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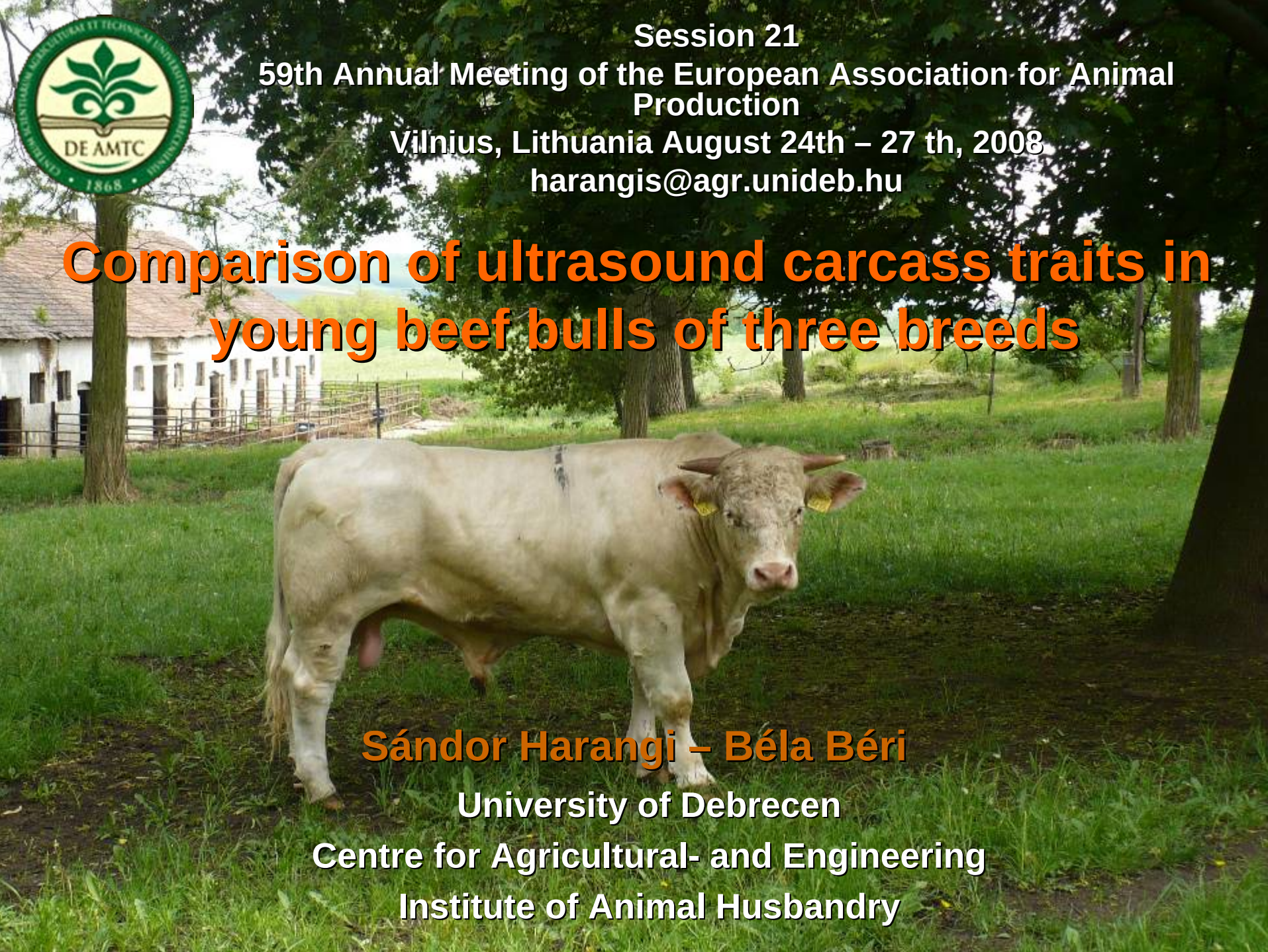
Comparison of ultrasound carcass traits in young beef bulls of three breeds



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Introduction

- **Considerable changes in beef cattle sector - quality-based market:** **demands of excellent quality, uniform end-product** ➡ improver bulls in carcass traits
- **Selection of stock animals on the basis of carcass traits:**

I. with the evaluation of progenies' carcasses

Progeny testing: labourious, expensive process

average time period to prove a sire for carcass merit is 3 to 5 years

II. with the use of real-time ultrasound (RTU):

- a noninvasive method for estimating carcass traits on live animals
- a quick, least expensive, accurate and precise method to obtain live-animal measures of body composition

Progeny testing: much easier and with less costs

- **Advantages of using scan data:**
  - additional information about carcass traits of that animal or its progeny
  - identifying sires or bloodlines that are superior or inferior
- ***Use of ultrasound technique:*** in some countries used widely in the evaluation of young bulls participating in self- or progeny performance test
- **Self-performance test in Hungary:** growing capacity, growth rate and phenotype of young bulls are measured

Aims

The main goals of our examination were to assess:

- how does the ultrasound parameters of three beef breeds change at the beginning and at the end of SPT
- how does the ribeye area and subcutaneous fat thickness increase during the self performance test
- what relationship exist between the ultrasound parameters at the beginning and at the end of SPT

Materials and methods

- Young beef bulls perform in self-performance test (SPT) made on farm
- Subcutanous fat depth and ribeye area were measured at the beginning and at the end of SPT

Hungarian Simmental (n=19)

Charolais (n=16)

Limousin (n=11)

- **Housing:** animals were kept in small groups, on deep litter in barn with paddock
- **Feeding:** During the testing period the animals were fed on silage, grass hay and concentrate on the ration of 100 kg live weight / 1 kg concentrate

Ultrasound devices

Ultrasound machine:

Falco 100 real-time scanner

Transducer:

ASP - 3,5 MHz, 18 cm

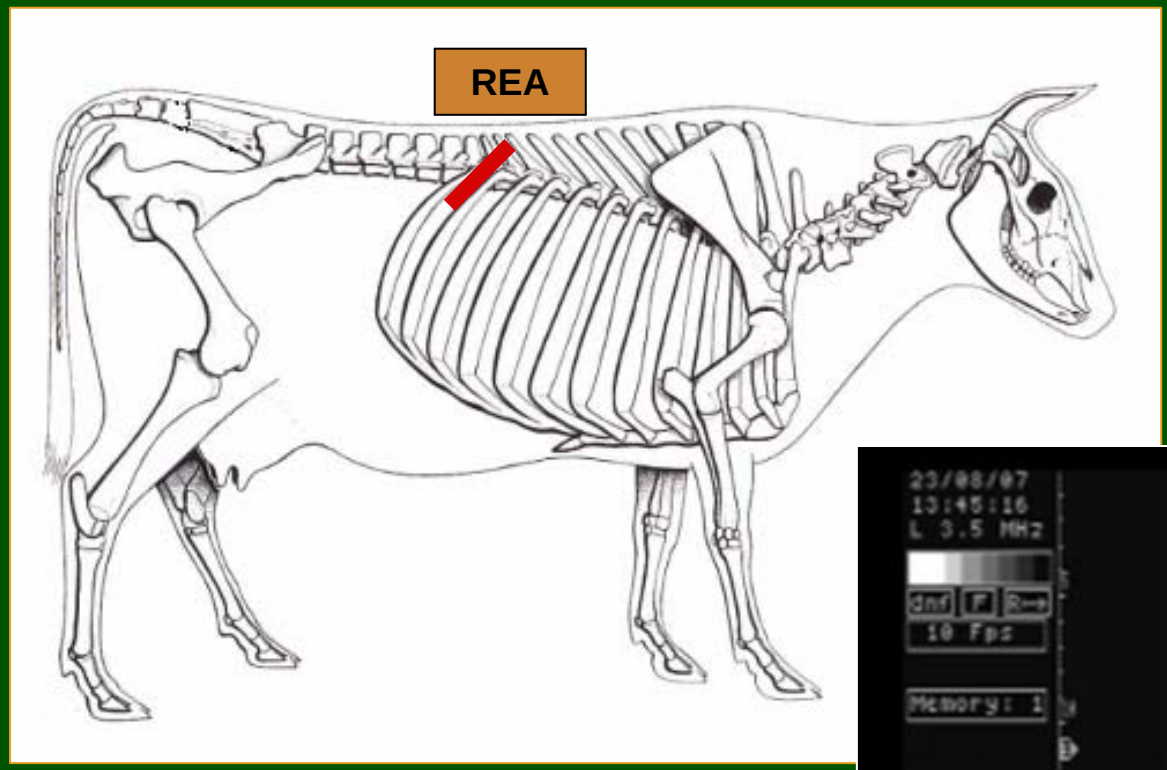
Measurement depth:

- *Ribeye area : 23 cm*
- *Subcutaneous rump fat depth (P8): 5 cm*

Image capturing, storing and analyzing:

- *portable PC*
- *Ultrasound Engineer 3.0*

Ribeye area – REA

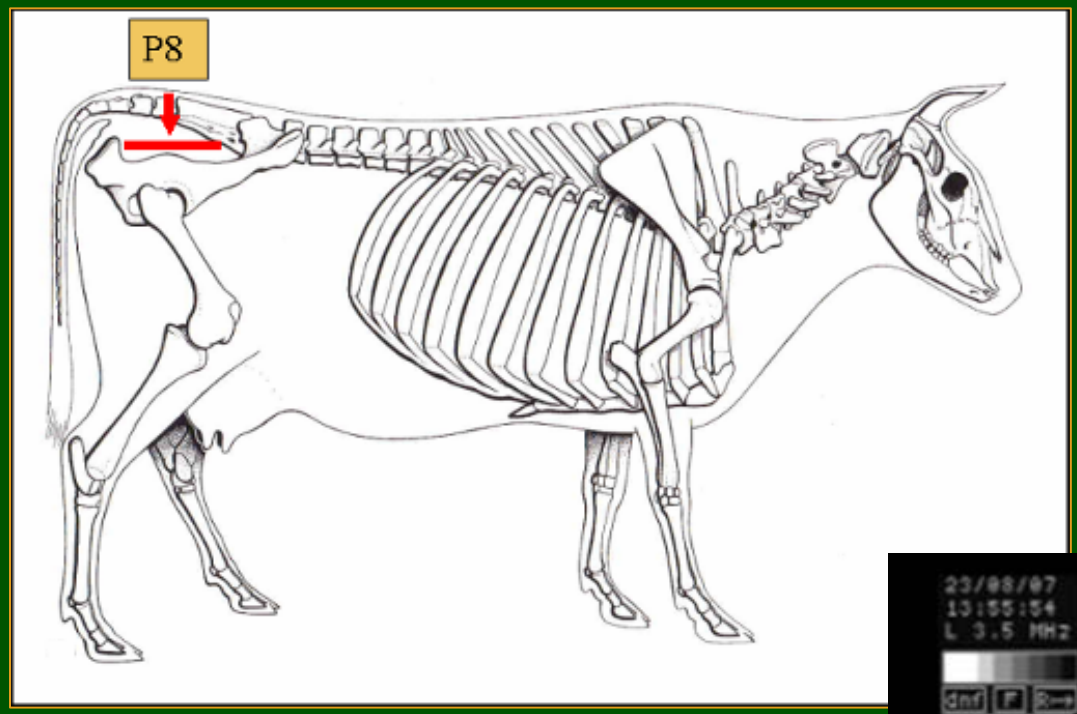


Source: Robinson et al. (1992)

Backfat thickness – BFAT

Source: Perkins et al. (1996)

P8 (subcutaneous rump fat depth at P8 site)



Source: Reverter et al. (2000)

Results and discussion

Ultrasound parameters, age and live weight of the evaluated breeds at the beginning of self-performance test

Tulajdonságok	Limousin n=11	Hungarian Simmental n=19	Charolais n=16	Total n=46
	$\bar{x} \pm s$			
Age, day	270.2±20.7^{a}	253.7±24.0^{a}	269.4±4.3^{a}	263.1±19.9
Live weight, kg	332.8±54.2^{ab}	307.4±30.3^{a}	356.0±48.7^{b}	330.4±47.6
Ribeye area, cm^2	64.4±9.3^{ab}	59.9±6.9^{a}	67.8±10.9^{b}	63.7±9.5
Backfat thickness, mm	2.16±0.29^{a}	2.49±0.54^{a}	2.11±0.44^{a}	2.28±0.48
P8, mm	2.05±0.74^{a}	2.69±0.68^{b}	2.37±0.62^{ab}	2.42±0.71

a,b:Difference is significant on P<0.05 level between values containing different letters

Ultrasound parameters, age and live weight of the evaluated breeds at the end of self-performance test

Traits	Limousin n=11	Hungarian Simmental n=19	Charolais n=16	Total n=46
	$\bar{x} \pm$ S			
Age, day	395.2±20.7^{a}	375.1±24.8^{a}	390.4±4.3^{a}	385.2±20.6
Live weight, kg	506.0±54.8^{a}	502.3±44.0^{a}	517.3±60.7^{a}	508.4±52.2
Ribeye area, cm^2	98.1±5.8^{a}	88.1±8.6^{b}	93.2±11.6^{ab}	92.3±9.9
Backfat thickness, mm	3.74±0.60^{ab}	3.94±0.88^{b}	3.28±0.63^{a}	3.66±0.78
P8, mm	3.95±0.84^{a}	5.10±1.03^{b}	3.91±0.91^{a}	4.41±1.09
Daily average gain, g/day	1363±109^{a}	1603±195^{b}	1333±189^{a}	1457±214

a, b: Difference is significant on P<0.05 level between values containing different letters

Correlation coefficients of ultrasound measured parameters to each other and to other traits (n=46)

Traits		Beginning of self-performance test				End of self-performance test			
		Live weight	REA	P8	BFAT	Live weight	REA	P8	BFAT
		Correlation coefficient, r							
Beginning of SPT	Age	**0.48****	NS	NS	NS				
	Live weight		**0.80****	**0.31***	NS	**0.85****			
	REA			NS	NS		**0.74****		
	P8				**0.68****			**0.62****	
	BFAT								**0.60****
End of SPT	Age					**0.39****	NS	NS	NS
	Live weight						**0.64****	NS	**0.47****
	REA							NS	**0.37****
	P8								**0.61****

*Difference is significant on *P<0.05 level, on **P<0.01 level*

Implications

- In Hungary it would be necesarry to utilize ultrasound carcass data in beef cattle genetic improvement programs. With our examination we would like to call the attention to this fact.

- Ultrasound measurements are suitable for selecting superior bull calves which can be entered in the self performance test on farm or on a test station.

- With RTU technique differences between young bulls in muscling and subcutaneous fat deposition can be revealed.

- In possession of scan data it is possible to identify sires that are superior for a particular trait of interest.

Thank you for your attention!