ARISTOTLE UNIVERSITY OF THESSALONIKI

Relationship of bodyweight & body condition score with backfat and *longissimus dorsi* thickness in four dairy sheep breeds

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Introduction

Body condition of small ruminants

✓ **Health & production performance**

✓ **Different physiological stages**

→ **energy requirements**

→ **restoration/mobilization body reserves**

Introduction

Body condition of small ruminants

Assessment

- ✓ **Body weight (BW) measurement**

  Gut fill, pregnancy, skeletal fracture??

- ✓ **Body condition score (BCS) by palpation**

  Technique & scale developed on meat and wool sheep!!

- ✓ **Ultrasonography**

  - **Backfat thickness (BFT)**
  - **Longissimus dorsi muscle thickness (LDT)**

  No evidence for the validity of this methodology in dairy sheep

Objective

✓ **ultrasound measurements of BFT & LDT**

to evaluate BCS & BW changes

in 4 different dairy breeds of sheep

Materials & Methods

- ✓ **30 non-pregnant, non lactating adult dairy ewes**

  n= 8 Chios, n= 8 Frizarta, n= 7 Lacaune , n= 7 Assaf

- ✓ **Different planes of nutrition**

  - 6-weeks period of over-feeding- *fattening*

  - 4-weeks period of restricted feeding- *fasting*

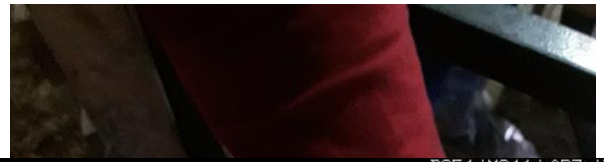
Materials & Methods

✓ **individual BW**

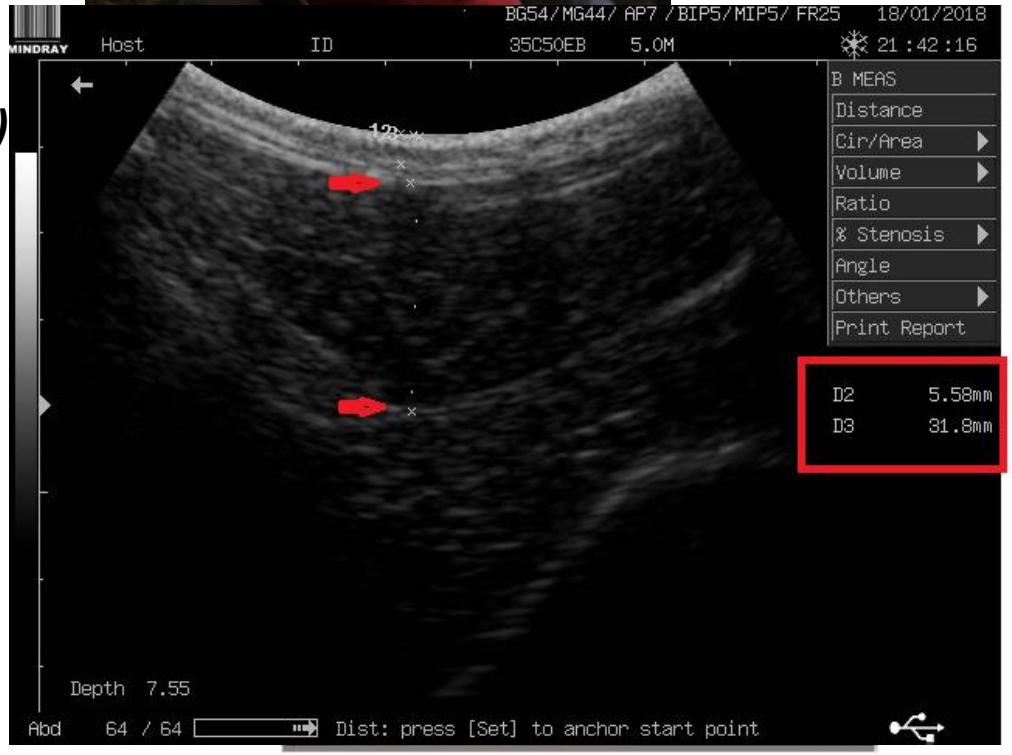
✓ **BCS**

- ***0-5 scale (Russel et al., 1969)/ 0.25 & 0.5 increments)***

Materials & Methods



- ✓ **U/S measurements** ***(5 MHz linear)***
  - **BFT**
  - **LDT**



Materials & Methods

- ✓ **Repeated measures mixed models (effect of BFT & LDT on BCS)**
  - **Fixed effects (Breed; Exp. Period)**
  - **Random effect (Ewe)**
- ✓ **Pairwise linear correlations between BCS, BW, BFT & LDT within each breed**

Statistical analysis
IBM SPSS v.25

Results

Experimental period - Fattening *(6 weeks)*

Breed	n	Initial BW	Initial BCS	Final BW	Final BCS
Chios	8	49.2 (±5.9)	2.63 (±0.19)	54.3 (±7.4)	3.19 (±0.32)
Frizarta	8	58.0 (±5.6)	2.88 (±0.44)	66.6 (±7.1)	3.50 (±0.63)
Lacaune	7	58.43±7.7)	2.46 (±0.34)	64.8 (±8.2)	3.07 (±0.50)
Assaf	7	61.93(±8.5)	2.32 (±0.37)	66.9 (±11.9)	3.07 (±0.55)

Results

Experimental period - Fasting *(4 weeks)*

Breed	n	Initial BW	Initial BCS	Final BW	Final BCS
Chios	8	52.3 (±8.0)	2.94 (±0.18)	46.4 (±8.0)	2.25 (±0.19)
Frizarta	8	62.2 (±5.4)	3.34 (±0.46)	55.6 (±6.6)	2.67 (±0.20)
Lacaune	7	60.4 (±6.7)	2.89 (±0.32)	48.1 (±6.6)	1.93 (±0.45)
Assaf	7	64.1 (±9.5)	2.68 (±0.35)	54.9 (±6.9)	1.89 (±0.45)

Results

Experimental period - Fattening *(6 weeks)*

Breed	n	Initial BW	Initial BCS	Final BW	Final BCS
Chios	8	49.2 (±5.9)	2.63 (±0.19)	54.3 (±7.4)	3.19 (±0.32)
Frizarta	8	58 (±5.63)	2.88 (±0.44)	66.63 (±7.12)	3.5 (±0.63)
Lacaune	7	58.43(±7.74)	2.46 (±0.34)	64.8 (±8.22)	3.07 (±0.5)
Assaf	7	61.93 (±8.47)	2.32 (±0.37)	66.86 (±11.86)	3.07 (±0.55)

+ 0.75 units

Results

Experimental period - Fattening *(6 weeks)*

Breed	n	Initial BW	Initial BCS	Final BW	Final BCS
Chios	8	49.2 (±5.9)	2.63 (±0.19)	54.3 (±7.4)	3.19 (±0.32)
Frizarta	8	58 (±5.63)	2.88 (±0.44)	66.63 (±7.12)	3.5 (±0.63)
Lacaune	7	58.43(±7.74)	2.46 (±0.34)	64.8 (±8.22)	3.07 (±0.5)
Assaf	7	61.93 (±8.47)	2.32 (±0.37)	66.86 (±11.86)	3.07 (±0.55)

+ 8.63 kg

Results

Experimental period - Fattening *(6 weeks)*

Breed	n	Initial BW	Initial BCS	Final BW	Final BCS
Chios	8	49.2 (±5.9)	2.63 (±0.19)	54.3 (±7.4)	3.19 (±0.32)
		+ 5.12 kg			
Frizarta	8	58 (±5.63)	2.88 (±0.44)	66.63 (±7.12)	3.5 (±0.63)
		+ 8.63 kg			
Lacaune	7	58.43(±7.74)	2.46 (±0.34)	64.8 (±8.22)	3.07 (±0.5)
		+ 6.36 kg			
Assaf	7	61.93 (±8.47)	2.32 (±0.37)	66.86 (±11.86)	3.07 (±0.55)
		+ 4.93 kg			

Results

Experimental period - Fasting *(4 weeks)*

Breed	n	Initial BW	Initial BCS	Final BW	Final BCS
Chios	8	52.25 (±8)	2.94 (±0.18)	46.44 (±8)	2.25 (±0.19)
Frizarta	8	62.19 (±5.44)	3.34 (±0.46)	55.58 (±6.55)	2.67 (±0.2)
Lacaune	7	60.43 (±6.67)	2.89 (±0.32)	48.14 (±6.63)	1.93 (±0.45)
Assaf	7	64.07 (±9.5)	2.68 (±0.35)	54.86 (±6.9)	1.89 (±0.45)

- 0.96 units

Results

Experimental period - Fasting *(4 weeks)*

Breed	n	Initial BW	Initial BCS	Final BW	Final BCS
Chios	8	52.25 (±8)	2.94 (±0.18)	46.44 (±8)	2.25 (±0.19)
Frizarta	8	62.19 (±5.44)	3.34 (±0.46)	55.58 (±6.55)	2.67 (±0.2)
Lacaune	7	60.43 (±6.67)	2.89 (±0.32)	48.14 (±6.63)	1.93 (±0.45)
Assaf	7	64.07 (±9.5)	2.68 (±0.35)	54.86 (±6.9)	1.89 (±0.45)

- 0.96 units

- 0.79 units

Results

Experimental period - Fasting *(4 weeks)*

Breed	n	Initial BW	Initial BCS	Final BW	Final BCS
Chios	8	52.25 (±8)	2.94 (±0.18)	46.44 (±8)	2.25 (±0.19)
			- 0.69 units		
Frizarta	8	62.19 (±5.44)	3.34 (±0.46)	55.58 (±6.55)	2.67 (±0.2)
			- 0.67 units		
Lacaune	7	60.43 (±6.67)	2.89 (±0.32)	48.14 (±6.63)	1.93 (±0.45)
			- 0.96 units		
Assaf	7	64.07 (±9.5)	2.68 (±0.35)	54.86 (±6.9)	1.89 (±0.45)
			- 0.79 units		

Results

Experimental period - Fasting *(4 weeks)*

Breed	n	Initial BW	Initial BCS	Final BW	Final BCS
Chios	8	52.25 (±8)	2.94 (±0.18)	46.44 (±8)	2.25 (±0.19)
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Lacaune	7	60.43 (±6.67)	2.89 (±0.32)	48.14 (±6.63)	1.93 (±0.45)
Assaf	7	64.07 (±9.5)	2.68 (±0.35)	54.86 (±6.9)	1.89 (±0.45)

- 12.29 kg

- 9.21 kg

Results

Experimental period - Fasting *(4 weeks)*

Breed	n	Initial BW	Initial BCS	Final BW	Final BCS
Chios	8	52.25 (±8)	2.94 (±0.18)	46.44 (±8)	2.25 (±0.19)
		- 5.81 kg			
Frizarta	8	62.19 (±5.44)	3.34 (±0.46)	55.58 (±6.55)	2.67 (±0.2)
		- 6.61 kg			
Lacaune	7	60.43 (±6.67)	2.89 (±0.32)	48.14 (±6.63)	1.93 (±0.45)
		- 12.29 kg			
Assaf	7	64.07 (±9.5)	2.68 (±0.35)	54.86 (±6.9)	1.89 (±0.45)
		- 9.21 kg			

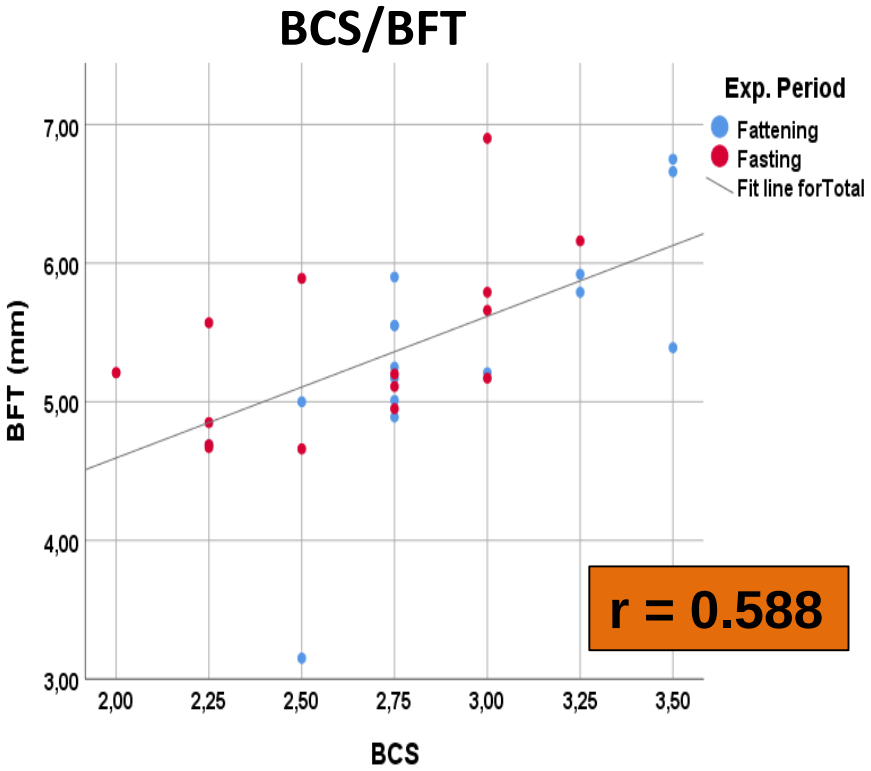
Results

Factors affecting BCS

Parameter	F	*P-value*
Intercept	8.09	*0.005*
Exp. Period	164.99	*<0.001*
Breed	12.72	*<0.001*
BFT	55.75	*<0.001*
LDT	57.64	*<0.001*

Results

Chios

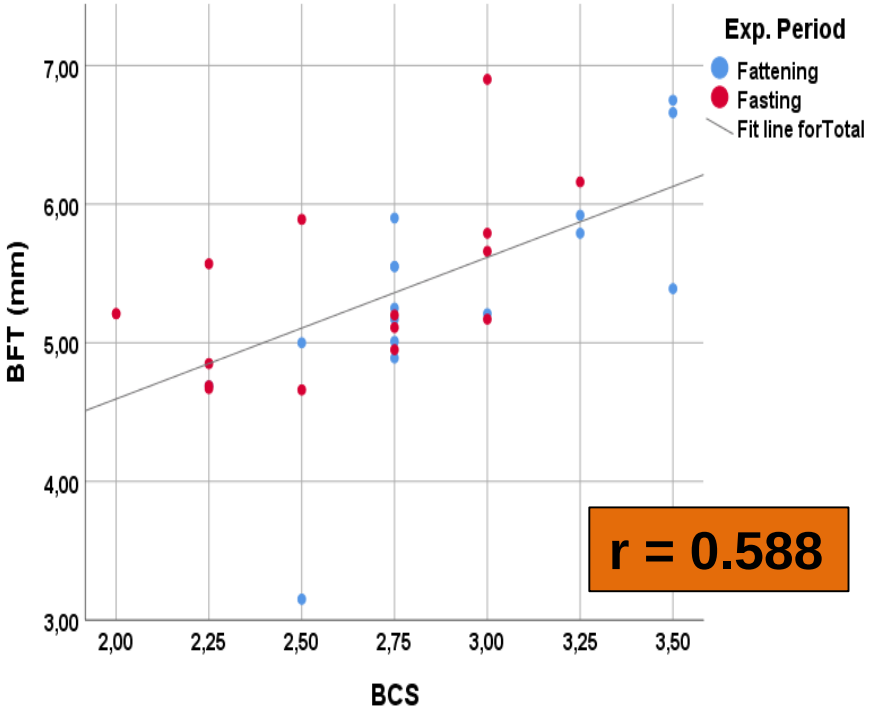


r = 0.588

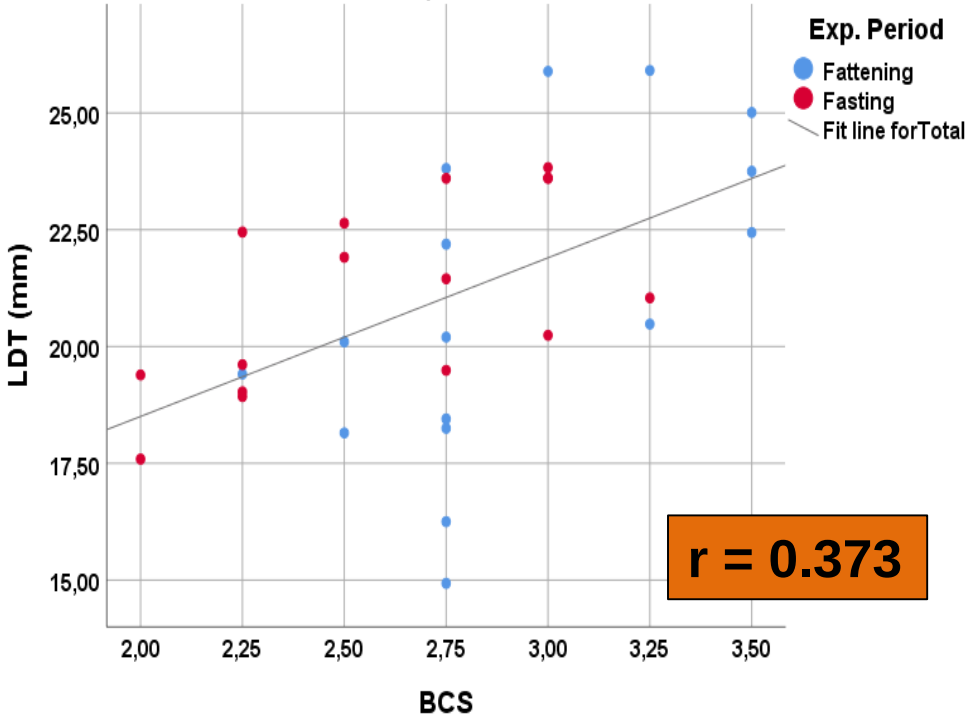
Results

Chios

BCS/BFT

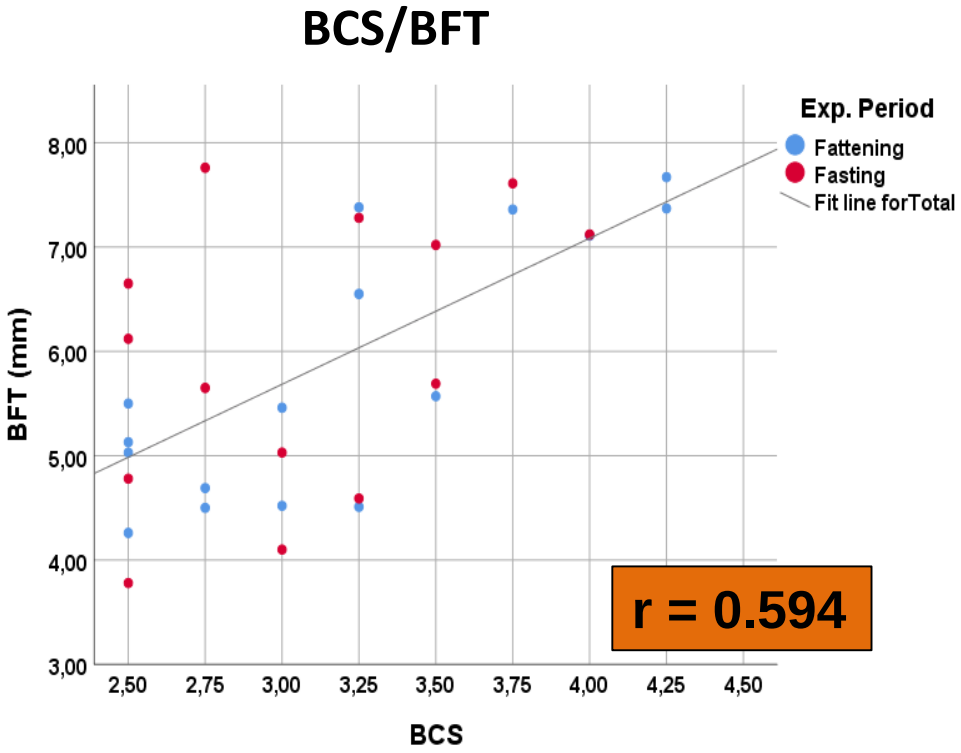


BCS/LDT



Results

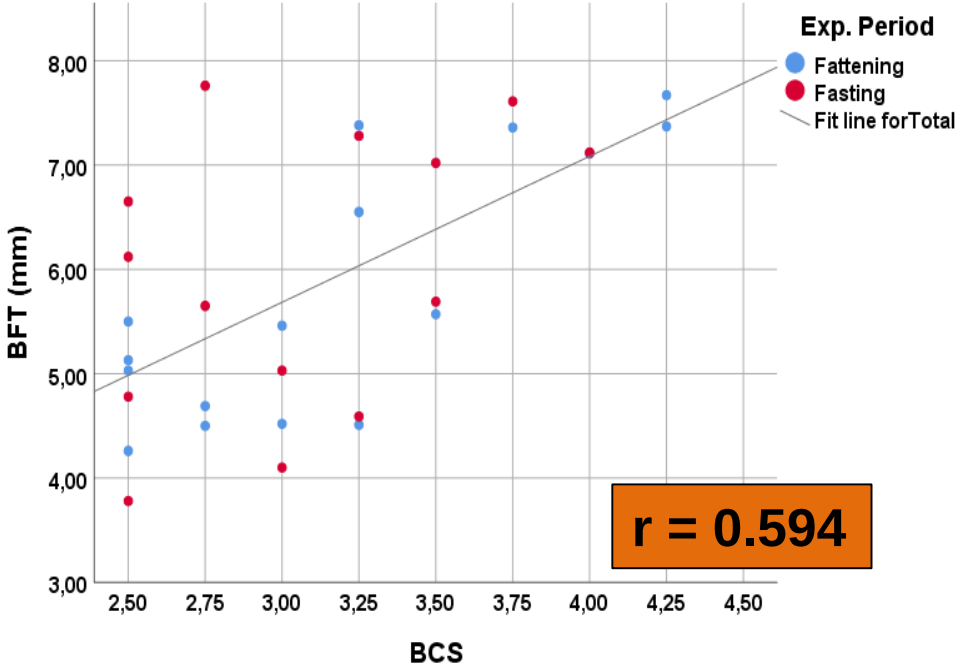
Frizarta



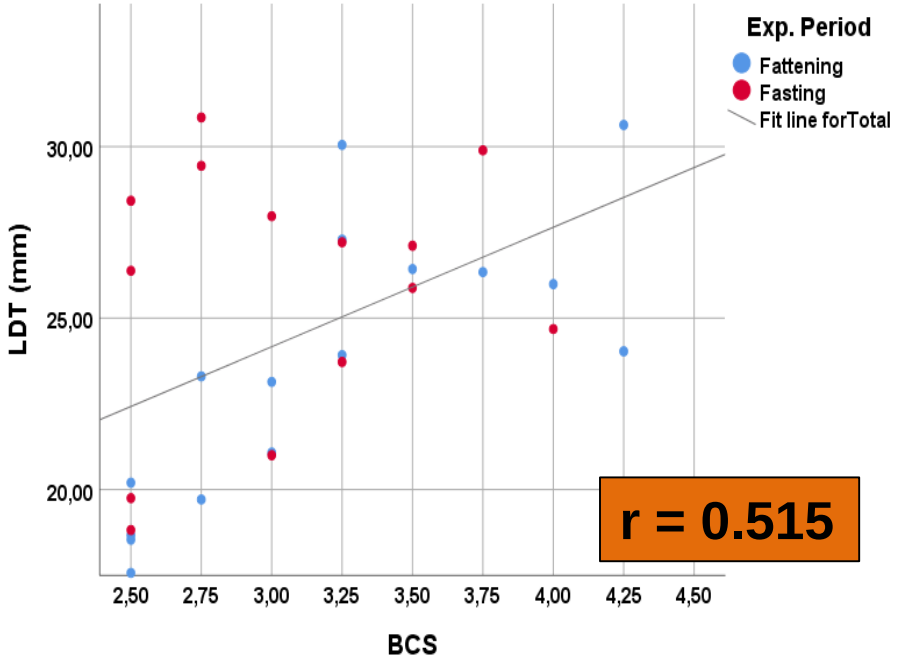
Results

Frizarta

BCS/BFT

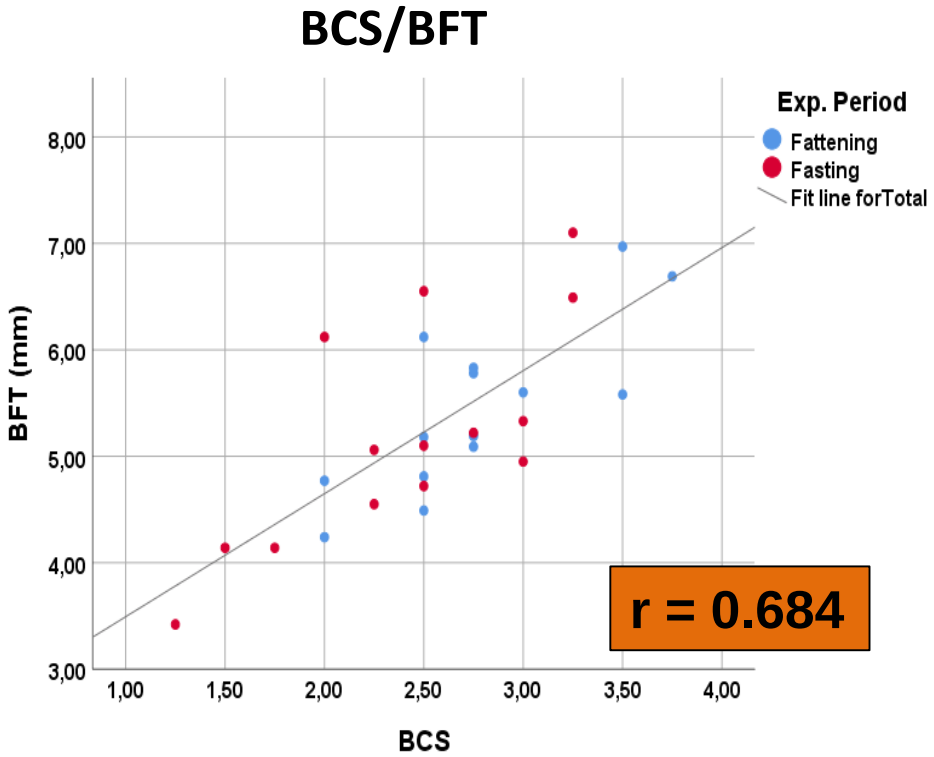


BCS/LDT



Results

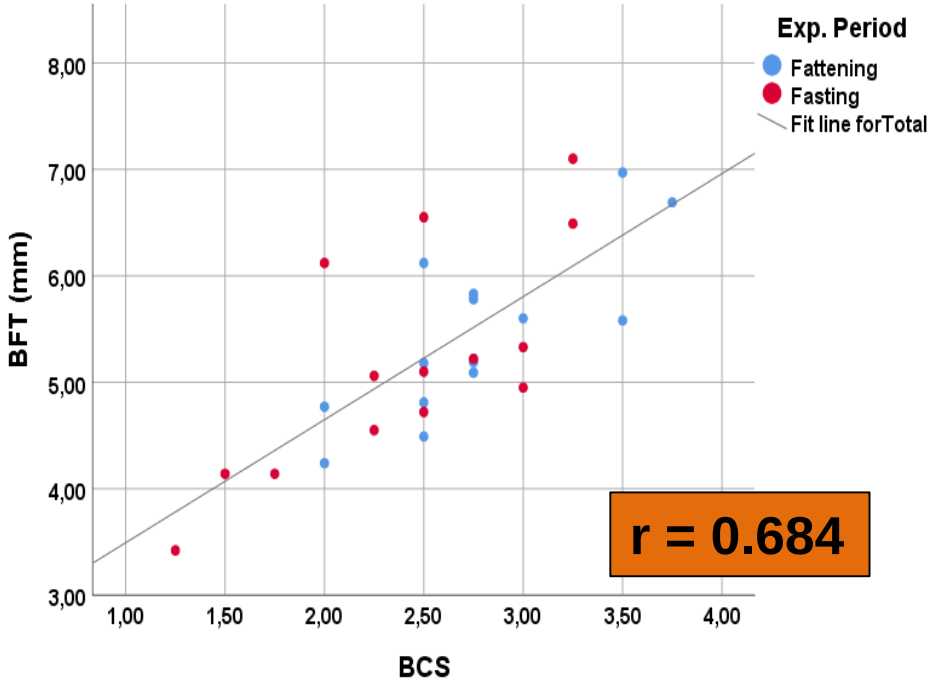
Lacaune



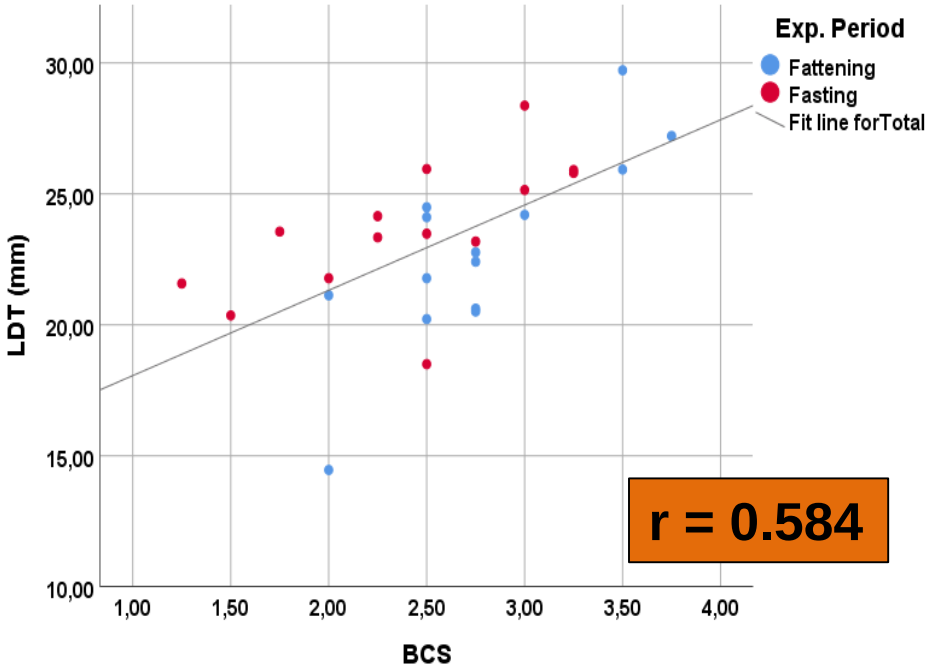
Results

Lacaune

BCS/BFT

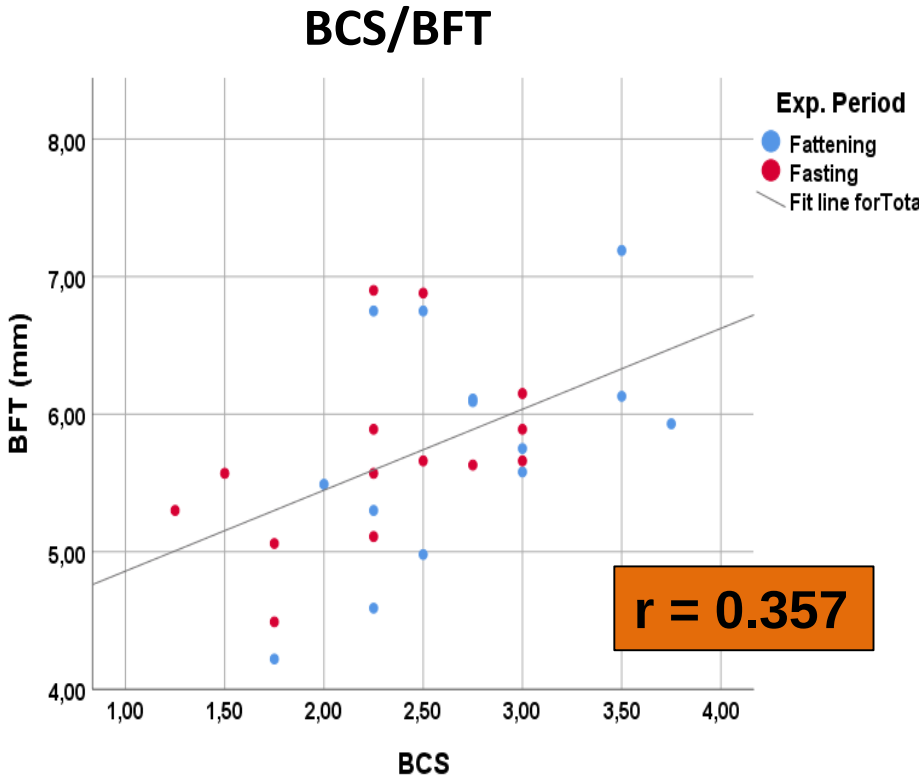


BCS/LDT



Results

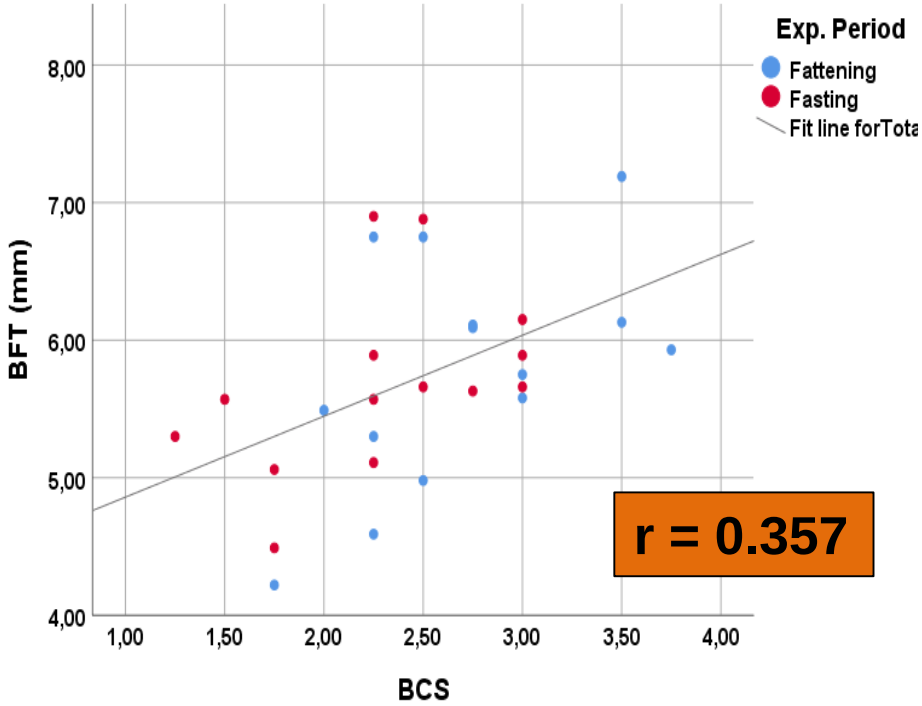
Assaf



Results

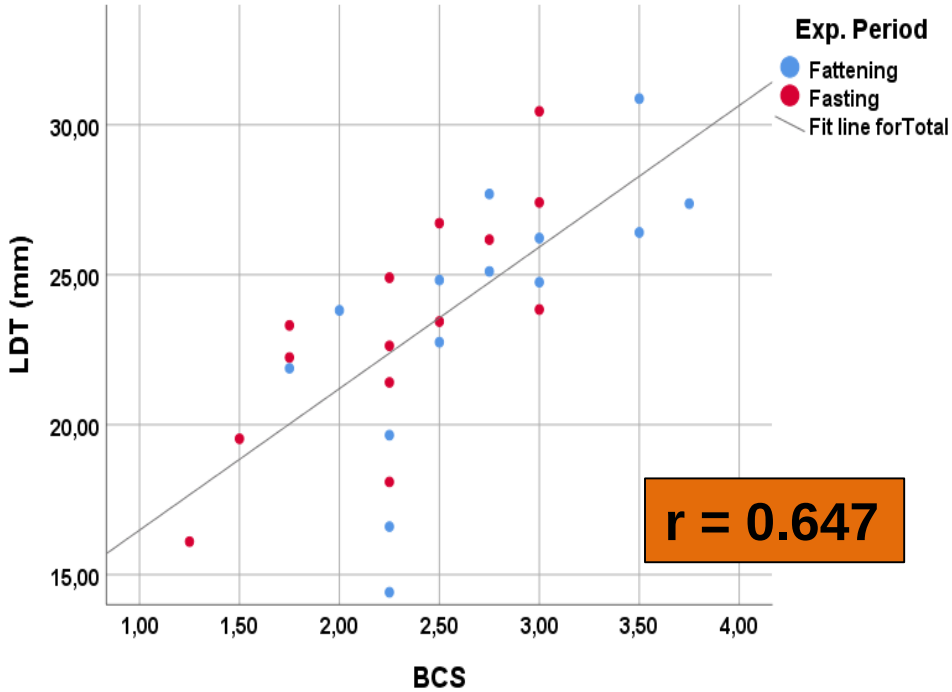
Assaf

BCS/BFT



r = 0.357

BCS/LDT



r = 0.647

Results

Breed	BCS/BW
Chios	0.312
Frizarta	0.363
Lacaune	0.876
Assaf	0.137

Results

Breed	BCS/BW
Chios	0.312
Frizarta	0.363
Lacaune	**0.876**
Assaf	0.137

Conclusions

- ✓ **Variation among breeds in changes of BCS and BW under the different nutritional periods**

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  → **differences in body conformation & fat distribution**

Conclusions

- ✓ **Variation among breeds in changes of BCS and BW under the different nutritional periods**

  → **differences in body conformation & fat distribution**

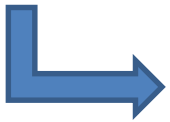
- ✓ **Breed & experimental period had a significant effect on the association of BFT and LDT with BCS estimates**

Conclusions

- ✓ **Variation in correlations of BFT & LDT with BCS among the four dairy breeds**

Conclusions

- ✓ **Variation in correlations of BFT & LDT with BCS among the four dairy breeds**



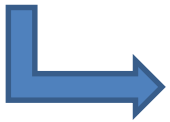
Assaf/Chios semifat-tailed breeds

Lacaune more similar conformation meat breeds

Frizarta composite breed with recently stabilized phenotypes

Conclusions

- ✓ **Variation in correlations of BFT & LDT with BCS among the four dairy breeds**



Assaf/Chios semifat-tailed breeds

Lacaune more similar conformation meat breeds

Frizarta composite breed with recently stabilized phenotypes

- ✓ **The existing BCS scale does not describe accurately the depletion/ restoration of body reserves in different breeds of dairy sheep**


Thank you for your attention!