Statistic-genetical analysis of auction price of Texel, Suffolk and German white-headed mutton rams

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Introduction

- 224,000 sheep in Schleswig-Holstein – 6,000 participating in the intensive registration system
- Texel, Suffolk and German white-headed mutton are the most widespread
- Breeding values estimated for 4 traits which are recorded before auction
- Auction price varies considerably from 120 to 2600 €

- Selling surplus of rams at auction yields an additional but important income
- Investigation of important factors affecting auction price needed
- Knowledge on relation between auction price and the traits recorded at licensing are necessary for understanding of price characteristics

Objectives

- Analysis of important factors affecting auction price
- Determination of impact of performance traits recorded at licensing on auction price
- Estimation of genetic parameters for performance traits and auction price

Materials and methods

- Performance trait data from 1988 to 2007

	No. of animals	Mean (SD)
Average daily gain (g)	**19,055**	**357.1** (69.5)
Muscle depth (mm)	**8,950**	**33.6** (4.0)
Fat depth (mm)	**8,950**	**8.1** (2.7)
Conformation (1-9)	**18,928**	**6.3** (0.8)
Muscle mass (1-9)	**18,934**	**6.9** (0.7)
Wool quality (1-9)	**18,934**	**6.9** (0.6)

- Auction price data from 2003 to 2007 in the range from 150 to 1000 €
- Auction prices of 1,133 Texel, 373 Suffolk and 341 German white-headed mutton rams

	Mean (SD)
Auction price (€)	**315.9** (133.7)
Auction price group (1-10)	**5.5** (2.1)
Age at auction (days)	**216.0** (18.8)
Weight at auction (kg)	**74.8** (16.3)

- Statistical analysis of fixed effects carried out using general linear model
- Impact of traits recorded at licensing analysed with multiple regression
- Genetic analysis carried out with multivariate animal model
- ASREML package (*Gilmour et al., 1998*)

Model: Auction price (AP)

AP = Breed
+ Owner
+ PrP genotype
+ Year of auction

Fixed

+ Direct additive genetic effect
+ Residual

Random

Model: Licensing traits (LT)

LT = Average daily gain, Muscle depth, Fat depth, Conformation, Muscle mass, Wool quality

LT = Breed
+ Flock
+ Litter size
+ Parity
+ Year of licensing
+ Regression on age at licensing

Fixed

+ Direct additive genetic effect
+ Residual

Random

Results

F-values for fixed effects on auction price

Weight at licensing	**215.4**
Conformation	**153.7**
PrP genotype	**69.3**
Breed	**45.8**
Muscle mass	**22.4**
Year of auction	**21.0**

Wool quality	**6.3**
Average d. gain	**5.6**
Muscle depth	**4.7**
Owner	**3.1**
Fat depth	0.2 ^{NS}

NS = not significant ($P \leq 0.05$)

LS means of auction price (1-10) for type traits

	Score class		
	≤6	7	≥8
Conformation	3.89 [a]	4.93 [b]	5.24 [c]
Muscle mass	4.37 [a]	4.64 [a]	5.05 [b]
Wool quality	4.49 [a]	4.69 [a]	4.89 [b]

Standard errors: 0.09 - 0.16

P≤0.05

Impact of traits (in %) on auction price

	Texel	Suffolk	G. mutton
Weight at licensing	**74.29**		
Conformation	**17.18**		
Muscle mass	**5.38**		
Average d. gain	**1.93**		
Muscle depth	**0.95**		
Fat depth	0.18 NS		
Wool quality	0.03 NS		

NS = not significant ($P \leq 0.05$)

Impact of traits (in %) on auction price

	Texel	**Suffolk**	G. mutton
Weight at licensing	74.29	**63.59**	
Conformation	17.18	**23.79**	
Muscle mass	5.38	**2.45**	
Average d. gain	1.93	**8.48**	
Muscle depth	0.95	0.02 NS	
Fat depth	0.18 NS	0.00 NS	
Wool quality	0.03 NS	**1.67**	

NS = not significant ($P \leq 0.05$)

Impact of traits (in %) on auction price

	Texel	Suffolk	**G. mutton**
Weight at licensing	74.29	63.59	**75.59**
Conformation	17.18	23.79	**20.41**
Muscle mass	5.38	2.45	**1.61**
Average d. gain	1.93	8.48	0.02 ^{NS}
Muscle depth	0.95	0.02 ^{NS}	**1.85**
Fat depth	0.18 ^{NS}	0.00 ^{NS}	0.00 ^{NS}
Wool quality	0.03 ^{NS}	1.67	0.52 ^{NS}

NS = not significant ($P \leq 0.05$)

Heritability estimates

Auction price	**0.27** (0.06)
Average d. gain	**0.38** (0.02)
Muscle depth	**0.32** (0.03)
Fat depth	**0.38** (0.03)
Conformation	**0.10** (0.01)
Muscle mass	**0.21** (0.02)
Wool quality	**0.24** (0.02)

Genetic and phenotypic correlations

	Auction price	
	r_G	r_P
Average d. gain	**0.42** (0.10)	**0.49** (0.02)
Muscle depth	**0.34** (0.12)	**0.28** (0.02)
Fat depth	0.17 (0.12)	**0.16** (0.02)
Conformation	**0.49** (0.13)	**0.47** (0.02)
Muscle mass	**0.39** (0.12)	**0.42** (0.02)
Wool quality	0.23 (0.12)	**0.18** (0.02)

Conclusions

- Live weight followed by conformation and muscle mass have the major influence
- Minimum impact of ultrasound measurements of muscle and fat depth
- Important effect of breed, PrP genotype and owner of the ram
- Favourable correlations between auction price and performance traits

Thank you for your attention!