

The importance of Pedigree in Livestock Breeding

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and Grassroots Systems Ltd

Spotted sticks and Spotted rams



Control Natural Selection

- Winter food supply
- Shelter
- Predation
- Disease control



Impose your own Selection

- Growth rate
- Body size
- Body shape
- Fecundity
- Appearance – Colour / horns / feather patterns
- Behaviour
- Fibre quality
- Milk Production



From primitive to
highly selected for:
meat, wool
or performance



From large
to small



Hard
Working
to High
Stepping





ornamental
and
specialist
breeds



From wild red jungle fowl



To high
production
hybrids



A long history of 'looking over the fence'



Pedigree Breed Societies

- Coates Herd Book 1822

- Pedigree

- Production



Pedigree Registration in the Computing Age

- Breed improvement for production
- Breed Conservation
- Monitor genetic change
- Marketing of breeding stock
- Monitor and control disease

Modern Registries

- Full pedigree records
- Progeny and descendant analysis
- Breeders and owner record
- Geographical location
- Identification - colours, patterns, photos
- Performance records
- Relationships within populations

Optional Functions

- DNA Parentage Checks
- DNA disease tracking
- Weight recording
- Linear Assessment
- Show and Sale catalogues

On Line Access

Please do not use the Browser BACK button

[Society Home Page](#)

[Animal Search](#)

[Member Search](#)

[Manage your Flock](#)

Yarcombe Pythagoras - 30N1602156

[Progeny](#)

[Pedigree](#)

Click to see the pedigree or progeny for this animal

Registration No : 30N1602156
EID Tag : UK0363488/02156
Manage Tag :
Registration Type : Registered
Breeder : [30N - Messrs H C & Sons Derrymat](#)
Owner : [A16 - Mr & Mrs Janet & Brian Hill](#)
Sex : M
Number Born : 1
Date of Birth : 09/12/2015
Sire : [30N1401320 - Yarcombe Quadrant \(UK36348801320\)](#)
Dam : [30N1401303 - Yarcombe \(UK36348801303\)](#)
Description :
Scrapie :
Status : Alive
NS/AI/ET : NS-
Date Birth Notified : 25/02/2016
Date Registered : 16/07/2016
Volume no :

Click on the Breeder / Owner to display information about that person

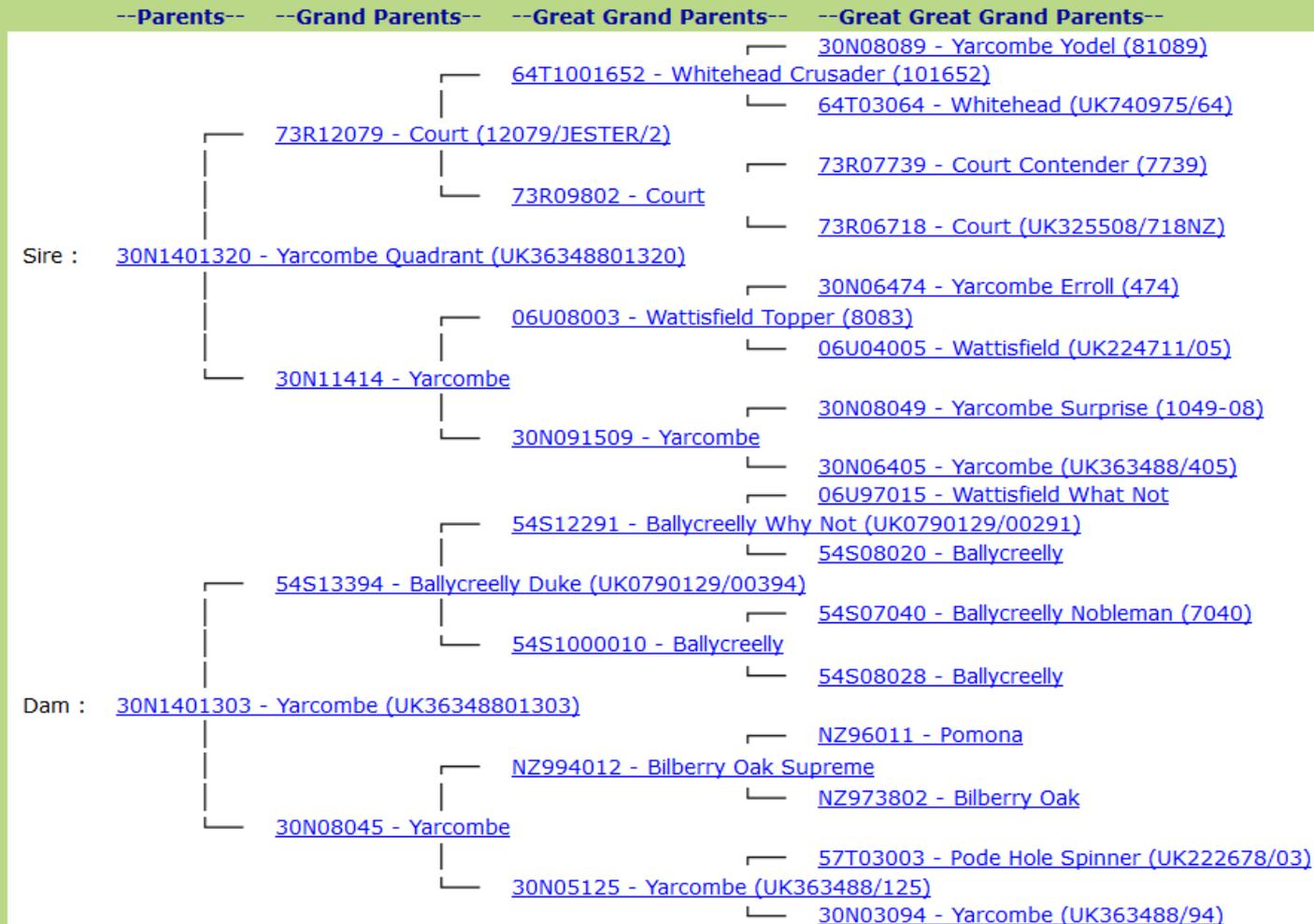
Click on the Sire / Dam to go to the parents record

On Line Access

Yarcombe Pythagoras - 30N1602156

[Back to Animal](#)

[Progeny](#)



Breeders keeping the records up to date

- Notify births and apply for registration
- Transfer to existing or new purchaser
- Apply for DNA tests
- Deaths – with PM reasons
- Apply for Show entry
- Issue service certificates
- Record weights

Easy to complete on line application forms

Birth Notifications

[Help ?](#)

Ear Tag : Your three letter herd code, the letters BASUK and an individual number

Microchip : EID microchip number

Date of Birth :

Sex :

Name : Toft

NS/AI/ET :

AI / ET Date :

Sire : [Search for Sire](#)

This list contains alive registered males with progeny, for a full list click on 'Search for Sire'

Dam : [Search for Dam](#)

Number Born : Enter number born

Eyes : Both Brown Both Blue One Brown & One Blue

	Solid	Multi	Blk	W	LF	MF	DF	LBr	MBr	DBr	LG	MG	DG	RG
Colour : Primary	<input type="radio"/>													
Secondary			<input type="radio"/>											

Style :

Notes :

Registration Type : Females - no chip or tag number yet, select pre registration. Males - register, notify or list non

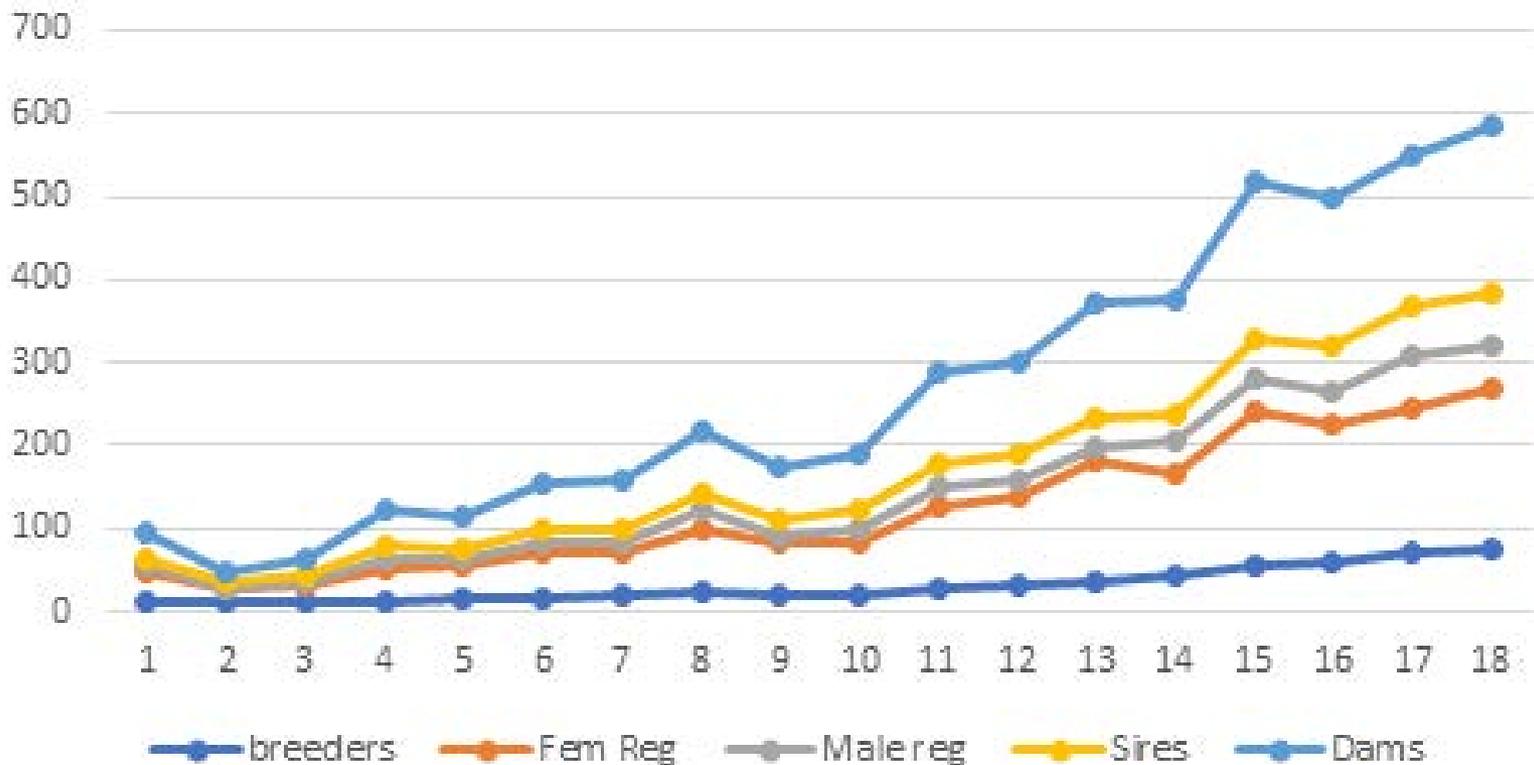
Summary & Statistical Information

- To create Flock or Herd Books
- Reports for the marketing committee
- The annual members meeting
- The magazine or News Letter
- Potential customers
- RBST / FAnGR Monitoring

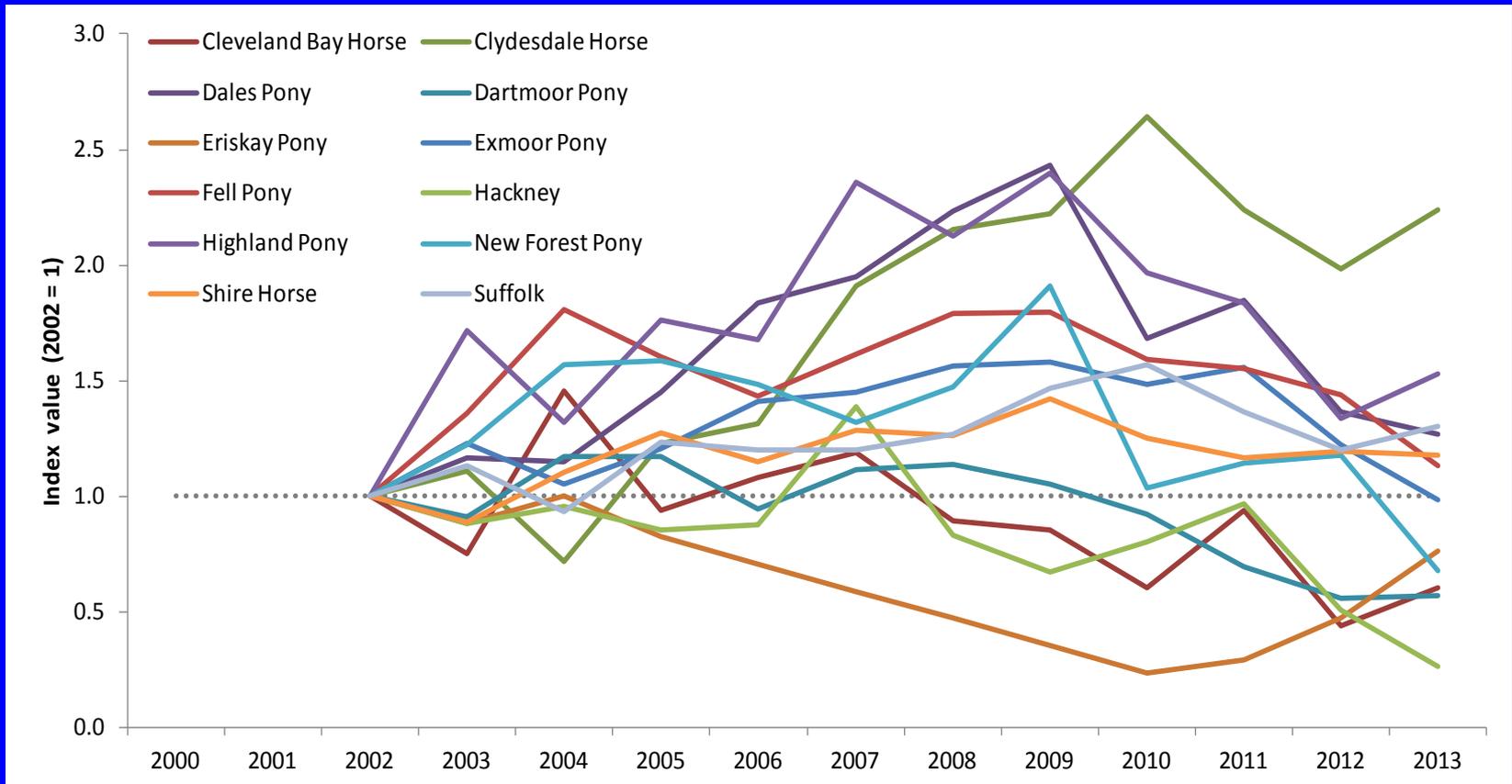
- And to design breeding programmes

FAnGR Monitoring

Boreray 2000 - 2017

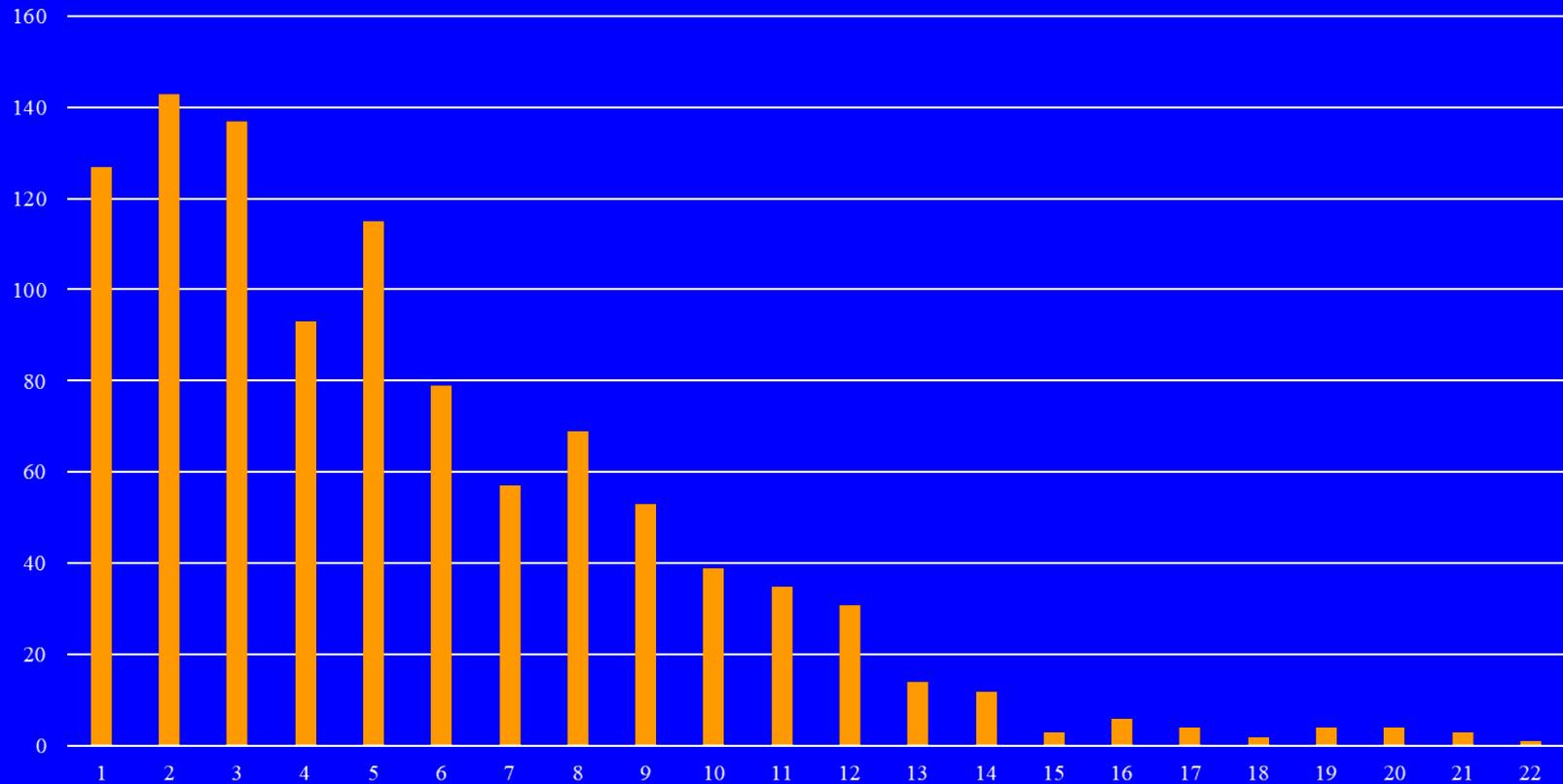


Biodiversity Indicators



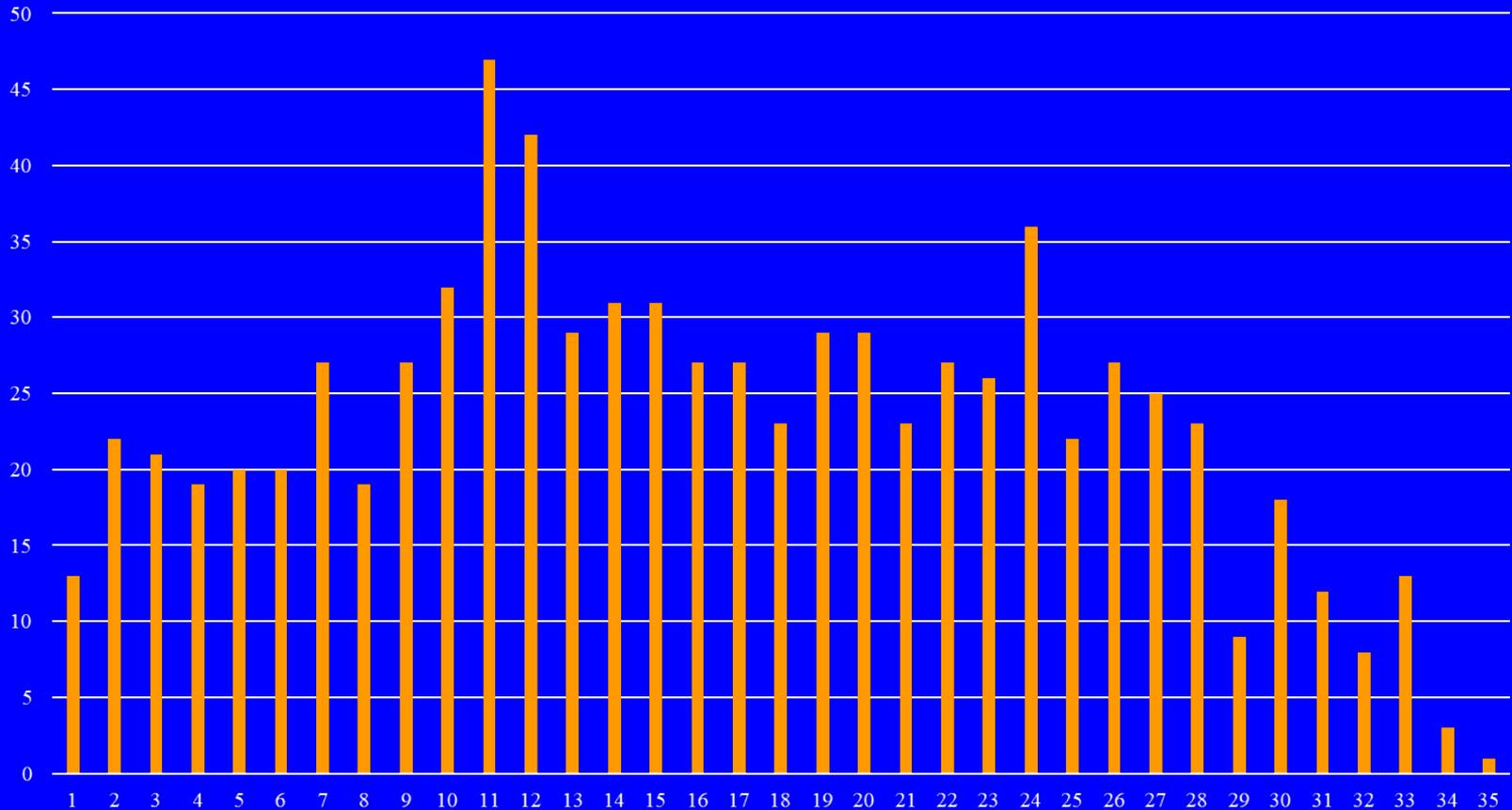
Trends Age Distribution

Age Distribution in Years - Gloucester Females 2018

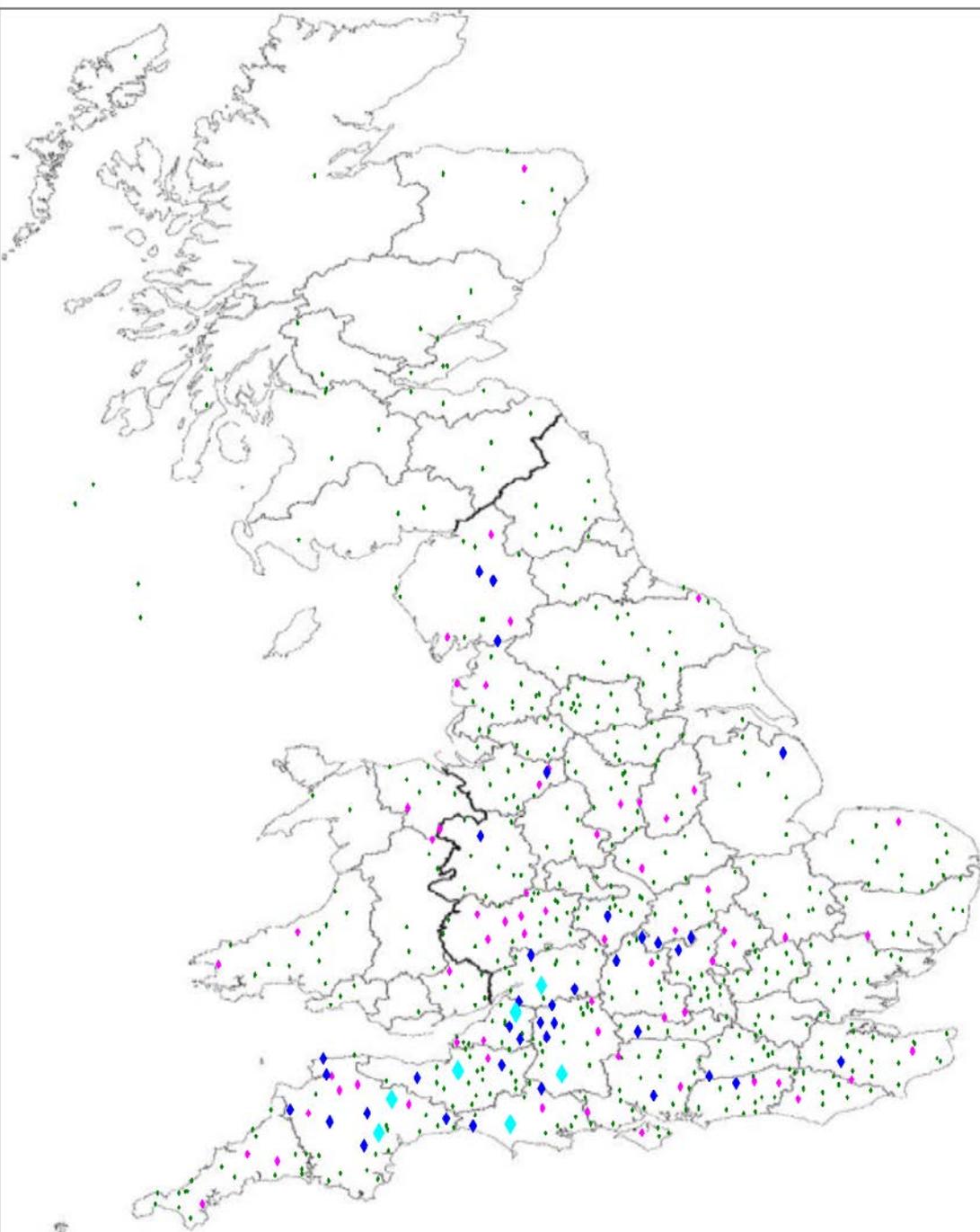


Trends Age Distribution

Age Distribution - Hackney Mares

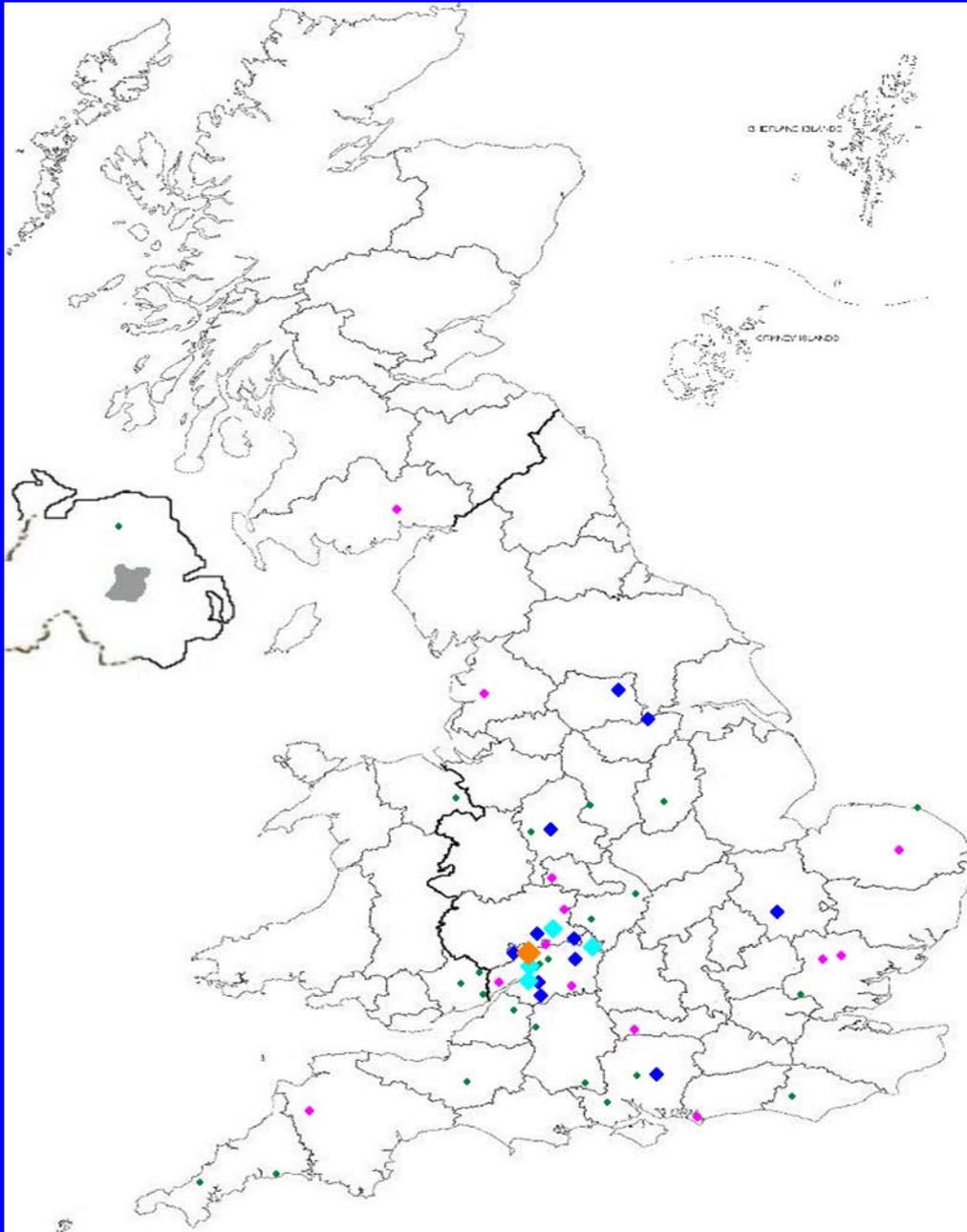


Geographical Distribution

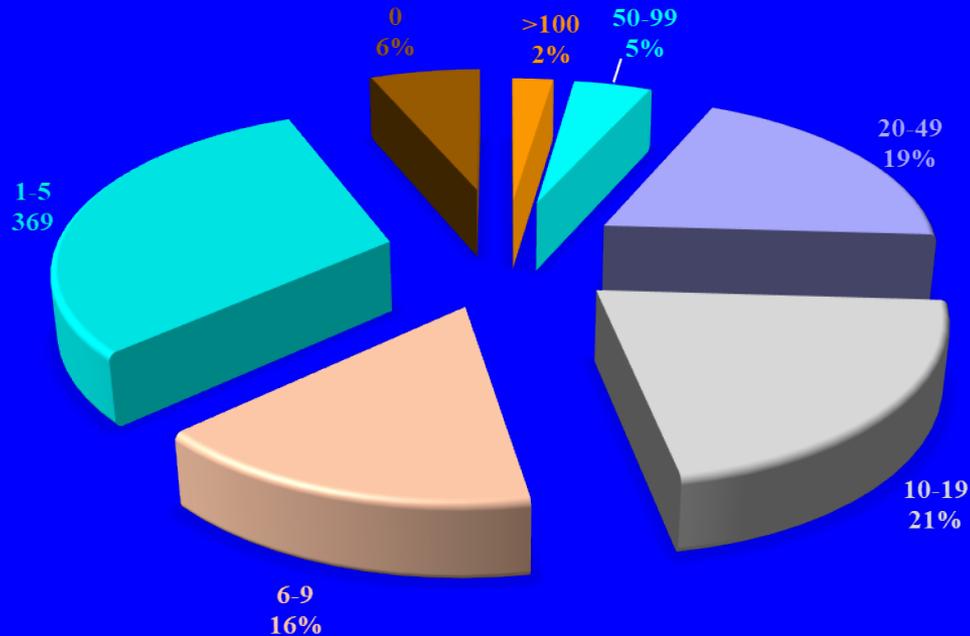


Geographical Risk

- '<=10'
- '11 - 25'
- '26 - 50'
- ◆ '51 - 100'

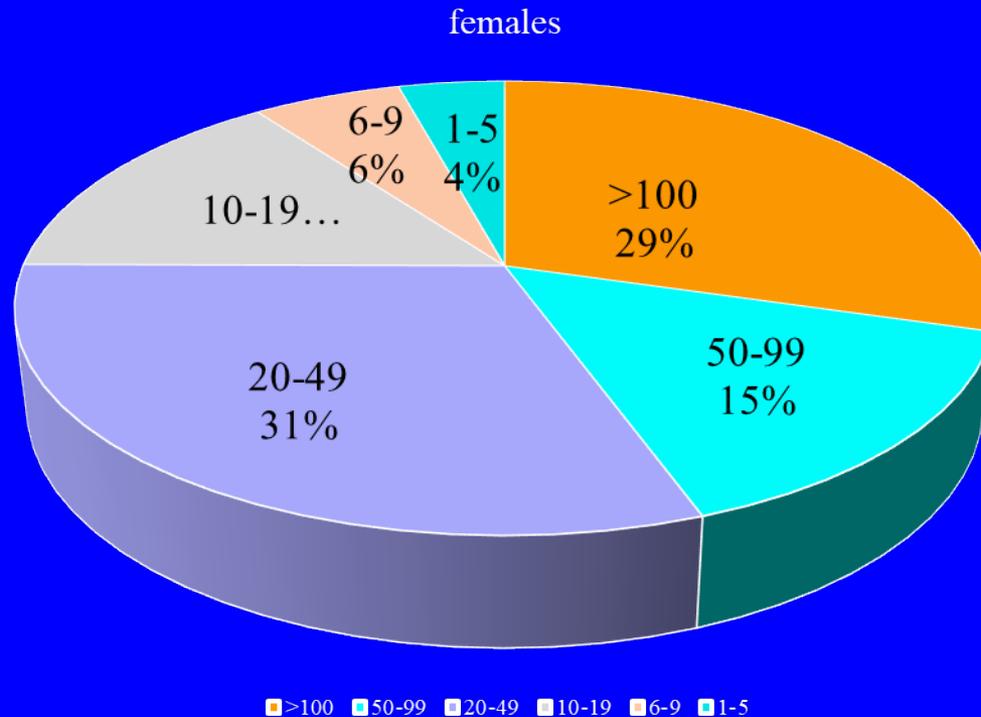


Numbers of Members by Flock or Herd Sizes



In this breed only 7% of the members own more than 50 females

Numbers of Animals by Flock or Herd Sizes



But those same 7 % of members own 44% of the total population

We are interested in the long term survival of breeds

- Three conflicting components in constant tension
 - – maintaining the breed type and breed characteristics
 - - creating a commercially viable product
 - - maintaining existing genetic variation within the breed.

Pedigree information as a tool

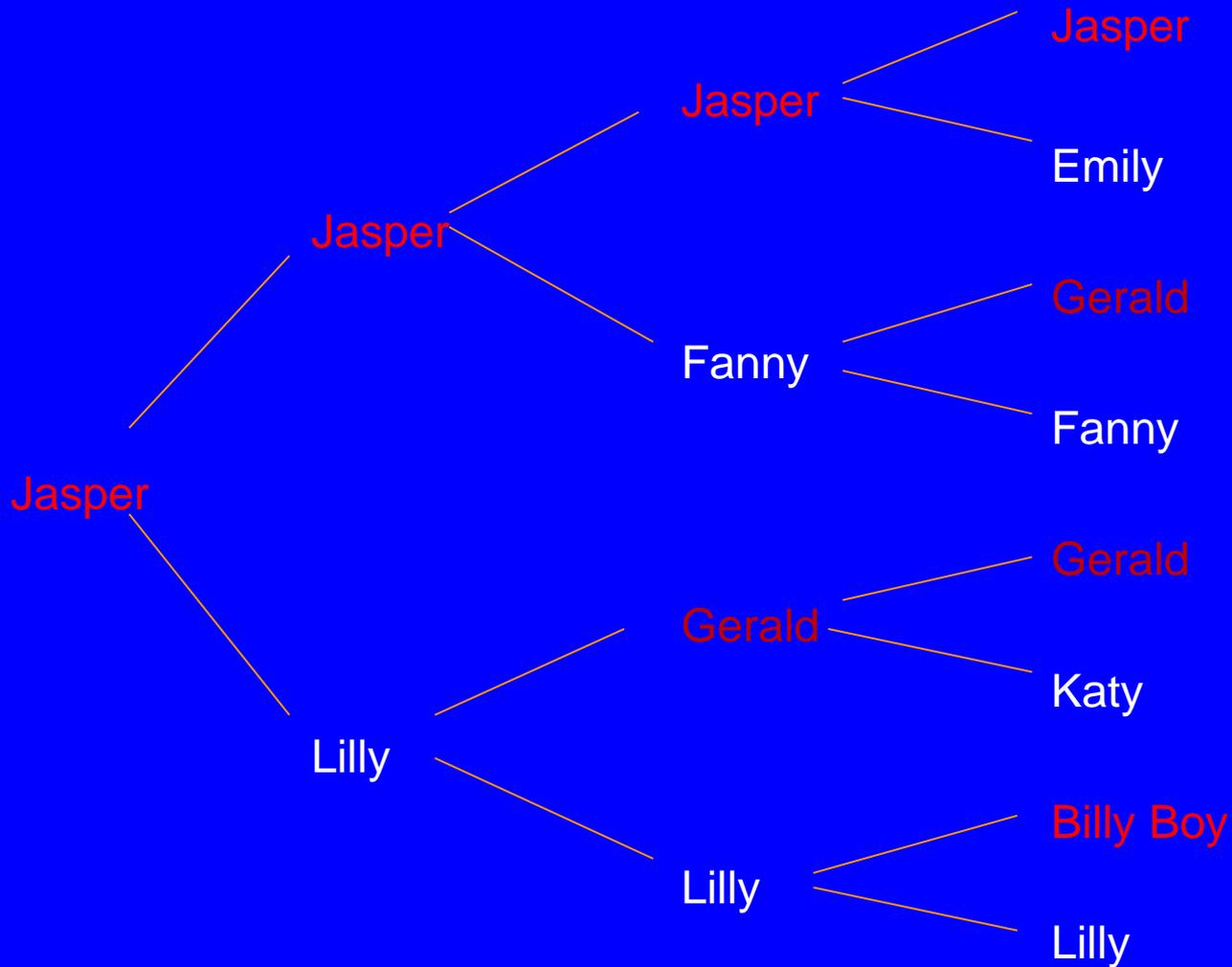
- We can use pedigree information to help us maintain existing genetic variation within the breed. Over the years people have tried different techniques to try to achieve that goal:
 - family names
 - founders
 - kinship

Family Names



- In the pig world family names have been traditionally used to track pedigrees. So a boar is always named after his father and a sow after her mother.
- The strategy is then to try to maintain as many of those ‘families’ as possible.

Pedigree for Jasper



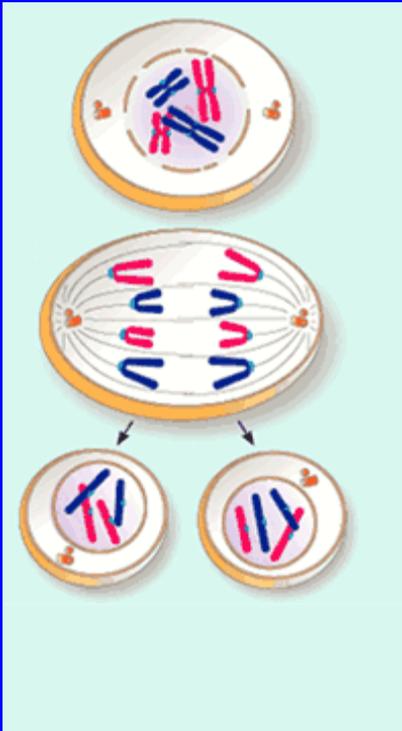
Founders

- Others have calculated the proportions of each founder in each animal's pedigree.

Problems

- the founders themselves are arbitrary - they are simply those animals with no parents in the electronic database.
- More important the founder affect only tells you what percentage of the pedigree is made up of that founder.
- It does not tell you the probability that those founders' genes are present in the current population.

Gene Transfer through the Generations



- As we all know, every cell in a mammals body has two complete sets of the DNA blueprint needed to build and run that animal.
- In the ovaries and testes, eggs and sperm are formed by pulling those two sets of DNA apart.

Probability

- The chance that any one gene passes from a parent to its offspring is 50: 50 in each generation
- But each gene either does pass or does not pass



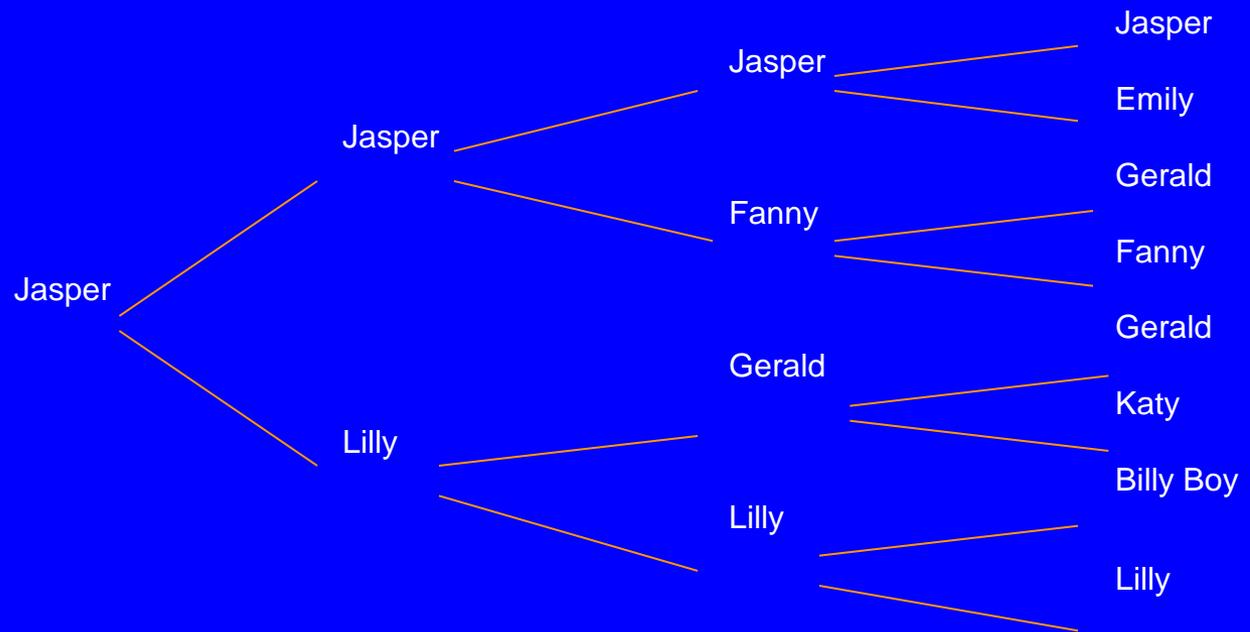
If you flip a coin you know that you have a 50:50 chance it will be heads

But how many times would you have to flip a coin before you would get heads six times in a row ?

That is the chance one gene will pass down 6 generations

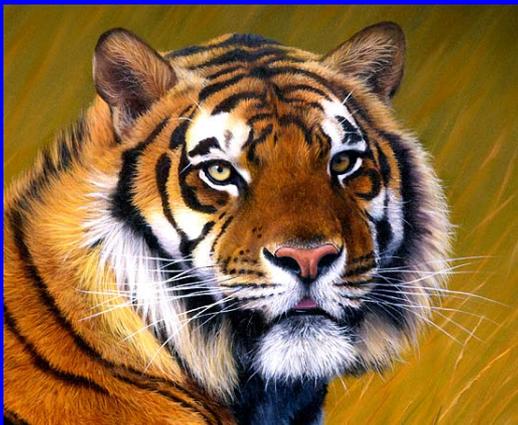
Founders - probability

- So the Founder Affect tell us what proportion of the **pedigree** comes from any one animal, but not how many of that founders **genes** have actually survived to the present day.



Optimal Conservation Breeding

- To optimize the chance that a static population maintains as much genetic variations possible, we should ensure that each male and each female in the population replaces itself with one male and one female.
- This is why tigers in zoos are all on the pill. Tiger space is limited and each needs to replace themselves and no more, in order to maintain the population and loose as little genetic variation as possible.



In rare breeds we generally have increasing populations, so we do not have to be so strict, but the same principals apply

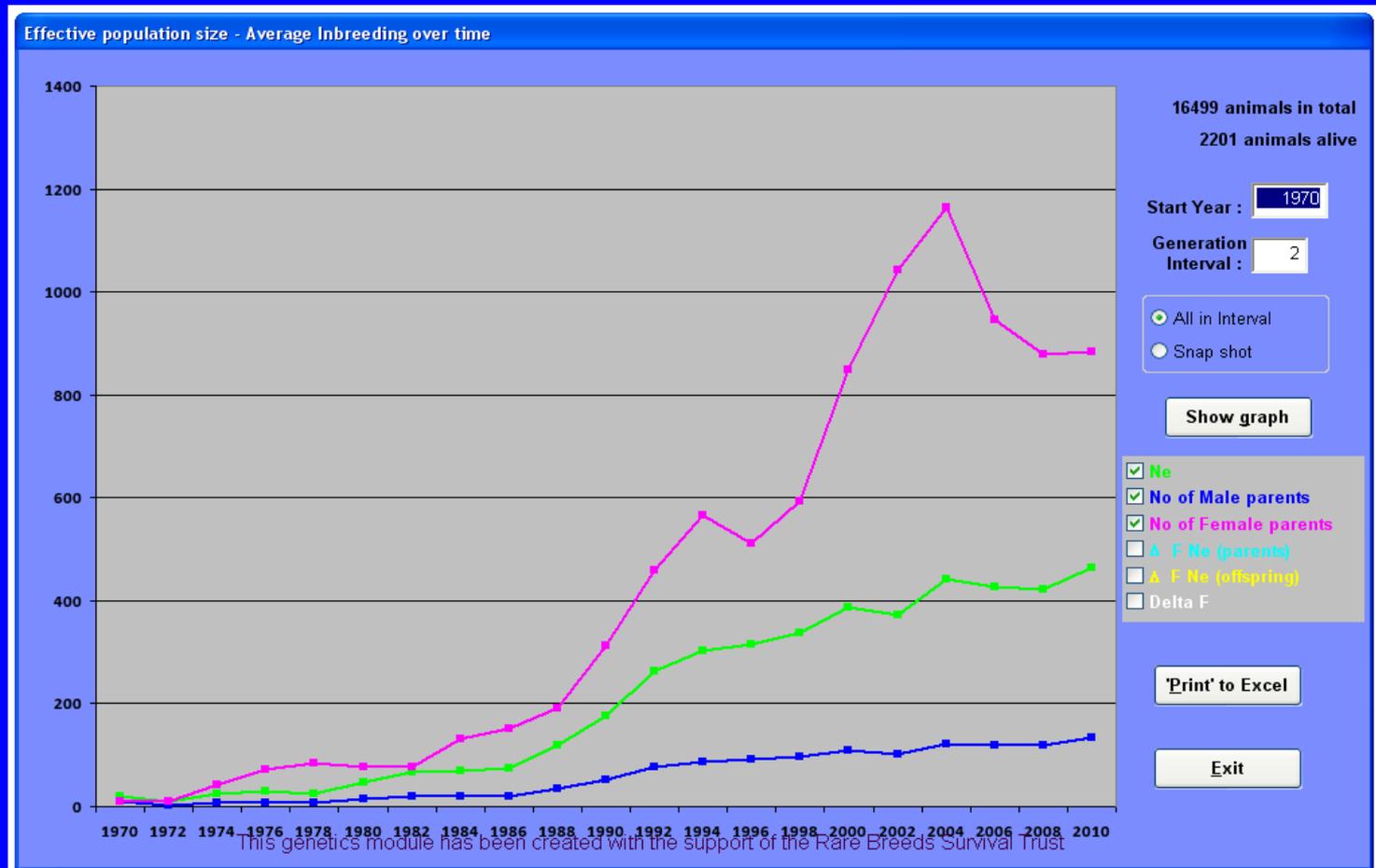
Effective Population Size

- The number of animal who actual make a genetic contribution to the next generation is determined by the ratio of males to females and is called the effective population size. For a population of 100 animal

No Males	No Females	Effective Population Size
50	50	100
30	70	84
20	80	64
10	90	36
5	95	19

Effective population size

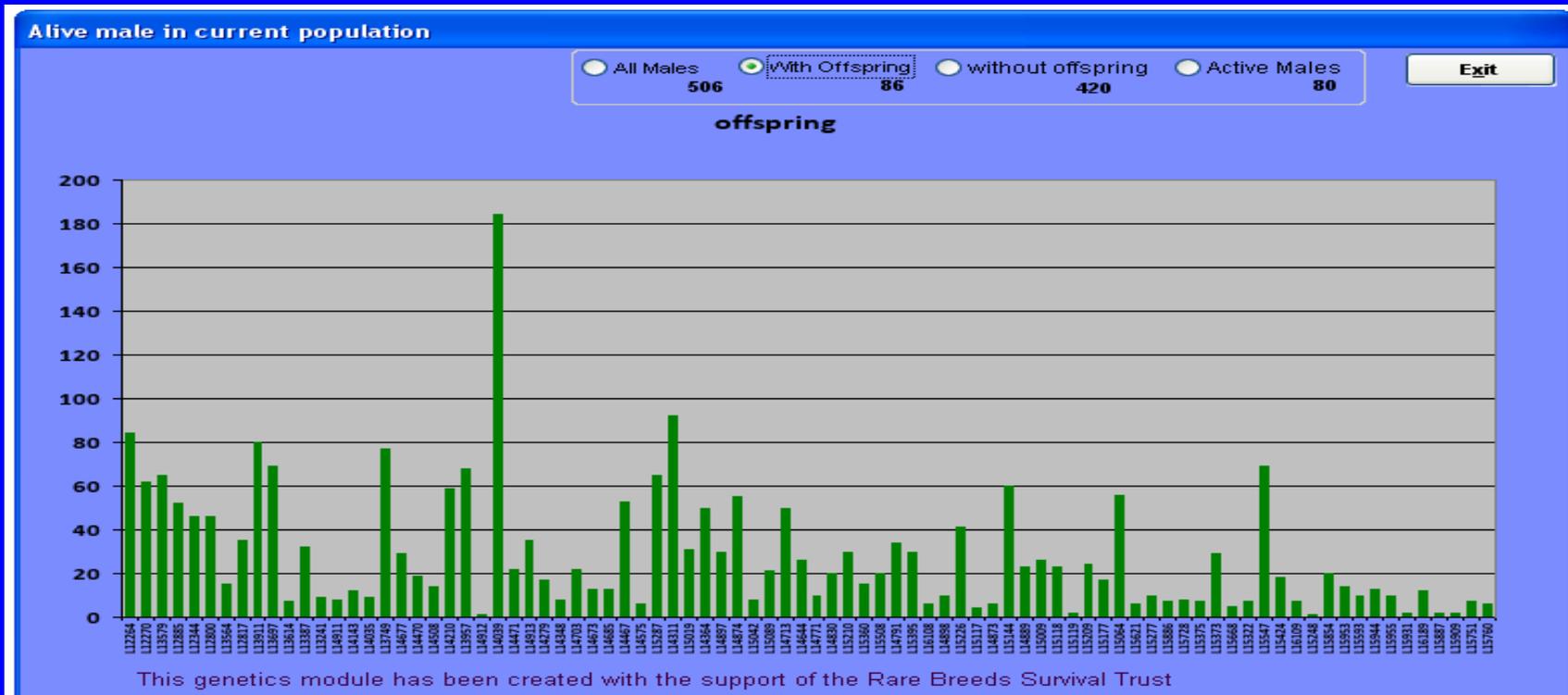
- So even when the number of females goes up dramatically the effective population size may not.



The Golden Rules of Conservation

- Use as many males as possible
- Not keep too many offspring from any one male
- Minimize inbreeding

Which Males do we have working in the population ?



No one male should produce more than 5% of the offspring which will make up the next generation

Inbreeding

- Inbreeding is a probability calculation, like our coin tossing exercise earlier. it calculates the probability that a gene will be inherited from a common ancestor in an inbred pedigree.
- An inbred animal is more likely to be homozygous, and an inbred population will carry less genetic variation
- To maximize the long term survival opportunities for a rare breed we need to minimize inbreeding.

Kinship

- Kinship is the ‘what if’ inbreeding coefficient’ for any mating - another probability calculation
- It is an indication of how closely related two animals are to each other
- or how closely related an animal is to any group of animals.
- It is a relative figure- and is always quoted alongside the animal or group to which it refers
-

Kinship as a tool

- **to identify 'outside line' males**
ie those least related to the population as a whole.
- **This can be used to help identify males for AI collection.** Males which are the least related to the population as a whole or to the current AI collection.

Pedigree Registration

- Breed improvement
- Breed Conservation
- Monitor genetic change
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