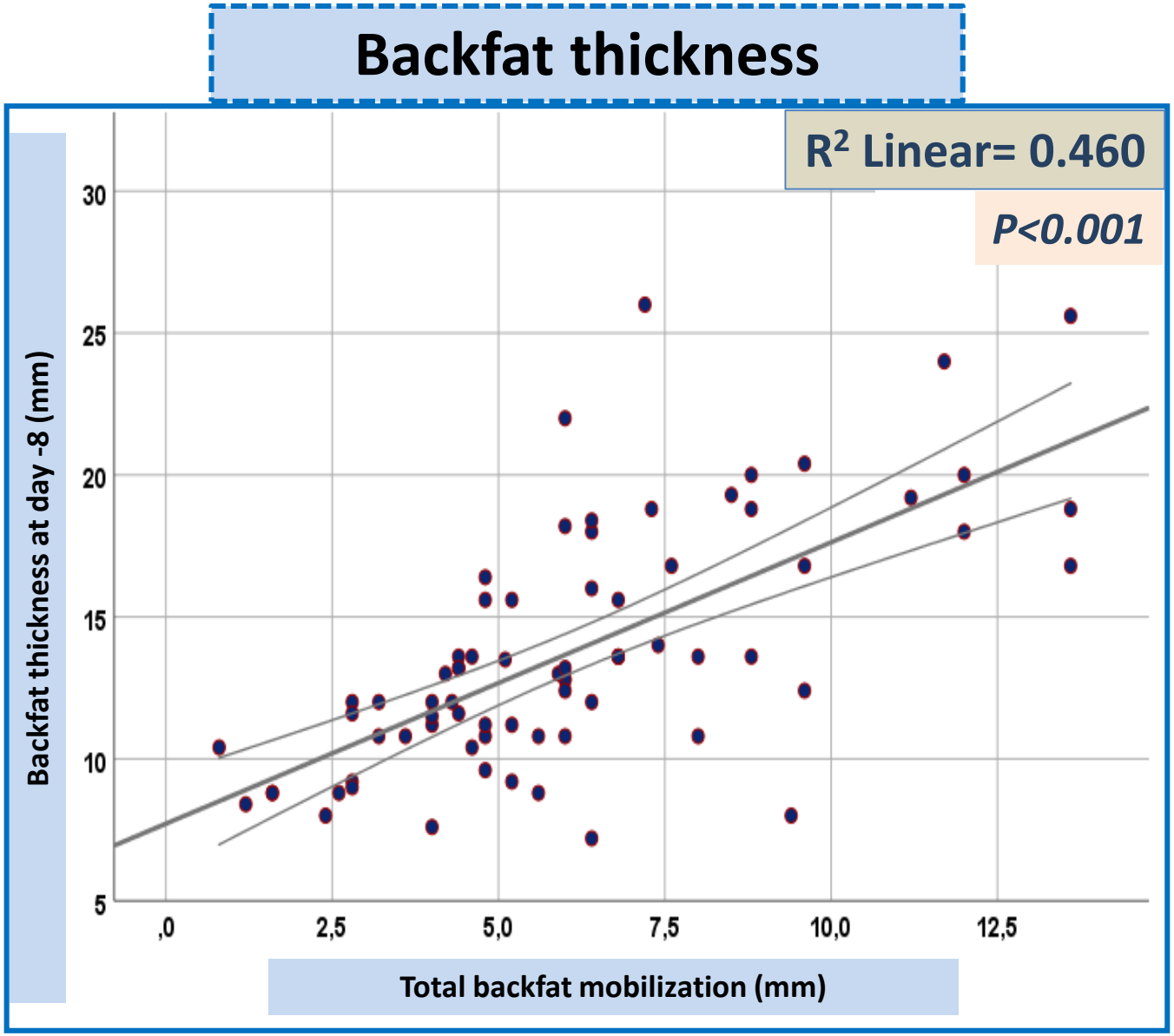
Relationship of max fat thickness & total fat mobilization

known



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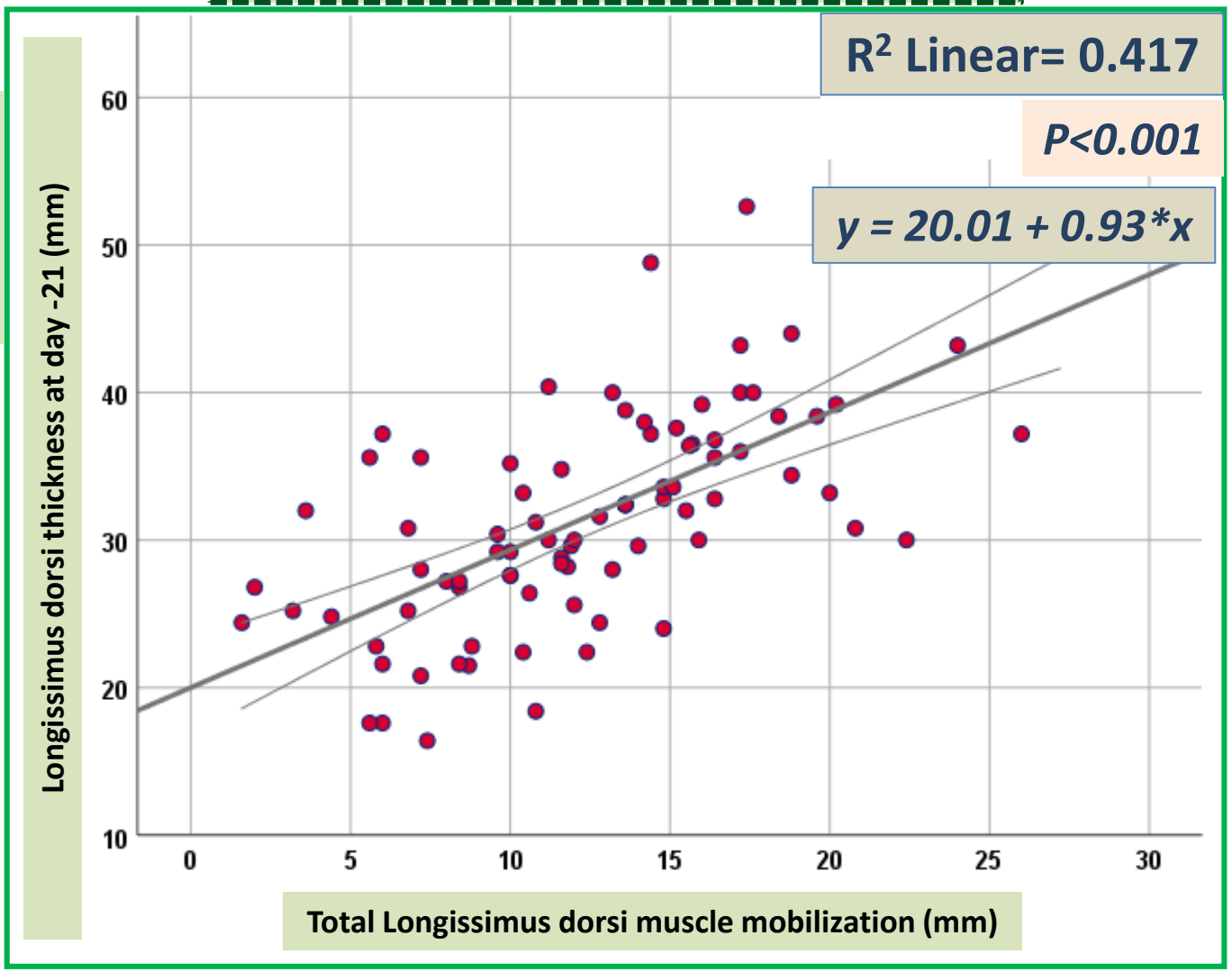
Longissimus dorsi thickness



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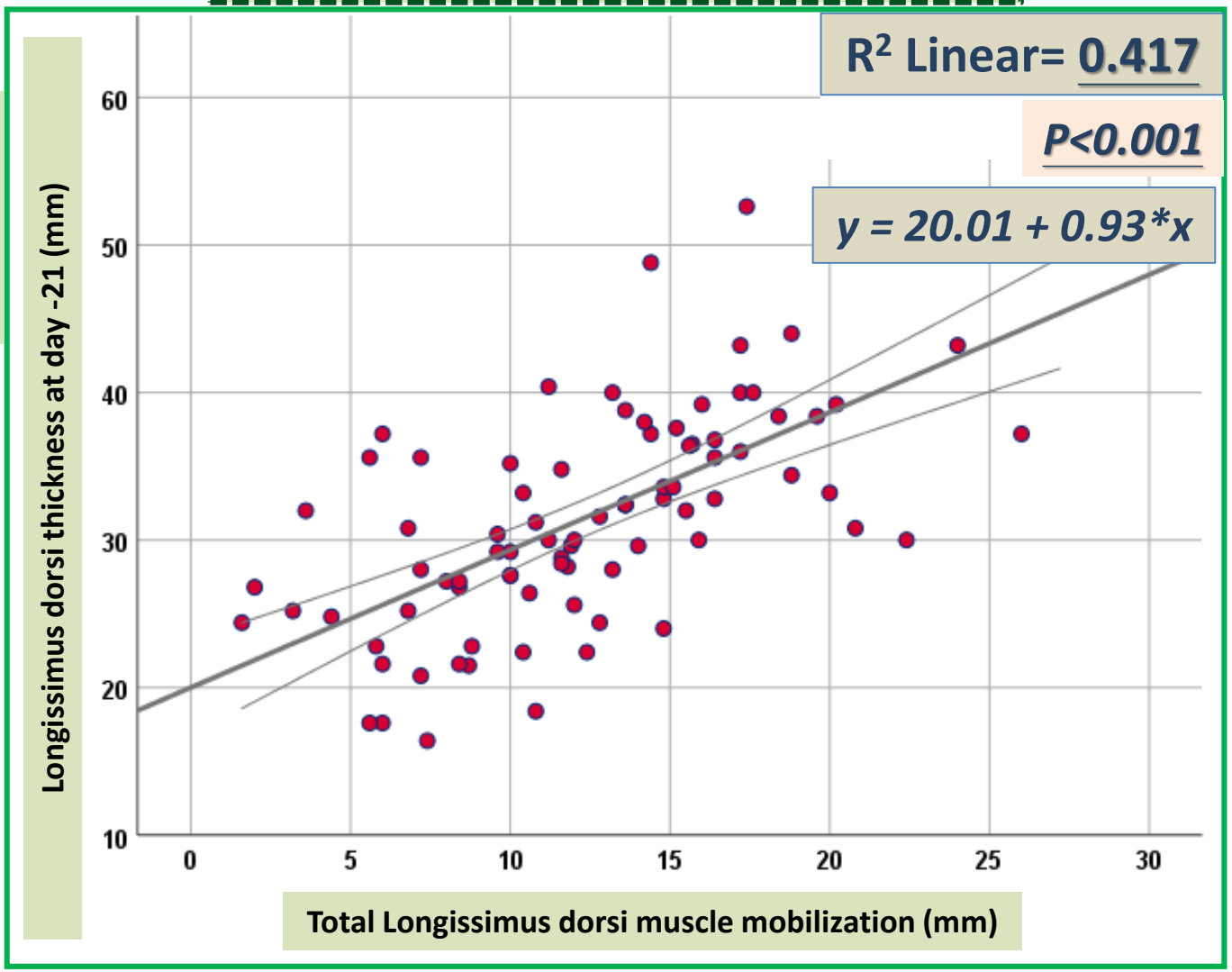
Relationship of max muscle thickness & total muscle mobilization

only as trend so far

Longissimus dorsi thickness



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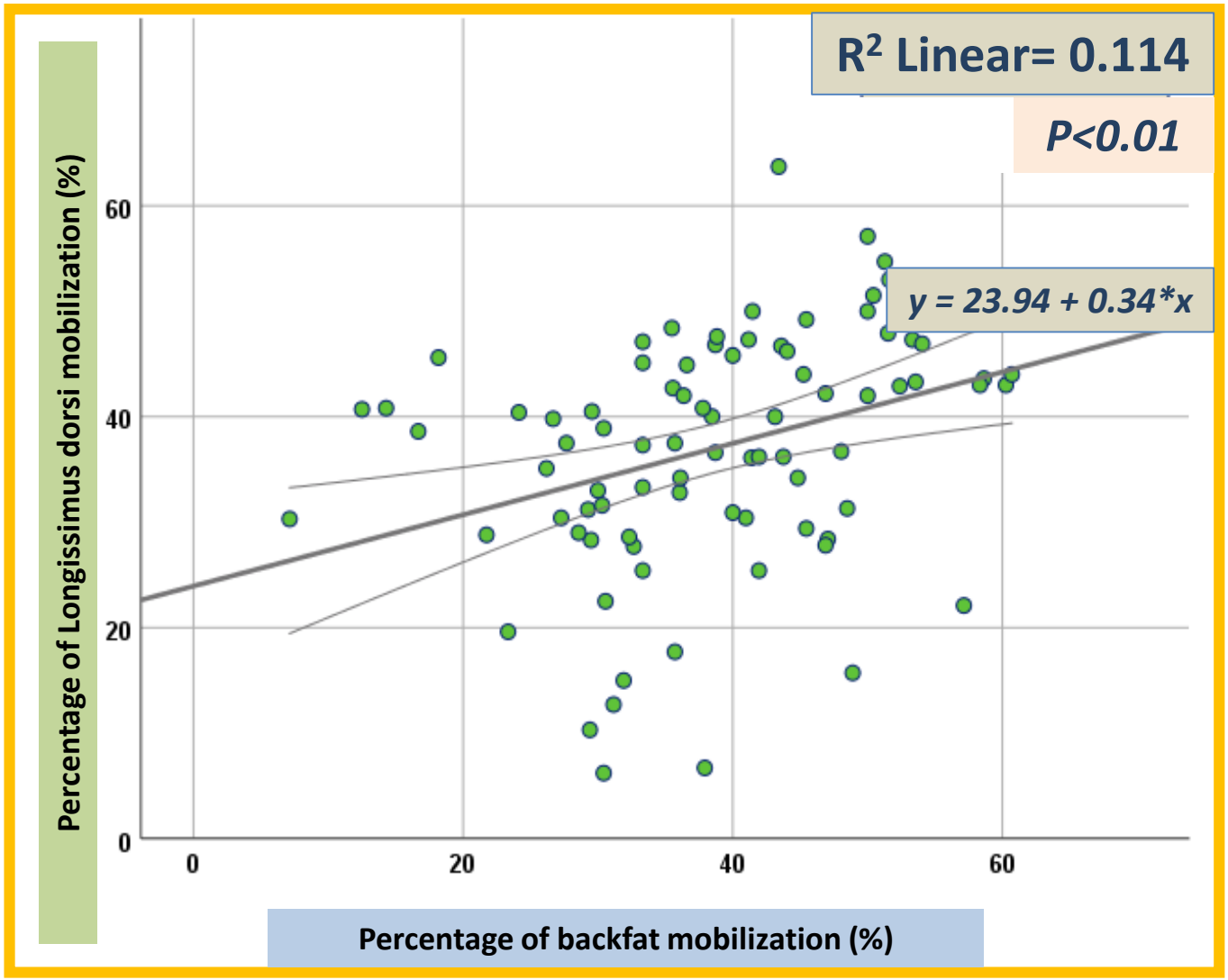

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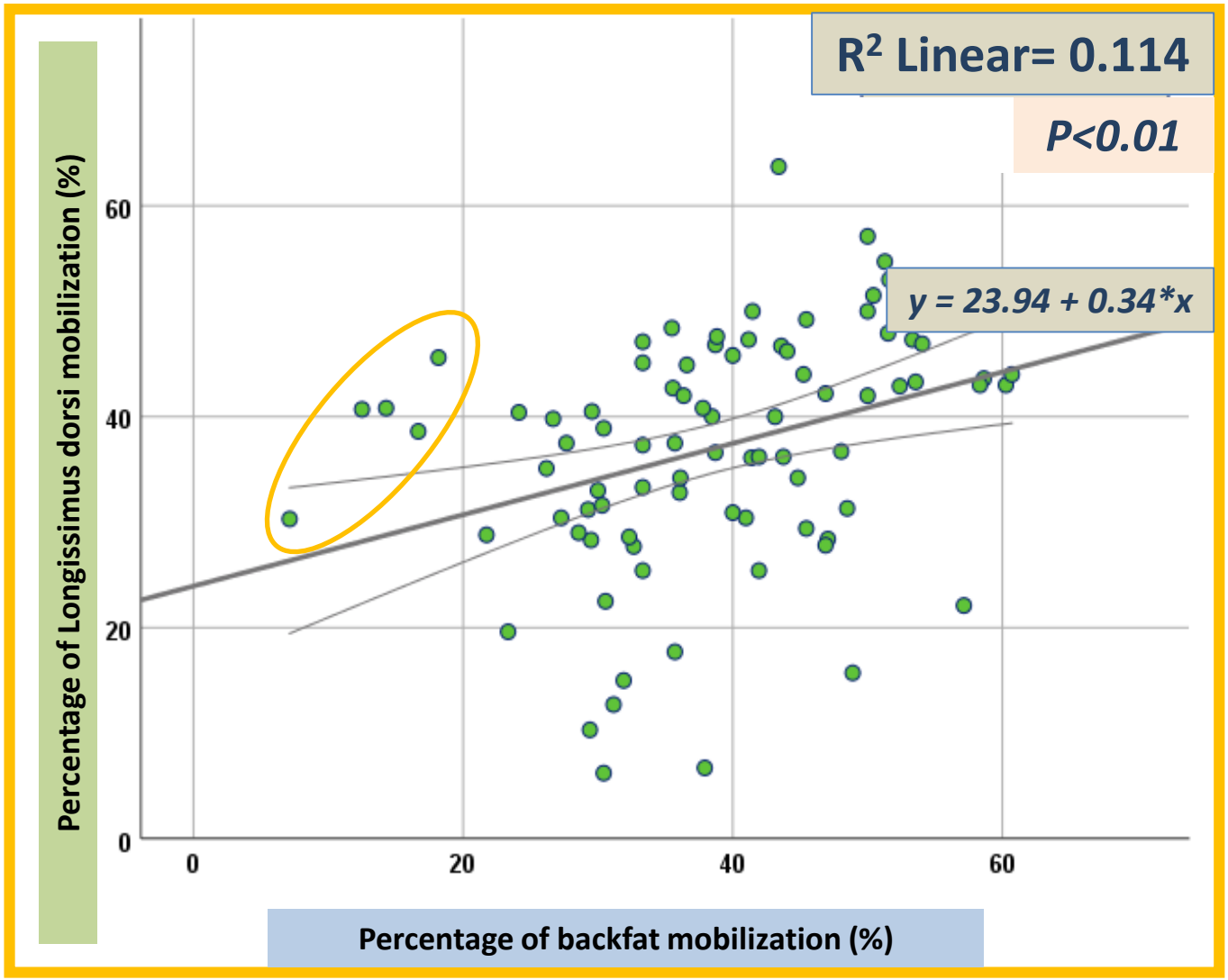

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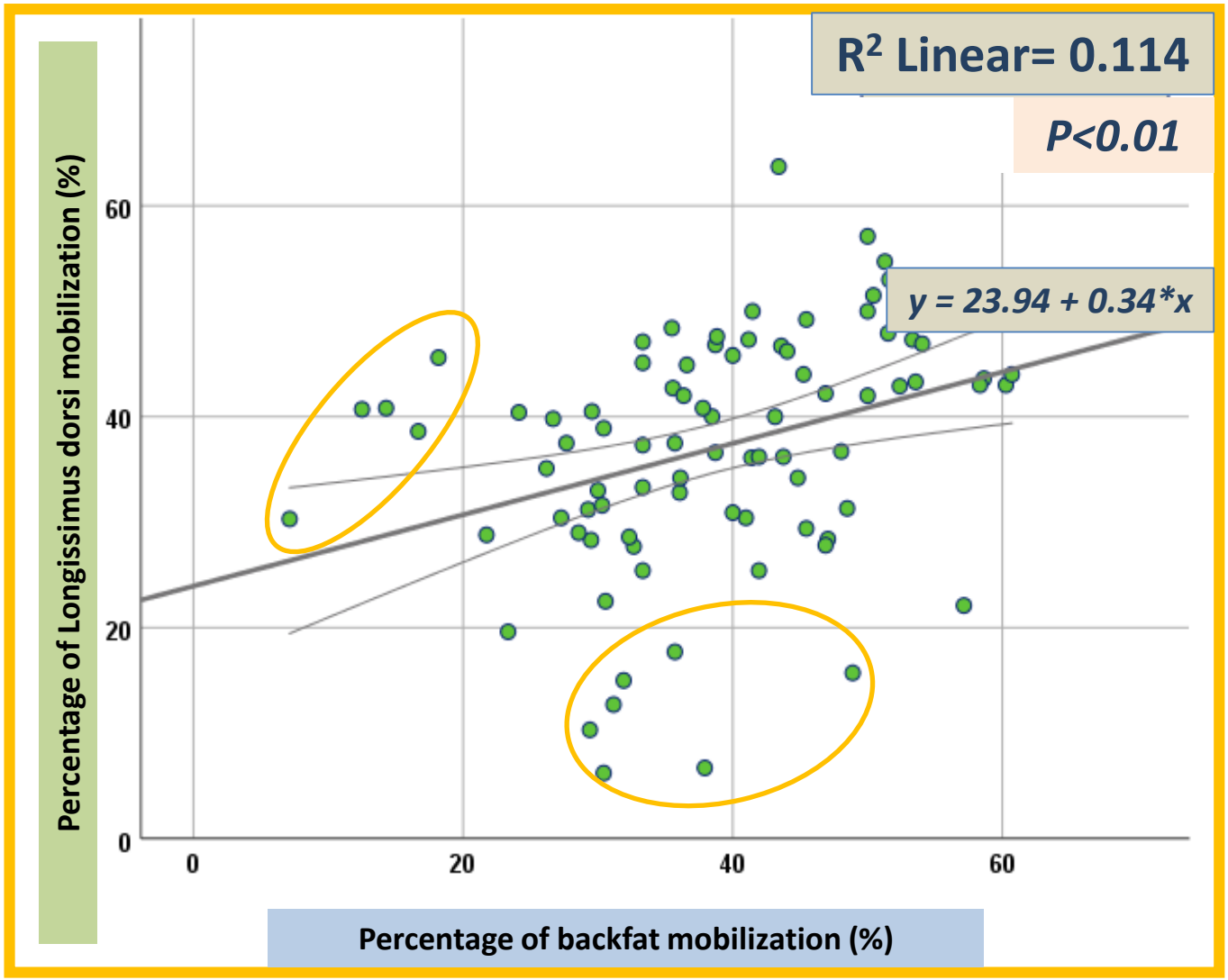

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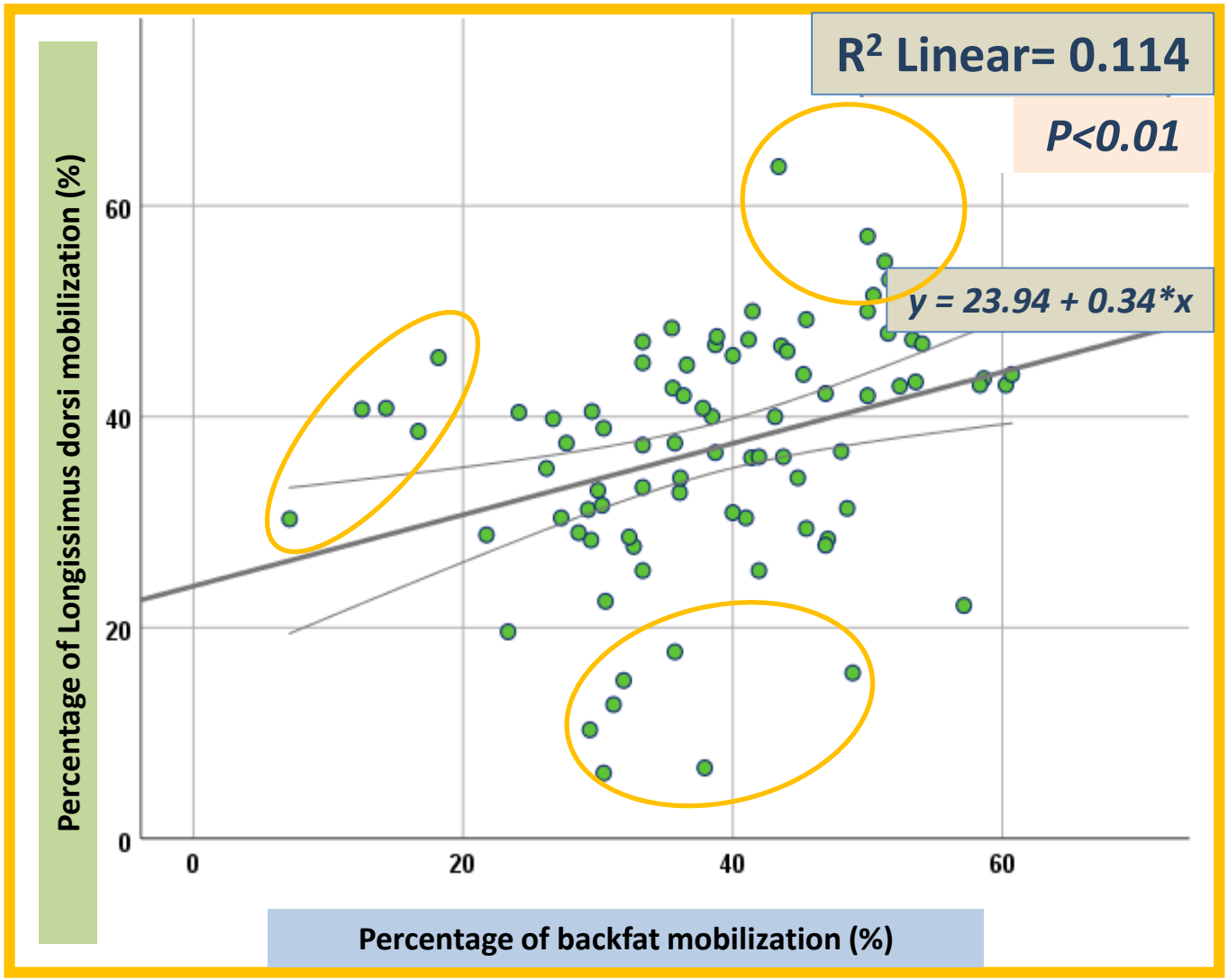

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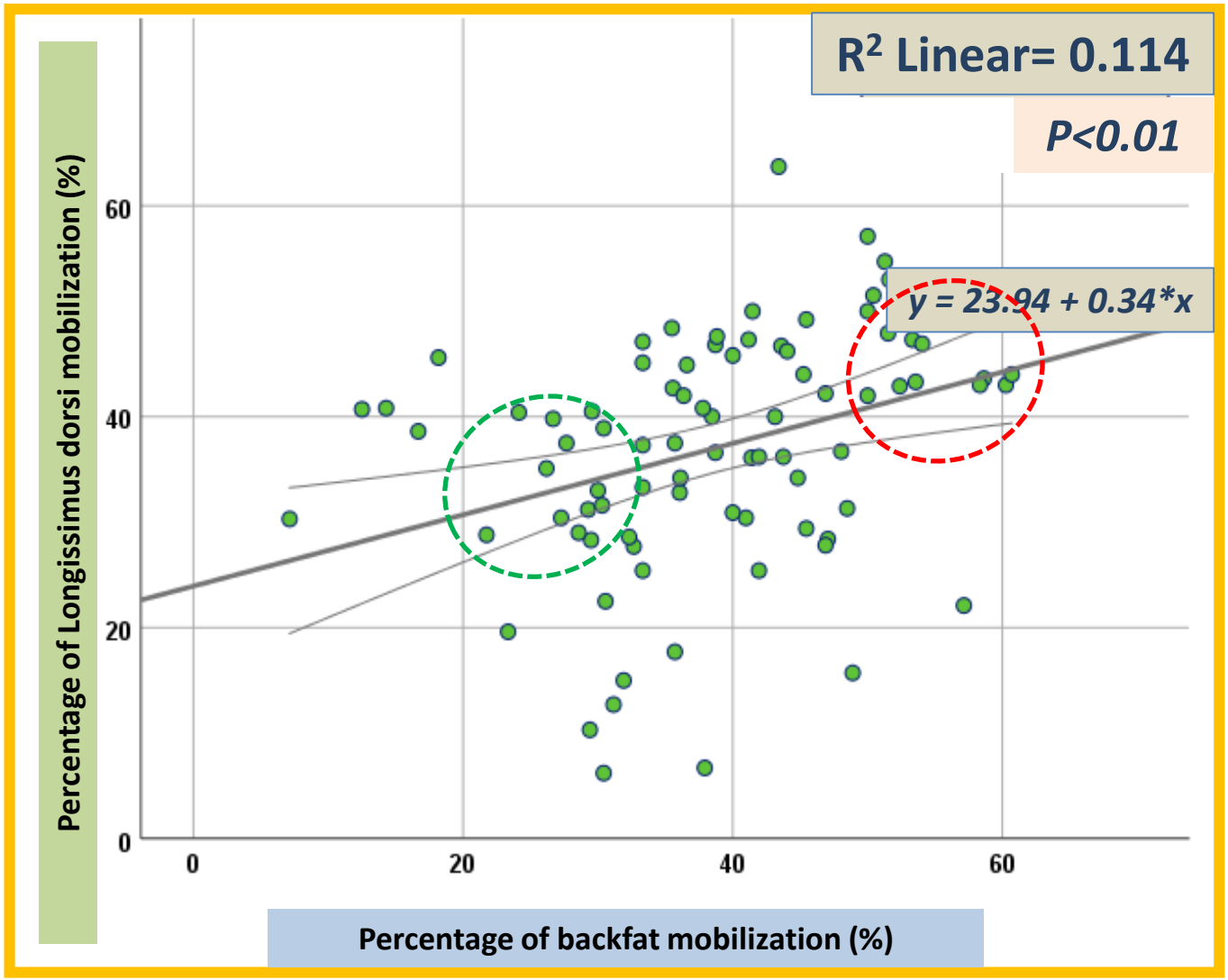

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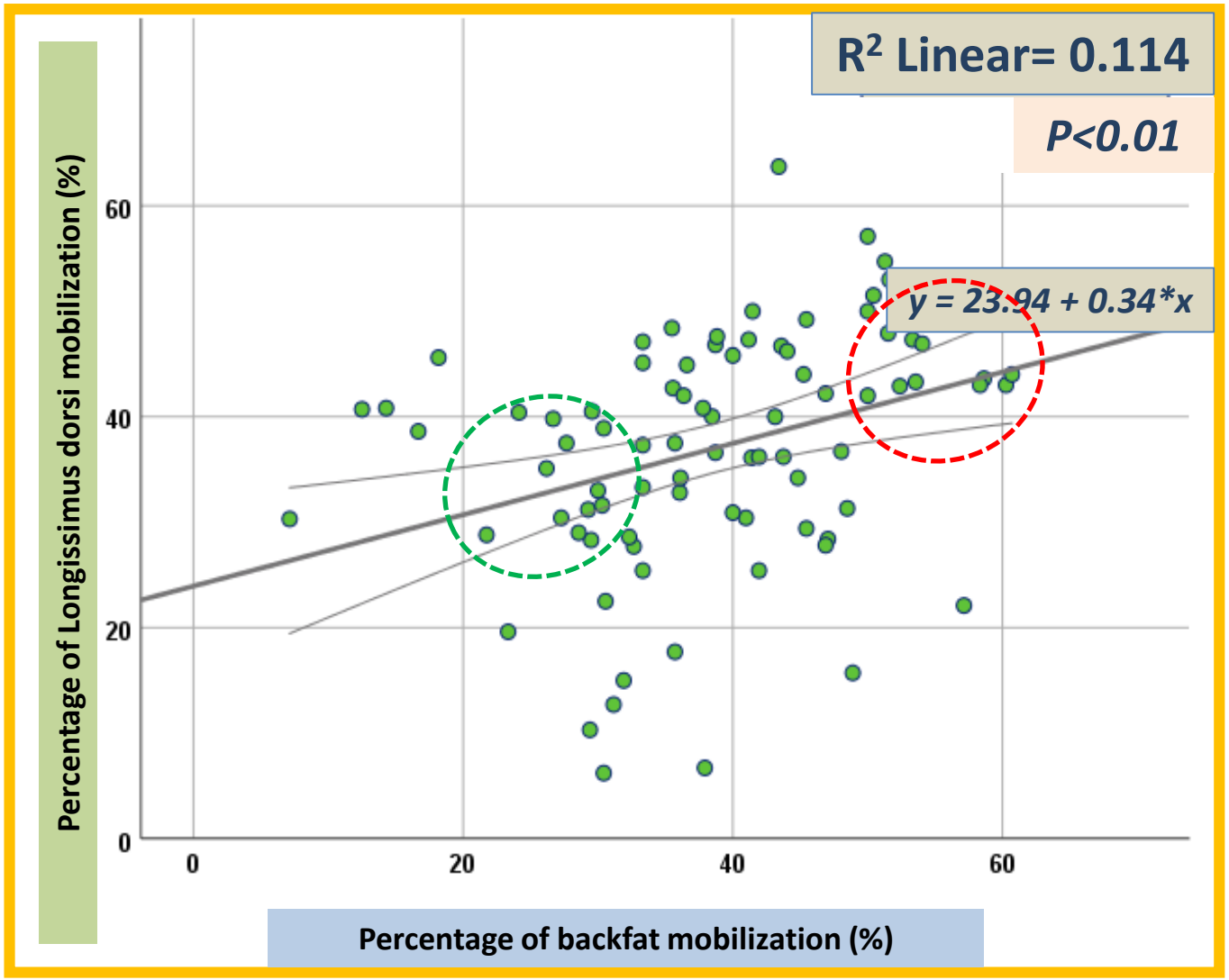

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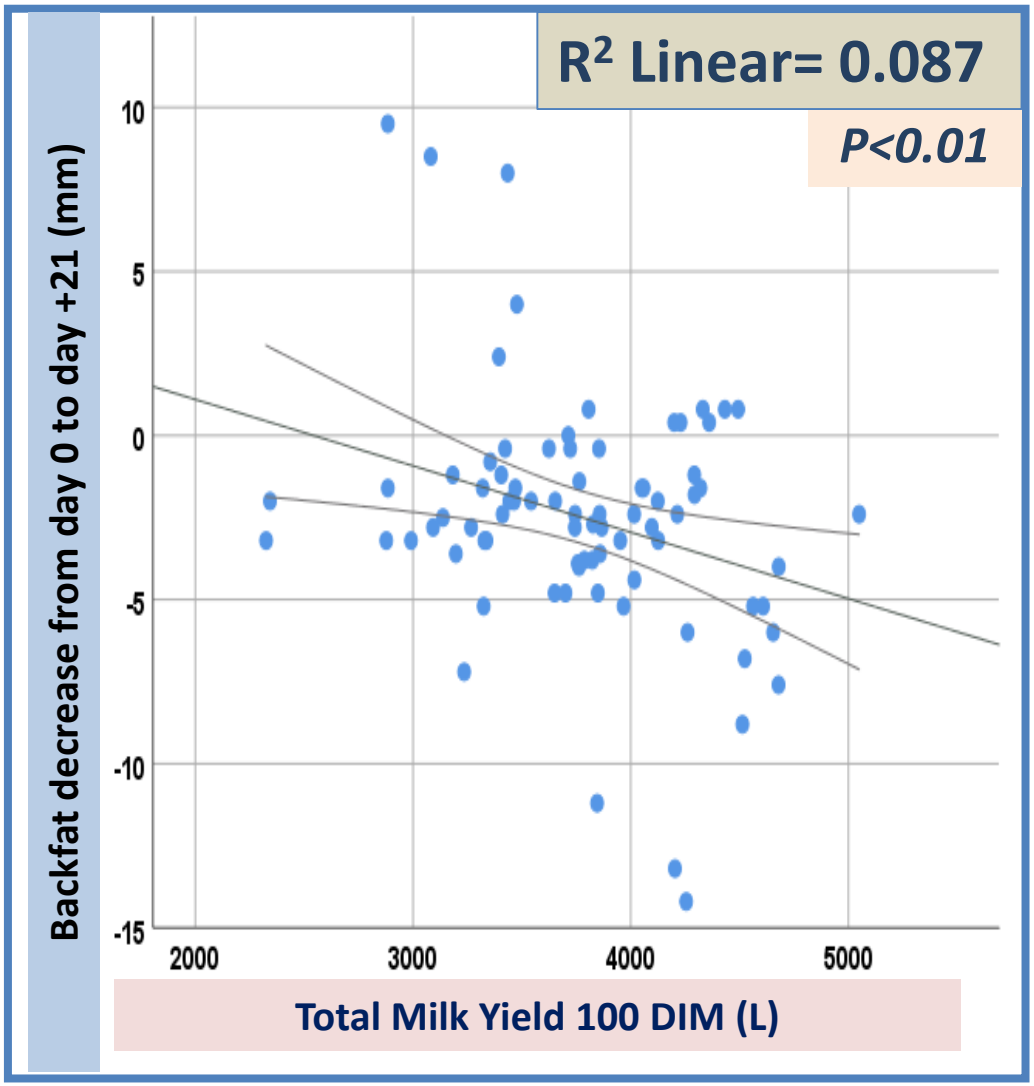
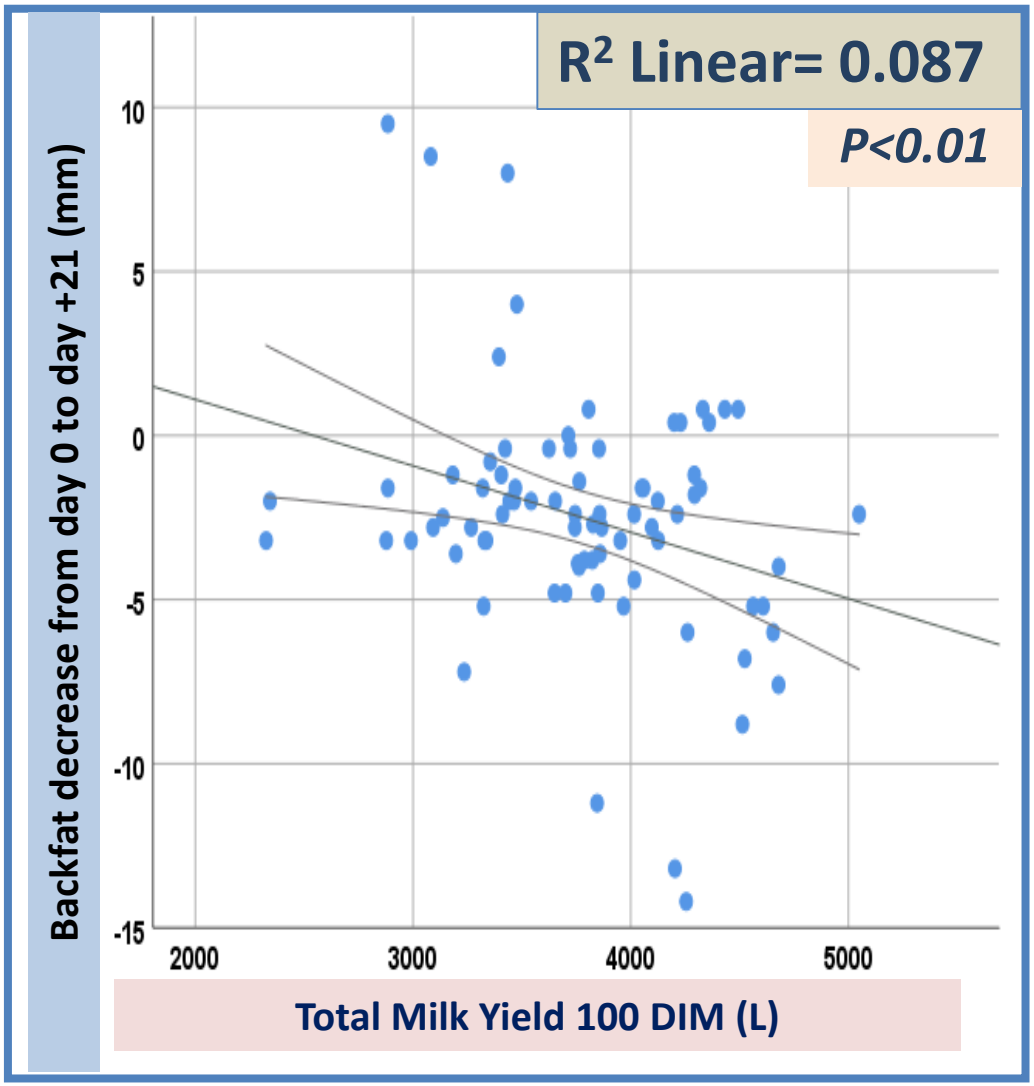


Relationship of fat mobilization & milk yield

Results



Relationship of fat mobilization & milk yield

1mm decrease

⇩

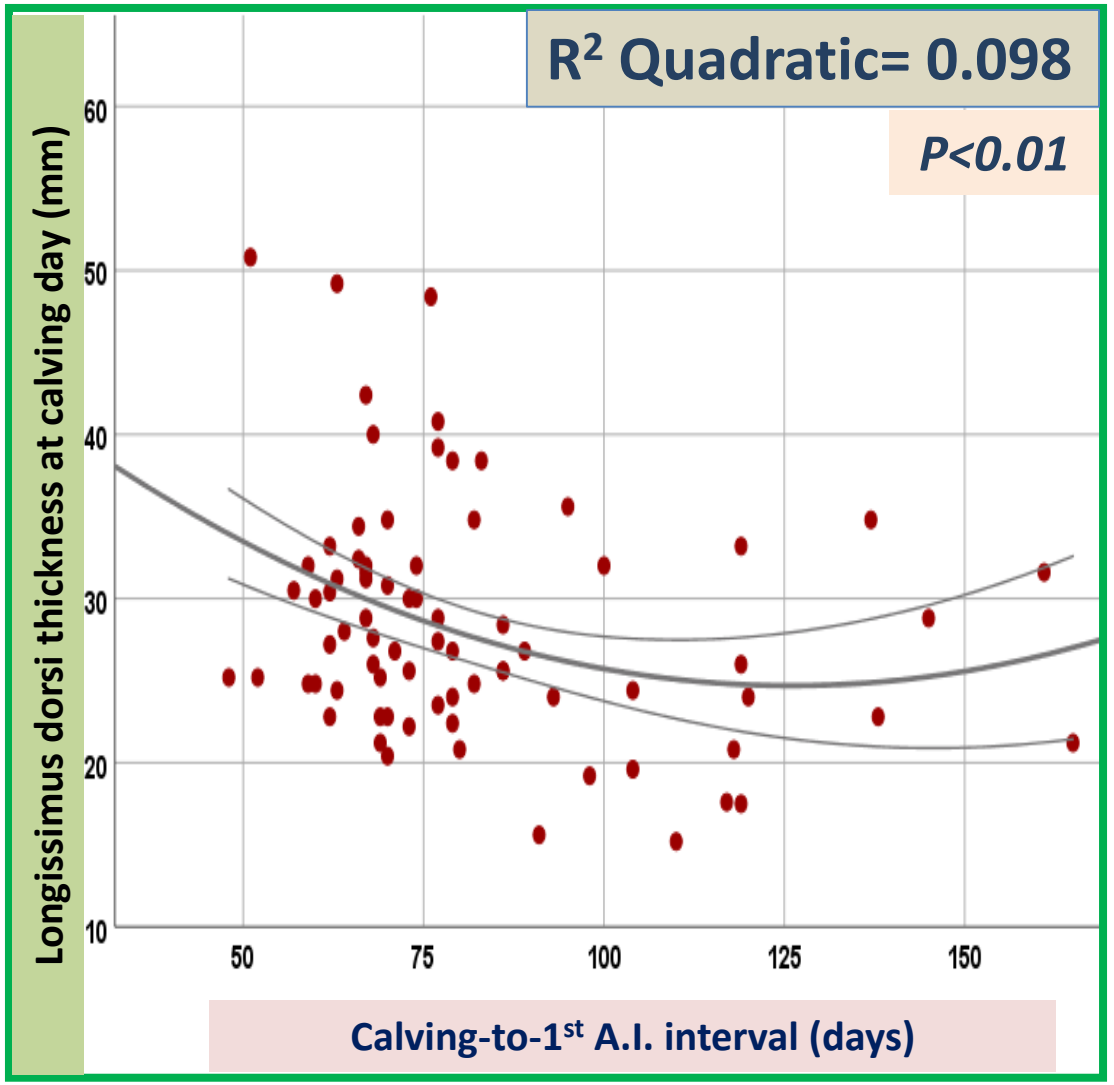
42.9 L

(*95%CI: 11.3-74.5*)

more milk

Results

Relationship of muscle mass & reproduction



Results

Relationship of muscle mass & reproduction

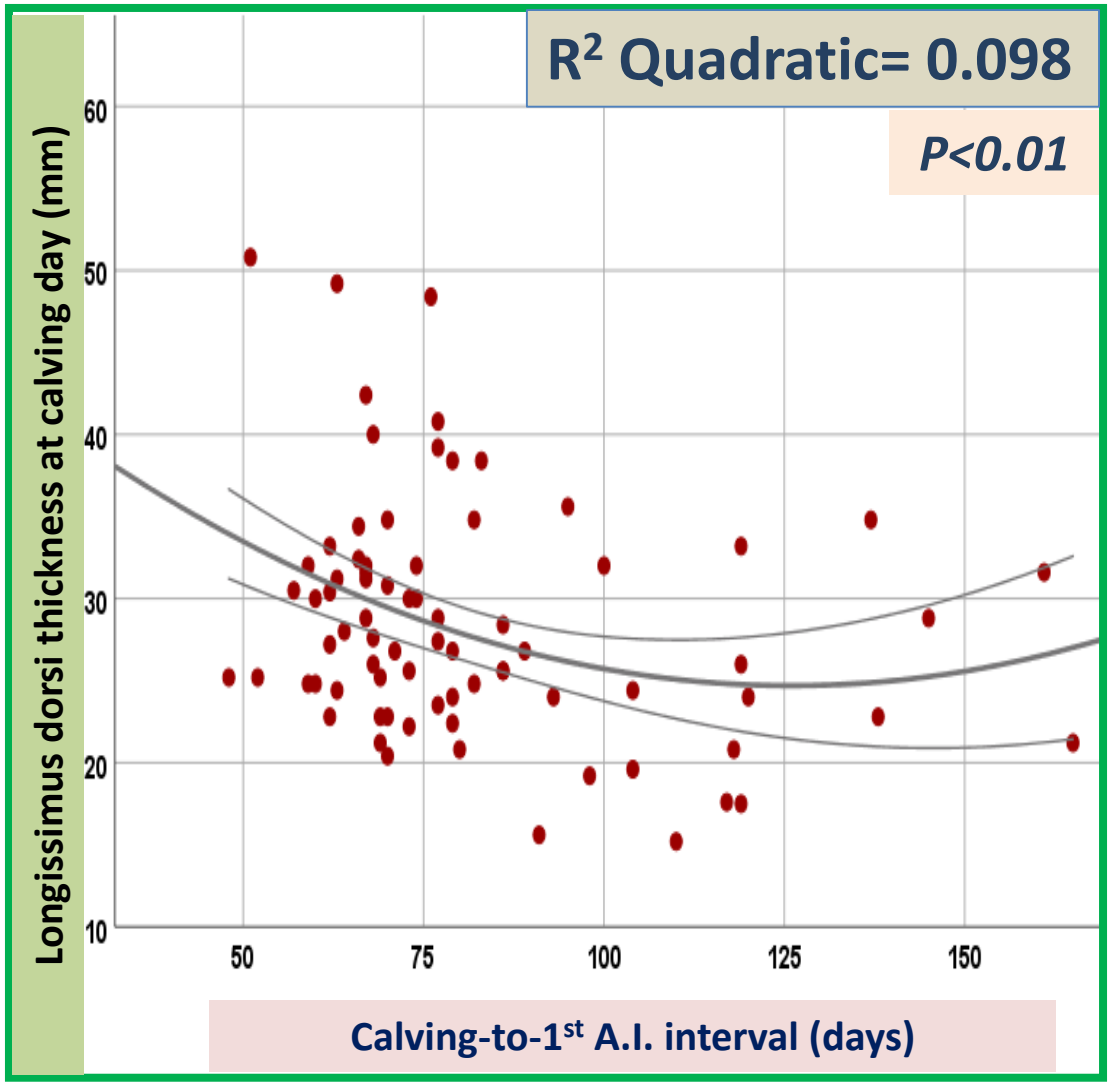
1mm increase

⇩

0.91 days

(95%CI: 0.15-1.68)

shorter



Results

Relationship of muscle mass & reproduction

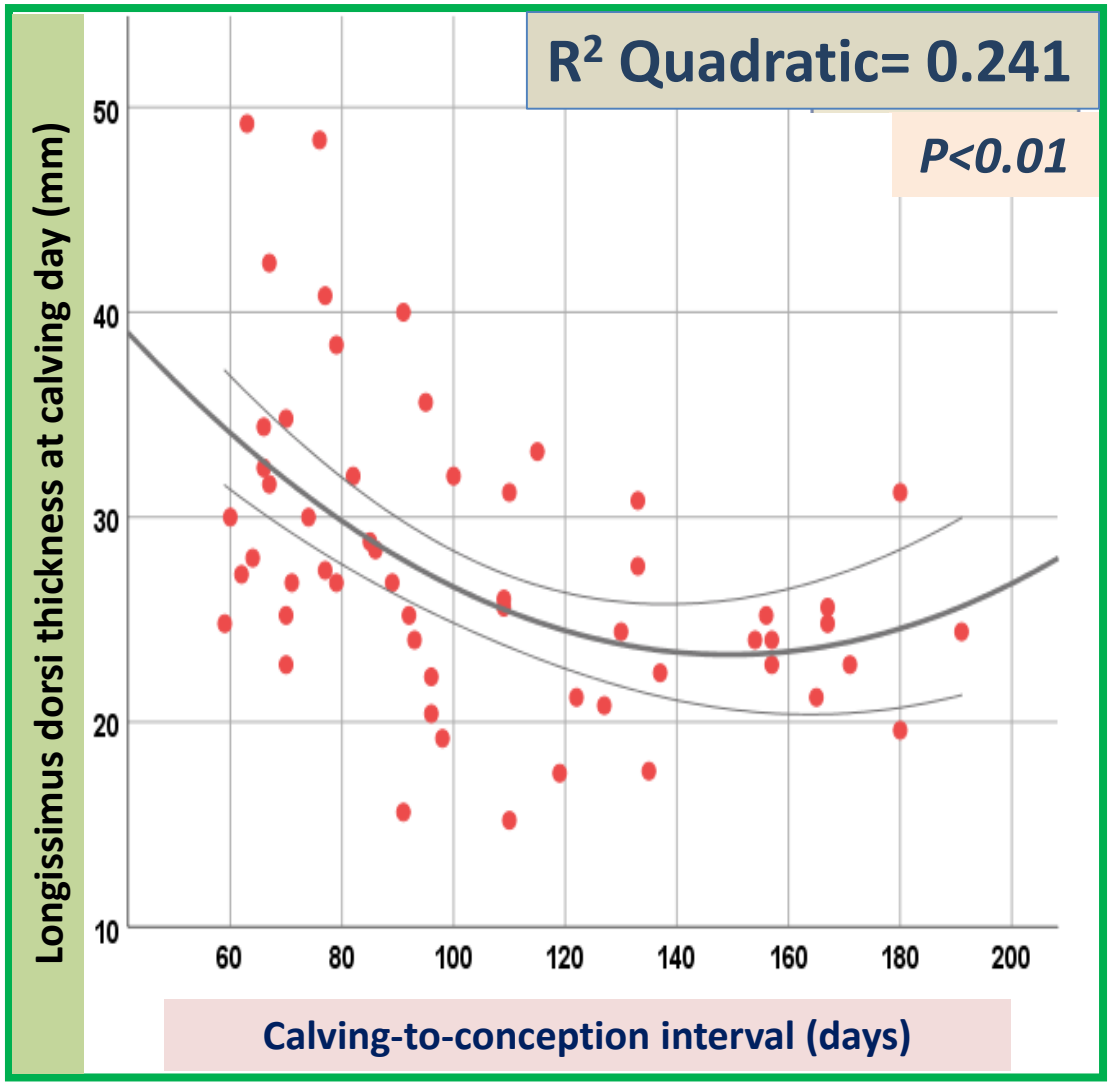
1mm increase

⇩

2.23 days

(95%CI: 0.96-3.49)

shorter



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  - **Method for more precise estimation of muscle reserves?**

- ✓ **In primiparous cows, LDT more significant effect on BCS variance**
  - **Recommendations for heifers → calving at higher BCS**

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- ✓ 12% CP dry-cow ration → muscle mobilized 3 weeks before calving

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- ✓ The more **muscle** reserves at calving → **Better reproduction**

Conclusions

- ✓ The more fat mobilized → More milk
- ✓ 12% CP dry-cow ration → muscle mobilized 3 weeks before calving
- ✓ The more muscle reserves at calving → Better reproduction
- ✓ Minimizing muscle tissue mobilization during the close-up period


Thank you for your attention!