Session 10 – Genetics and physiology of female fertility in ruminants

Presenting author: M.J. Carabaño

E-mail:mjc@inia.es

Survival analysis of interval from first to last insemination (FLI)

Carabaño M.J.[1], González-Recio[2], O., Ugarte, E.[3], Rodríguez, E.[4], Díaz C[1].

1

2

3

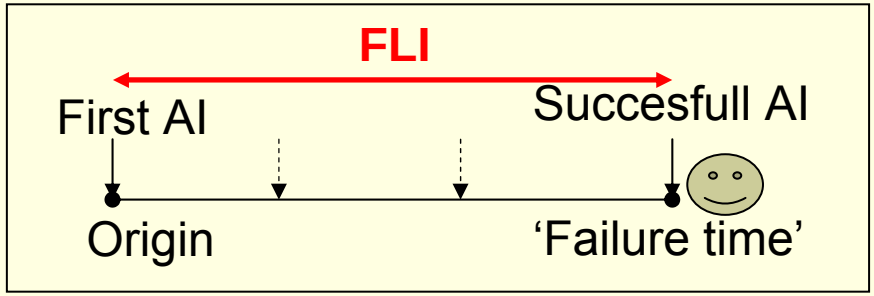
4

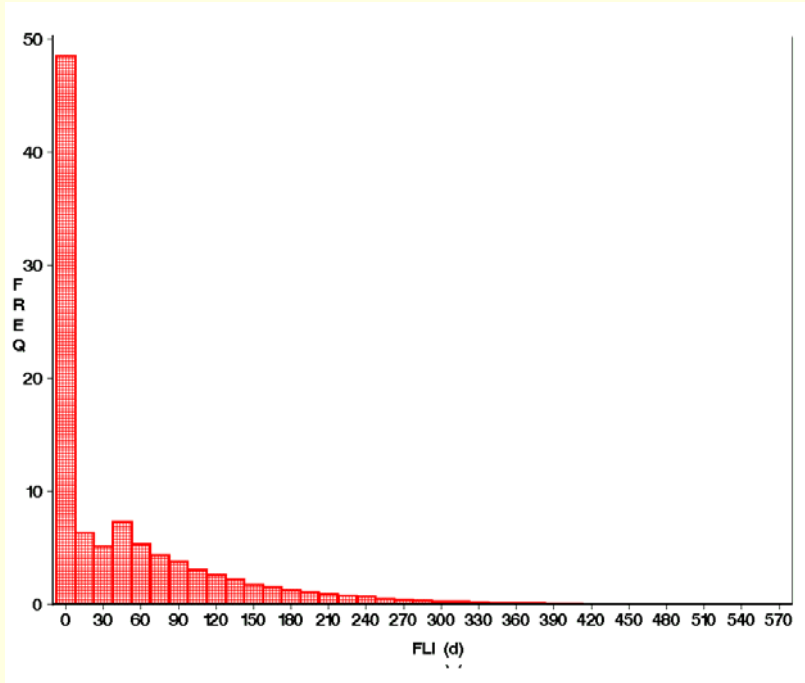
Why FLI?

- Fertility of cow=ability to cycle early after parturition+ **regular and detectable cycles + ability to conceive once inseminated**
- FLI Measures ability to conceive and to show cyclic activity
- Significant economic value
- ‘Continuous’

Why Survival analysis for FLI?

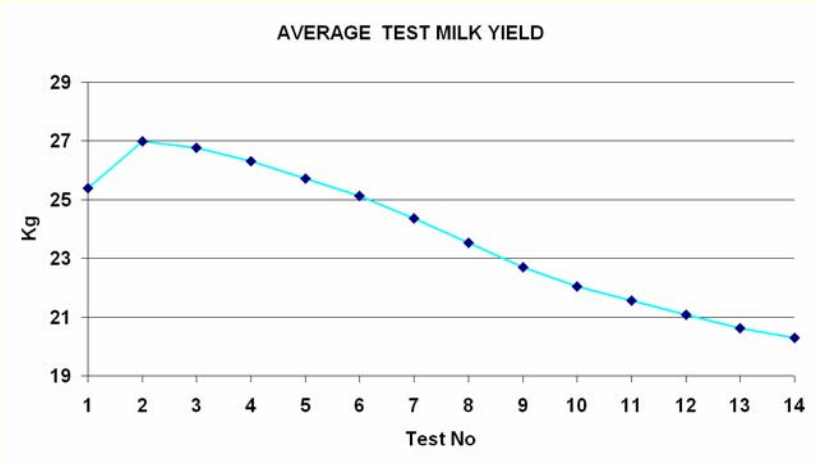
- Process with origin (first insemination) and end (pregnancy)
- Incomplete (censored) data
- Factors change with time (production, SCC, AI bull, management)
- Factors may not be additive
- FLI is not Normal

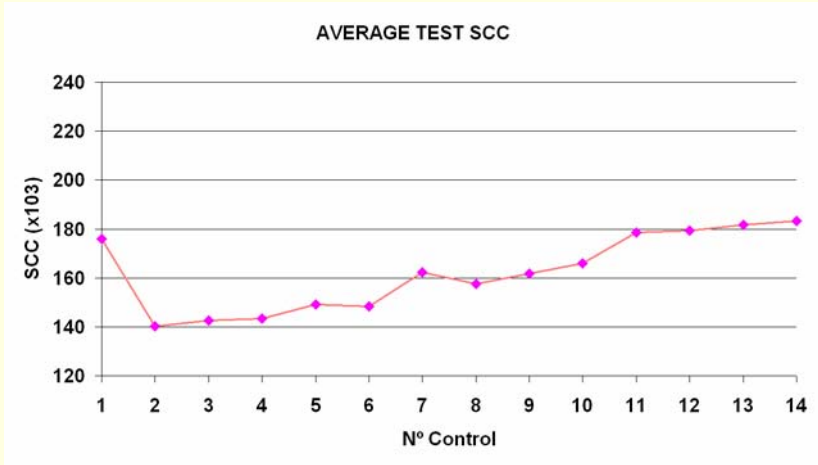




Data

- 20,074 **Primiparous** HF cows Alava_1990
- INS (≤ 9)
  - Date
  - AI bull
- Test day milk, SCC





Data

	AVG	SD
FLI-COMPLETE (d) ($N_{complete}$=15,189)	41.9	61.9
FLI-CENSORED (d) ($N_{censored}$=4,885 – 24.3%)	75.1	96.9
Age First Calving (mo)	28.0	5.40
Calving - First AI (d)	76.3	28.9

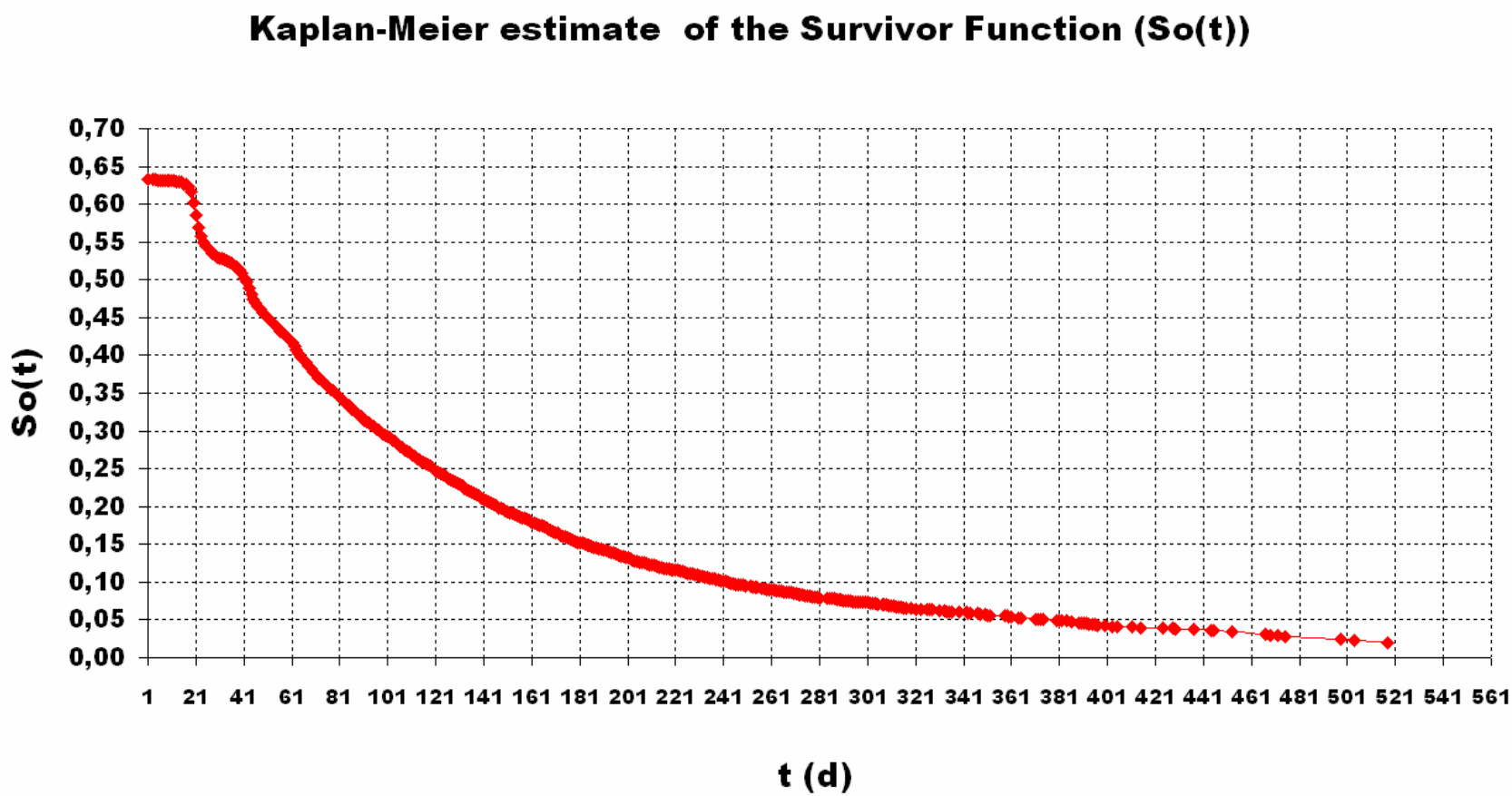
Survival Analysis – Model – Cox and Weibull

- Risk of 'failure' (= pregnancy) at time t

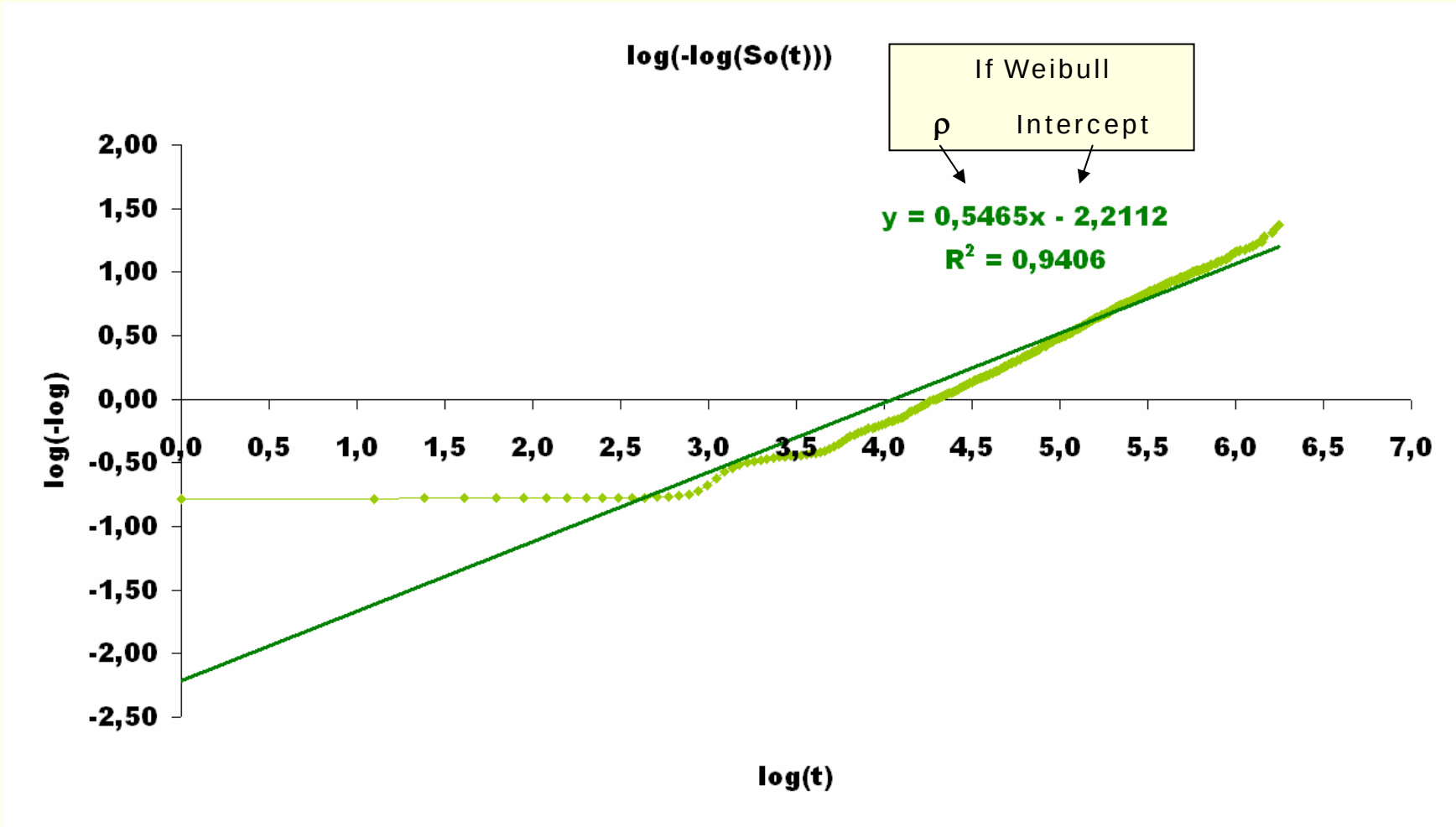
$$h(t) = h_o(t)\, e^{(H + YS(t) + AFC + CFI + MY(t) + SCC(t) + SB(t) + SireBV)}$$

- H = herd (Log-Gamma)
- YS = Year-Season of insemination (t dep)
- AFC = Age at calving
- CFI = Interval Calving-First insemination
- MY = Milk yield closest to AI (t dep)
- SCC = Somatic cell count closest to AI (t dep)
- SB = Service bull (t dep-Log-Gamma)
- SireBV = Sire of cow additive genetic effect (Normal)

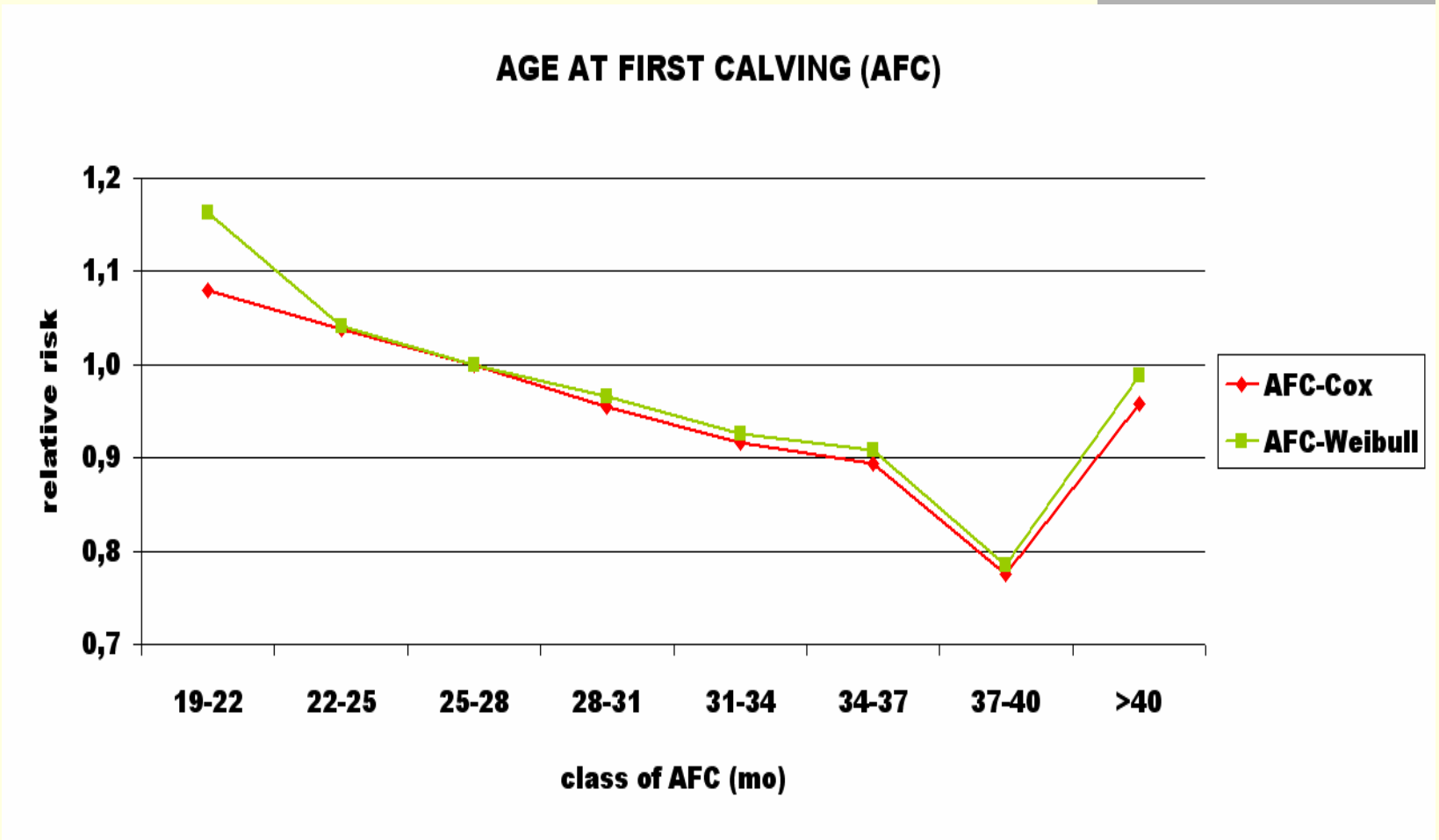
Survival Analysis – Survival Kit – Survivor f. - Kaplan



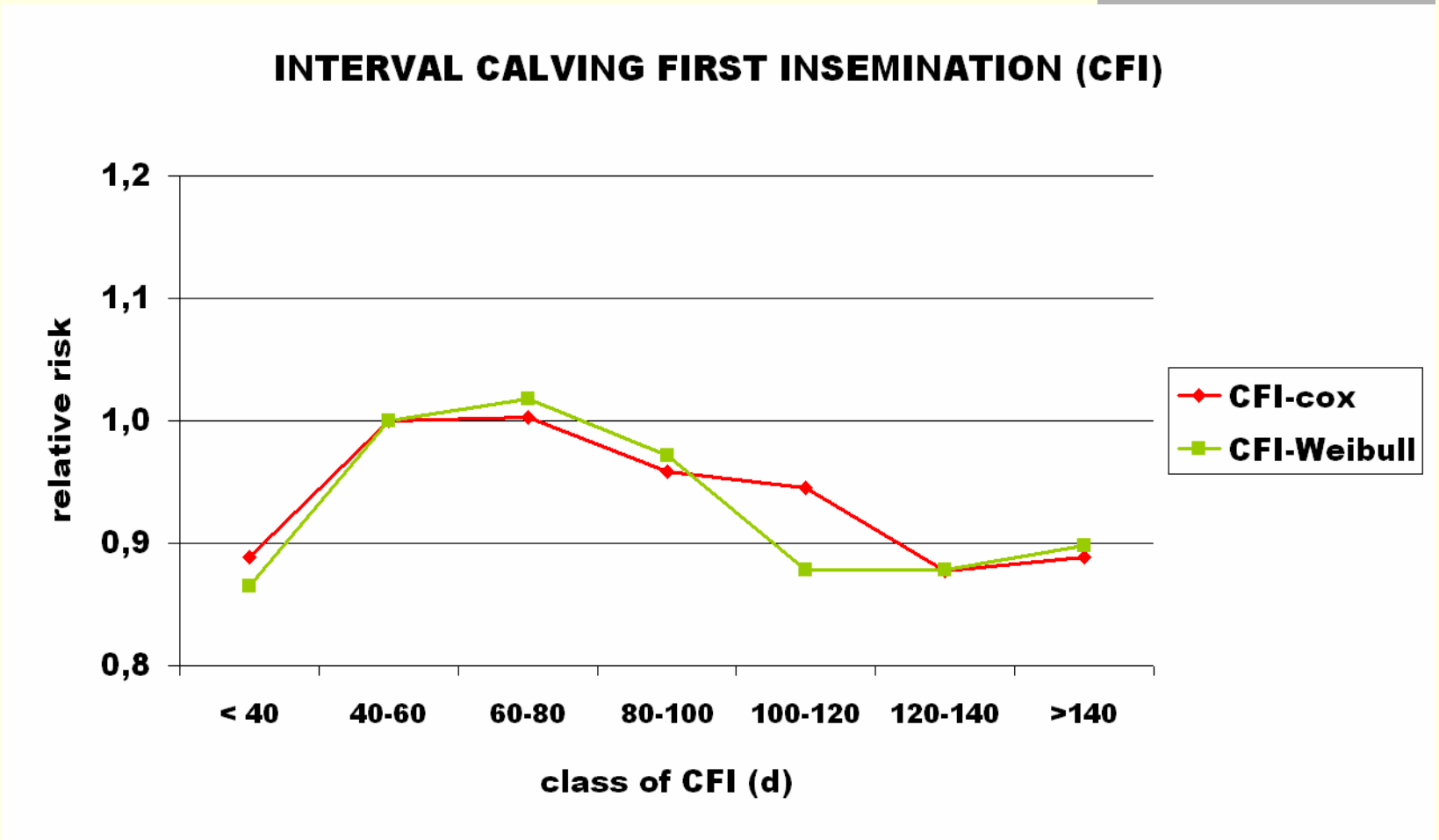
Survival Analysis – Weibull ???



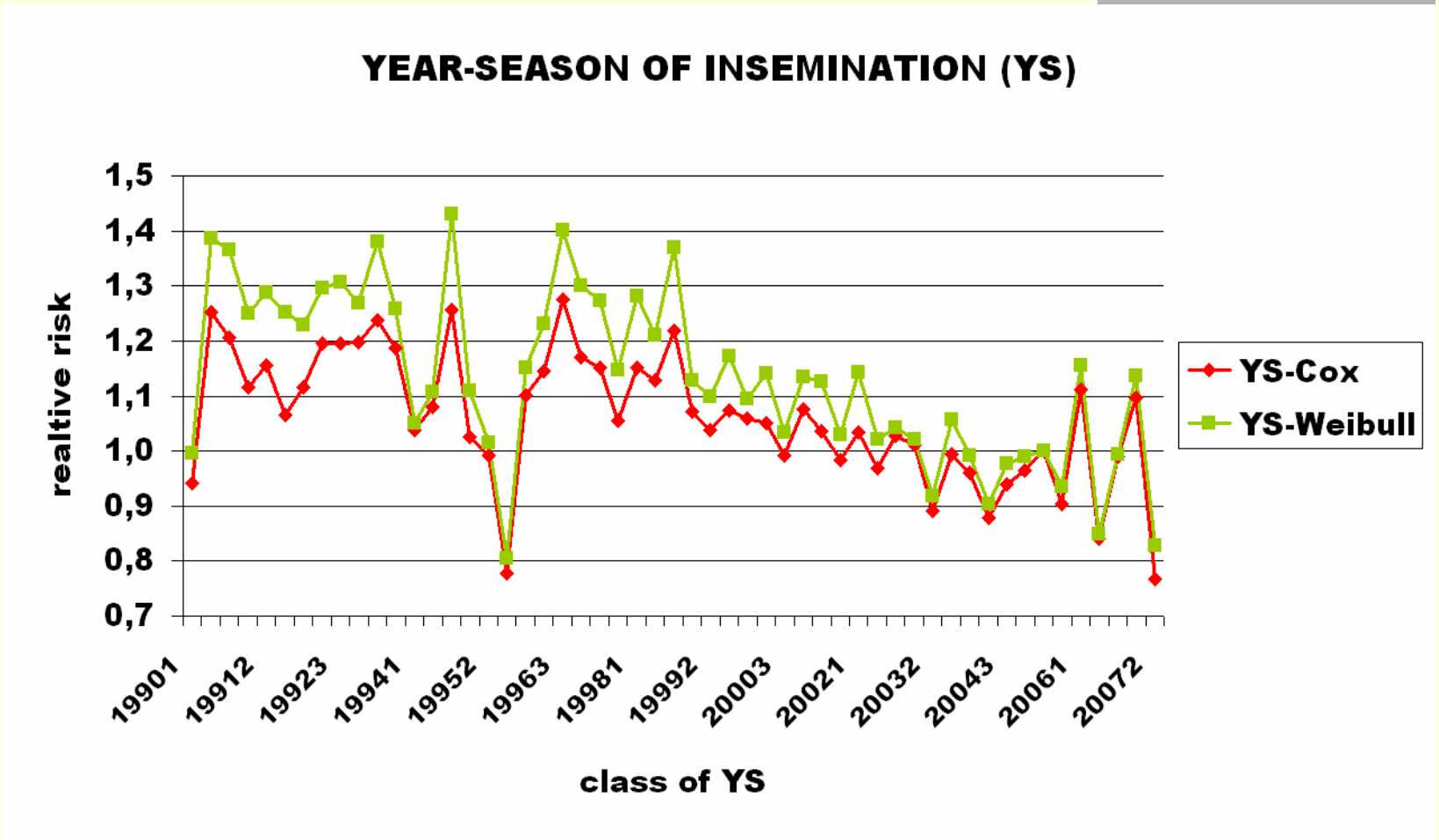
Survival Analysis – Fixed effects



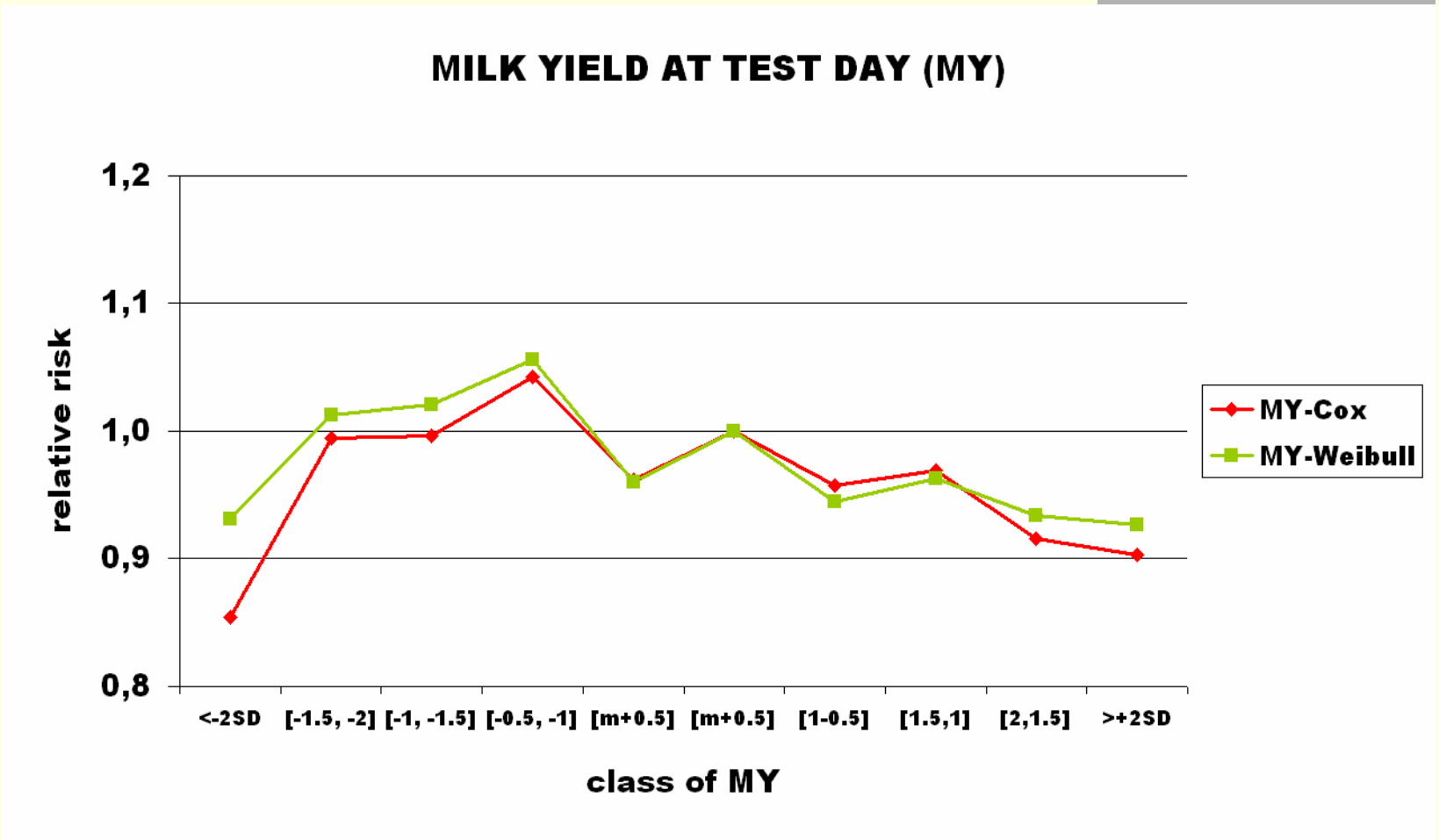
Survival Analysis – Fixed effects



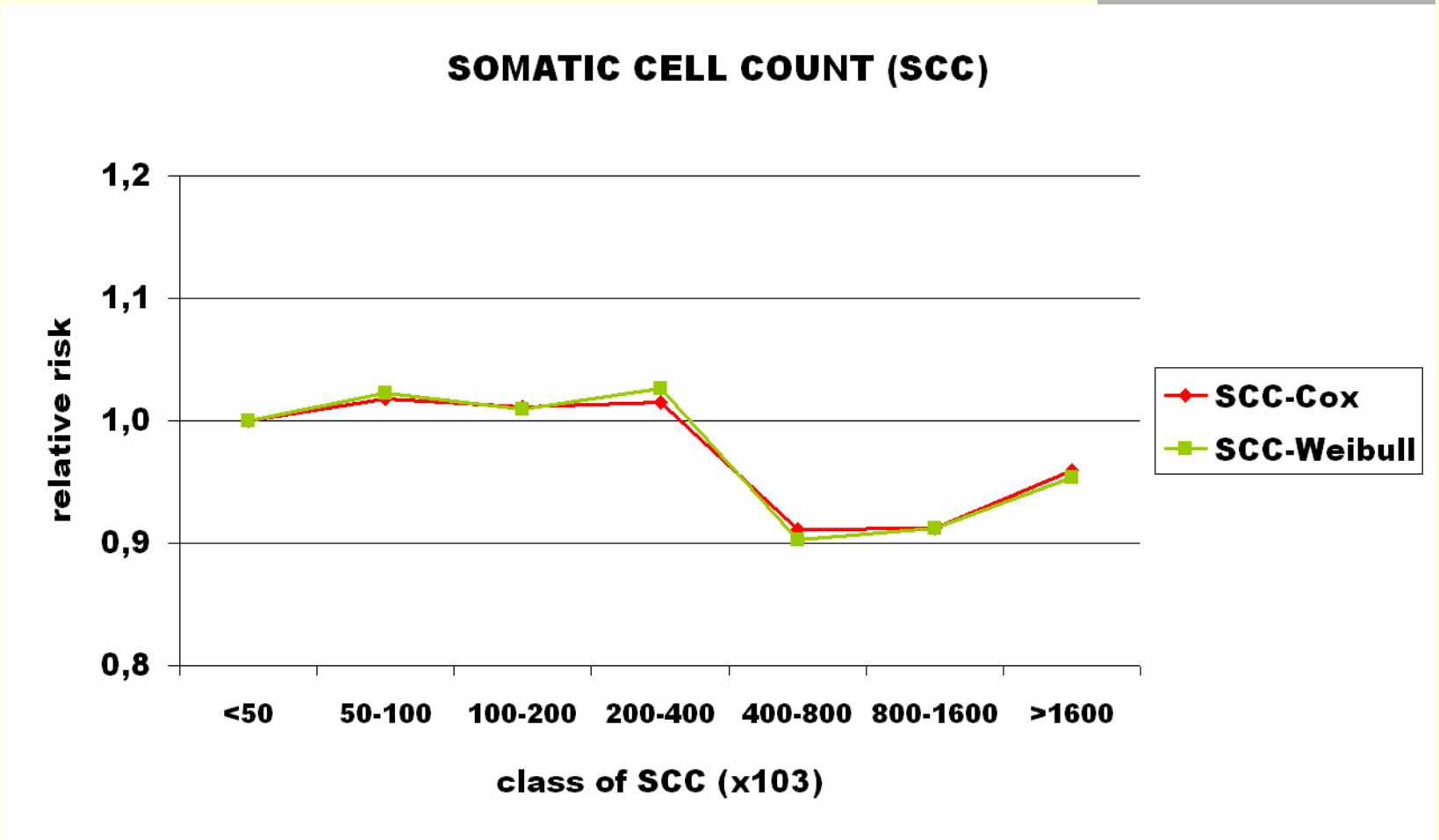
Survival Analysis – Fixed effects



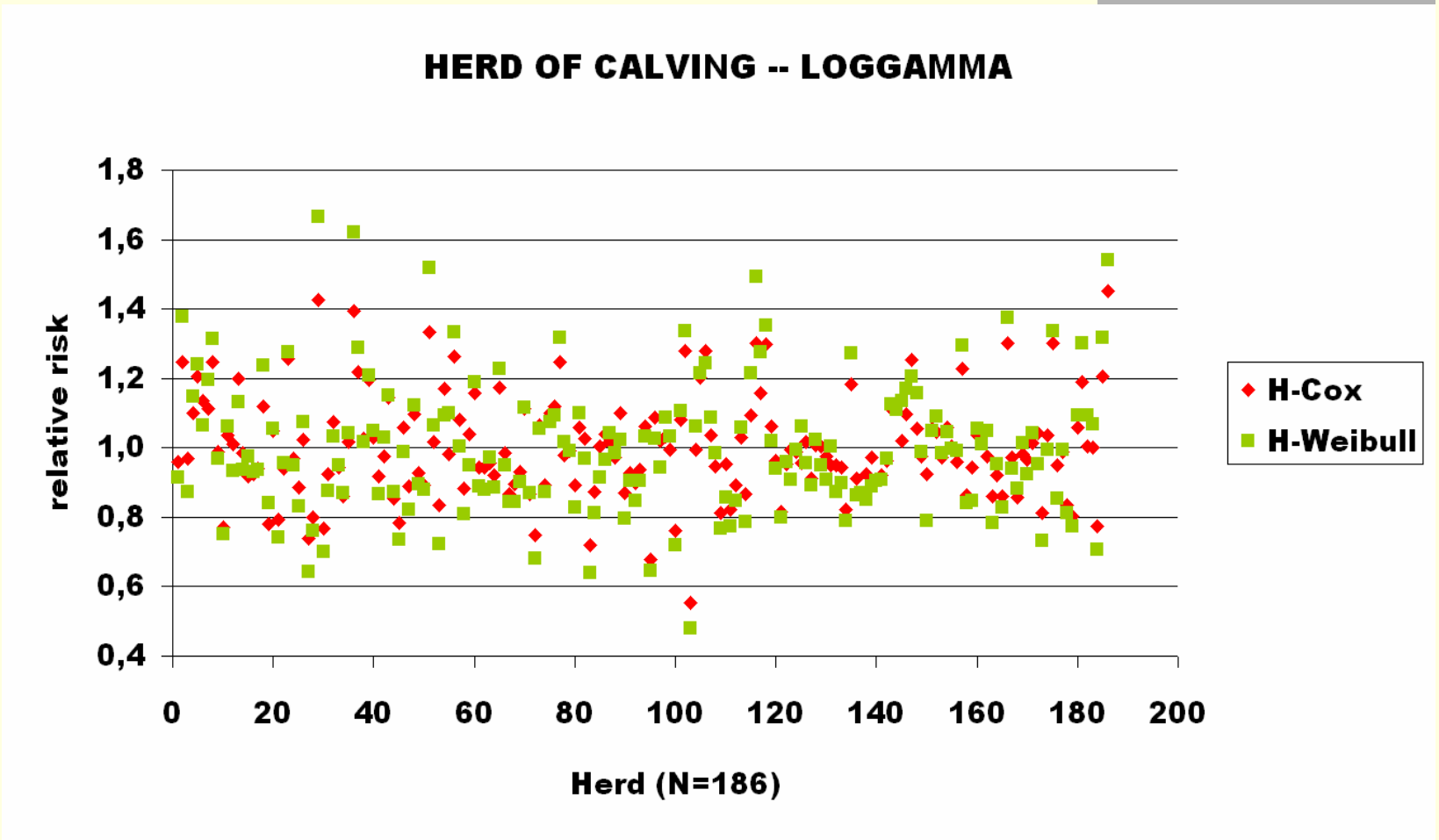
Survival Analysis – Fixed effects



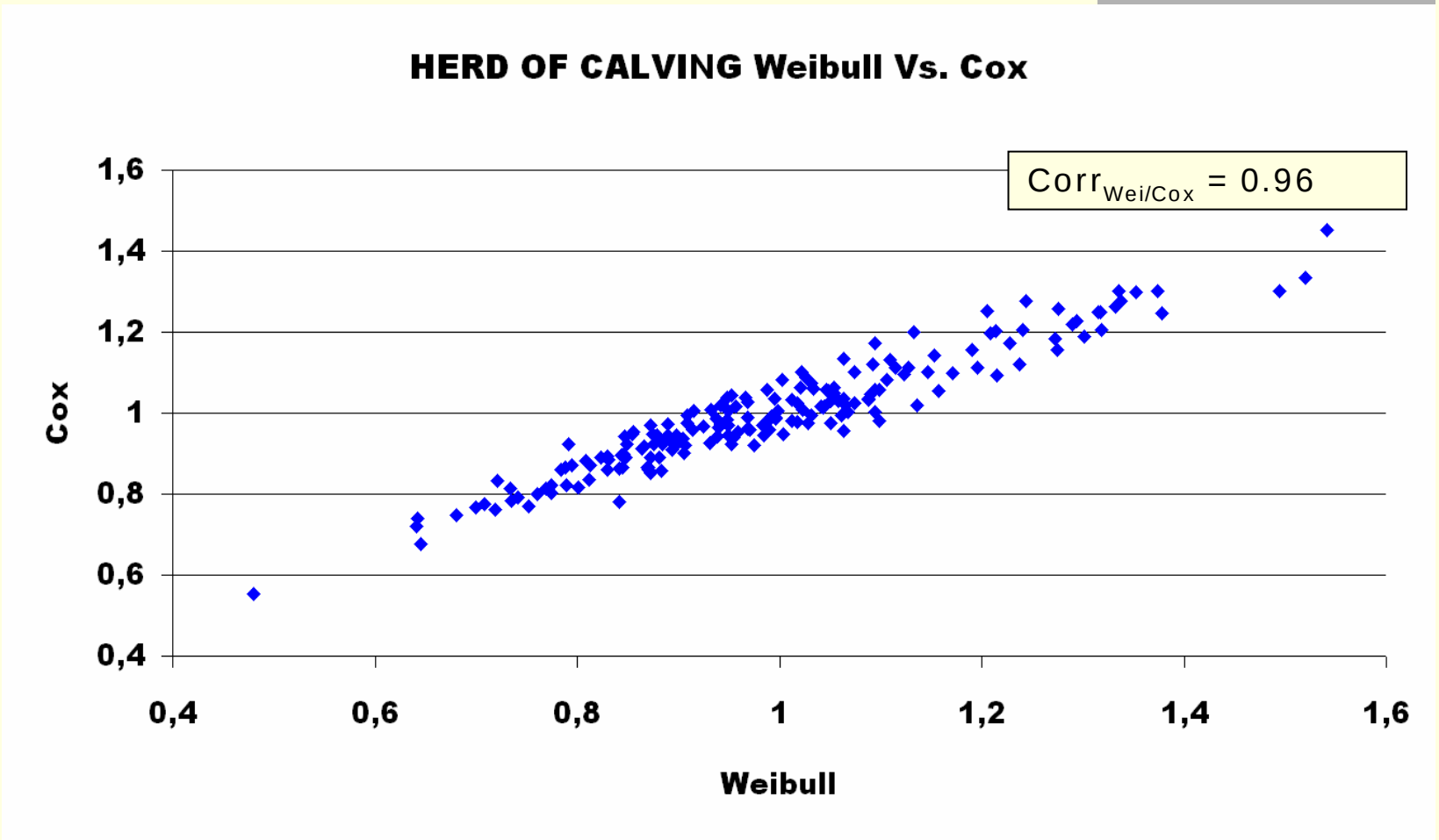
Survival Analysis – Fixed effects



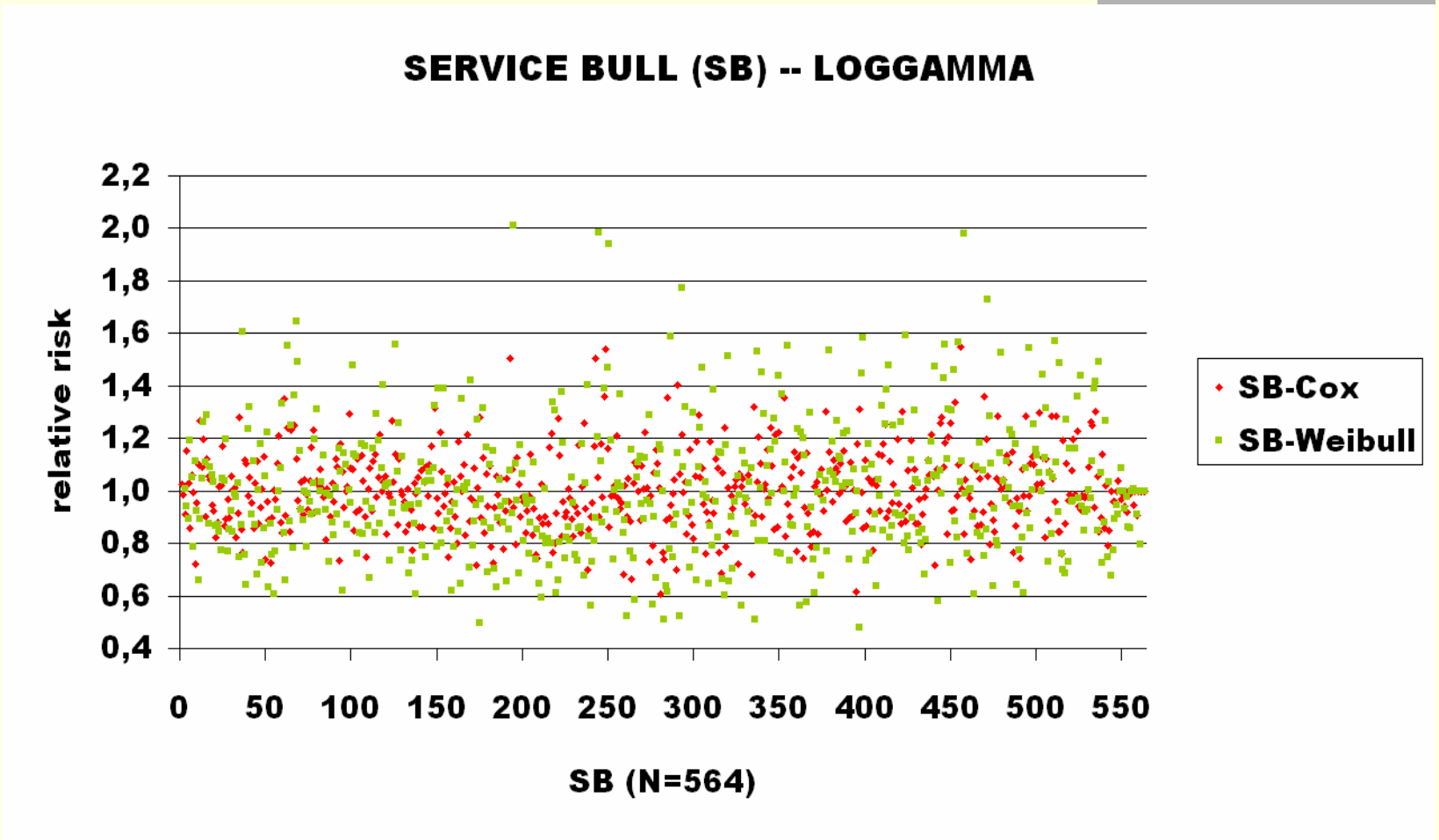
Survival Analysis – Random effects



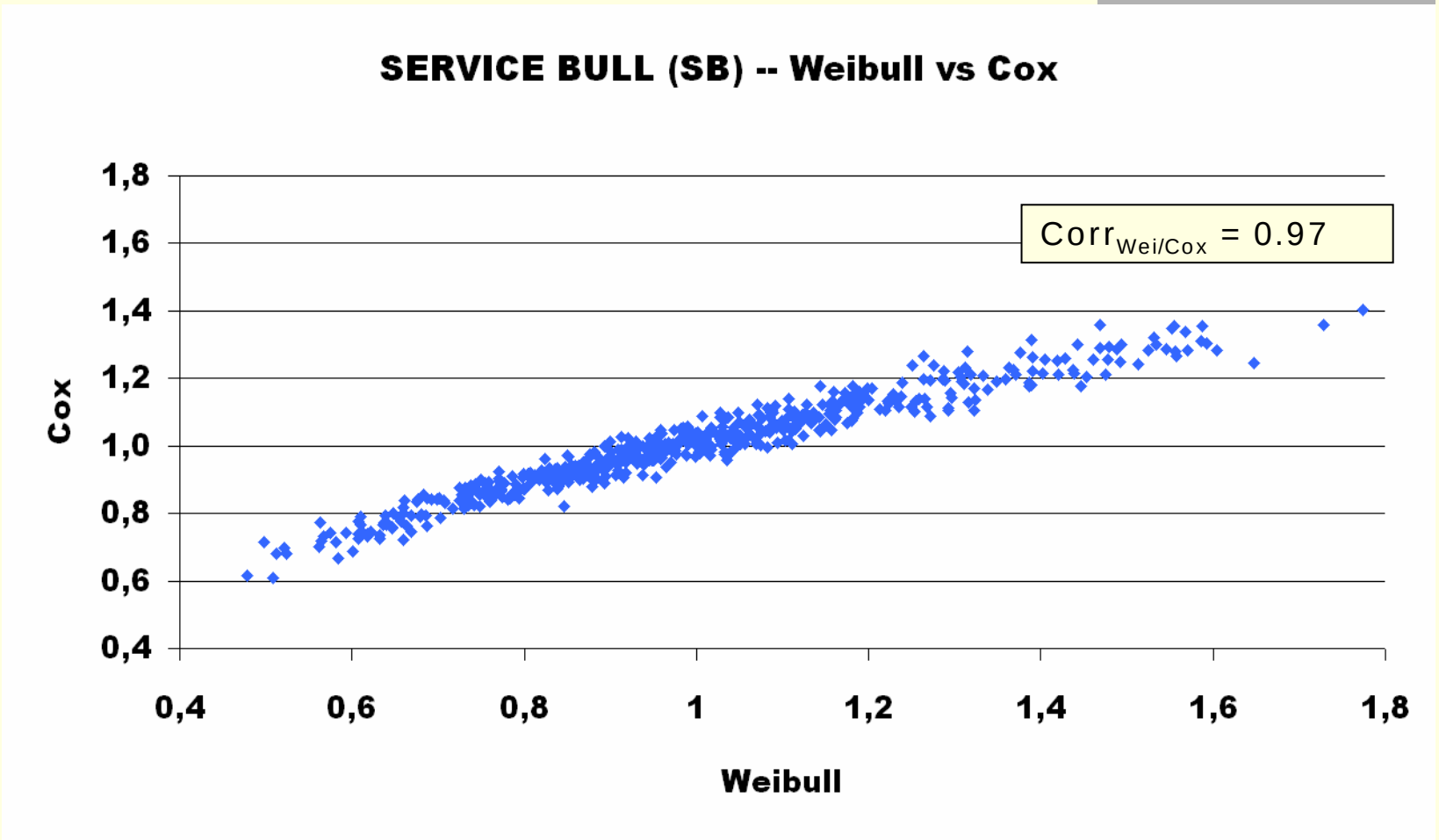
Survival Analysis – Random effects



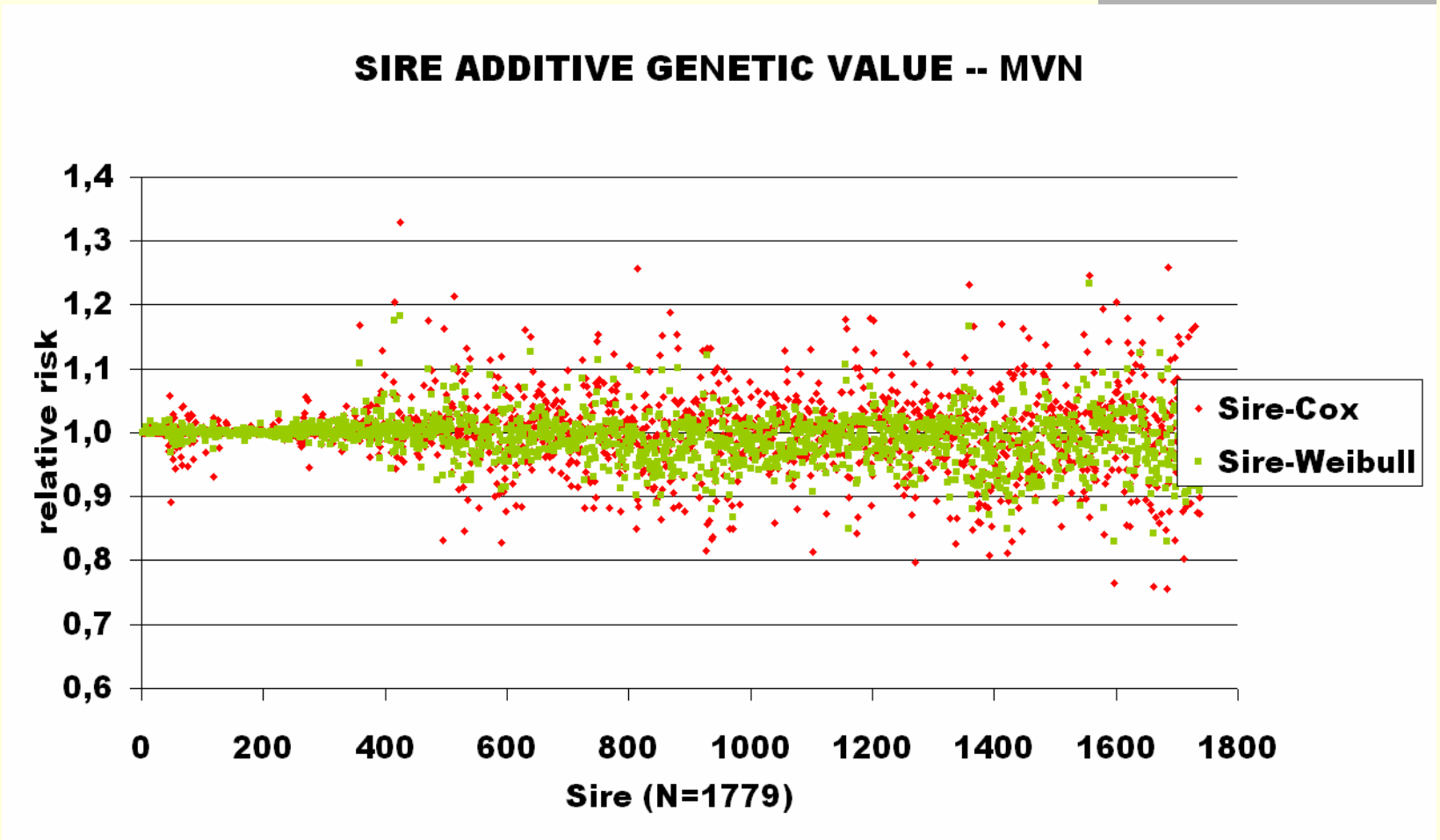
Survival Analysis – Random effects



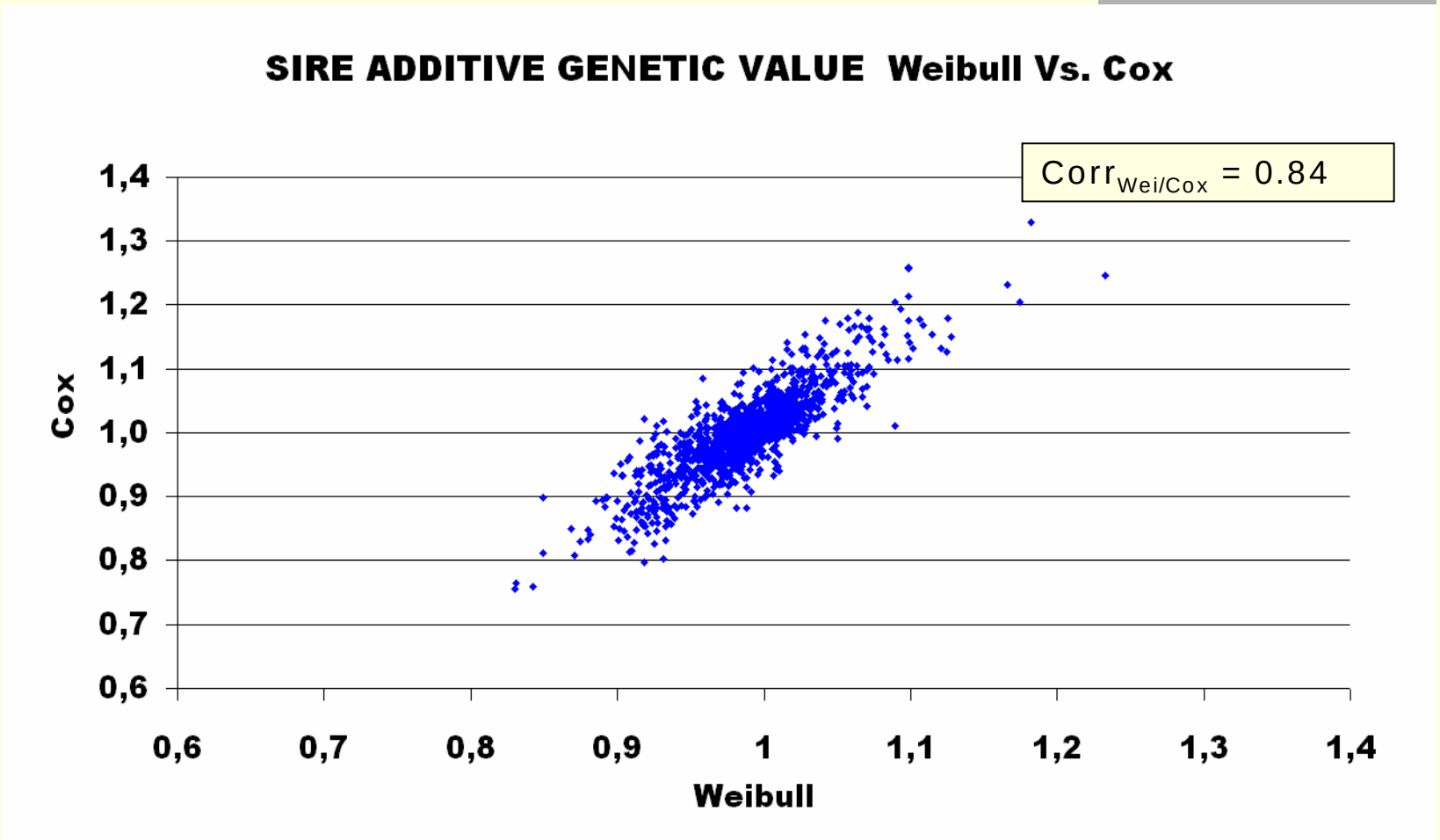
Survival Analysis – Random effects



Survival Analysis – Random effects



Survival Analysis – Random effects



Survival Analysis – Parameter estimates

	Weibull Rho /Intercept	γ_H/V(H)	γ_{SB}/V(SB)	V(sire)	h^2_{log}	h^2_{Yazdi*}
Cox	__	15.5/0.06	15.5/0.06	0.04	0.08	0.10
Weibull	0.5/1.7	16.0/0.06	9.1/0.11	0.01	0.02	0.02

* h^2_{Yazdi}=(4*V(sire)/(V(sire)+V(H)+V(SB)+(1/1-c)); V=variance, H=herd, SB=service bull, c=proportion of censored records

Conclusions

- Assuming a Weibull distribution to analyze FLI data may be improper (Initial 21 d)
- Differences between Cox and Weibull were not large
- Relatively small differences in risk (of pregnancy) due to the factors studied
- Compare with other approaches/traits (INS)

Thank you !!!


GOBIERNO
DE ESPAÑA
MINISTERIO
DE CIENCIA
E INNOVACIÓN
INIA
Instituto Nacional de Investigación
y Tecnología Agraria y Alimentaria


neiker
tecnalia


ESCUELA TÉCNICA SUPERIOR
DE INGENIEROS AGRÓNOMOS
DE LA UNIVERSIDAD POLITÉCNICA
DE MADRID