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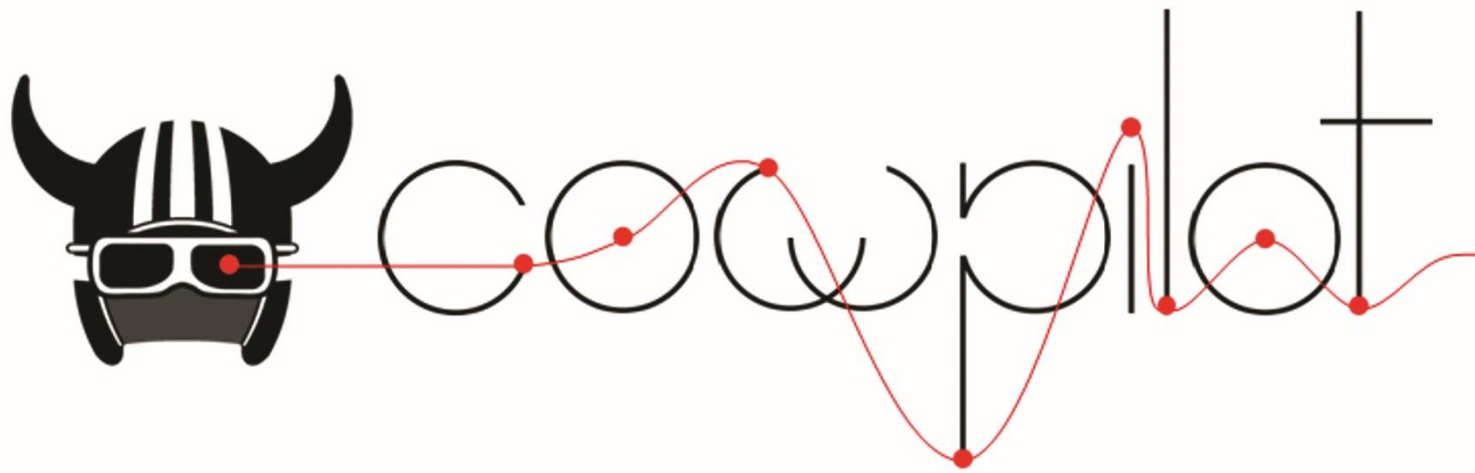
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What is an optimal body condition profile for reproduction in dairy cows?

C. Dezetter, F. Bidan, F. Blanc, L. Delaby, S. Fréret and N. Bédère



Avec
la contribution
financière du compte
d'affectation spéciale
développement
agricole et rural
CASDAR



**MINISTÈRE
DE L'AGRICULTURE
ET DE L'ALIMENTATION**

Liberté
Égalité
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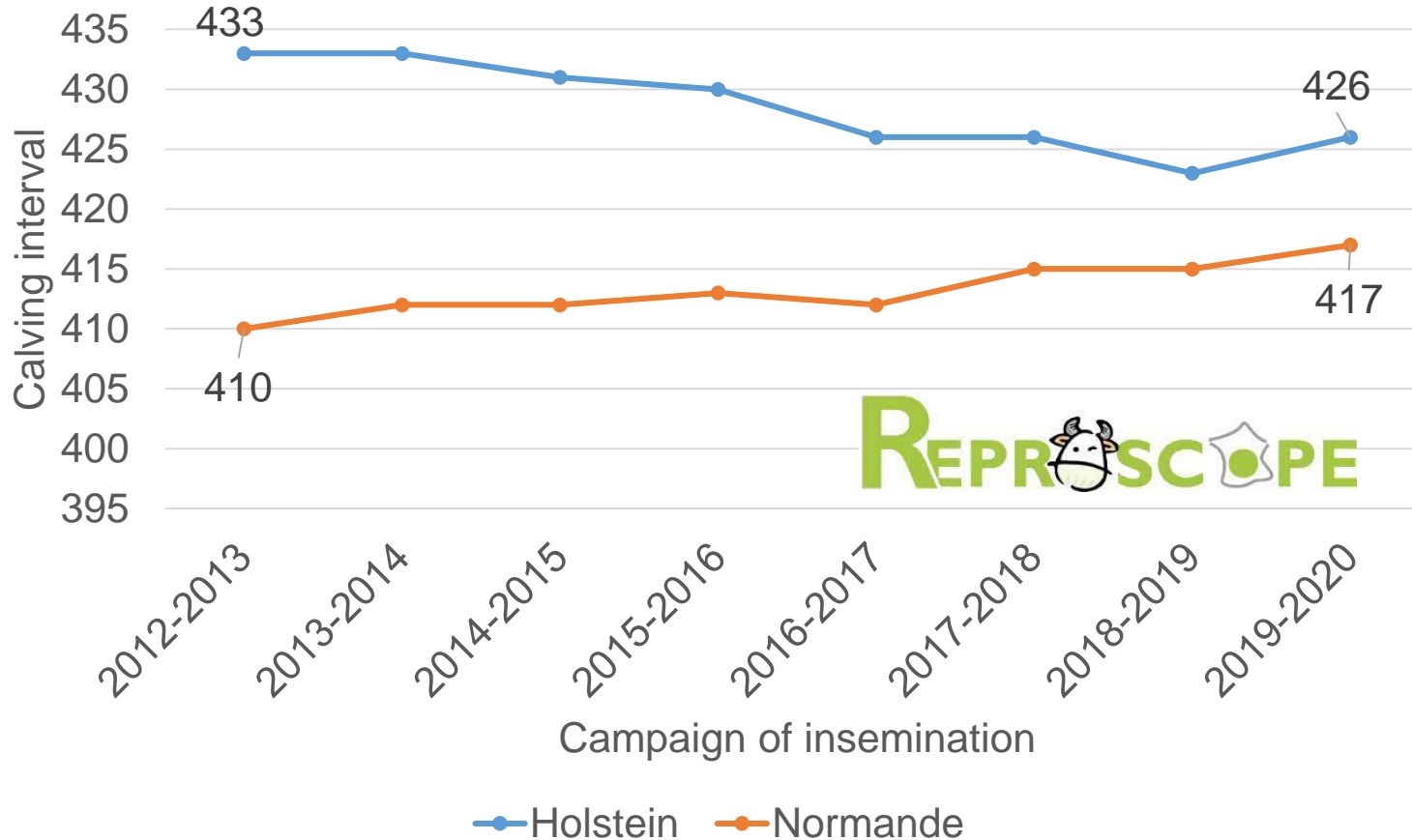
AAP CASDAR Recherche Technologique 2018





Context: Reproductive performances vary a lot between cows

Evolution of calving interval in French dairy herds



¼ of cows > 456 days for calving interval
¼ of cows < 361 days for calving interval

¼ of cows > 441 days for calving interval
¼ of cows < 357 days for calving interval

There is more than 90 days between cows in the first quarter and cows in the last quarter



Aim of the study

- Existence of an ideal BCS profile to preserve reproductive performance (Royal et al., 2000; López-Gatius et al., 2003; Chagas et al., 2007; Friggens et al., 2010; Bedere et al., 2018).
- Individual profiles of BCS vary greatly between cows

The objective of this work was to study the relationships between reproductive performance and different BCS profiles



Material and Methods: Data base

- 2 breeds: Holstein and Normande
- 6 experimental dairy farms with seasonal calving (5 with HO and 2 with NO)
- At least 5 BCS from 5 days pre calving to 210 days post calving
 - ➔ Weekly BCS were obtained using an interpolation spline
- Reproductive events: dates of calving, dates of inseminations, dates of next calving
- Production performances: Milk yield, fat and protein contents over 44 weeks

Nb of lactation	Primiparous	Multiparous	Total
Holstein	787	898	1685
Normande	183	292	482

- Ovarian activity (P4 profile): commencement of luteal activity, normal P4 profile
 - ➔ only 721 HO and 414 NO



Material and methods: determining BCS profile within breed

Weekly BCS from 0-210d pp

5 variables of BCS

BCS at calving BCS at 28d pp BCS at 56d pp BCS at 98d pp BCS at 210d pp

4 variables of BCS variation between these stages

Δ BCS 28d pp – BCS at calving

Δ BCS 56d pp – BCS 28j pp

Δ BCS 98d pp – BCS 56d pp

Δ BCS 210d pp – BCS 98d pp

PCA
and
HCA

Sankey diagram and Kappla coefficients between successive lactations

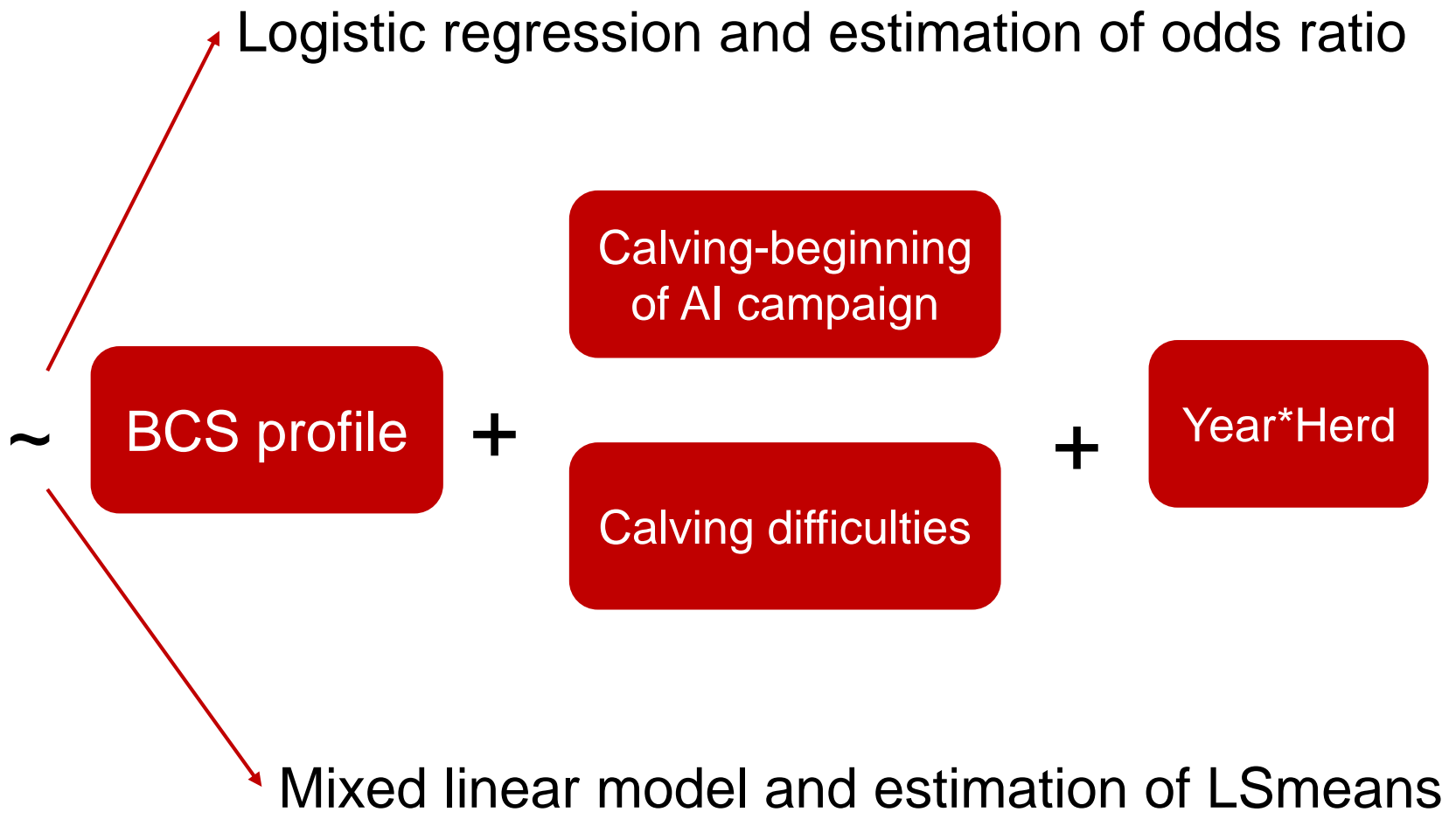


Material and methods: analyses between performance and BCS profile

Reproduction variables

Ovarian activity variables

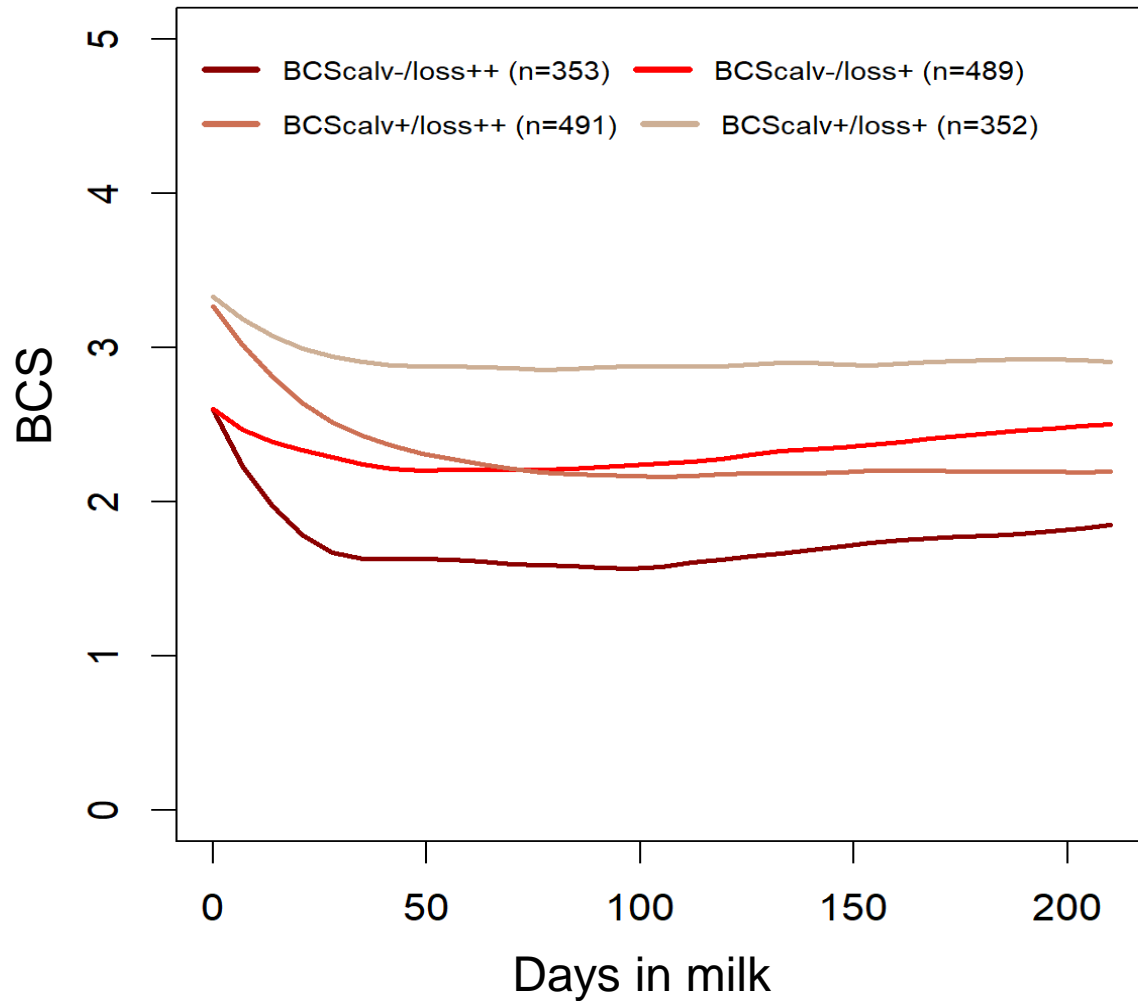
Production variables



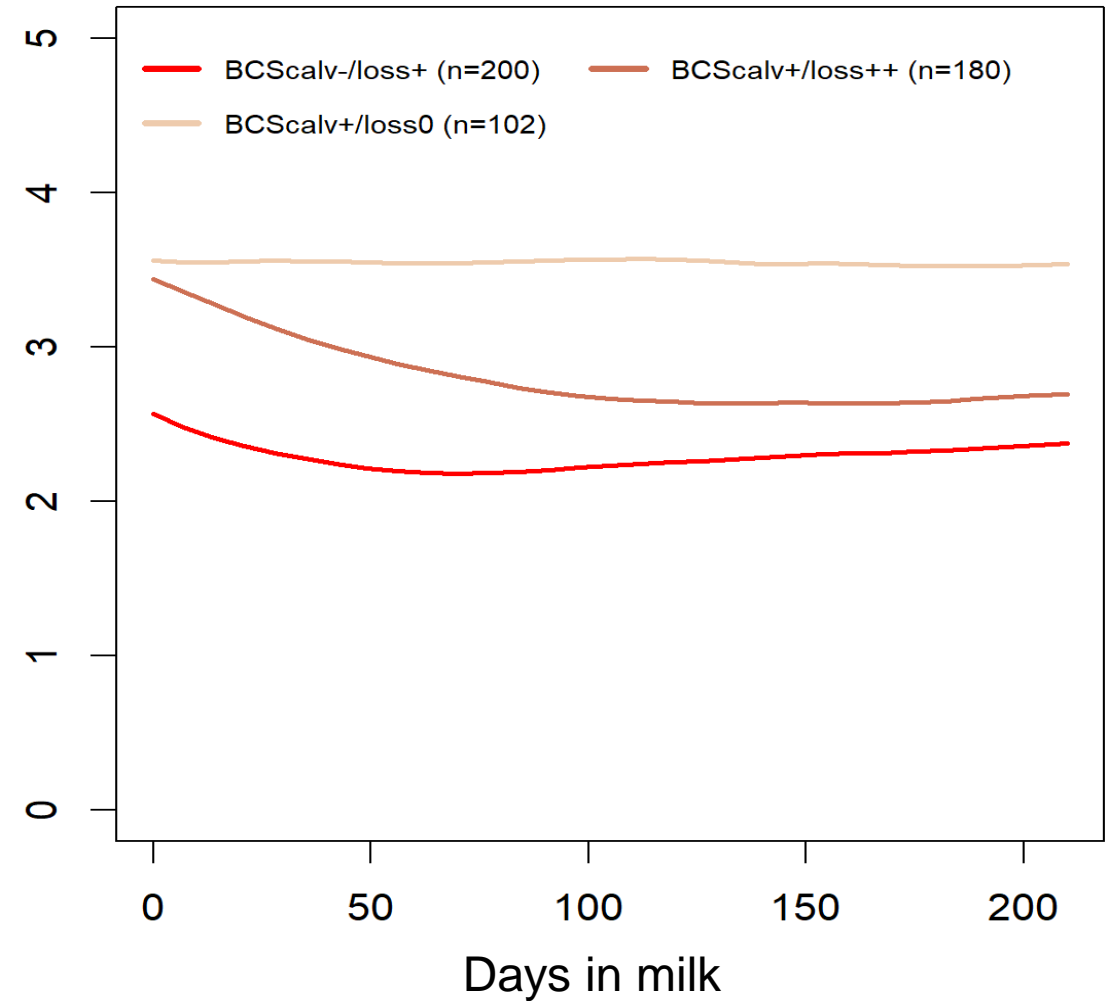


Results: BCS profile identified

4 BCS profiles in Holstein breed



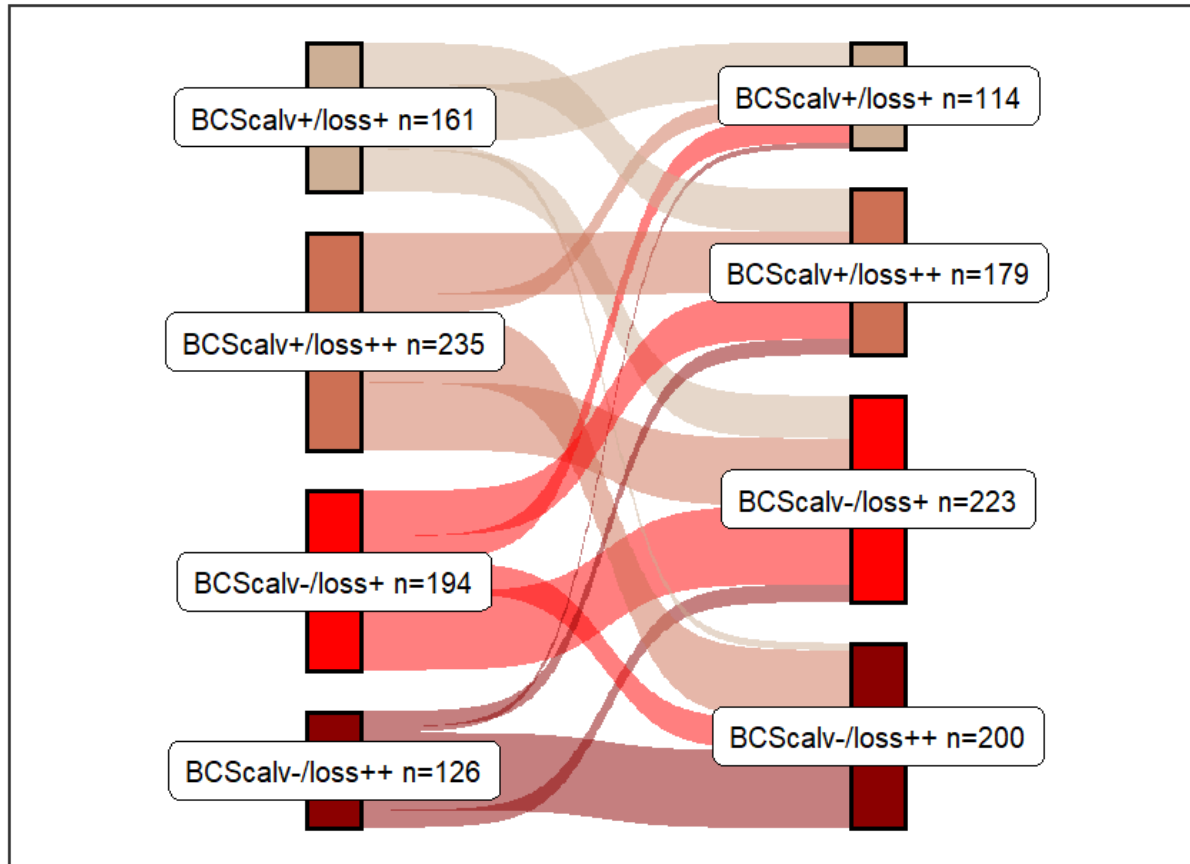
3 BCS profiles in Normande breed





Results : Concordance of BCS profile through successive lactations

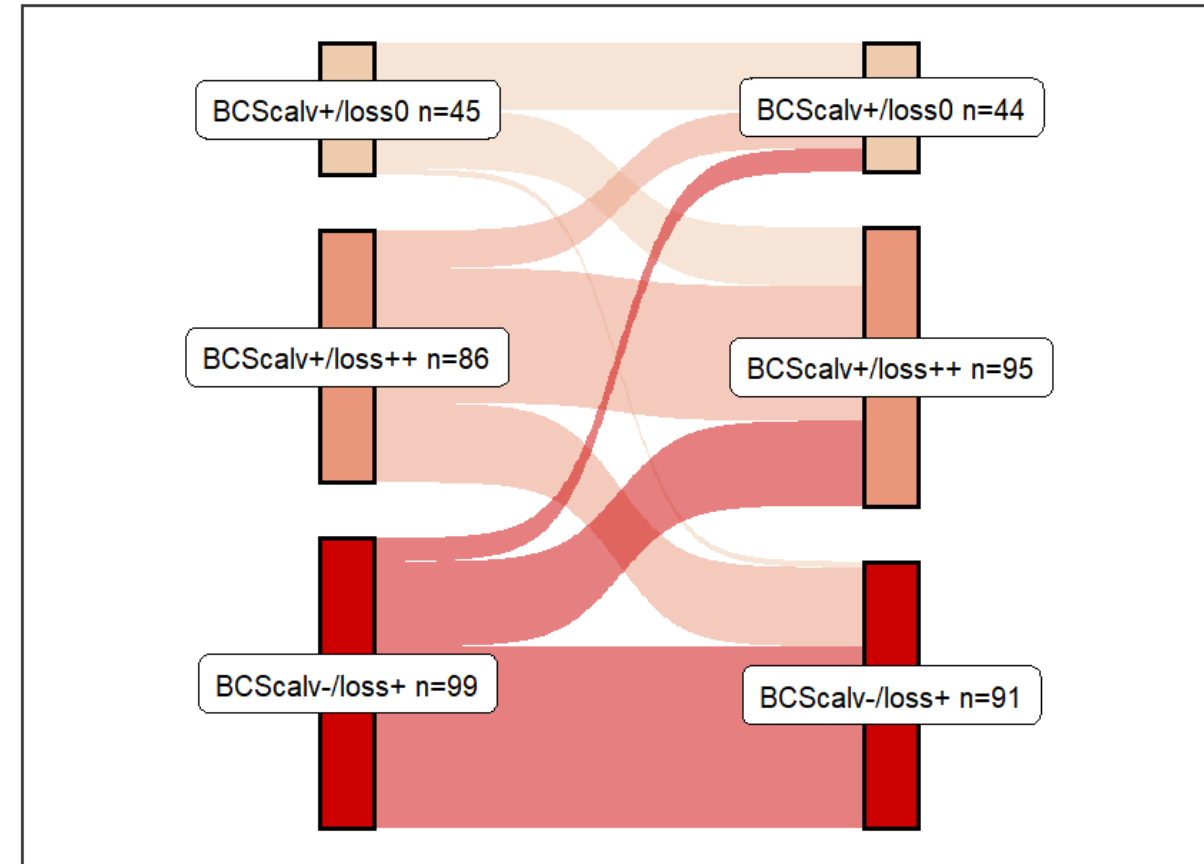
Sankey diagram HO cows (n=716)



Previous Lactation

Next Lactation

Sankey diagram NO cows (n=230)



Previous Lactation

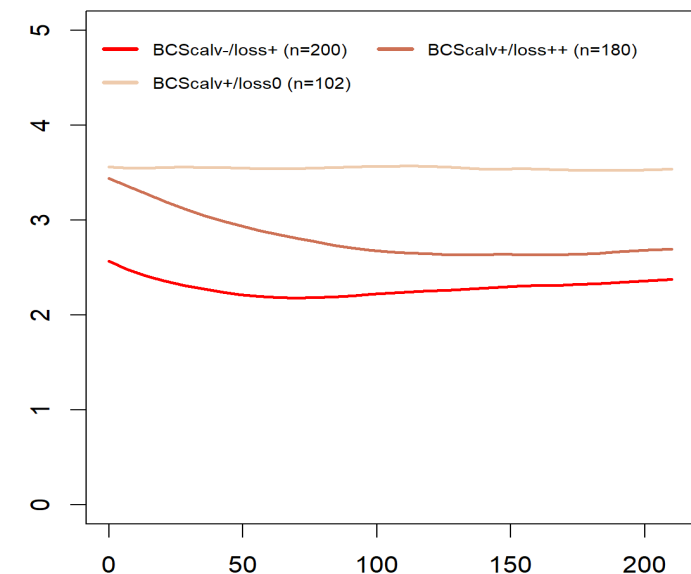
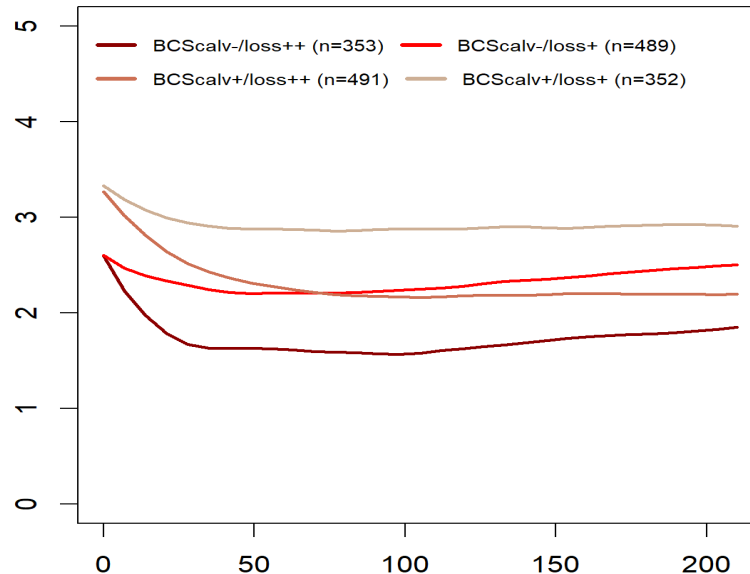
Next Lactation



Results: Performance for reproduction for each BCS profile

Holstein breed	BCScalv-/loss ++	BCScalv-/loss +	BCScalv+/loss ++	BCScalv+/loss +
Number of lactations	353	489	491	352
Proportion of cows calving after 1 AI (OR (IC))	0.85 (0.64-1.13)	0.84 (0,64-1,10)	1	0.97 (0.73-1.30)
Proportion of cows calving again (OR (IC))	0.64 (0.45-0.92)	0.99 (0.70-1.41)	0.80 (0.57-1.11)	1

Normande breed	BCScalv-/loss +	BCScalv+/loss ++	BCScalv+/loss 0
Number of lactations	200	180	102
Proportion of cows calving after 1 AI (OR (IC))	0.90 (0.60-1.35)	1	0.55 (0.33-0.93)
Proportion of cows calving again (OR (IC))	1	0.97 (0.61-1.56)	0.65 (0.38-1.11)

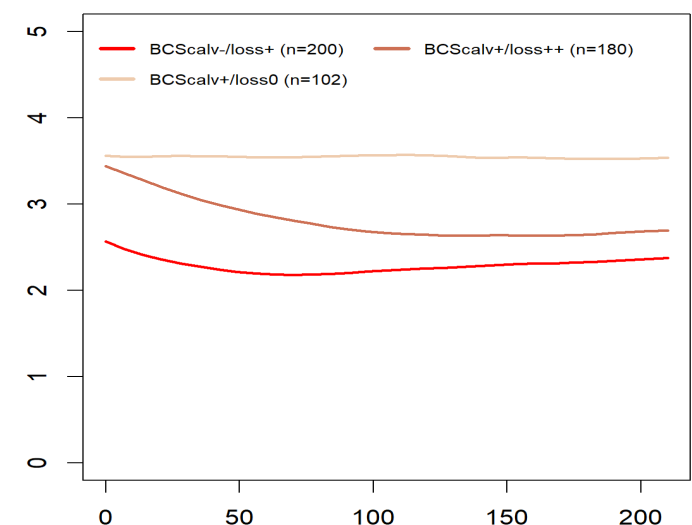
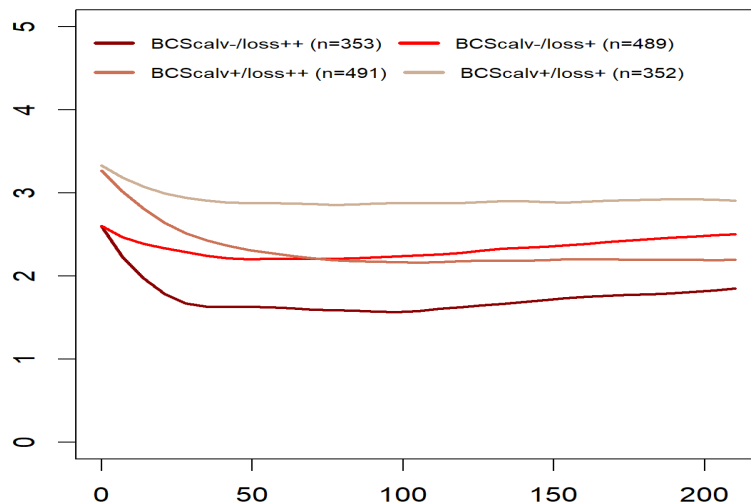




Results: Performance for reproduction for each BCS profile

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Calving-1st AI interval (days)	85.1 b	83.1 ab	80.7 a	82.3 ab

Normande breed	BCScalv-/loss +	BCScalv+/loss ++	BCScalv+/loss 0
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Proportion of cows calving again (OR (IC))	1	0.97 (0.61-1.56)	0.65 (0.38-1.11)
Calving-1st AI interval (days)	82.0b	72.1 a	71.7 a





Results: Performance for reproduction for each BCS profile

Holstein breed	BCScalv-/ loss ++	BCScalv-/ loss +	BCScalv+/ loss ++	BCScalv+/ loss +
Number of lactations	353	489	491	352
Proportion of cows calving after 1 AI (OR (IC))	0.85 (0.64-1.13)	0.84 (0,64-1,10)	1	0.97 (0.73-1.30)
Proportion of cows calving again (OR (IC))	0.64 (0.45-0.92)	0.99 (0.70-1.41)	0.80 (0.57-1.11)	1
Calving-1st AI interval (days)	85.1 b	83.1 ab	80.7 a	82.3 ab
Number of lactations	241	370	347	263
Calving interval (days)	380 ab	383 b	377 a	379 ab

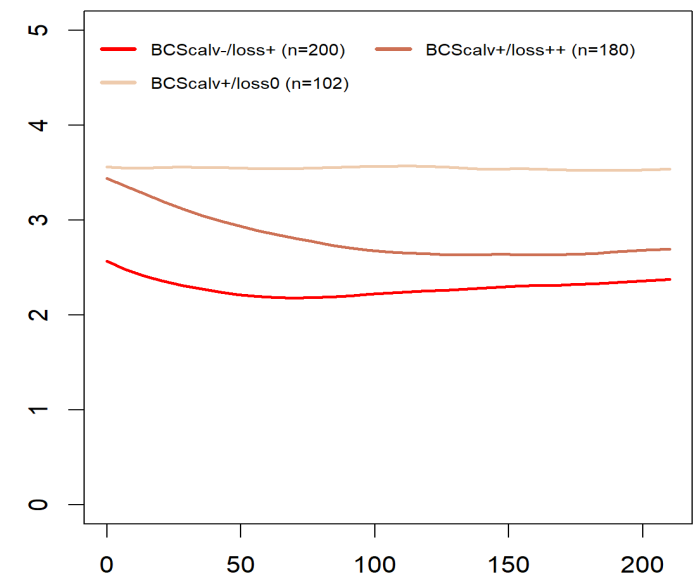
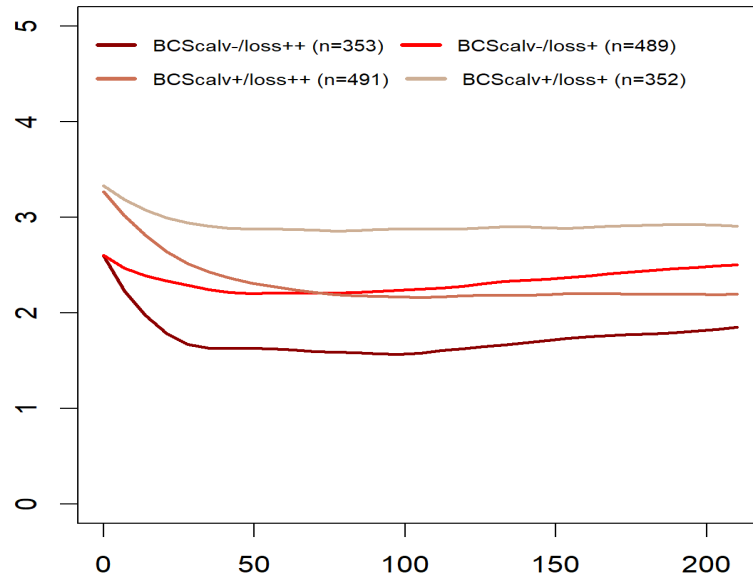
Normande breed	BCScalv-/ loss +	BCScalv+/ loss ++	BCScalv+/ loss 0
Number of lactations	200	180	102
Proportion of cows calving after 1 AI (OR (IC))	0.90 (0.60-1.35)	1	0.55 (0.33-0.93)
Proportion of cows calving again (OR (IC))	1	0.97 (0.61-1.56)	0.65 (0.38-1.11)
Calving-1st AI interval (days)	82.0b	72.1 a	71.7 a
Number of lactations	144	130	65
Calving interval (days)	383 b	373 a	377 ab



Results: Ovarian activity according to BCS profile

Holstein breed	BCScalv-/loss ++	BCScalv-/loss +	BCScalv+/loss ++	BCScalv+/loss +
Number of cows	121	306	162	132
CLA (days)	26.8 b	24.8 b	23.6 ab	20.7 a
Proportion of normal ovarian cyclicity	46%	62%	55%	69%
OR (IC)	0.39 (0.23-0.68)	0.74 (0.46-1.18)	0.59 (0.36-0.98)	1

Normande breed	BCScalv-/perte +	BCScalv+/perte ++	BCScalv+/perte 0
Number of cows	169	155	90
CLA (days)	27.4 a	28.2 a	29.7 a
Proportion of normal ovarian cyclicity	79%	72%	59%
OR (IC)	1	0.7 (0.4-1.2)	0.4 (0.2-0.7)

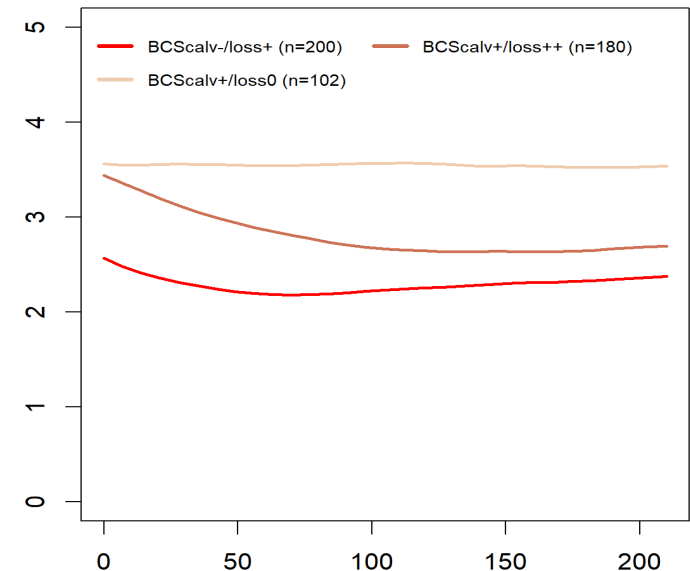
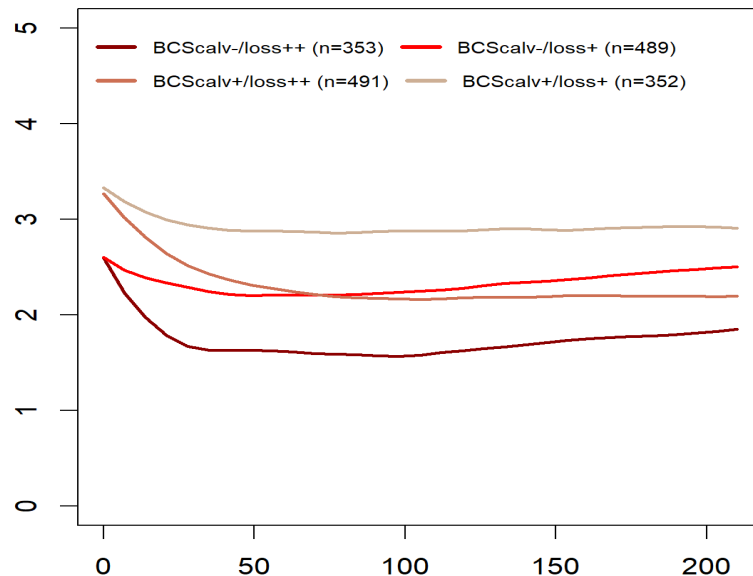




Results: Performance of production for each BCS profile

Holstein breed	BCScalv-/loss ++	BCScalv-/loss +	BCScalv+/loss ++	BCScalv+/loss +
Total milk yield over 44w	7792 a	7291 b	7319 b	6963 c
Fat content over 44w	39.2 a	40.0 ab	39.8 ab	40.2 b
Protein content over 44w	31.3 a	32.1 b	31.5 a	32.5 c

Normande breed	BCScalv-/loss +	BCScalv+/loss ++	BCScalv+/loss 0
Total milk yield over 44w	5 178 a	5 869 b	5 664 b
Fat content over 44w	40.6 a	40.6 a	42.0 b
Protein content over 44w	33.3 a	33.1 a	34.9 b

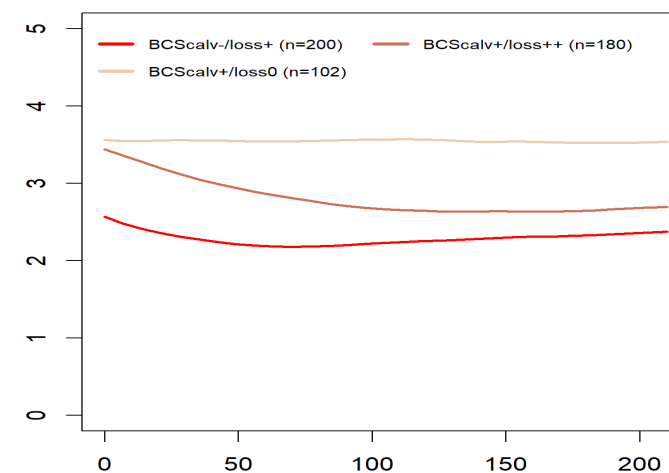
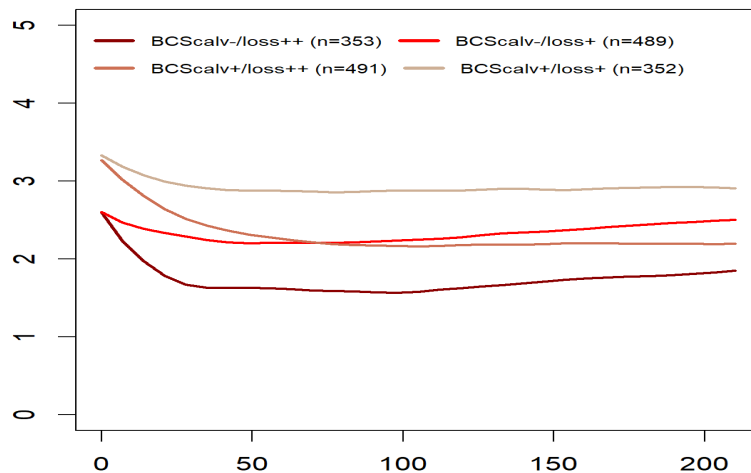




Conclusion

Holstein breed	BCScalv-/loss ++	BCScalv-/loss +	BCScalv+/loss ++	BCScalv+/loss +
Calving again				
Delay to obtain a pregnancy				
% of normal ovarian activity				

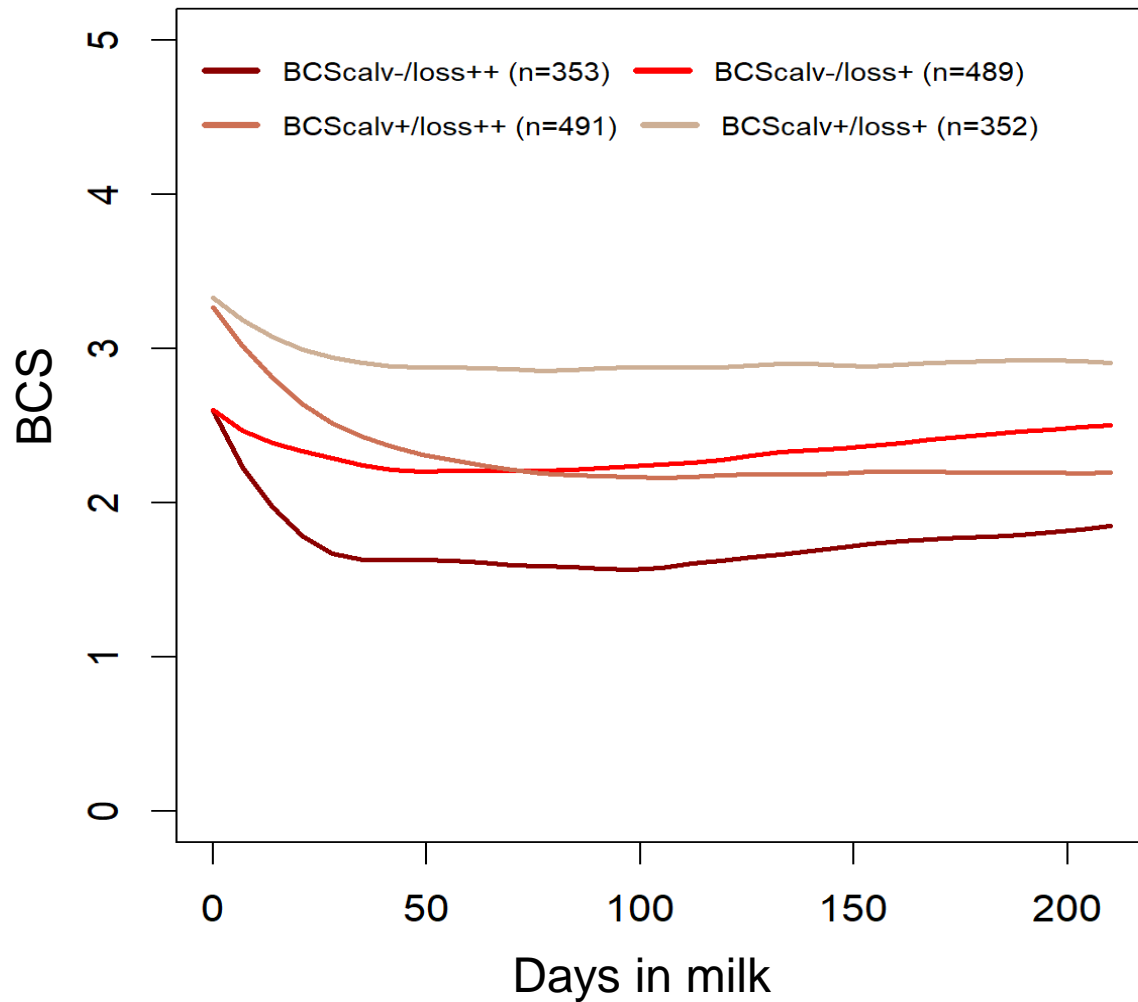
Normande breed	BCScalv-/loss +	BCScalv+/loss ++	BCScalv+/loss 0
Calving again			
Delay to obtain a pregnancy			
% of normal ovarian activity			





Conclusion

BCS profile for Holstein cows



BCScalv+/loss+



Failure of reproduction explained mainly by a milk yield effect

BCScalv+/loss++



Strong effect of BCS loss on success of first AI

BCScalv-/loss +

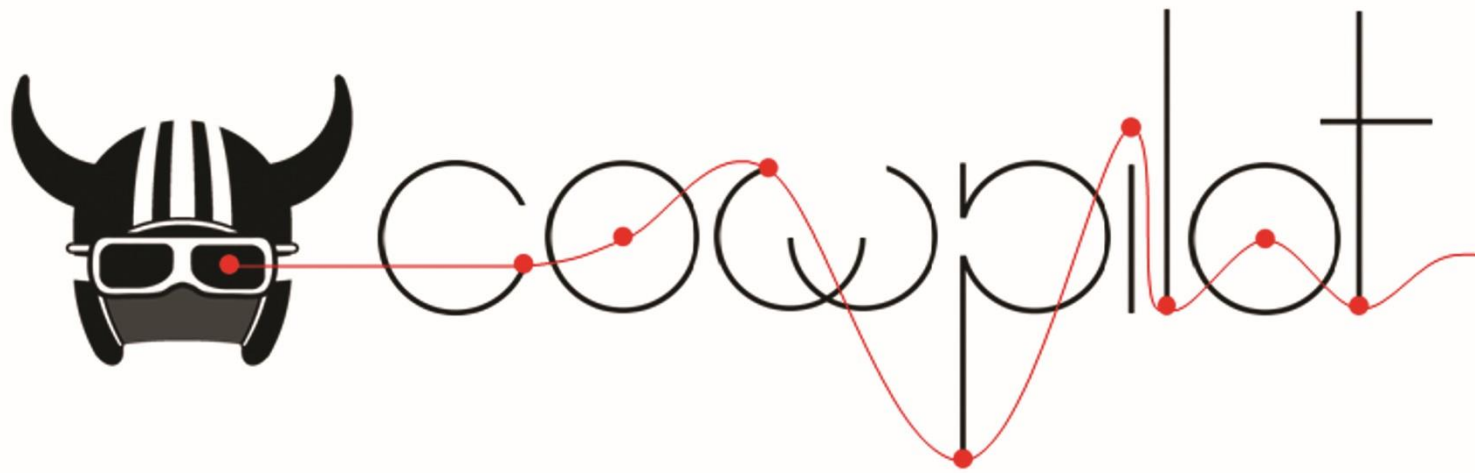


? Main effect to identified

BCScalv-/loss ++



Success of reproduction mainly affected by the start of reproduction



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Thank you



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