

Uterine infections: How to find them, what to do about them?

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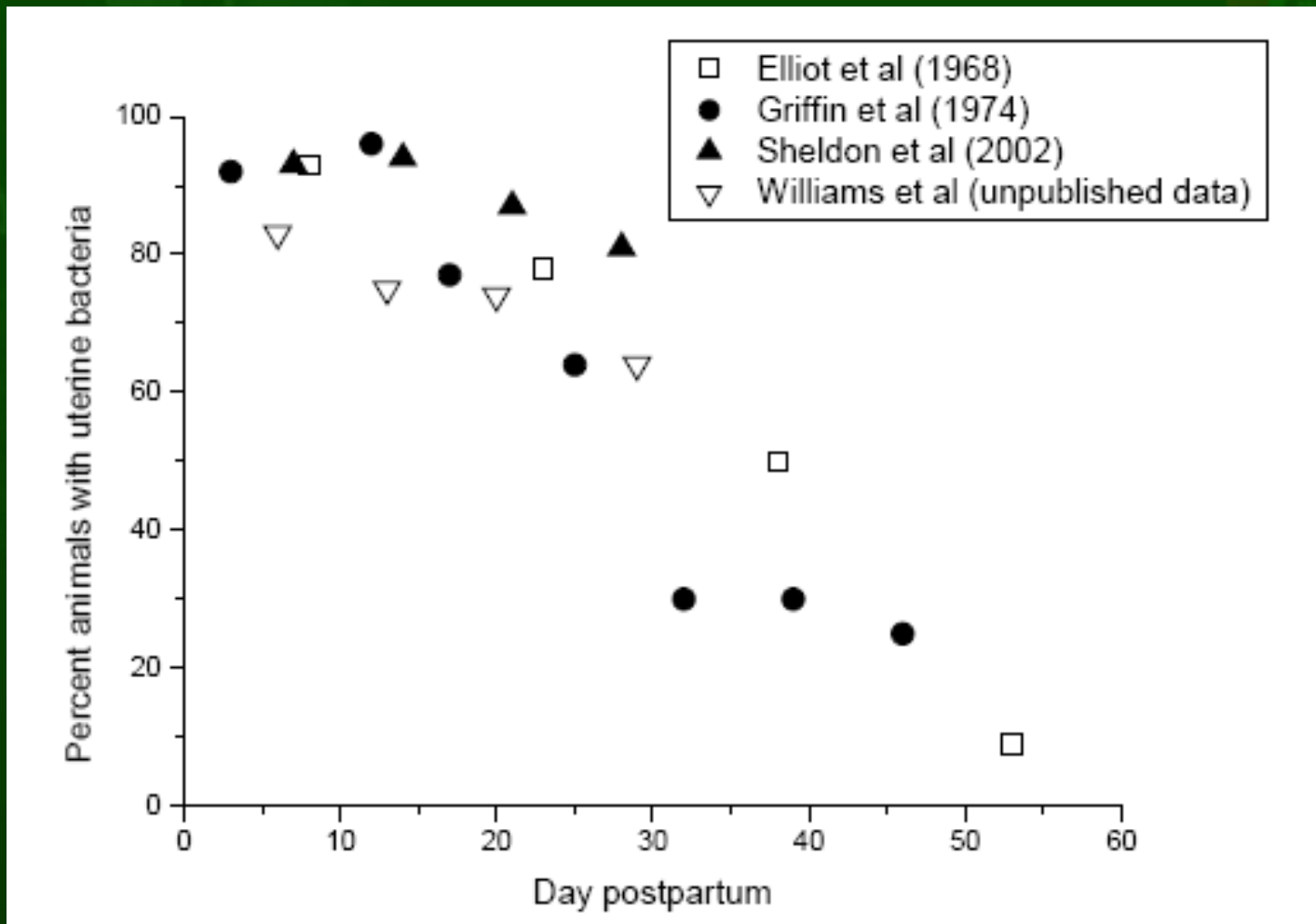


VET

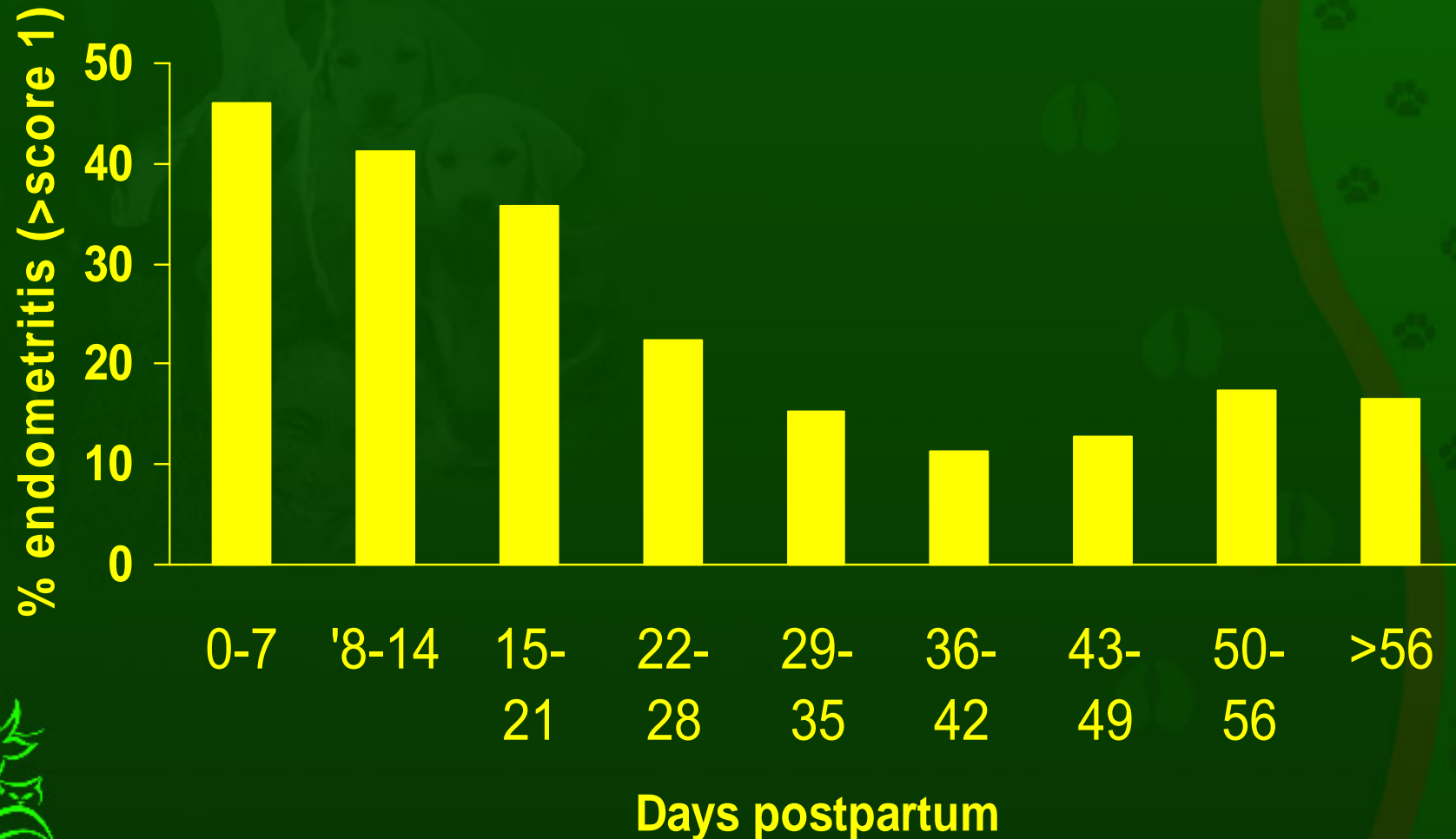
Will this cow conceive?



% of cows with uterine infections by days calved



% of cows with endometritis by days partum at examination



- Majority of cows infected after calving
- Most infections 'self-curing'
- However, some are persistent for many months
 - 21% of non-pregnant cows had bacteria isolated from the uterus at slaughter (McDougall, NZVJ, 2005)
 - Cows in negative energy balance more at risk?
 - Ketosis → ↓[IGF1] → PMN functionality (Foldi et al 2005)

Definitions

- (puerperal) Metritis
 - Systemically ill cow within 2 weeks of calving
 - Foul smelling, bloody discharge
- Endometritis
 - Not 'sick'
 - Infections within the uterus
 - May or may not have external (vulval) discharge
- Pyometron
 - Uterine infections with a corpus luteum

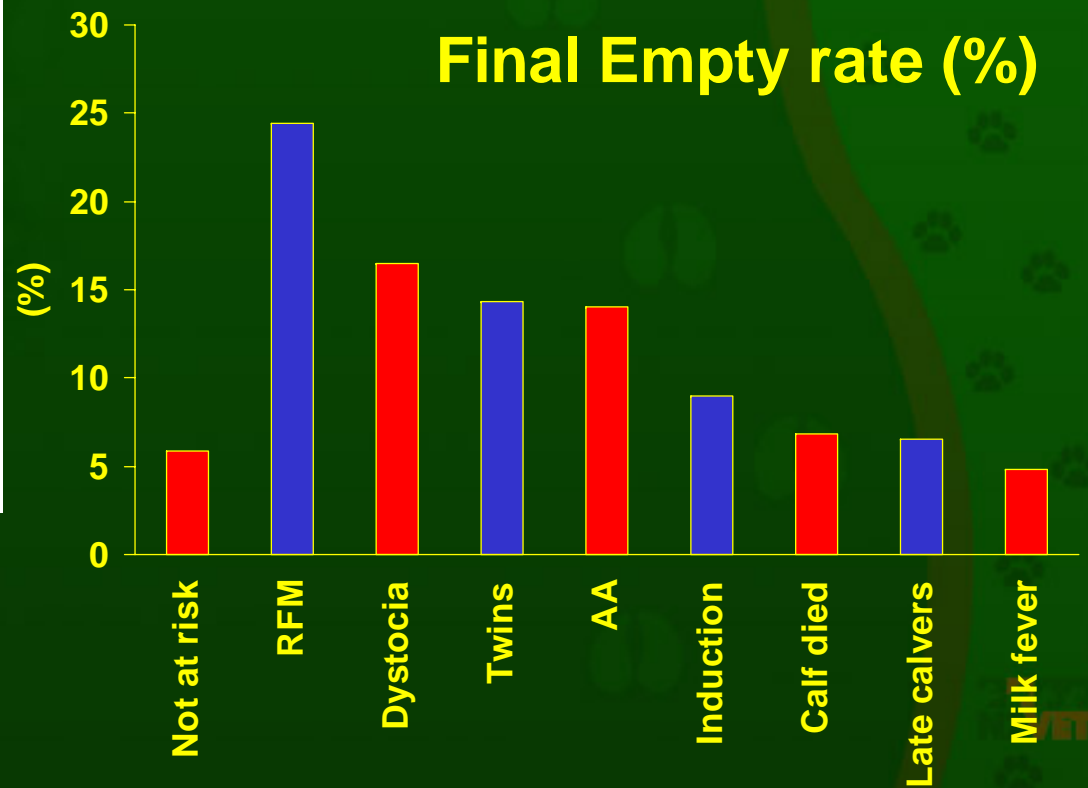
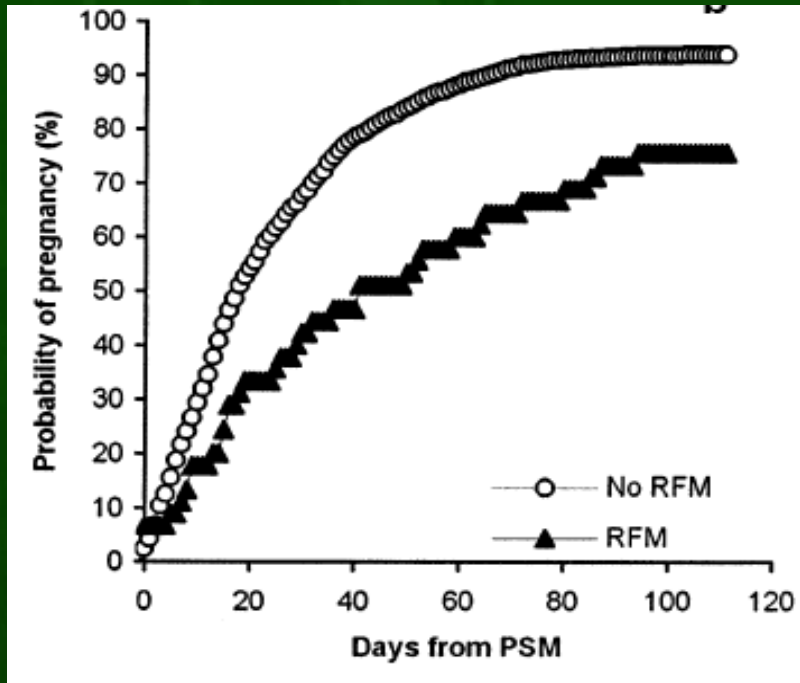
Bacteriology

- Mixed population of bacteria found in the uterus after calving
- Only some of these are regarded as 'pathogenic':
 - *Arcanobacterium pyogenes*
 - *Escherichia coli*
 - *Fusobacterium necrophorum*, and
 - *Prevotella melaninogenicus*

Risk factors for uterine infections

- Difficult calving
- Caesarean section
- Twins
- Retained placenta
- Milk fever
- Ketosis
- Displaced abomasum
- High milk protein %

Effect of disease on fertility



McDougall 2001 NZ Vet J 49: 60-67

Diagnosis of uterine infections

Metricheck



Vaginoscope

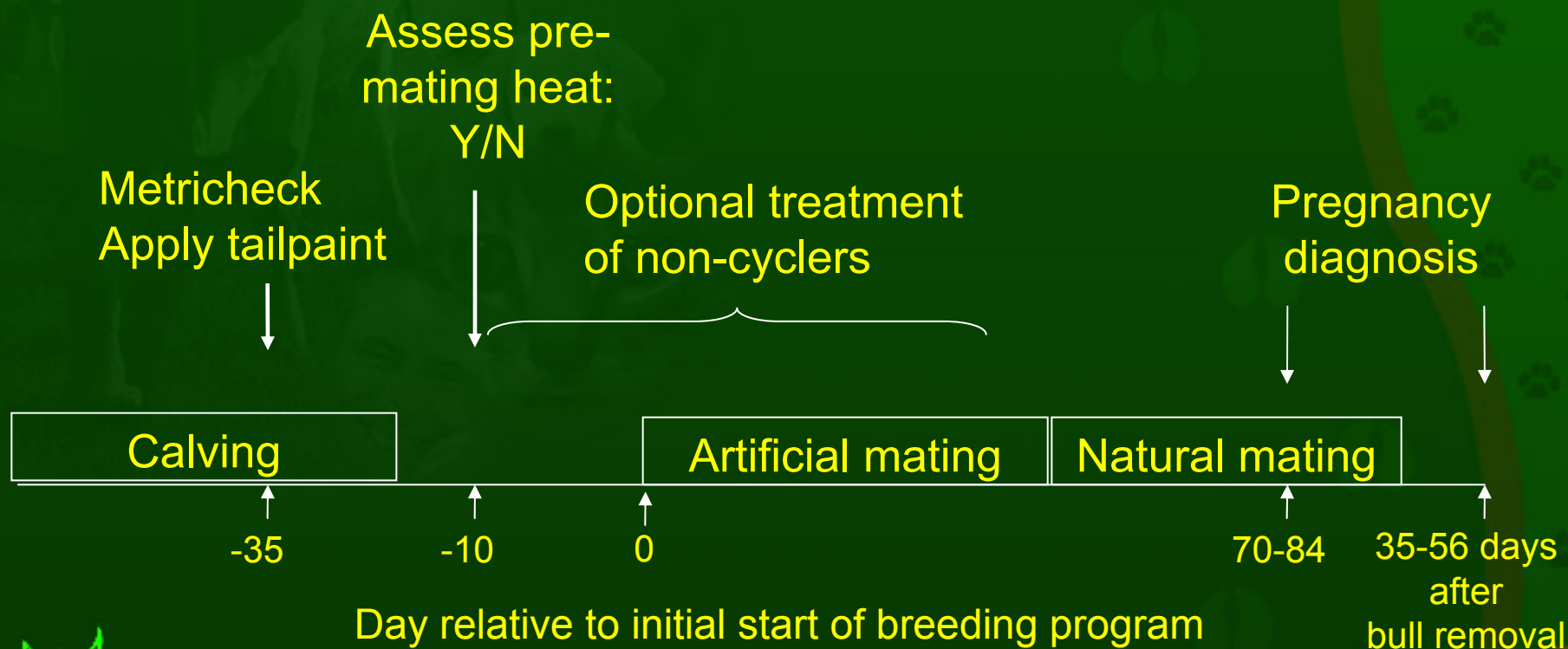
Scoring system

Score	Description
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0	No material detected	} combined for analysis
1	Clear mucous	
2	A few flecks	
3	Mucopurulent (<50% pus)	
4	Mucopurulent (>50% pus)	
5	Mucopurulent (>50% pus) + odour	

What is the relationship between metricheck score and subsequent fertility?

N= 2780 cows, 9 spring-calving herds

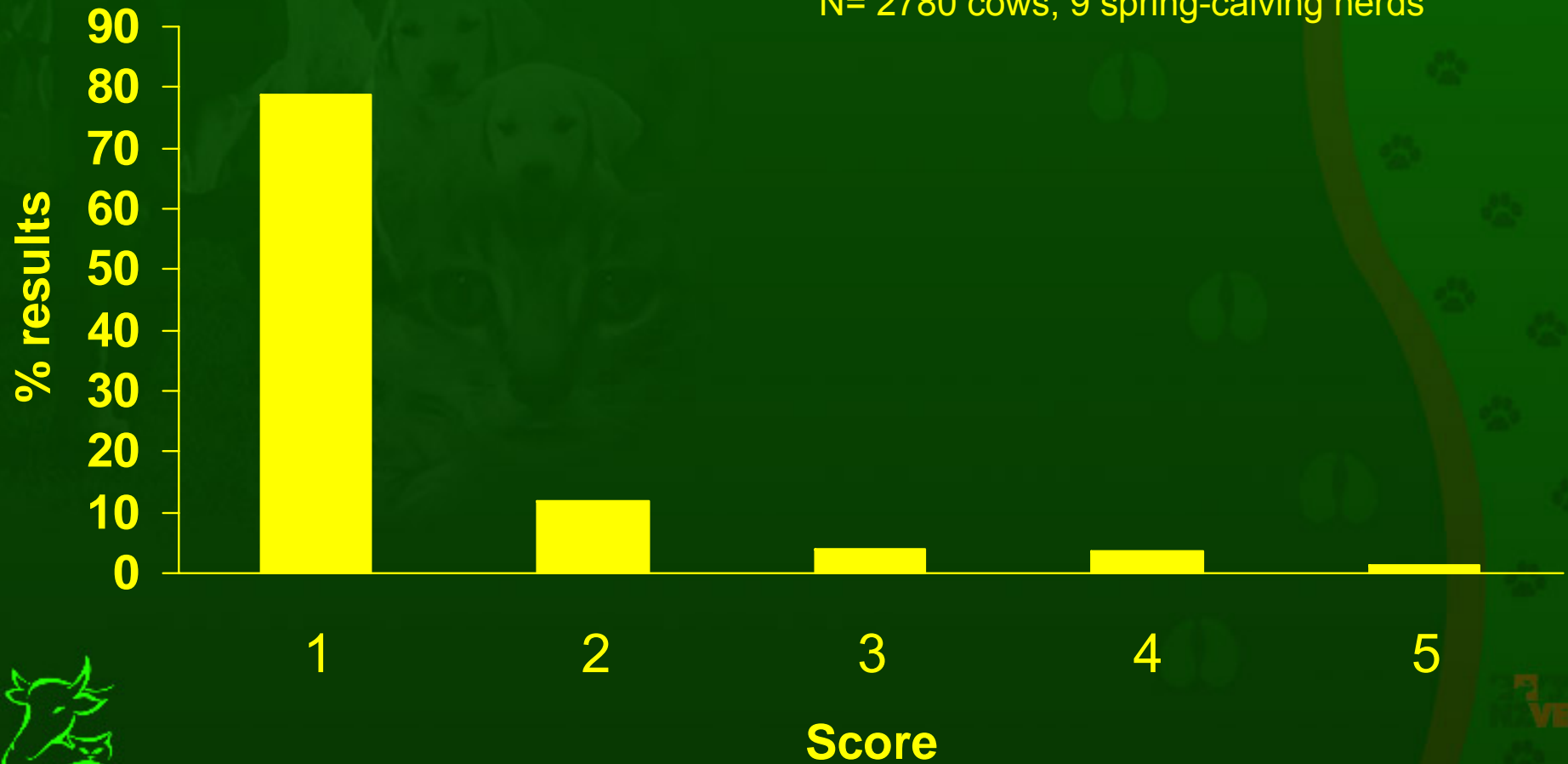


Note: 1 vet at all visits, other vets scored but under direction of 1 vet ignored days calved and history; i.e. all cows examined



Frequency of score (4 weeks before breeding start)

N= 2780 cows, 9 spring-calving herds



% score 2+ across entire herds

(n = 9 herds; 2780 cows total)

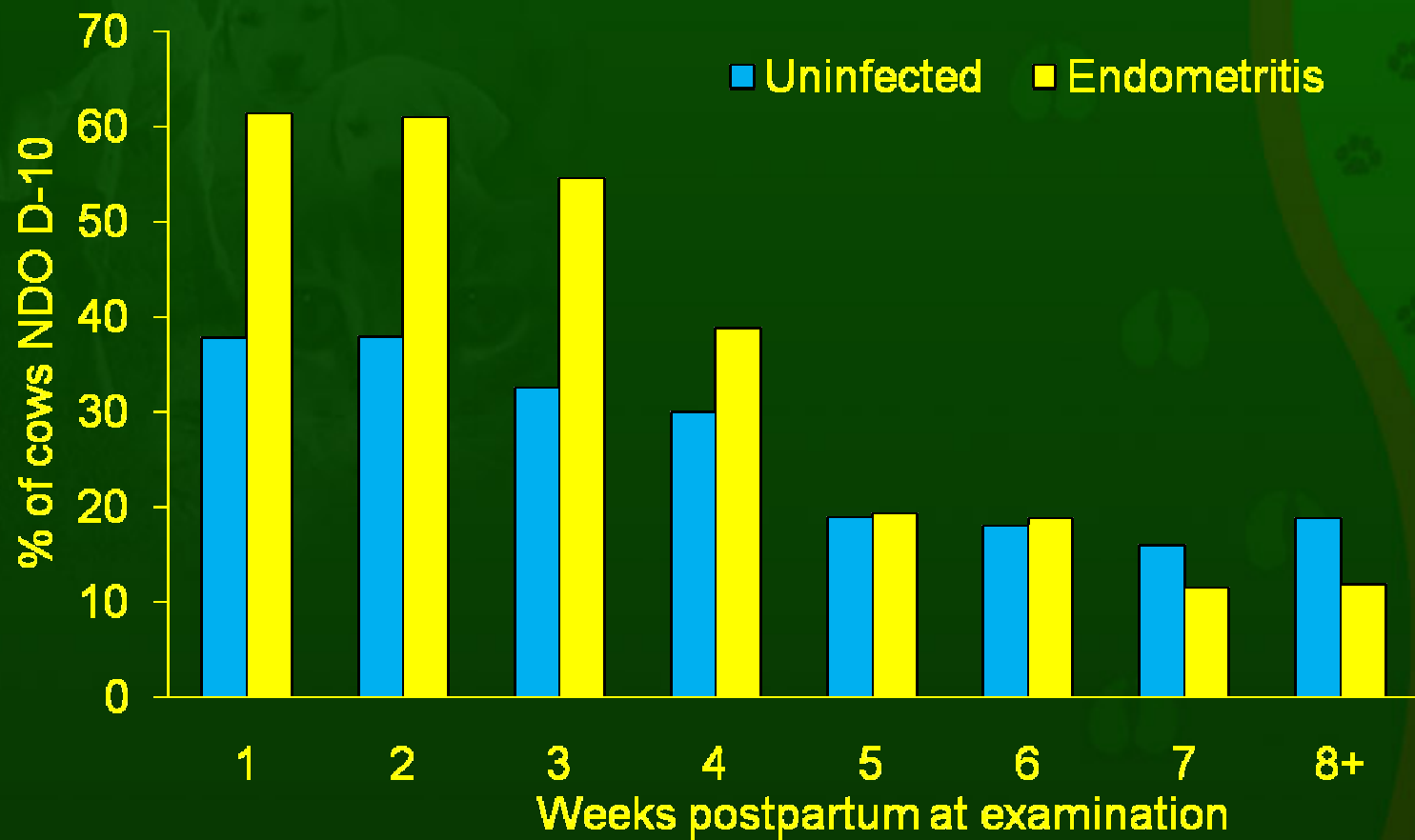


Average all herds = 21%

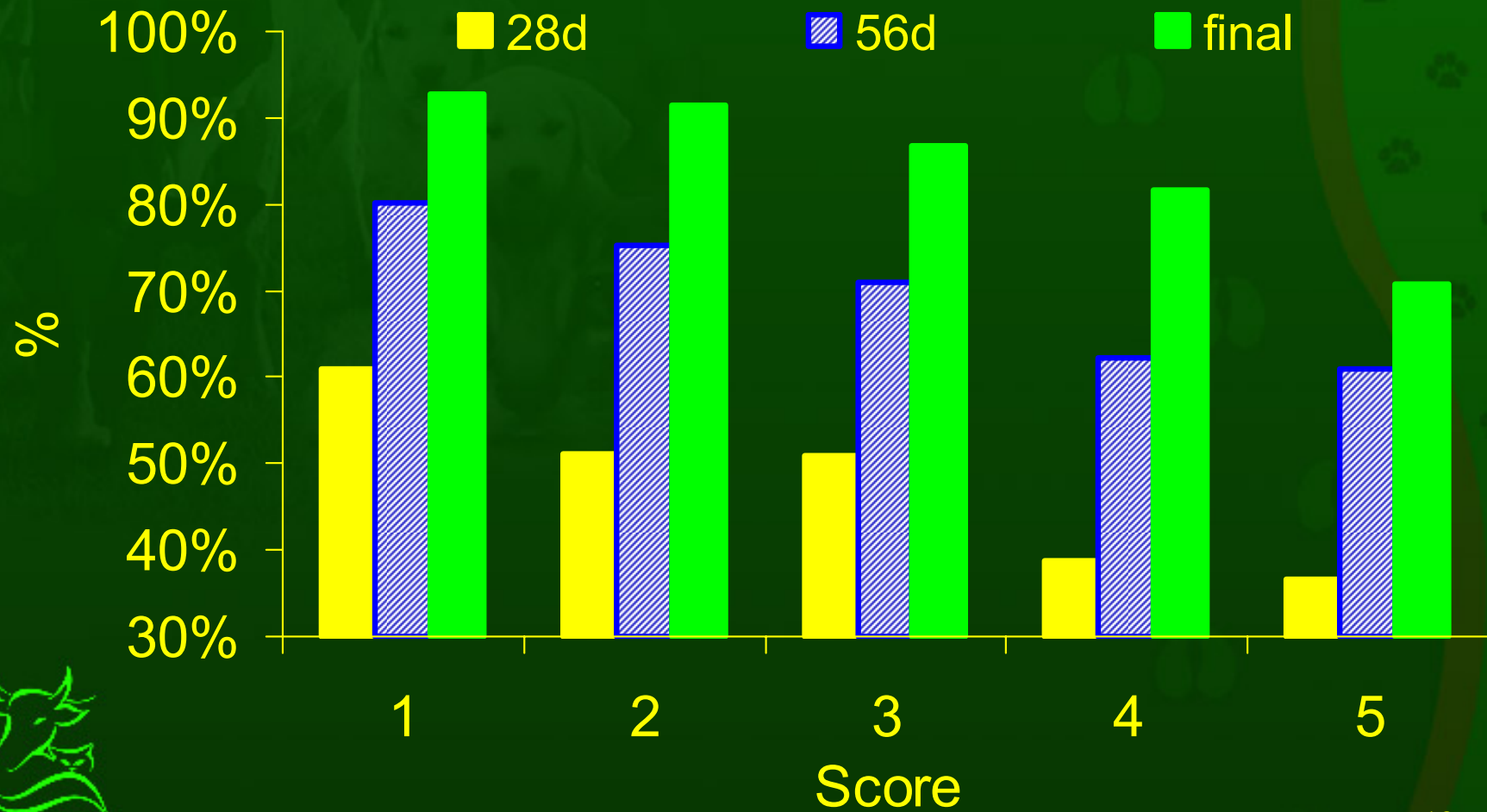
Score by peripartum disease history



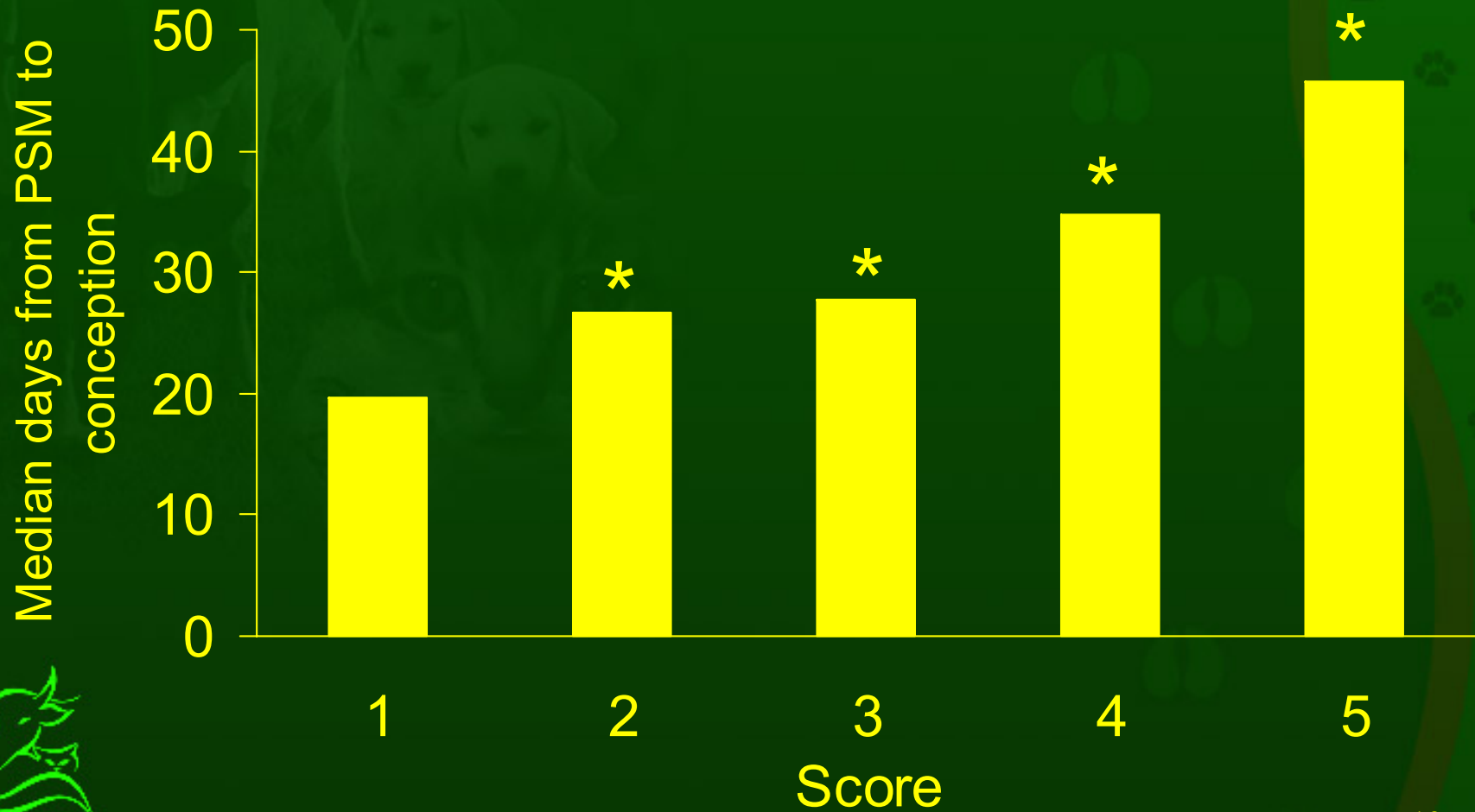
% of cows 'not detected in oestrus' by 10 days before breeding start date

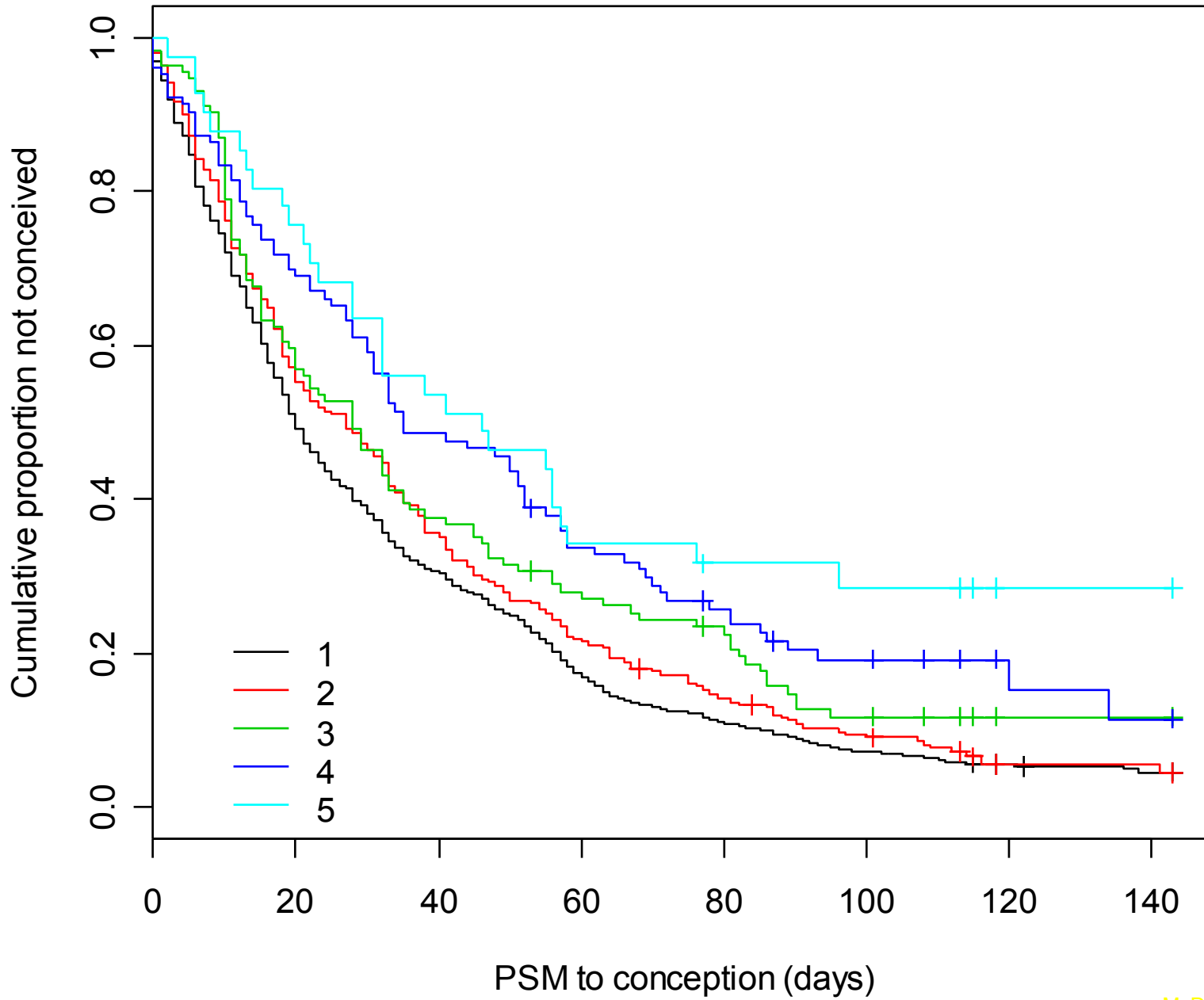


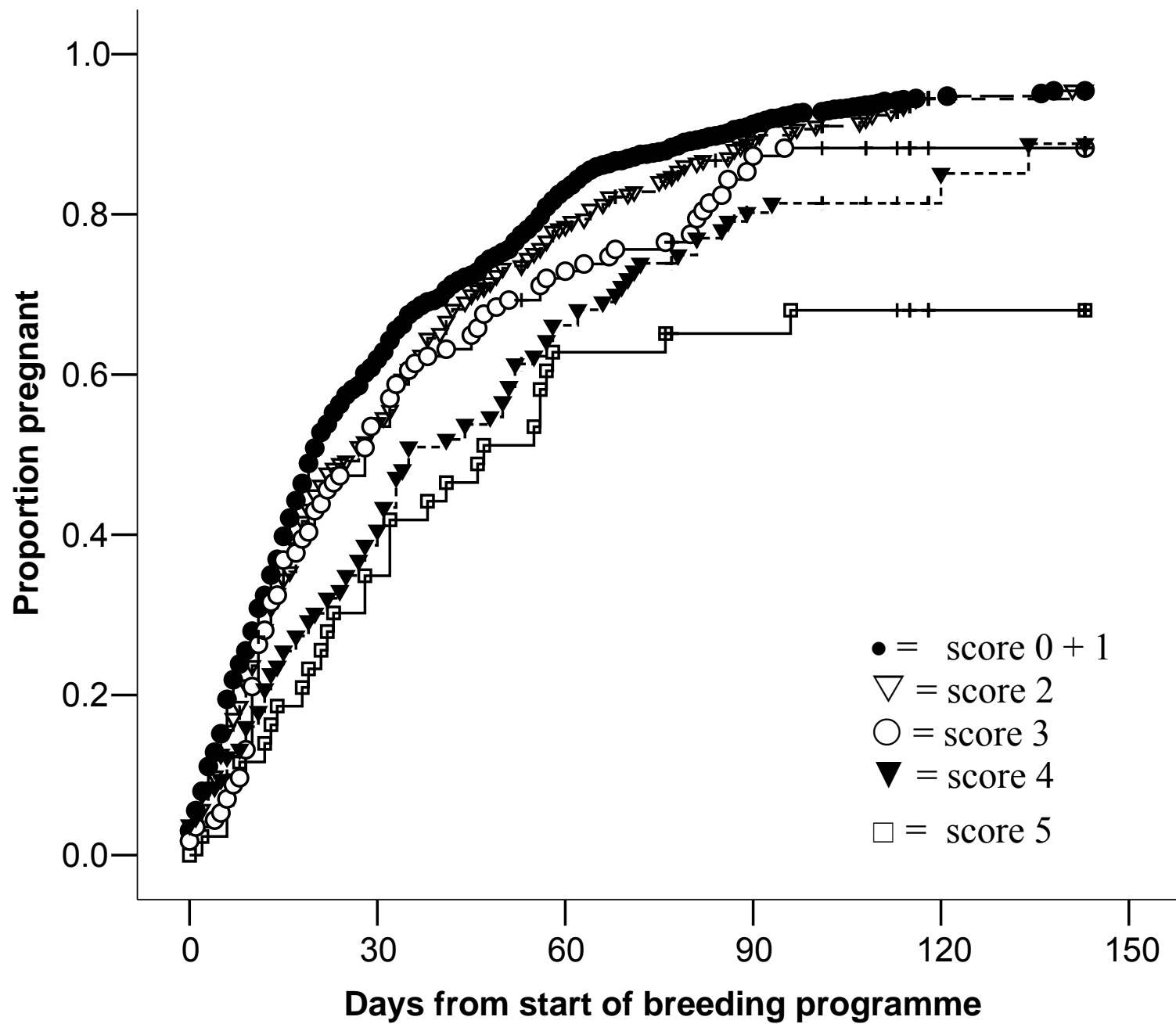
In-calf proportion (%) by score



Median interval (d) to conception







Final model P values (relative to score of 1)

	Score			
	2	3	4	5
Preg 28	**	ns	**	*
Preg 56	ns	*	**	*
Preg Final	ns	*	***	***
PSM-conception	*	**	***	***

Models include herd, age code

ns = not significant ($P > 0.05$), * = < 0.05 , ** < 0.01 , *** $P < 0.001$

Other diagnostic approaches

- Detection of PMN's in the uterus
 - Endometrial cytology (Kasimanickam et al 2004)
 - Uterine flush (Gilbert et al 2005)
- Elevations in serum markers of inflammation
 - Haptoglobin
 - α 1-acid glycoprotein (Regassa et al 2002)
- Ultrasonography (Kasimanickam et al 2004)

What can be done about cows with uterine infections?

- Leave to 'self cure'
- Prostaglandins $F_{2\alpha}$
 - For corpus luteum +ve, pyometron
- Infusion of antibiotics into the uterus (e.g. cephapirin; McDougall 2001; LeBlanc et al 2002)
- Others
 - Antiseptics (Knutti et al 2000; Feldman et al 2005)
 - Proteolytic enzymes (Drillich et al 2005)



Results

- Retained foetal membranes
 - (>24 h; RFM; n = 282)
- Dystocia
 - (vet or herdowners assisted; n = 234)
- Metabolic disease/recumbency;
 - (n = 141)
- Vaginal discharge > 2 weeks postpartum
 - (n = 101)
- Calf dead at birth or within 24 hours
 - (n = 169)
- Twins
 - (n = 46)

All 'at-risk' cows

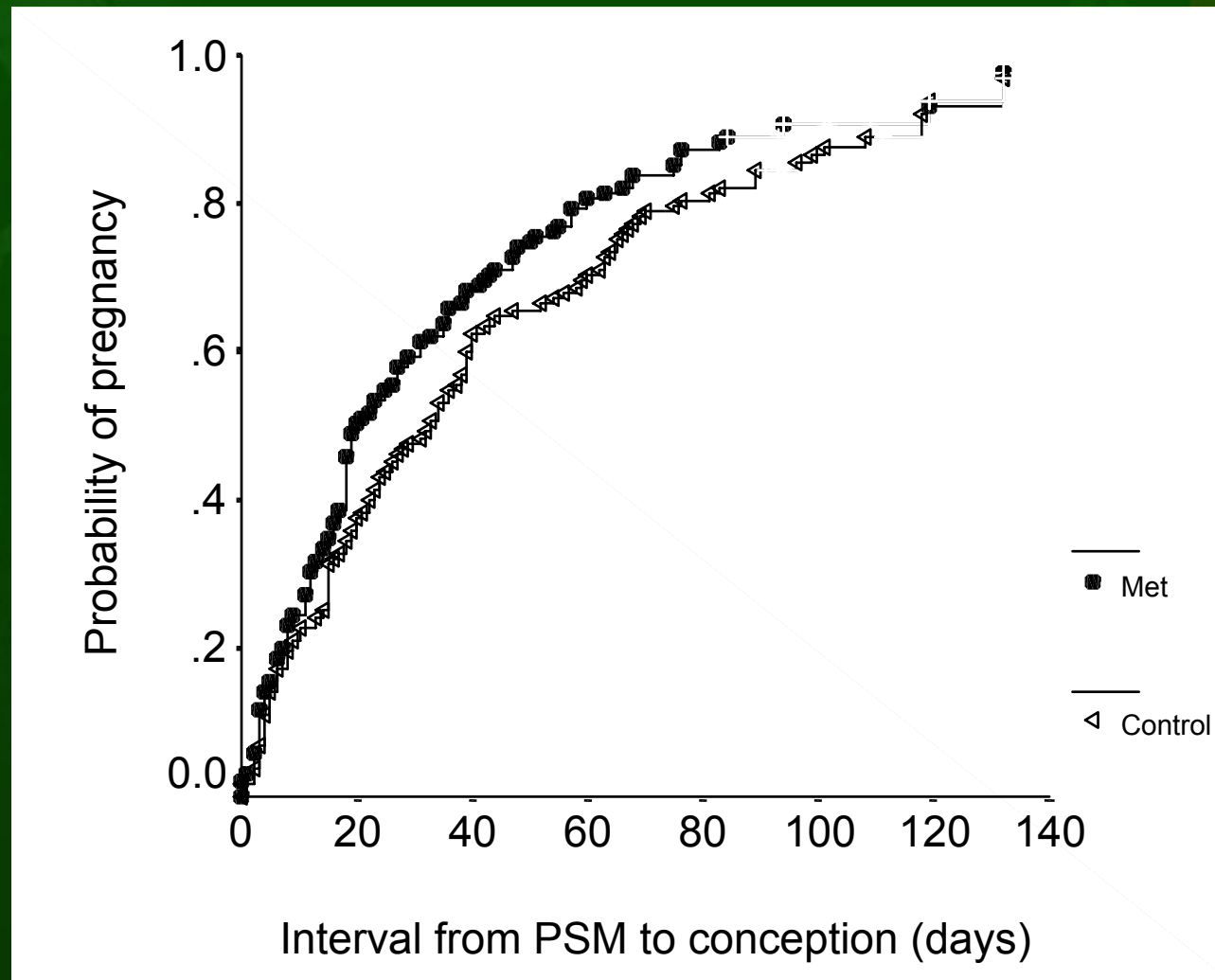
	Con	Rx	Diff	OR	95% CI	P
No. cases	342	348				
Culled (%)	7.7	4.7	3.0			*
AA (%)	14.6	17.2	3.0			ns
Sub D28 (%)	87.1	93.1	6.0	1.83	1.07-3.02	*
Con S1 (%)	42.4	46.4	4.0			ns
Preg D28 (%)	48.8	54.0	5.2			ns
Preg D56 (%)	82.5	85.9	3.4			ns
D to conceive	26.2	23.3	-2.9			ns
MT (%)	6.4	7.5	1.1			ns



Treating cows with a history of an RFM

	Con	Cephapirin	Diff	OR	95% CI	P
No. cases	132	136				
AA (%)	15.2	16.9	1.8			
Sub D28 (%)	87.9	94.9	7.0			
Con S1 (%)	40.9	50.0	9.1			
Preg D28 (%)	45.5	57.4	11.9	1.64	1.01-2.67	*
Preg D56 (%)	78.4	86.7	8.3	1.79	0.90-3.59	†
D to conceive	33	20	-13	1.28	0.98-1.67	†
MT (%)	9.1	7.4	-1.7			

Days to pregnancy (RFM)



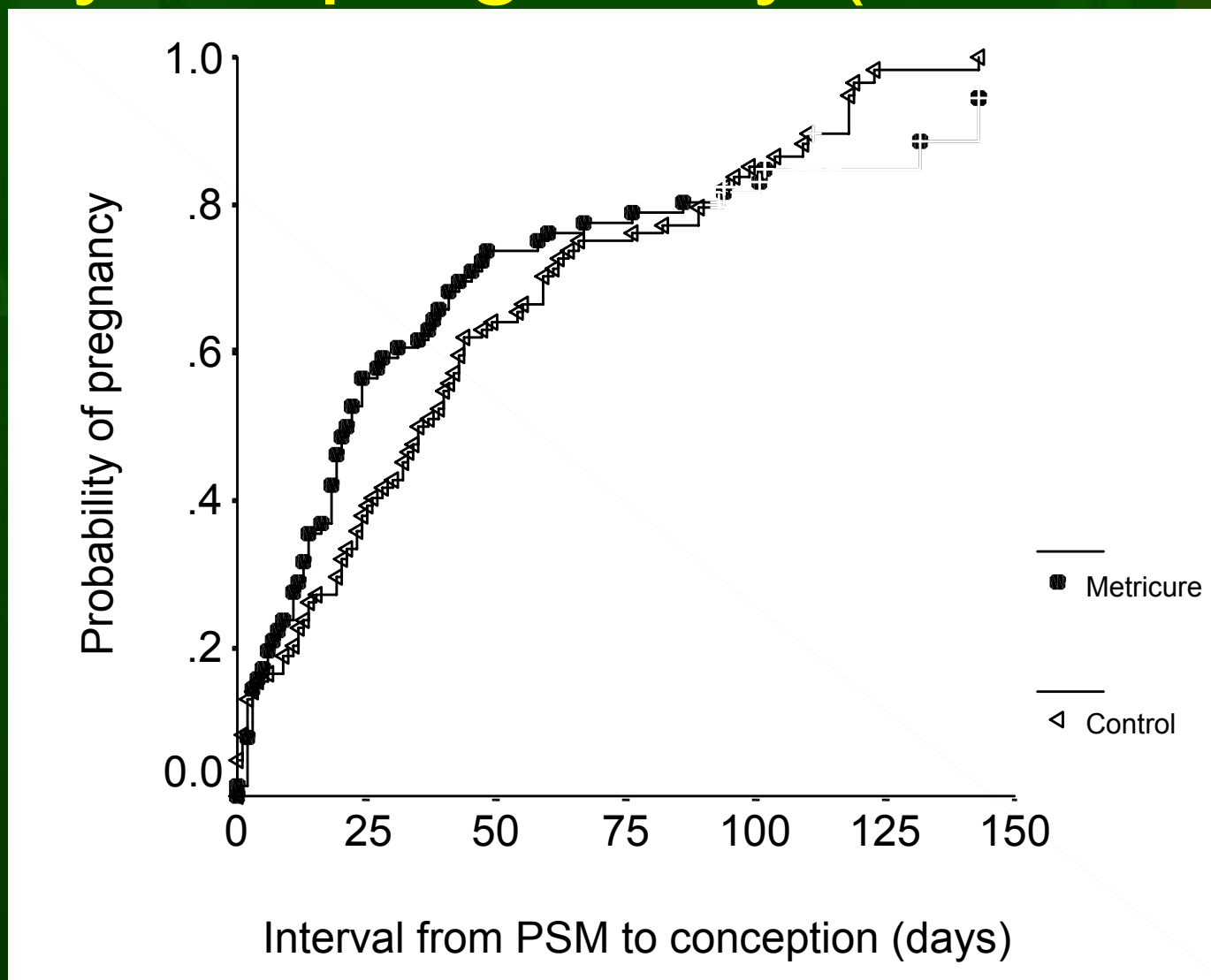
- Significant positive treatment effects following treatment of cows with
 - A still-born calf
 - Farmer observed vaginal discharge
- No treatment effect of cows with
 - Milk fever
 - Difficult calving (unless RFM)

“Dead calf” performance

	Con	Rx	Diff	OR	95% CI	P
no. cases	86	77				
AA (%)	11.6	18.2	6.6			
Sub D28 (%)	91.9	93.5	1.6			
Con S1 (%)	36.0	42.9	6.8			
Preg D28 (%)	41.9	59.7	17.9	2.06	1.10-3.85	*
Preg D56 (%)	78.1	89.1	11.0	2.29	0.87-5.98	†
D to conceive	35	21	-14			
MT (%)	4.7	13.0	8.3	15.8	1.8-141	**

* p<0.05, † p<0.1

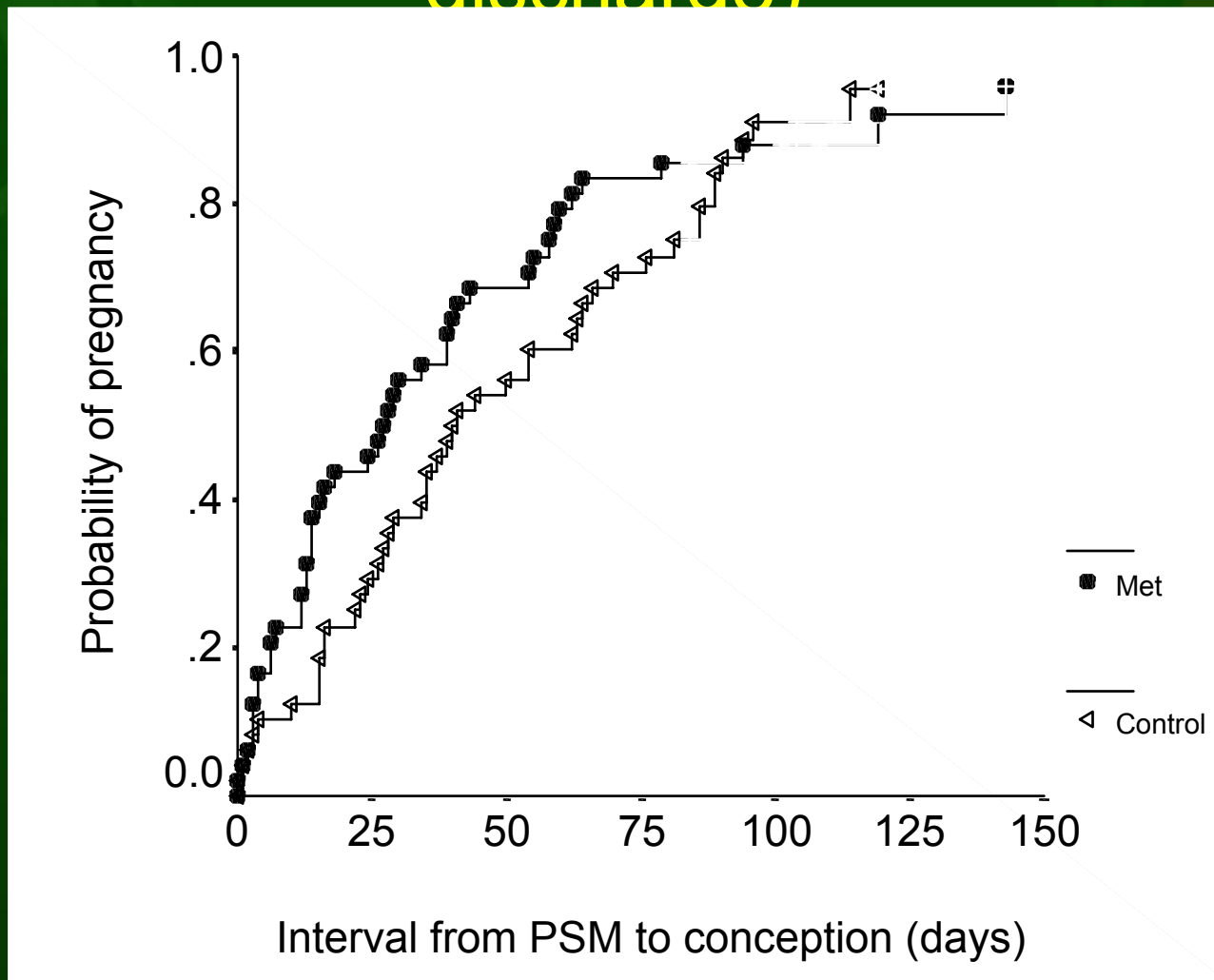
Days to pregnancy (dead calf)



Vulval discharge performance

	Con	Rx	Diff	OR	95% CI	P
no. cases	48	48				
AA (%)	16.7	10.4	-6.3			
Sub D28 (%)	81.3	85.4	4.2			
Con S1 (%)	29.2	45.8	16.7	2.81	0.96-8.29	†
Preg D28 (%)	35.4	52.1	16.7	3.13	1.02-9.59	*
Preg D56 (%)	65.9	83.3	17.4	2.87	1.00-8.22	*
D to conceive	40	27	-13			
MT (%)	8.3	8.3	0.0			

Days to pregnancy (Vaginal discharge)



Others

- No significant effect of treatment on reproductive outcomes for
 - Hypocalcaemia
 - Dystocia

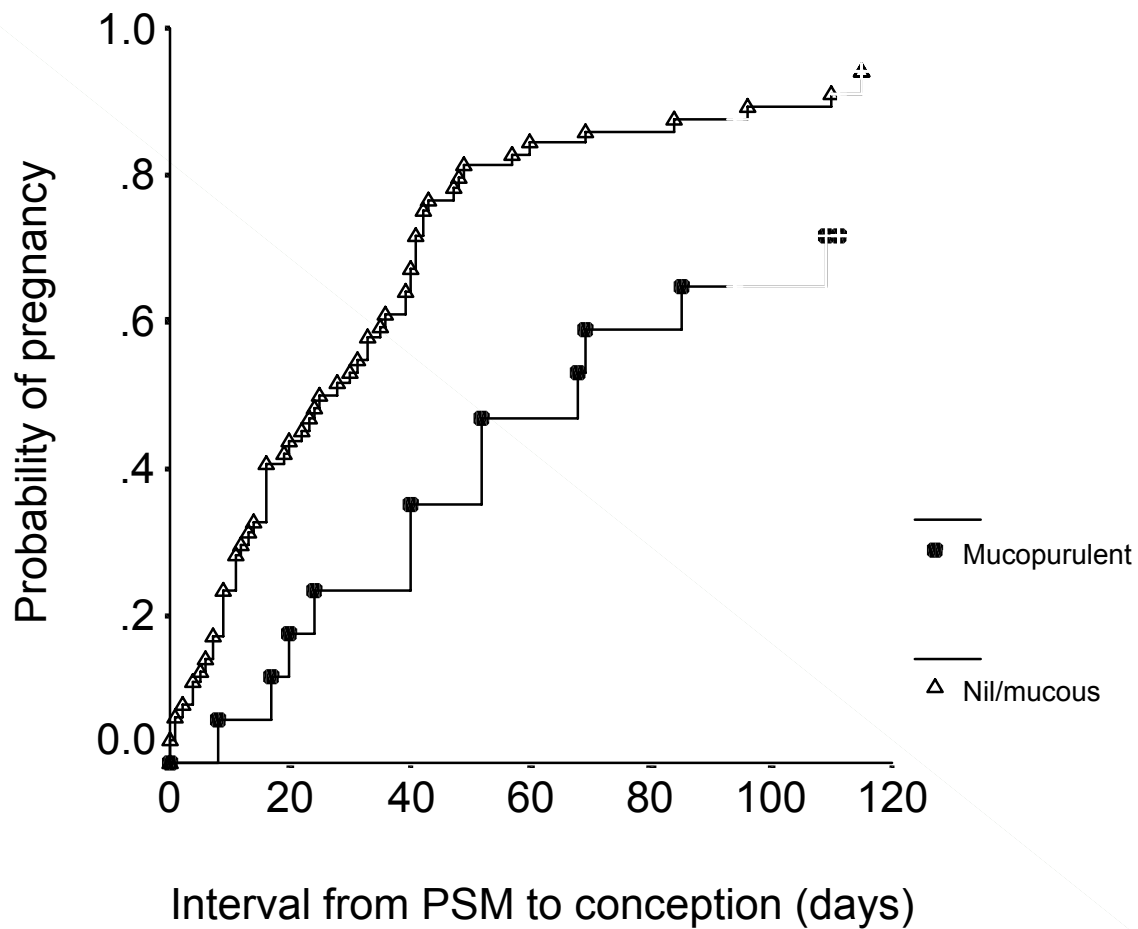
Vaginal and rectal exam findings

- Rectal and vaginal speculum exam:
 - 28.6% of cows had a palpable CL
 - 20.9% had purulent discharge at cervix os

Reproductive performance of 'nil/mucous' vs. 'purulent' cows

	Nil	Purulent	P	Not at risk*
N	72	19		
Sub D 28 (%)	94.4	73.7	*	94.0
Preg D 28 (%)	51.4	26.3	*	67.5
D to conceive	25	68	**	18
MT	6.9	26.3	**	5.9

Days to pregnancy for discharge cows



Milk production

		<u>Treated</u>		<u>Control</u>		
		Mean	SD	Mean	SD	P
Volume	L/cow/D	16.3	0.3	16.3	0.2	0.97
Milk solids (Fat + protein)	Kg/cow/D	1.32	0.2	1.34	0.2	0.91

Median days open (calving-conception) after treatment for endometritis

	Control	Cephapirin	PG	P-value
Overall	178	134	164	0.13
20-26 DIM	137	134	150	0.65
27-33 DIM	205	133	171	0.07

Hazard (HR) of pregnancy (All cows)

(>1 = faster; <1 = slower)

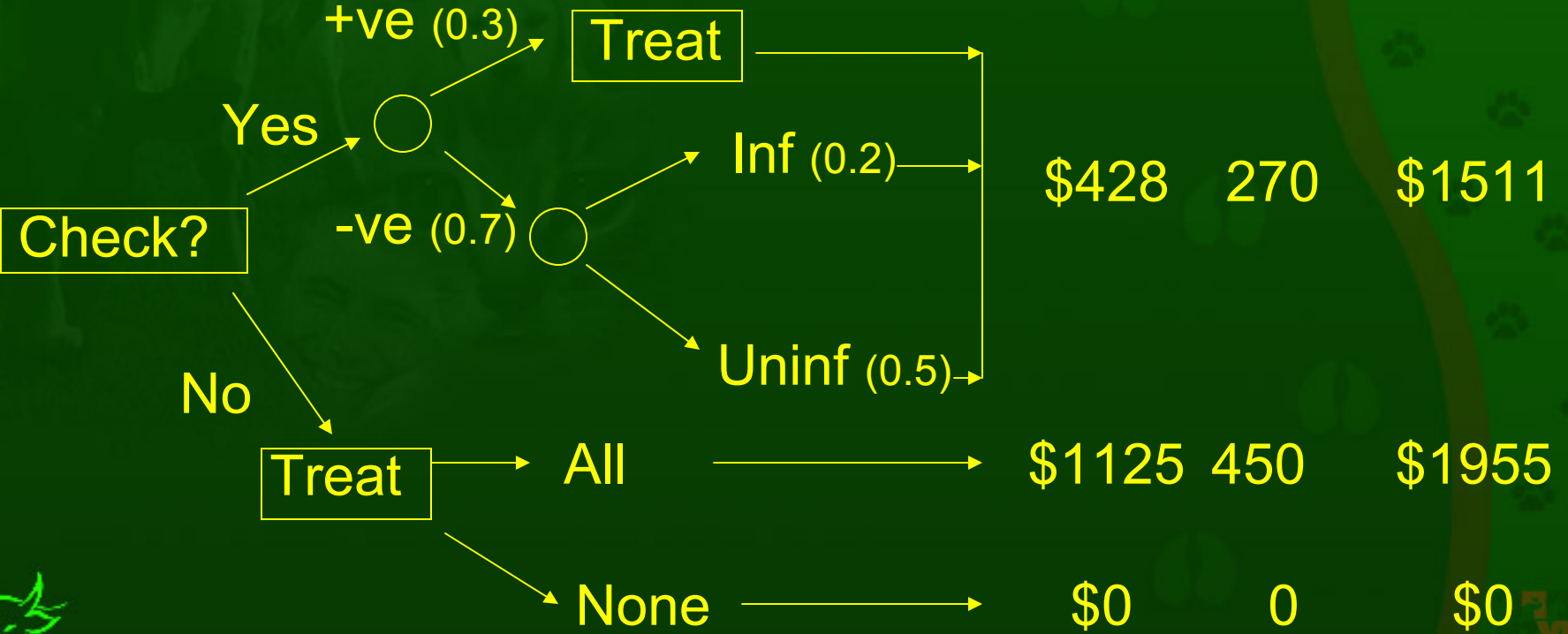
	CL palpable (n = 125)		No CL palpable (n = 184)	
	HR (95% CI)	P	HR (95% CI)	P
Cephapirin	1.75 (1.2 to 2.5)	0.003	1.12 (0.7 to 1.7)	0.61
PGF2 α	1.43 (0.8 to 2.4)	0.21	0.65 (0.4 to 1.1)	0.09
Contrast P		0.36	0.02	

	Treated 20 to 26 DIM (n = 168)				Treated 27 to 33 DIM (n = 141)			
	<u>CL palpable</u> (n = 58)		<u>No CL palpable</u> (n = 110)		<u>CL palpable</u> (n = 67)		<u>No CL palpable</u> (n = 74)	
	HR	P	HR	P	HR	P	HR	P
	(95% CI)		(95% CI)		(95% CI)		(95% CI)	
Cephapirin	1.13	0.79	0.96	0.9	2.1	0.01	1.26	0.44
	(0.5 to 2.8)		(0.5 to 1.9)		(1.2 to 3.6)		(0.7 to 2.3)	
PGF2 α	1.17	0.79	0.50	0.02	1.45	0.29	1.03	0.93
	(0.5 to 2.9)		(0.3 to 0.9)		(0.7 to 2.9)		(0.5 to 2.1)	
Contrast P		0.93		0.03		0.29		0.57

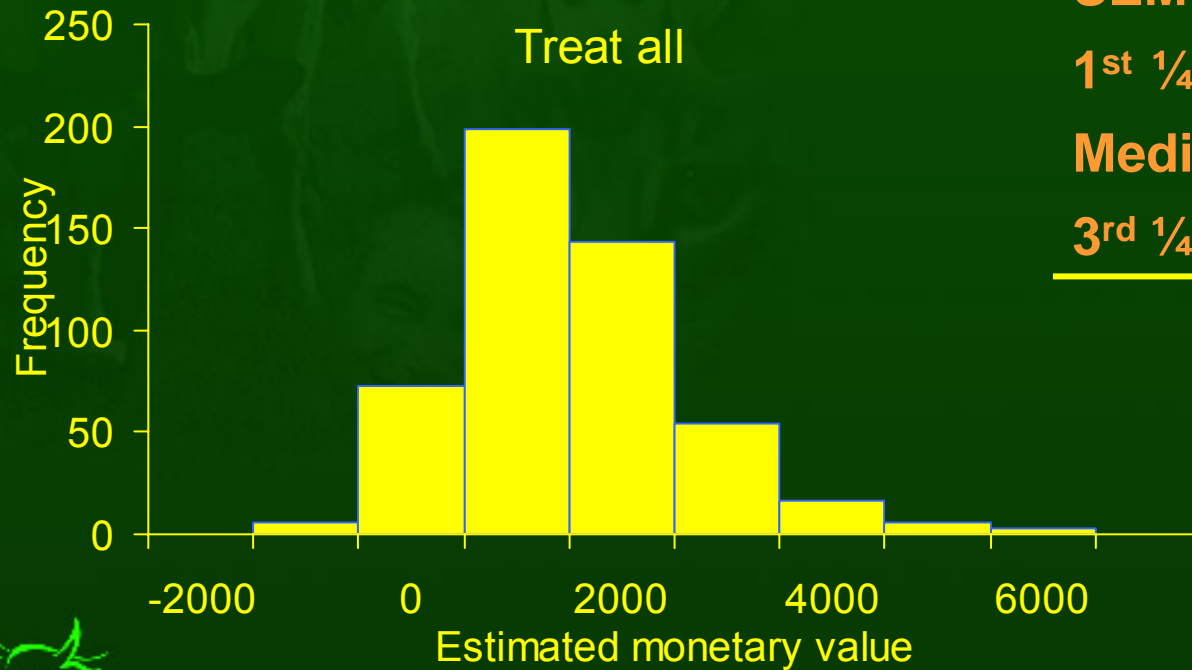
Cost/benefit of treatment

- 15% of cows in 300 cow herd 'at risk'
- Milk production 1.2 kg MS/cow/day
- Payment for milk \$ 5.60/kg milk solids
- Return per extra day in milk = \$6.84
- Extra DIM after treatment (all) = 10
- Extra DIM after treatment (Dx +ve) = 20
- Cost of 'metrhecking' (\$/cow) = \$2
- Treatment cost (\$/cow) = \$25

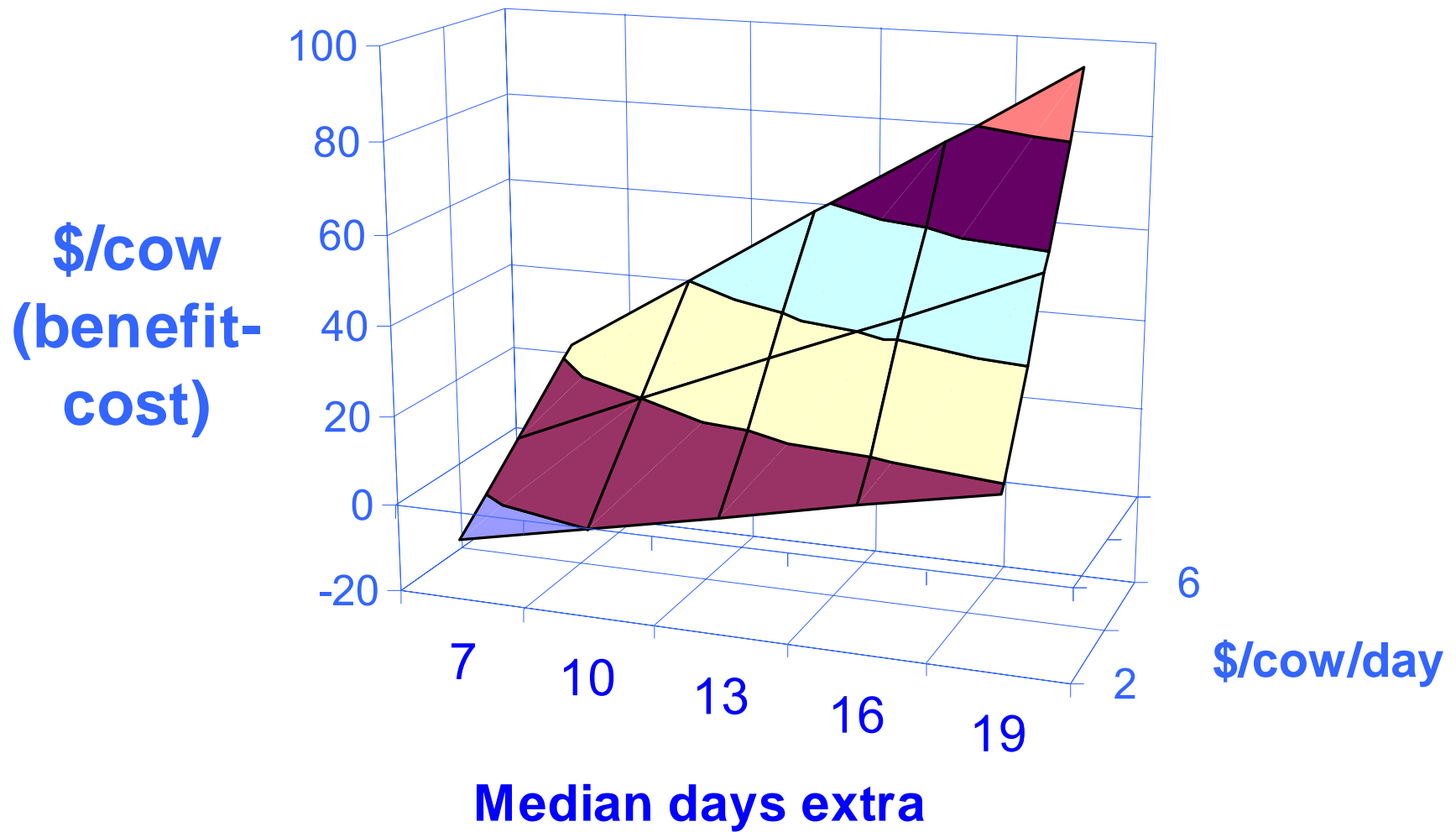
Cost DIM Benefit-cost



EMV (\$)



	RX all	Dx + Rx
Mean	1017	886
St Dev	1101	1845
SEM	49	83
1 st 1/4	263	-19
Median	820	399
3 rd 1/4	1656	1562



Conclusions

- Uterine infections have negative effects on fertility
 - Poorer pregnancy rate by day 28, 56 and final where score >2
- Uterine infections are common (10-20% of cows)
- Treatment of uterine infections by intrauterine infusion of antibiotics (cephapirin) results in improved fertility and is cost-effective
- Prevention of intrauterine infections involves minimising
 - Calf deaths
 - Retained foetal membranes
 - Appropriate sire selection
 - Minimise ketosis

Thanks



Any questions?



Thanks; questions?

