

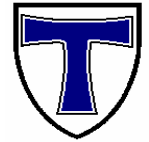
Genetic and environmental factors affecting beef cattle temperament.



Sebastian Hoppe
Institute of Animal Breeding and Genetics
Georg-August-University Goettingen

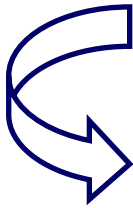


Introduction



Characteristics of beef cattle production:

- Increasing herd sizes
- High level of extensification
 - Production systems
 - Time spend caring for the animals



Lack of habituation of the animals to man because of reduced human-animal-interactions.

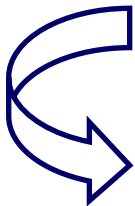


Introduction



Implications of this development:

- Required management tasks like identification of calves, weighing, herding or vaccinations can lead to handling problems.



- Higher risk of injuries.
- Increasing workload for cattle handling.
- Reduction of animal welfare.

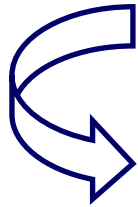


Introduction



Definition of cattle temperament:

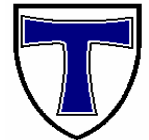
- Temperament is the response of an animal to human presence or human handling which can be quantified by measuring behaviour in a standardised test situation.



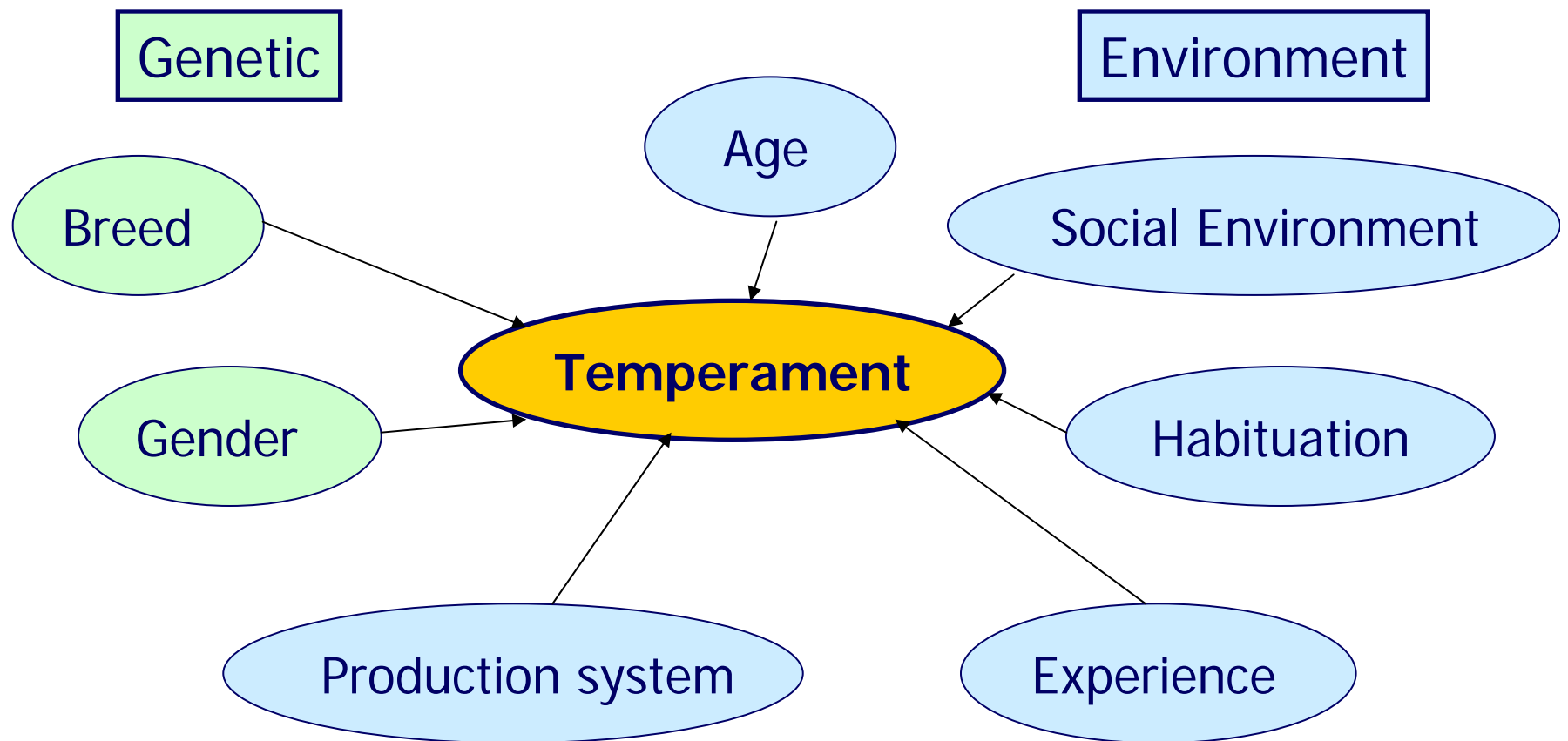
Cattle remaining calm and docile during handling are considered to have a good temperament.



Introduction

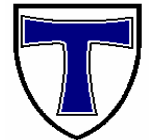


Factors affecting temperament:

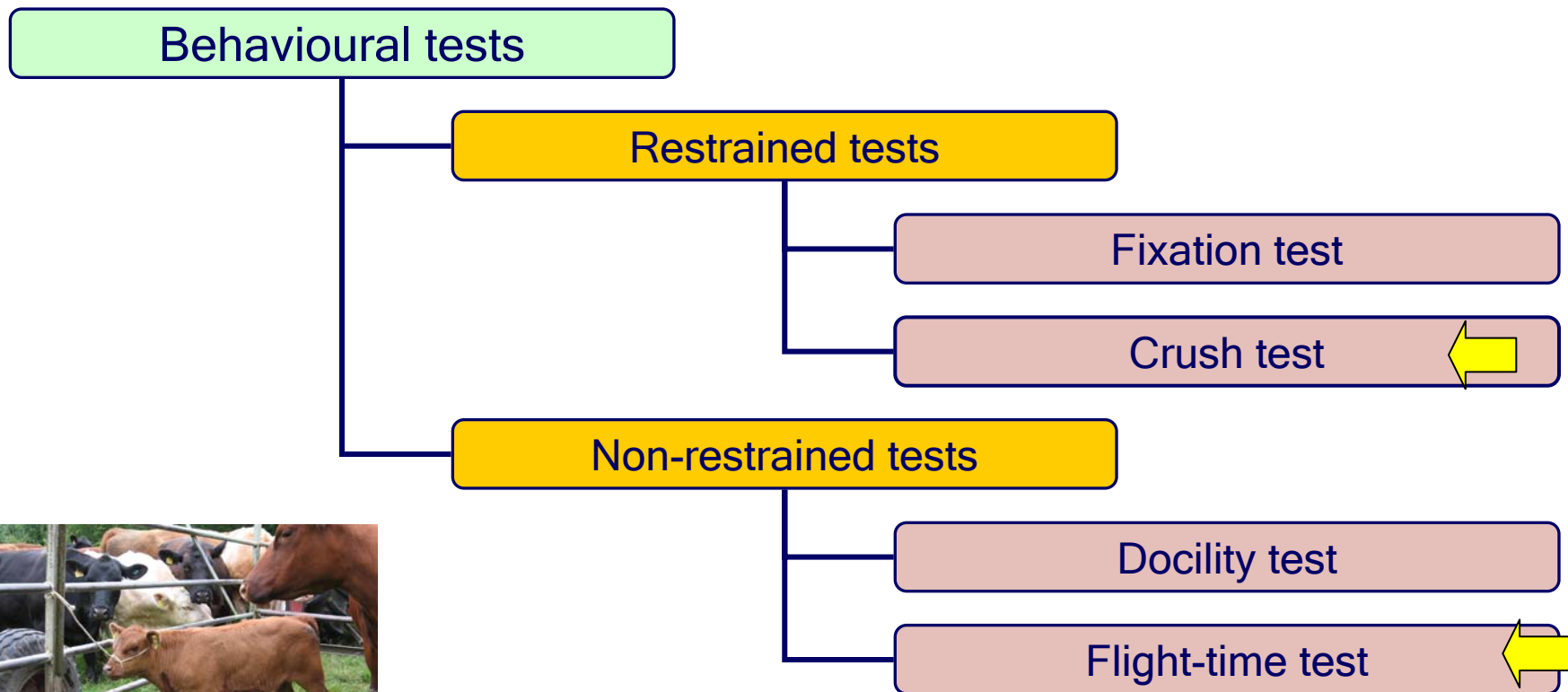




Introduction



Assessment of cattle temperament:





Introduction

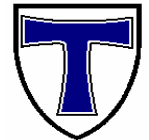


Effects of temperament on production traits:

- Cattle with „poor“ temperament,
 - have been shown to have lower weight gain,
 - and poorer feed conversion rates.
(Tulloh, 1961; Voisinet et al., 1997; Petherick et al., 2002)
- produce tougher meat (Dark cutting beef)
- and worse carcasses (bruises).
(Fordyce et al., 1985, 1988; Voisinet et al., 1997)



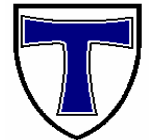
Crush test



- Temperamental differences between breeds are significant.
 - British breeds are more docile than continental breeds.
- Females are usually more behaviourally agitated during handling than males.
- Temperament is a moderately heritable trait in beef cattle.



Crush test



Advantages of the crush test:

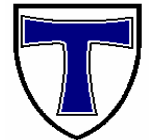
- Implementation in the routine weighing process,
- with no additional workload required.

During restraint in the head bail, observations are made on:

- the animals behavioural agitation („crush score“)
- the animals balking behaviour while entering and leaving the crush.



Crush test

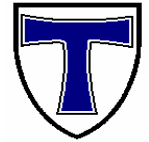


Crush score (Grandin, 1993):

- 1: calm, no movement
- 2: restless, shifting
- 3: squirming, occasionally shaking of the crush
- 4: continuous vigorous movement and shaking of the crush
- 5: rearing, twisting of the body or violent struggling



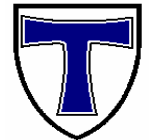
Crush test



15th World Hereford Conference, Copenhagen



Crush test



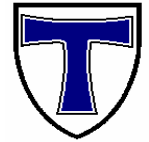
Flight-speed (Lanier et al., 2002)

→ A visual flight-speed score is given according to the animals gait while leaving the crush:

- 1: walk
- 2: trot
- 3: run
- 4: jump



Results



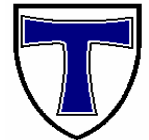
Number of weaner calves observed in 2006 and 2007:

Year		Angus	Charolais	Fleckvieh	Hereford	Limousin
2006	male	219	124	209	188	138
	female	207	130	130	185	125
2007	male	149	158	156	165	72
	female	131	144	172	159	89
Total		706	556	667	697	424

→ In total, 3050 beef cattle calves were observed at weaning with 7 month of age.



Results

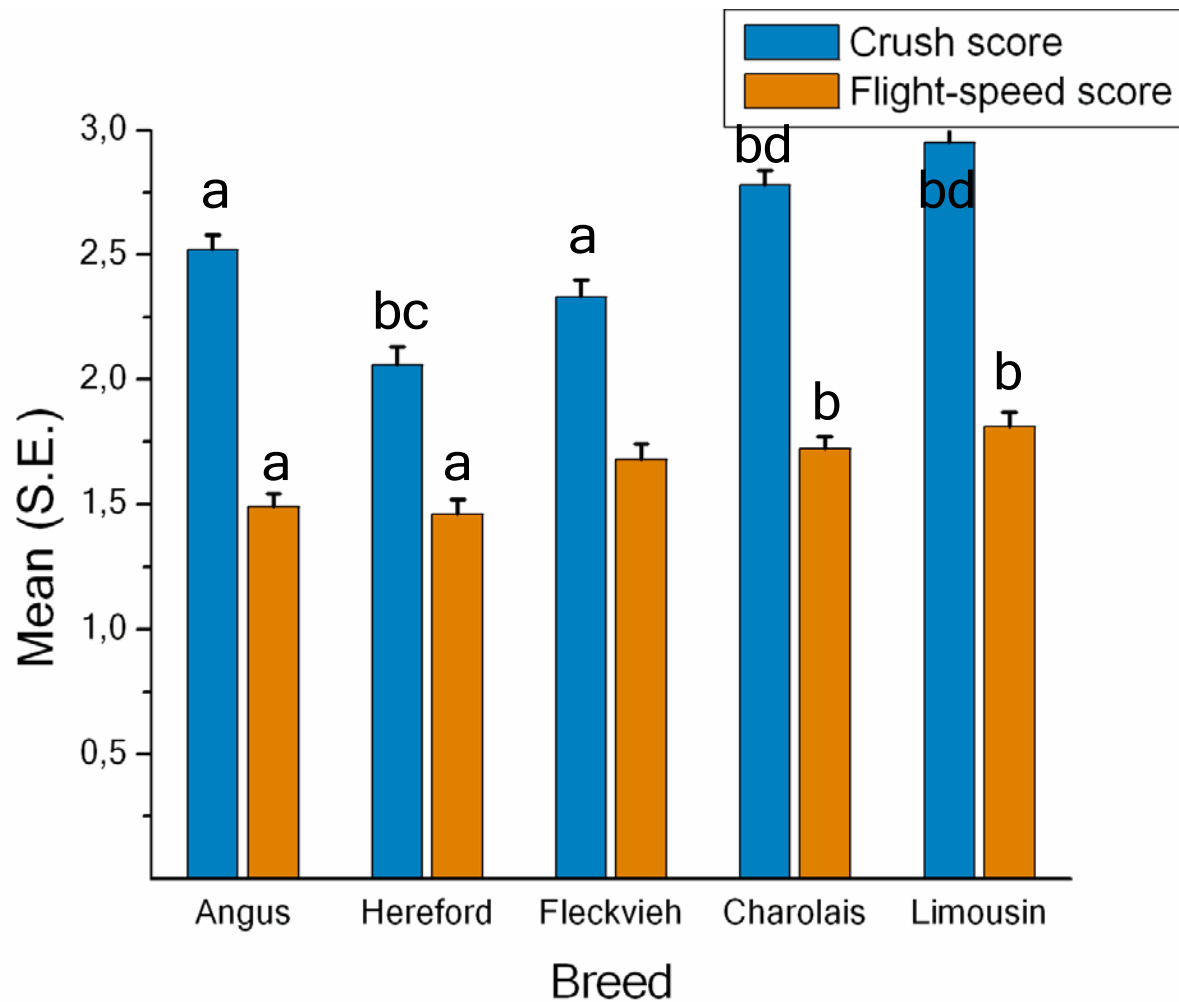


Survey of sires within the breeds:

	Sires	Mean \pm S.D.	Minimum	Maximum
Angus	40	17.6 \pm 19.1	1	73
Charolais	32	17.4 \pm 16.7	1	64
Fleckvieh	45	14.8 \pm 18.2	1	89
Hereford	40	17.4 \pm 20.4	1	80
Limousin	56	7.6 \pm 8.6	1	45



Results



a,b $P < 0,05$
c,d $P < 0,001$



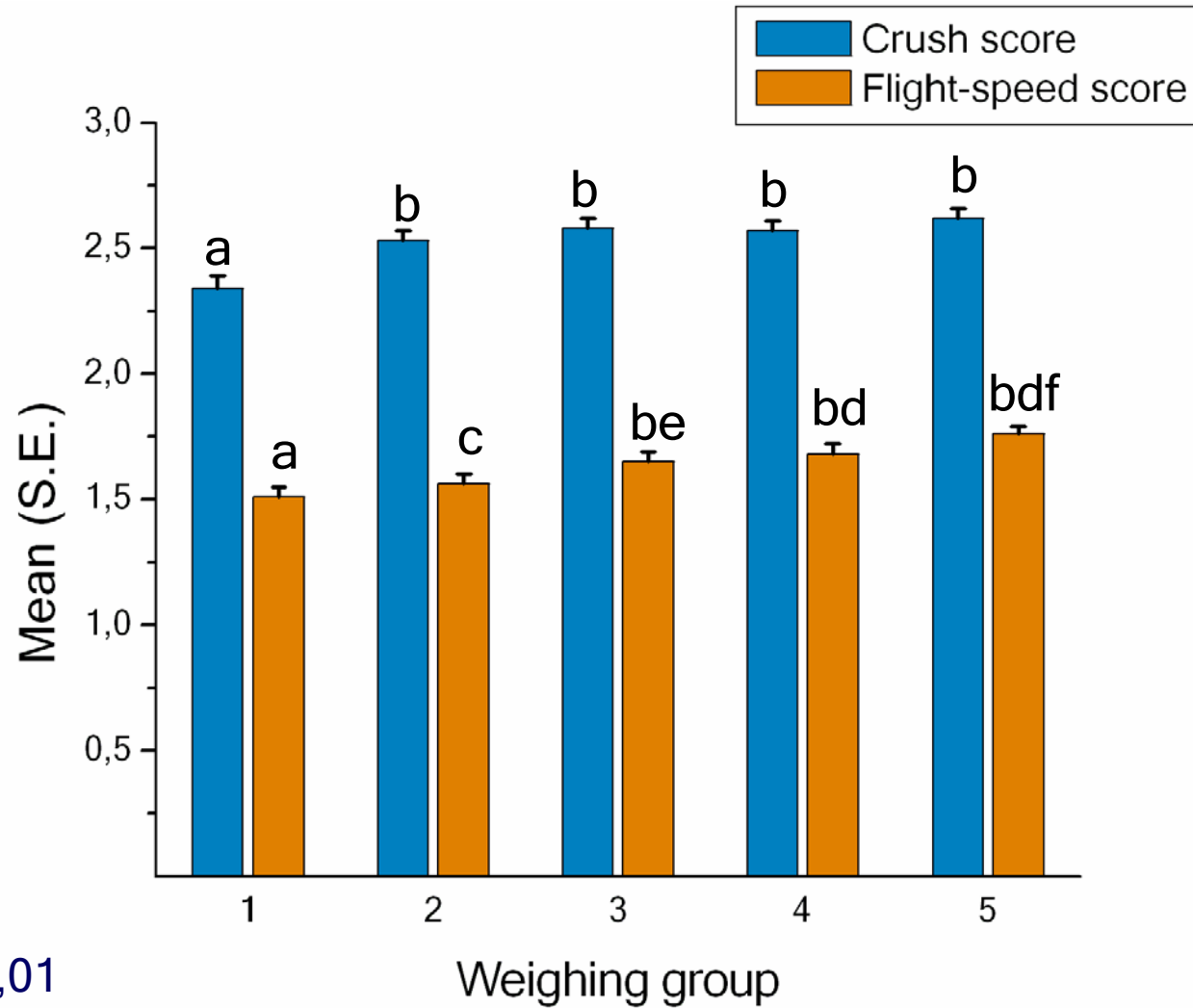
Results



- Temperament is significantly influenced by breed:
 - Continental breeds are more behaviourally agitated during restraint.
 - British breeds have a significantly lower flight-speed while leaving the crush.
 - British breeds are traditionally reared under extensive conditions, therefore an indirect selection for docile animals in the past is possible.



Results



a,b; c,d $P < 0,01$
e,f $P < 0,05$



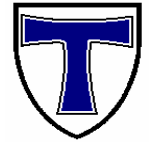
Results



- Temperament differs significantly between sexes.
 - female calves are scored higher for both traits than their male counterparts.
- Effect of farm is significant for the behavioural agitation of the animals within a breed.
- Average scores are significantly higher in 2007 than in 2006.



Results

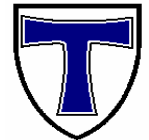


Phen. correlations of crush score and flight-speed score to average daily weight gain.

	Angus	Charolais	Fleckvieh	Hereford	Limousin
	Average daily weight gain				
Crush score	0.02	-0.02	0.07	-0.15	-0.02
Flight-speed	-0.04	0.05	0.01	-0.10	-0.12

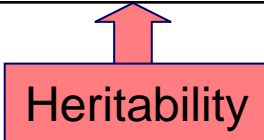
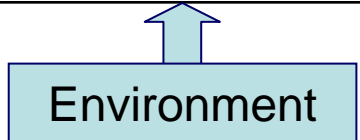
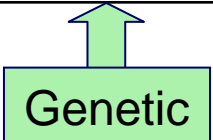


Results



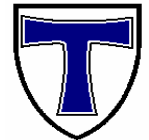
Variance components - Crush score

	σ^2_v	σ^2_a	σ^2_{res}	σ^2_p	$h^2 \pm S.E.$
Angus	0.024	0.097	0.776	0.801	0.12 \pm 0.09
Charolais	0.036	0.144	0.811	0.847	0.17 \pm 0.12
Hereford	0.050	0.200	0.742	0.792	0.25 \pm 0.13
Fleckvieh	0.054	0.218	0.860	0.914	0.24 \pm 0.14
Limousin	0.025	0.102	0.832	0.857	0.12 \pm 0.12
Total	0.039	0.157	0.802	0.841	0.19 \pm 0.05



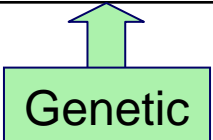
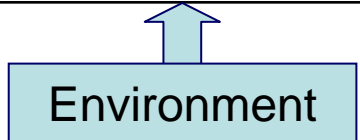
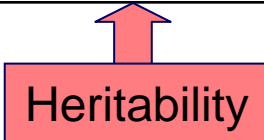


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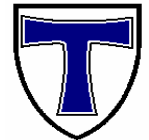
Variance components - Flight-speed score

	σ^2_v	σ^2_a	σ^2_{res}	σ^2_p	$h^2 \pm S.E.$
Angus	0.015	0.060	0.313	0.328	0.18 ± 0.11
Charolais	0.024	0.095	0.489	0.513	0.18 ± 0.14
Hereford	0.045	0.178	0.402	0.447	0.40 ± 0.15
Fleckvieh	0.047	0.189	0.577	0.624	0.30 ± 0.15
Limousin	0.021	0.084	0.509	0.530	0.16 ± 0.13
Total	0.038	0.151	0.451	0.489	0.31 ± 0.07

 Genetic  Environment  Heritability



Conclusions



- Crush test and visual flight-speed score are appropriate tools to characterise individual differences of beef cattle temperament.
- The estimated heritabilities are moderate:
 - Selection for temperament is possible.
- Further studies are required to determine how selection could impact on other temperamental traits of beef cattle.
 - e. g. maternal protective behaviour.



Thank you for your attention.





Statistical Analysis



- Statistical analysis with SAS 9.1.3
- Estimation of variance components with ASReml 1.10
- Sire model

$$Y_{ijklmn} = \mu + R_i + S_j + J_k + B_l + G_m + bA + a_n + e_{ijklmn}$$

μ	=	Mean of observed trait
R_i	=	fixed effect of breed
S_j	=	fixed effect of sex
J_k	=	fixed effect of year
B_l	=	fixed effect of farm
G_m	=	fixed effect of weighing group
bA	=	age of animal as covariate
a_n	=	random effect of sire
e_{ijklmn}	=	random residual effect



Results



Phen. correlations between different traits of the crush test.

	Bew	ScEin	ScWieg	ScAus	GangAus
Laut	0.06	-0.01	0.21	-0.07	0.19
Bew		-0.02	0.19	-0.04	0.10
ScEin			-0.08	0.22	-0.05
ScWieg				-0.09	0.55
ScAus					-0.13