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Session 21

Pelvic opening and dystocia in Charolais cattle

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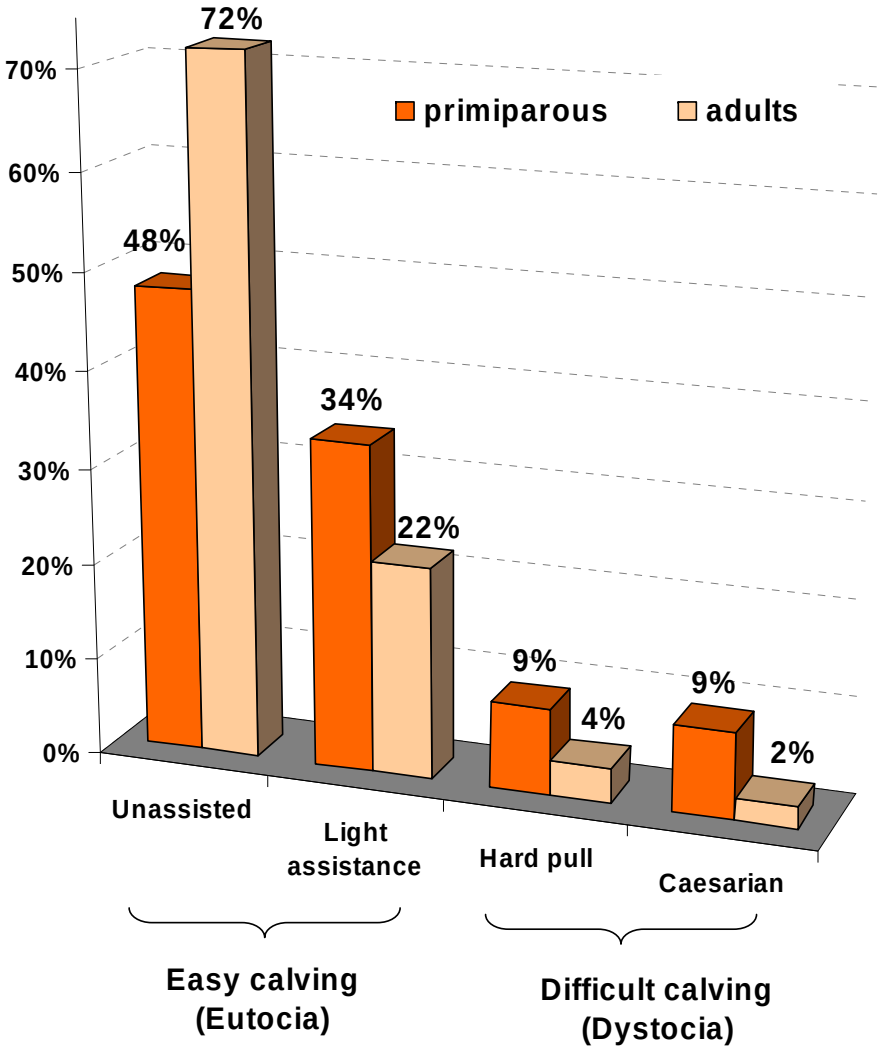
Dystocia in the French Charolais breed



Economic consequences

- labour and veterinary expenses

- increased calf mortality

- weakened cow production and reproduction ability

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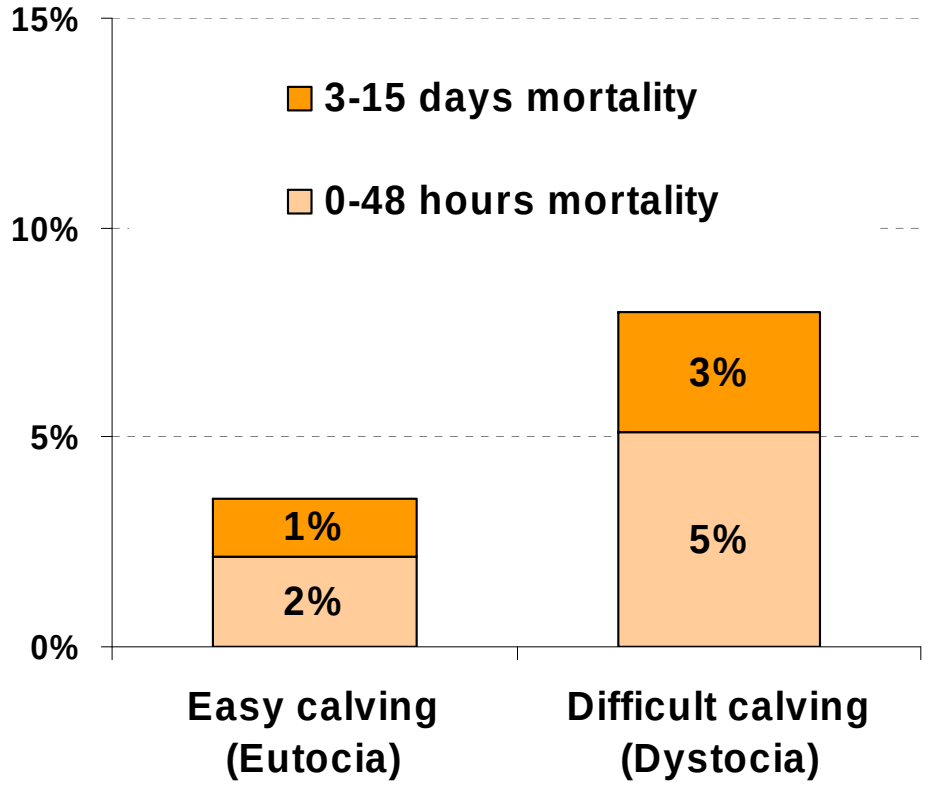
Objective of the study

- analysis of dystocia and associated calf and dam traits
- genetic determinism of traits
- seeking for selection criteria

Experimental design

- INRA Charolais herd
- 3,686 calvings between 1988 and 2008
- random mating : 82 sires and 1,430 cows
- no selection
- 4 calving seasons, no culling

Early mortality in the herd (3,817 calves)



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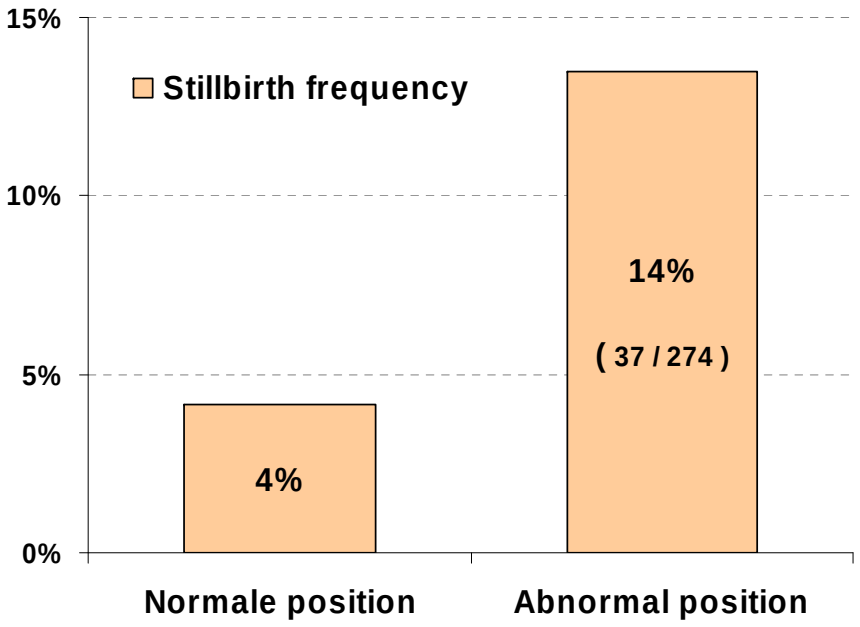
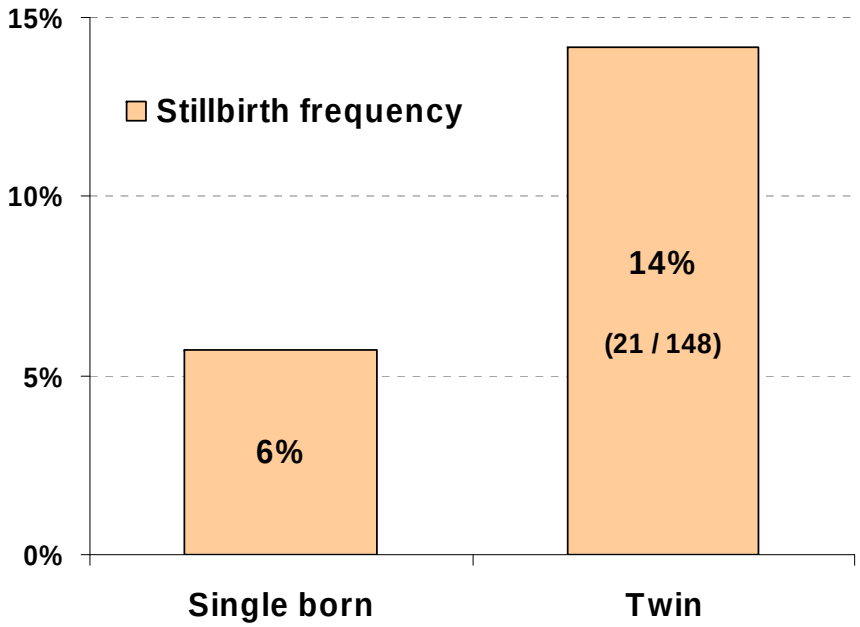
Early mortality in relation to

the calf position at birth



the twinning status



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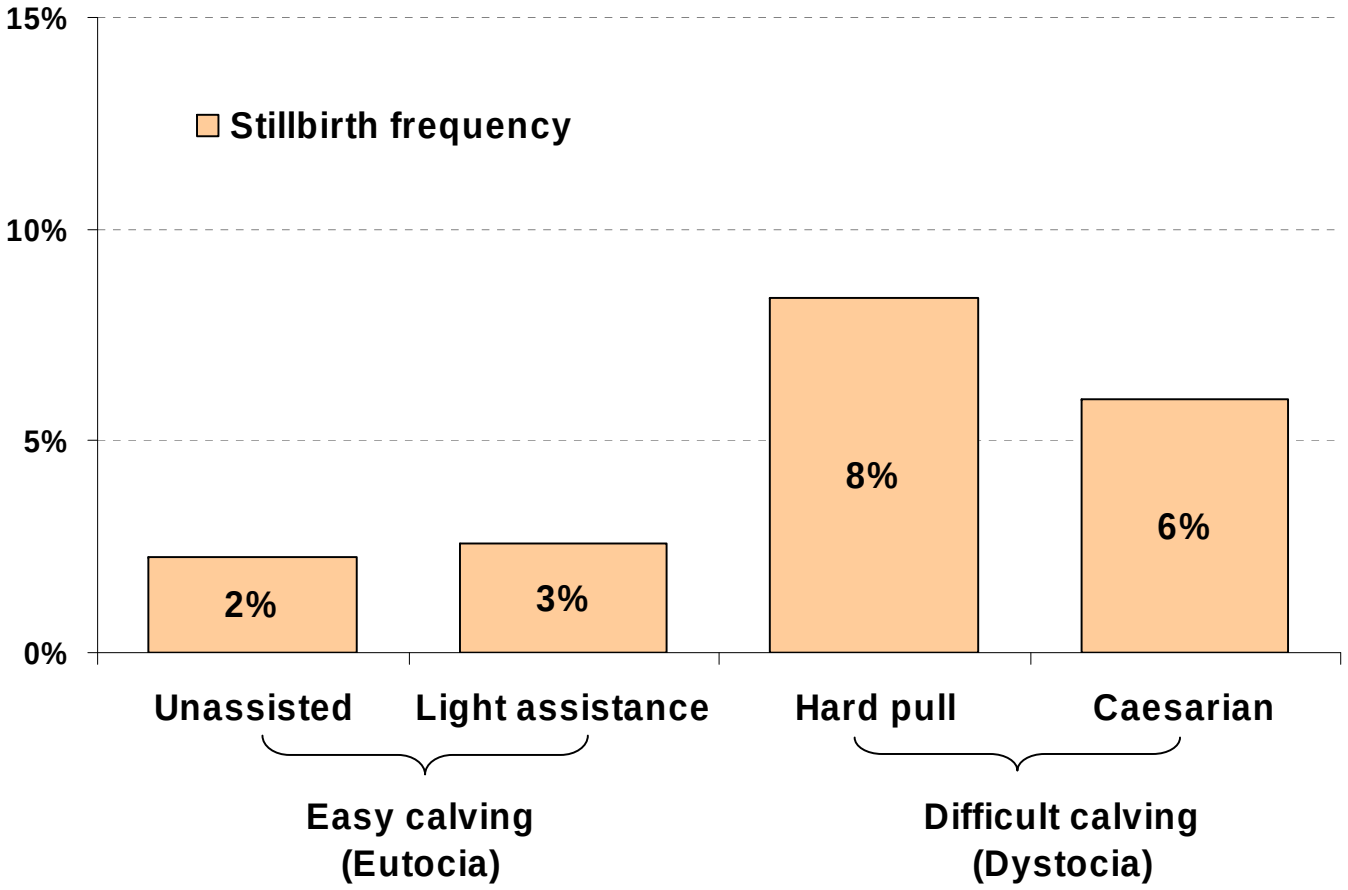
Early mortality of single born & normally positioned calves

(n=3,328 calves)

in relation to dystocia score



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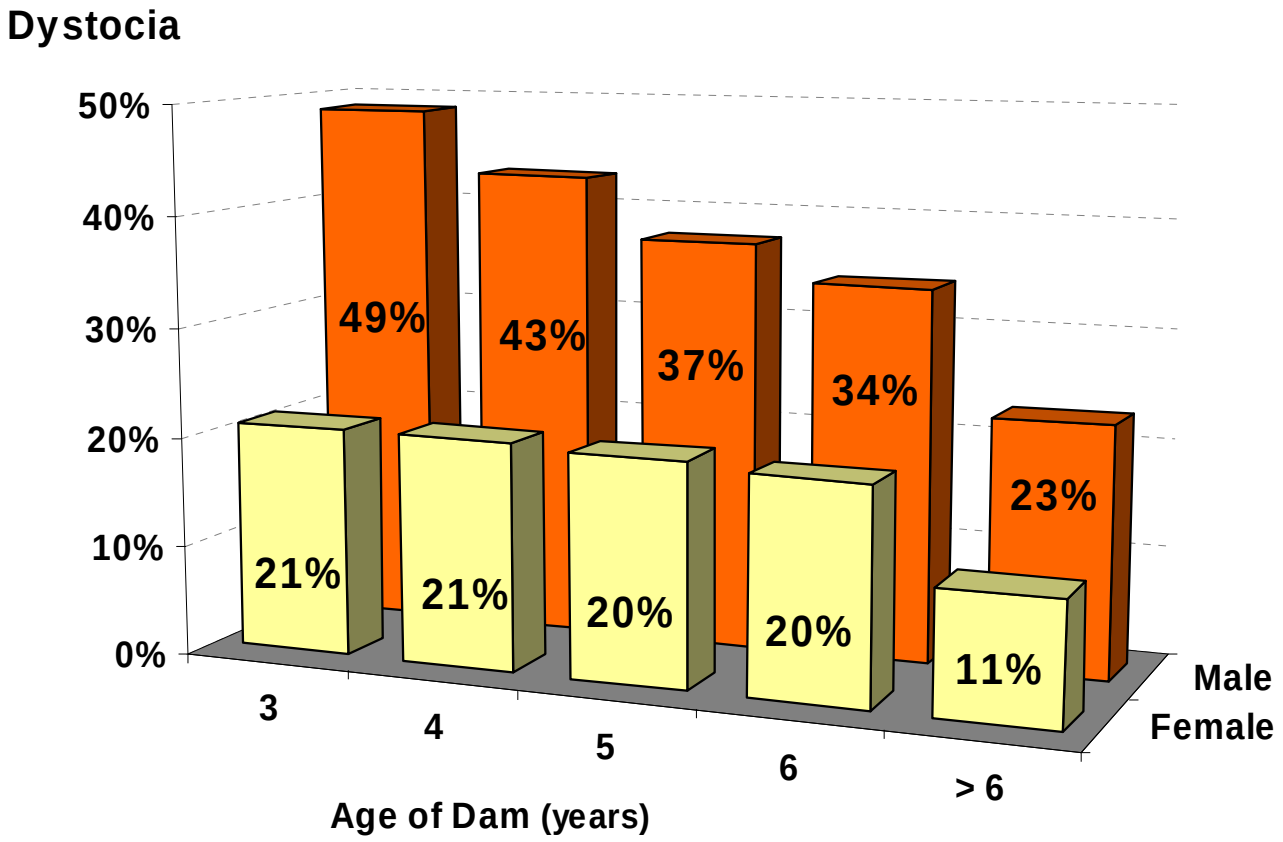
Dystocia frequency in relation to the sex of the calf and age of the dam

(n=3,328 calves)



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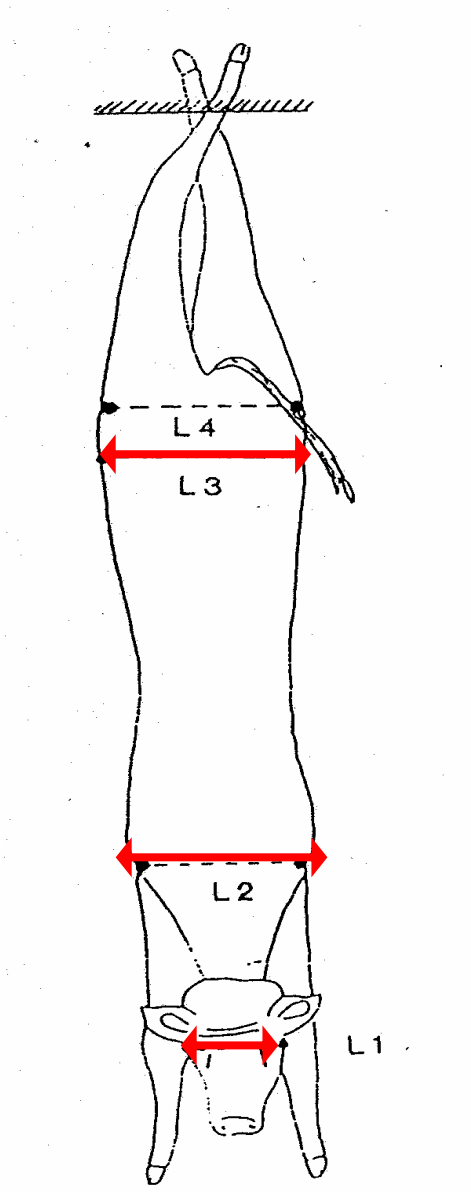
Calf associated traits

Birth Weight

+ Hip Width

+ Shoulder Width

+ Head Width



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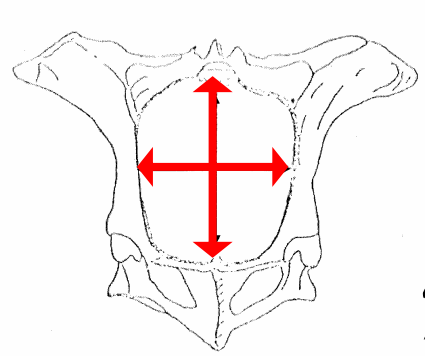
Cow associated traits

Live Weight

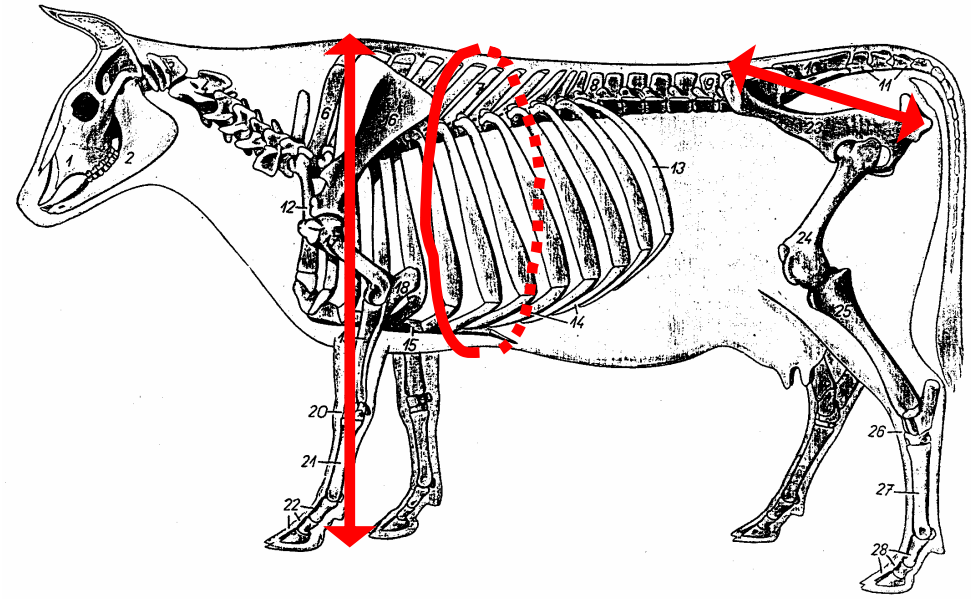


+ Pelvic Area

+ Withers Height

+ Chest Girft

+ Pelvis Length



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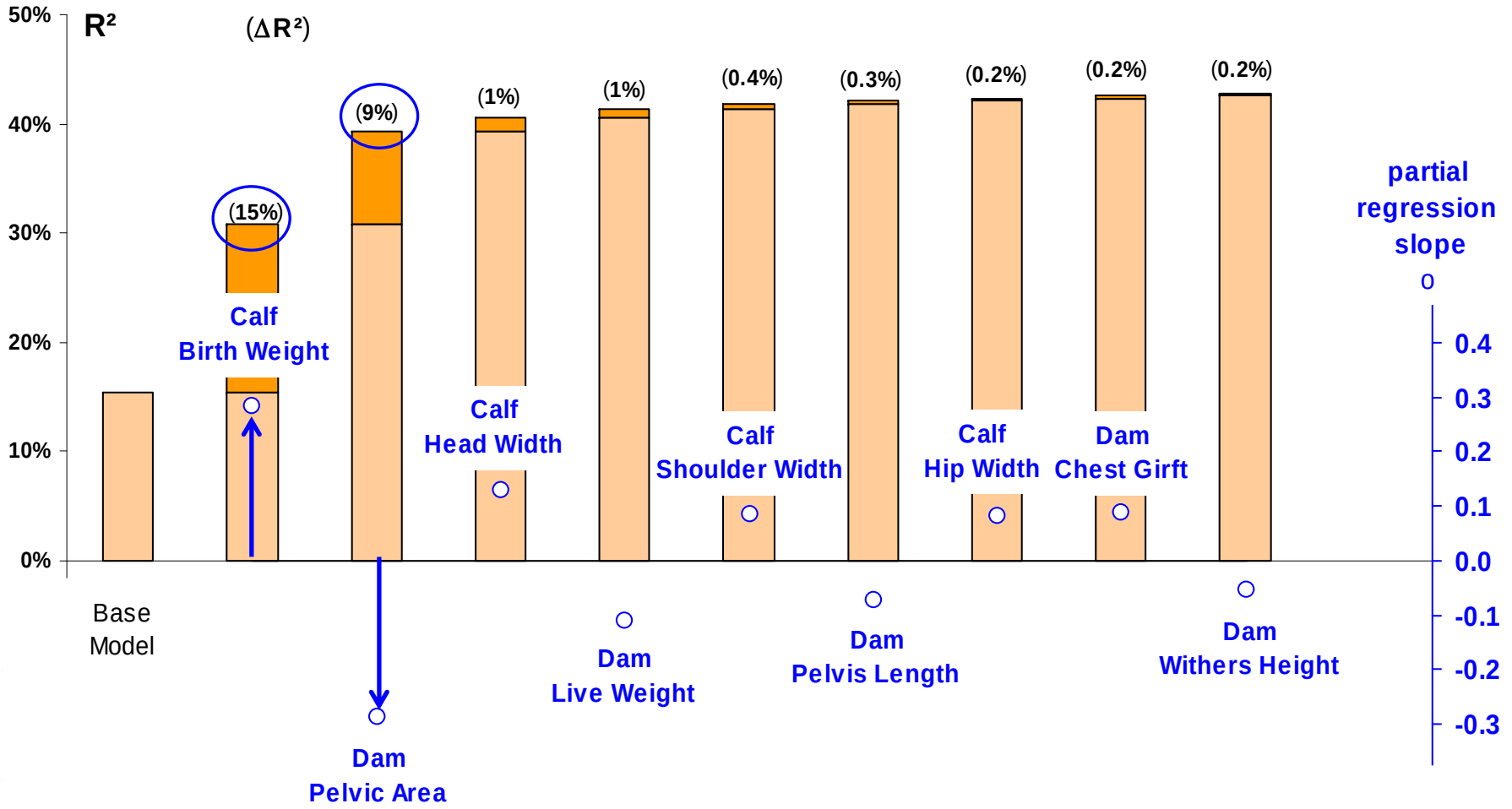
Multiple regression of Dystocia Score on Calf and Dam traits



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Genetic analysis of Dystocia Score & Calf and Dam traits (n=3,817 calves)

The models

		Fixed effects			Regression	Direct component		Maternal component	
Calves									
DS & BW	**CG**	**Sex & Twinning**	**AgeDam**	**-**	**-**	**Gd**	**-**	**Gm**	**PEm**
Cows									
PA & LW	**CG**	**-**	**-**	**Calving/Dry**	**β Age**	**Gd**	**PEd**	**-**	**-**
Heifers									
PA & LW	**CG**	**-**	**AgeDam**	**-**	**β Age**	**Gd**	**PEd**	**-**	**-**
Young Bulls									
PA & LW	**CG**	**-**	**AgeDam**	**-**	**β Age**	**Gd**	**-**	**-**	**-**

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Genetic analysis of Dystocia Score & Calf and Dam traits

	Dystocia Score	Birth Weight		Pelvic Area	Live Weight
Direct genetic effects			**Cows**		
h^2_d	0.25	0.31	h^2_d	0.21	0.49
Rg_d	+ 0.91		Rg_d	+ 0.47	
Maternal genetic effects			**Heifers**		
h^2_m	0.08	0.13	h^2_d	0.18	0.47
Rg_m	+ 0.36		Rg_d	+ 0.53	
			Young Bulls		
			h^2_d	0.16	0.33
			Rg_d	+ 0.50	

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Genetic correlations between Dystocia Score & other traits

	Dystocia Score		
	Calf Birth Weight	Direct genetic effects	Maternal genetic effects
Calf Birth Weight	**1.00**	**+ 0.91**	**+ 0.36**
Cows			
Live Weight	**+ 0.56**	**+ 0.27**	**- 0.31**
Pelvic Area	**+ 0.27**	**- 0.04**	**- 0.77**
Heifers			
Live Weight	**+ 0.53**	**+ 0.01**	**- 0.61**
Pelvic Area	**+ 0.20**	**- 0.21**	**- 0.62**
Young Bulls			
Live Weight	**+ 0.32**	**+ 0.06**	**- 0.19**
Pelvic Area	**- 0.06**	**- 0.22**	**- 0.82**

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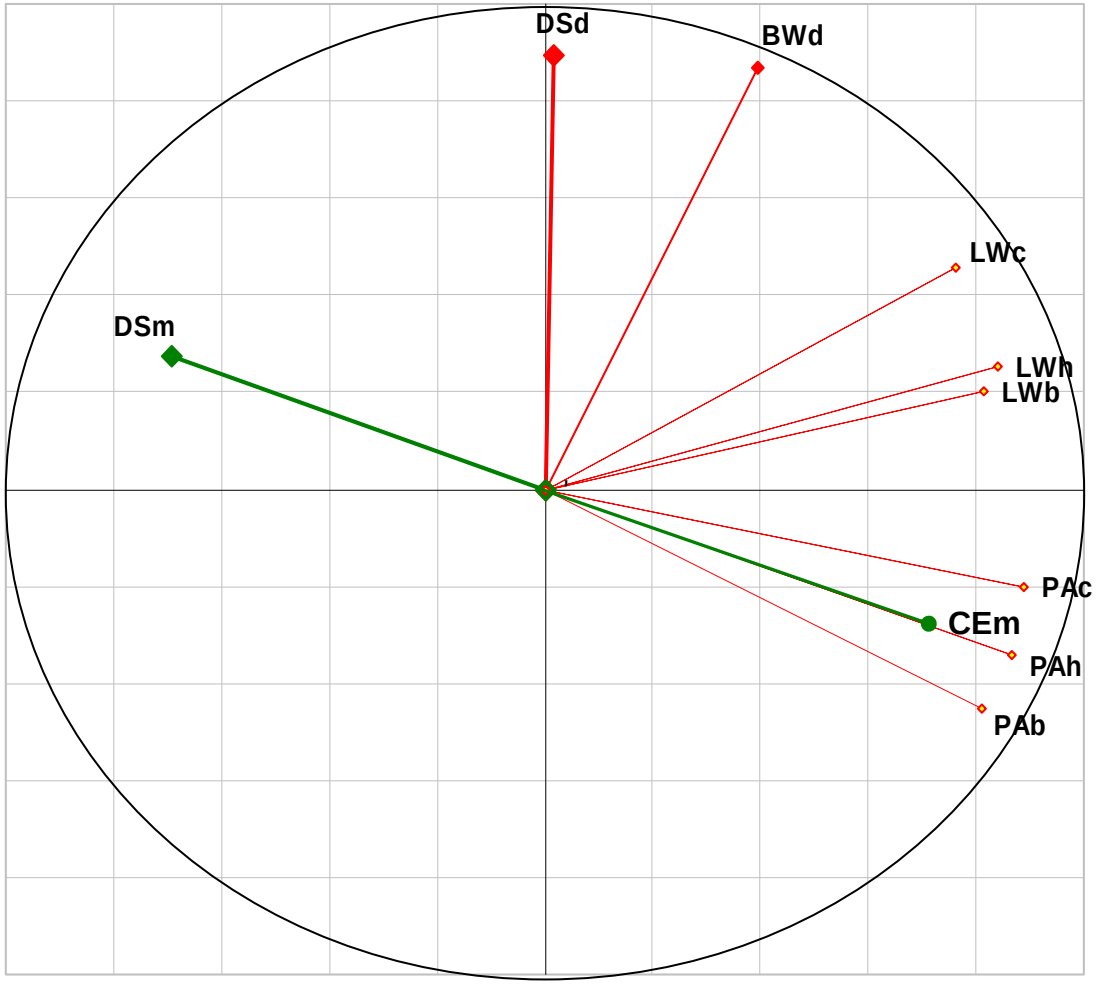
Genetic correlations : Principal Component Analysis



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Responses to selection of Young Bulls
in Performance Testing Stations

Correlated responses	Selection Criteria: LW_b	LW_b - BW	LW_b + PAb
Young Bull			
Live Weight	**+ 0.33**	**+ 0.16**	**+ 0.31**
Pelvic Area	+ 0.11	+ 0.09	+ 0.19
Heifer			
Live Weight	**+ 0.33**	**+ 0.08**	**+ 0.32**
Pelvic Area	+ 0.13	+ 0.06	+ 0.21
Calf			
Birth Weight	+ 0.11	- 0.13	+ 0.07
Dystocia	**+ 0.02**	**- 0.17**	**- 0.02**
Dam			
Calving Ability	**+ 0.03**	**+ 0.01**	**+ 0.09**

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Conclusions

Dystocia is genetically highly correlated to Birth Weight

↳ *Selecting against Birth Weight will improve Calving Ease*

Birth Weight is positively correlated to post natal Growth Capacity

↳ *Selecting against Birth Weight will reduce post natal Growth Capacity*

Maternal Calving Ease is genetically closely correlated with Pelvic Area

Pelvic Area of young bulls is closely correlated with female Pelvic Area

↳ *Selecting candidate seed-stock bulls for larger Pelvic Area will improve Calving Ease of females without reduction of post natal Growth Capacity*