



Vigour and performance of German Angus cattle with different Myostatin-Genotypes

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62nd Annual Meeting of EAAP 2011 in Stavanger – Norway, 29th August -1st September



Aim of the present study

Realize possible influences of:

- ⊙ increased amount of higher birth weights
- ⊙ higher frequency of dystocia
- ⊙ deficiency of the vitality

of German Angus calves



Structure

- ④ Literature
- ④ Materials and Methods
- ④ Discussion of the Results
- ④ Conclusion



Myostatine-Gene

- ④ Charlier *et al.* (1995):
Myostatine-Gene on bovine chromosome two
- ④ Grobet *et al.* (2000):
autosomal recessive inheritance
- ④ Hanset (1987):
Three Genotypes:
 - ④ homozygous free
 - ④ heterozygous
 - ④ homozygous double muscling

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Variants of mutations of the Myostatine-Gene

Belgian Blue
Angus
South Devon

nt821

F94L

Limousin

Dunner et al. (2003)

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German Angus Cattle

Crossbreed

Holstein Friesian

Aberdeen Angus

Simmental

Belgian Blue

Gelbvieh

Drögemeyer (1956)



Data Collection

Data collection

- September 2009 until March 2010
- 31 herd book breeders from all federal states of Germany

Animals

- 952 German Angus herd book cows
- 732 German Angus herd book calves

Genotyping of the Myostatine-Gene

- SNP – Genotyping (Eurofins Medigenomix GmbH®)



Statistical model

$$Y_{ijklm} = \mu + D_i + L_j + R_k + S_m + B_l(R_k) + e_{ijklm}$$

Y = observation

μ = sample mean

D = fixed effect (double muscling gene)

L = fixed effect (number of lactation)

R = fixed effect (region)

S = fixed effect (sex)

$B(R)$ = fixed effect (farm within the region)

e = residual random error



Frequency (%) of the three Myostatine – Genotypes (nt821)

n		Double Muscling Genotype*		
		MH+/MH+	MH+/mh-	mh-/mh-
Cows	936	78.50%	21.40%	0.10%
Bulls	106	85.80%	14.20%	-

MH+/MH+ = homozygous free genotype; MH+/mh- = heterozygous genotype;
mh-/mh- = homozygous double muscling genotype



LSQ-Average (SE as Index) of dates from German Angus Cows

Traits	Myostatine-Genotype			
	n	homozygous free	n	heterozygous
Cow weight [kg]	509	625.3 _{3.7} ^a	127	646.8 _{6.2} ^b
Distance between ischial tuberosities [cm]	747	28.3 _{0.1} ^a	205	28.6 _{0.1} ^b
Breeding value for meat	564	99.9 _{0.5} ^a	154	102.6 _{0.7} ^b

a,b significant differences ($p \leq 0,05$)



LSQ-Average (SE as Index) of dates from German Angus Calves

Traits of calves	Myostatin-Genotype of cows			
	n	homozygous free ¹	n	heterozygous ²
Birth weight [kg]	571	36.9 _{0.27} ^a	161	38.6 _{0.44} ^b
Body length [cm]	476	54.3 _{0.21} ^a	145	55.2 _{0.32} ^b

¹)Homozygous free cows x homozygous free bulls : 100 % homozygous free calves

²)Heterozygous cows x homozygous bulls: 50 % homozygous free, 50 % heterozygous calves

a,b significant differences ($p \leq 0,05$)



Myostatine-Gen in German Angus Cattle, nt821(del11)





Conclusion

- ④ About 20 % of the German Angus herdbook cows carry the heterozygous myostatine-genotype
- ④ Which causes an increase of:
 - ④ cow weight
 - ④ distance between ischial tuberosities
 - ④ breeding value for meat
- ④ Heterozygous Genotype of the cow causes:
 - ④ heavier calves
 - ④ dystocia
 - ④ increased body length of calves



Medigenomix



Interessengemeinschaft Angus



Thank You

