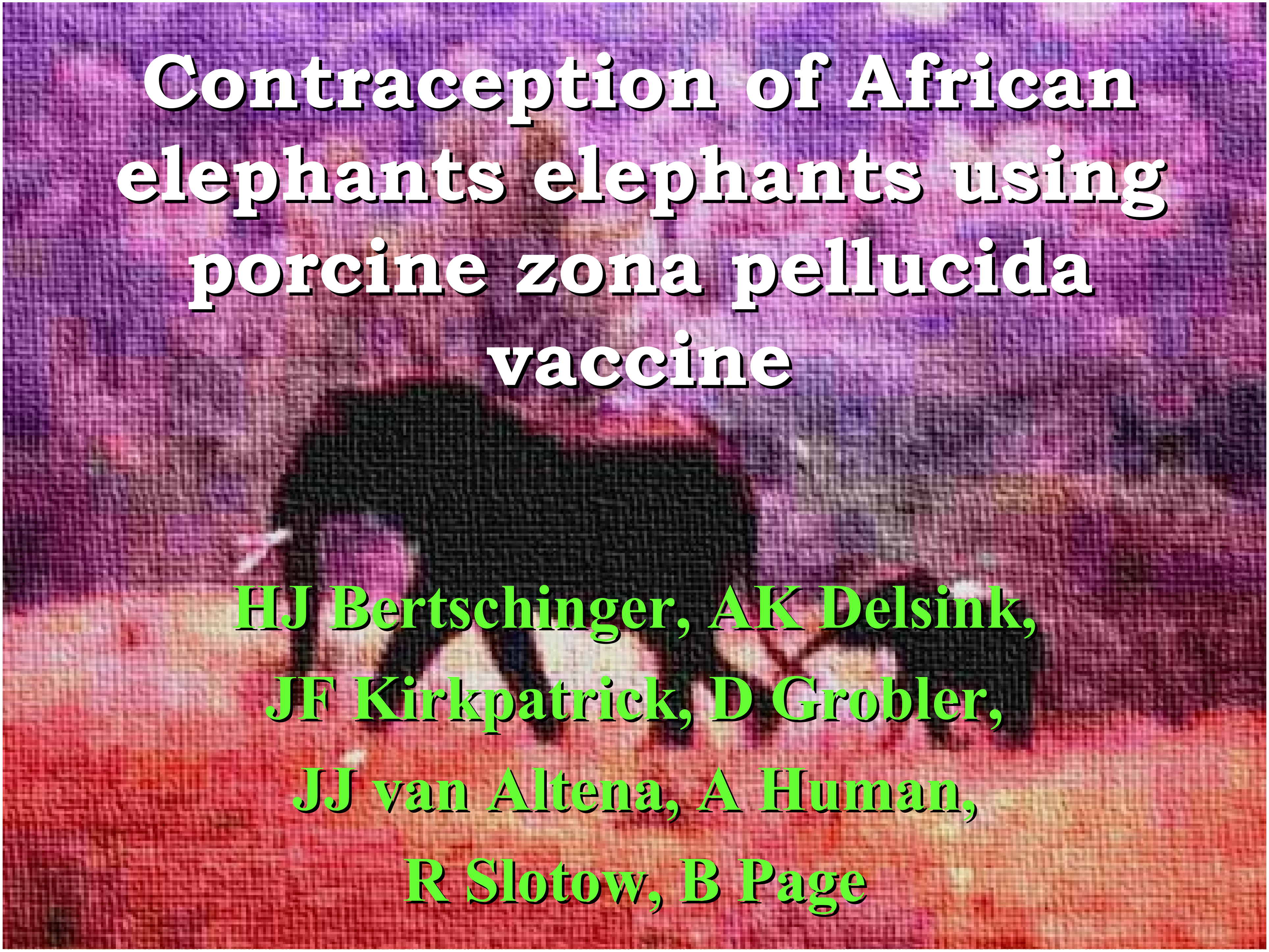

Contraception of African elephants elephants using porcine zona pellucida vaccine

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JJ van Altena, A Human,
R Slotow, B Page

Preliminary work in KNP 1995-2000

- Basic research to show that it could work in 1995
- Followed by two filed trials 1996-2000
- Proved that elephants can be successfully contracepted with the zona pellucida vaccine with an efficacy of 60 % and 80 % respectively

Trials on smaller populations in private reserves

- Makalali – flagship - started in 2000
  - 23 cows and project of Audrey Delsink
- Mabula – started in 2002 - 4 cows
- Shambala – 4 cows
- Phinda – 19 cows
- Thaba Tholo – 8 cows
- Few more in the pipeline and interest growing

2004

Makalali project

- Darting carried out from the ground in 2000-2002
- Darting from the chopper in 2003-2004
  - Flying time required was 30 min
- 100 % fertility control achieved in 10 cows that have passed the 53-month intercalving interval
- Chopper darting far less disruptive to herds – settled down after 1-2 days

Makalali - Behavioural changes?

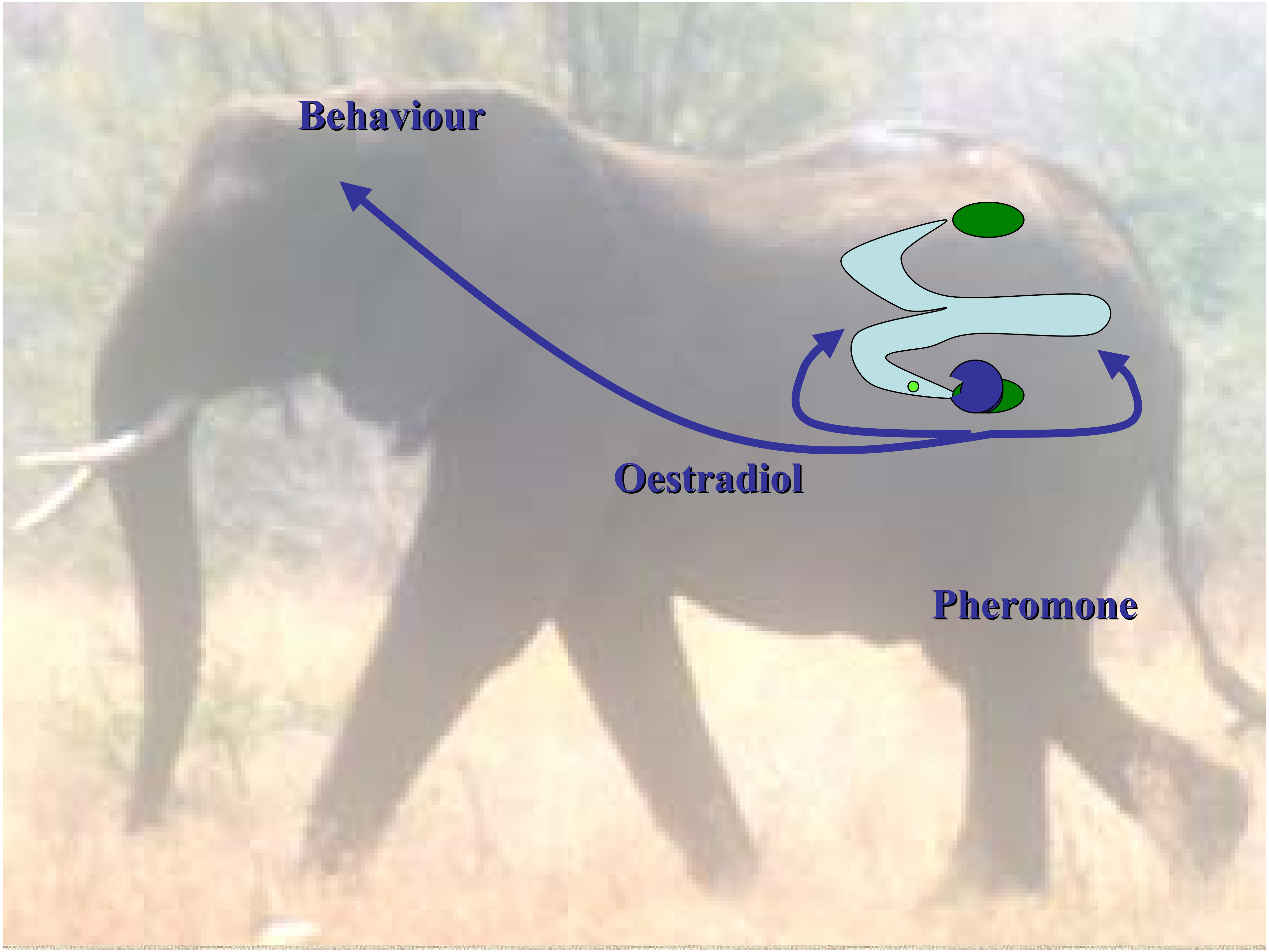
- No anomalies with regard to nursing time, nursing behaviour and calf proximity
- No change in the cows' social hierarchy
- Since January 2003, total of 15 heats observed in 10 cows (2003 = 9; 2004 = 6) and 4 mating episodes
- Normal musth episodes observed – highest frequency in dominant bull
- No harassment or separating off of cows or calves observed

So how does the porcine zona pellucida vaccine work?

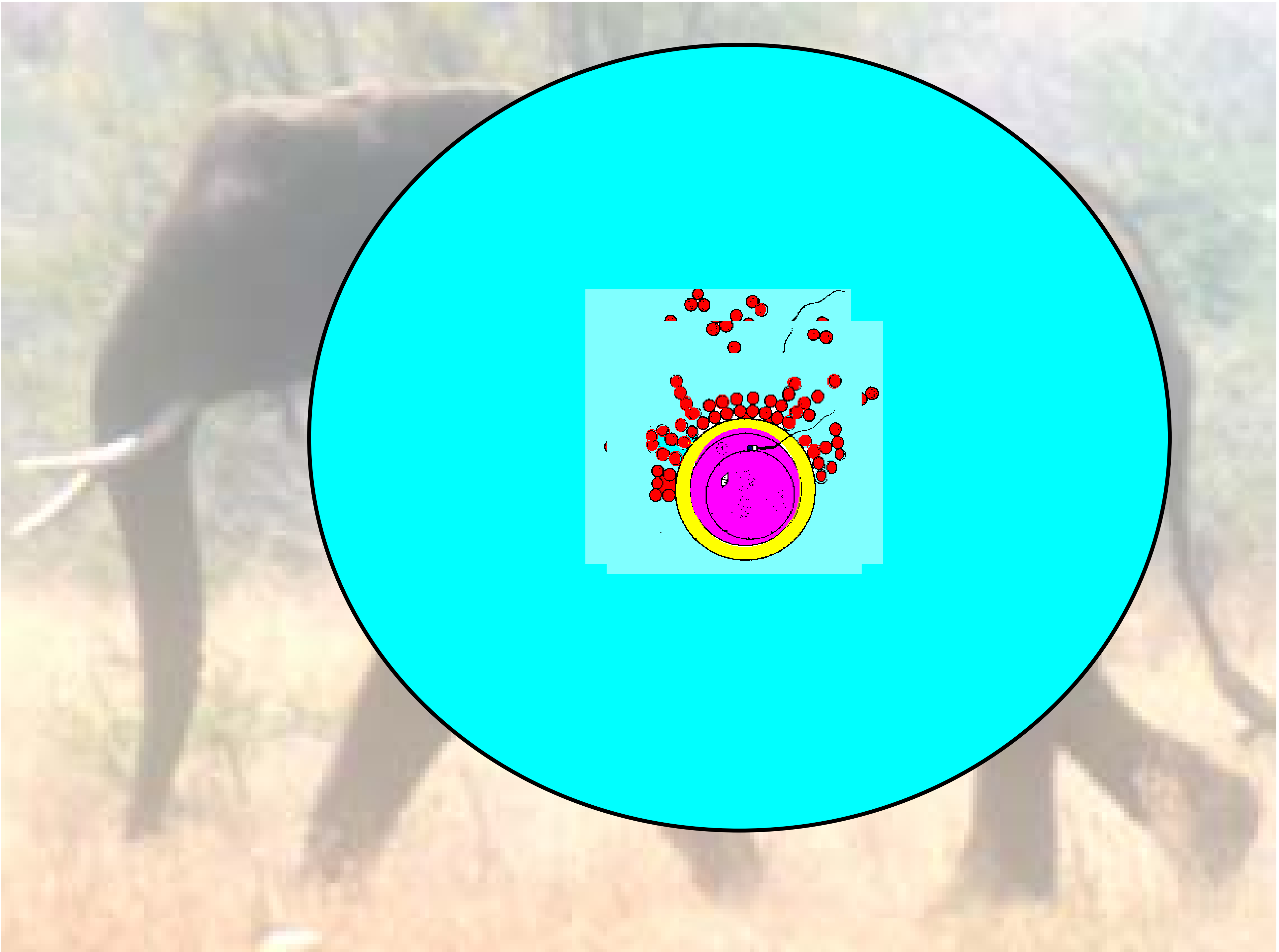
- Vaccination of an animal
- Antibody response
- Antibodies prevent fertilisation and cause temporary infertility
- Big advantages are:
  - Remote delivery
  - Reversibility which is essential

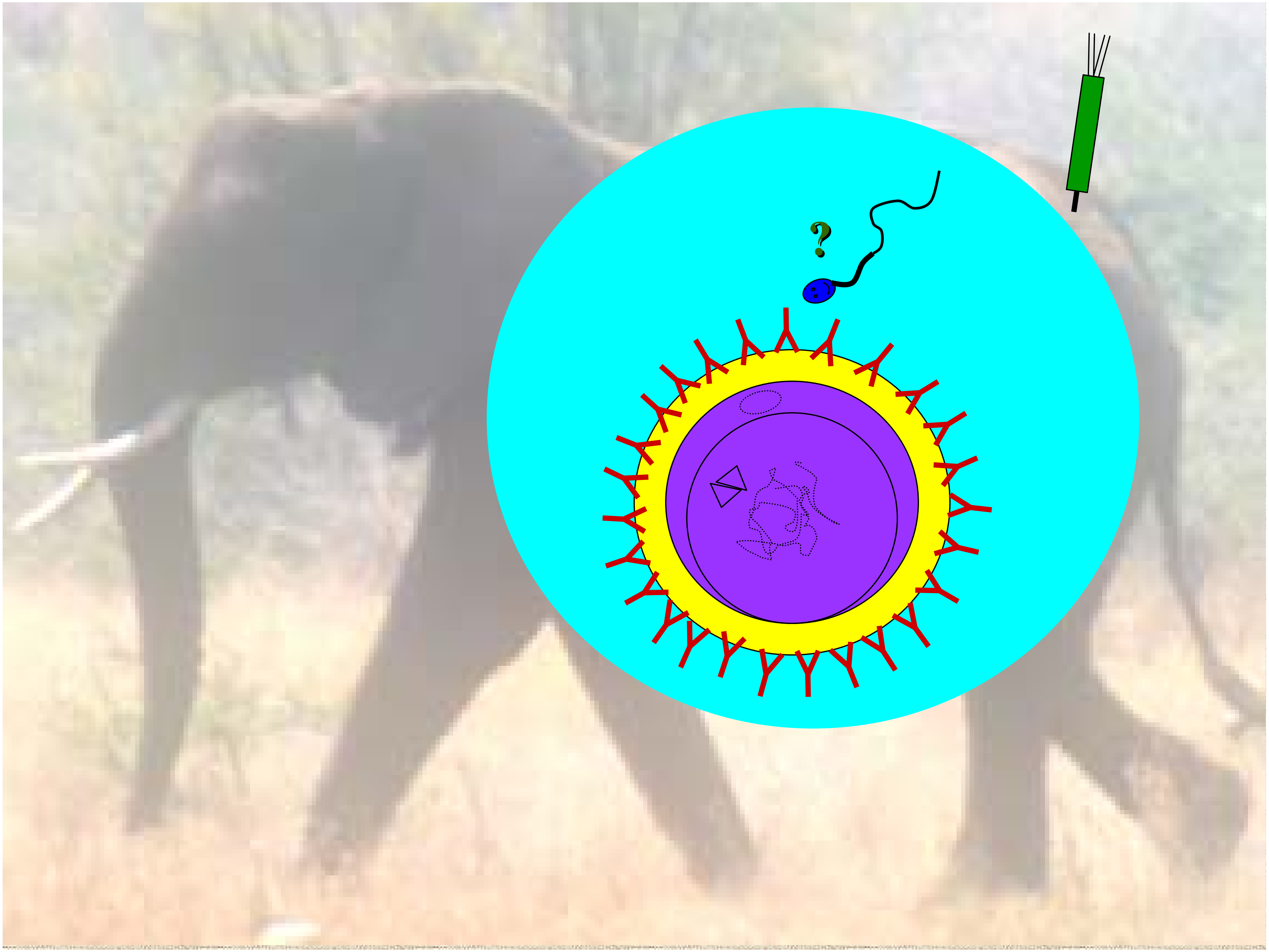
Vaccine

- Pigs' ovaries from abattoirs
- Minced
- Filtered
- Just zP capsules left
- Add adjuvant = vaccine
- Produce 1 500 doses/annum
- Can increase to 10 000 or more
- Approval to produce vaccine by MCC for elephant contraception projects


Behaviour
Oestradiol
Pheromone

Mating and deposition of sperm





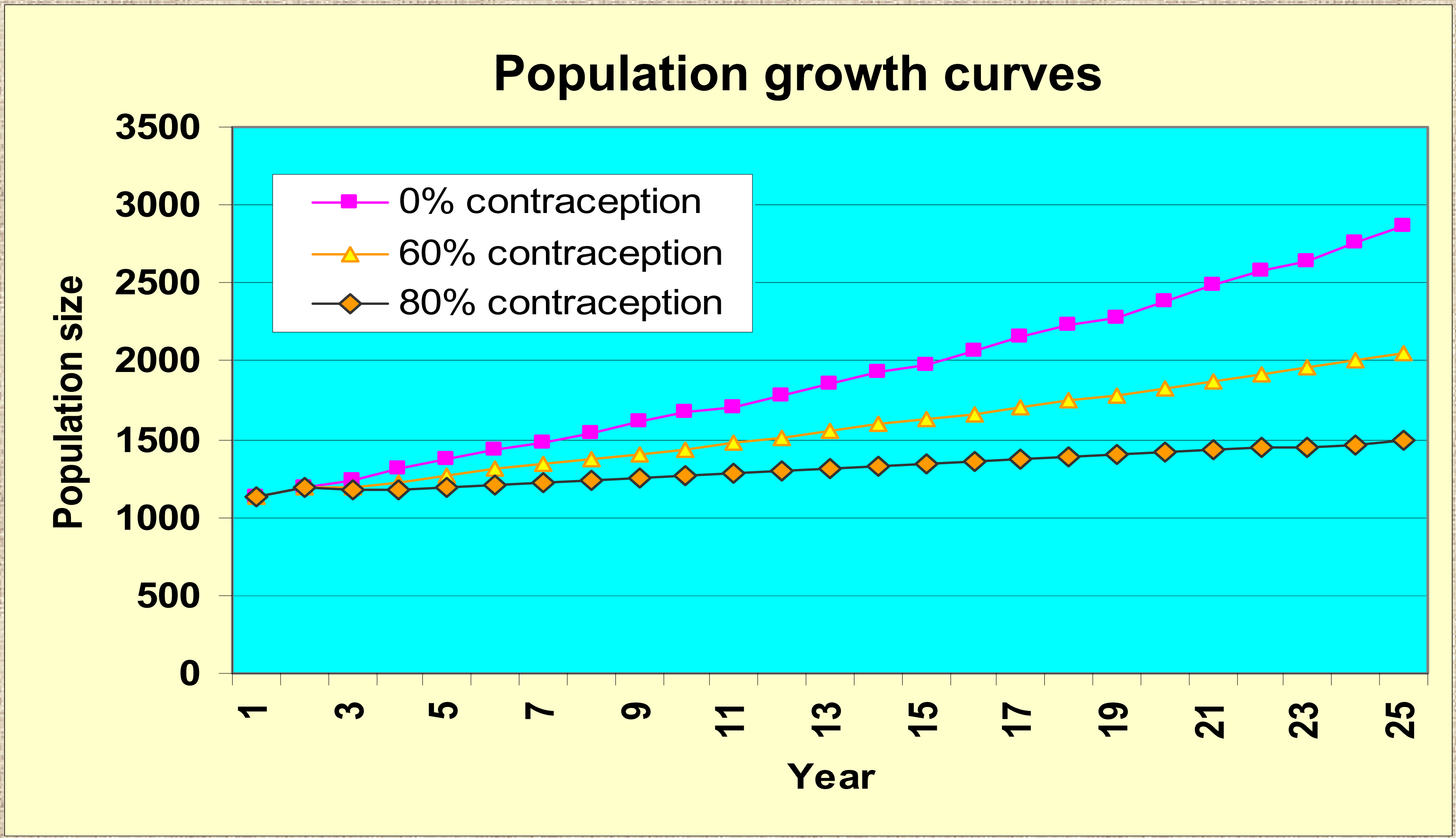
How do we vaccinate the elephant cows?

- Method of vaccination
  - Use drop-out darts – no immobilisation!
  - Dart from the ground – easier to ID cows
  - Dart from a helicopter – very quick
- Primary vaccination
- 1st booster after 3-6 weeks
- 2nd booster after another 3-6 weeks
- Annual vaccination maintains infertility

Vaccination with drop-out dart

Age and state model used to simulate dynamics

- Initial population of 1000 individuals
  - equal sex ratio 1 – 15 years (50 m, 50 f 0-1 y; 50 m, 50 f 1-3 y; 50 m, 50 f 3-5 y; 50 m, 50 f 5-10 y; 50 m, 50 f 10-15 y and 325 fem 15-55, 125 male 15-25)
- Calving interval of 4 years
- Simulated 9 scenarios but showing one only:
  - 2.5% mortality rate and 0%, 60 % and 80% contraception efficacy



- mortality 2.5 %
- calving interval 4 years
- conception rate of 1, 0.4 and 0.2
- r is 6.0, 4.0 and 2.4

Basic cost of primary vaccination for 375 cows in Year 1

Item / Procedure	Number	Cost Rands
Darts	400	28 600
Vaccine	400	60 000
Helicopter	20 h	56 000
	Total	144 600

No professional fees included

Vaccination costs for population of 1 000 (initial 375 cows) for 10 years

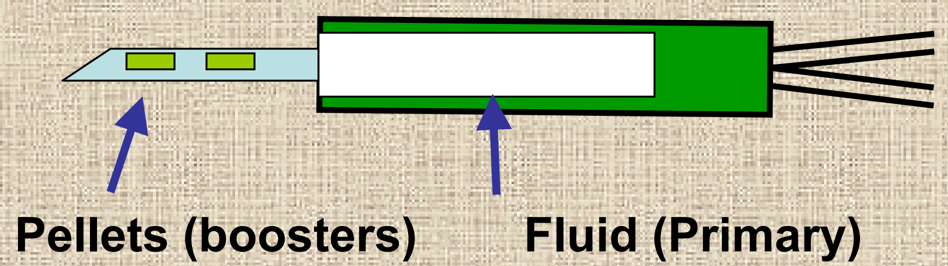
Year	Number cows	Rands
1 Primary 1st Booster 2nd Booster	 375 375 375	Total 433 800 (or 144 600)
2	375 + 24	153 854
3	399 + 24	163 109
4	423 + 14	168 506
5	437 + 14	173 906
6	451 + 18	180 846
7	469 + 22	189 330
8	491 + 21	197 427
9	512 + 21	205 525
10	533 + 21	213 622

pZP Immunocontraception of elephants conclusions

- It works
- Safe during pregnancy and no negative effect on calf raising
- No side effects other than occasional lumps
- Reversible
- Other than increased heat incidence, no behavioural side effects
- Administration is remote – does not require immobilisation
- Why not try it in botanically sensitive areas of KNP!

New one-shot vaccine

- Now successful in wild horses
- Means that during year one only primary vaccination is required
- Will be testing the vaccine in elephants early next year
  - Compare the effect on antibody titres



Acknowledgements

Humane Society of the US

Makalali Game Reserve

University of Pretoria

KNP

CatchCo

AMARULA

Amarula elephant research program