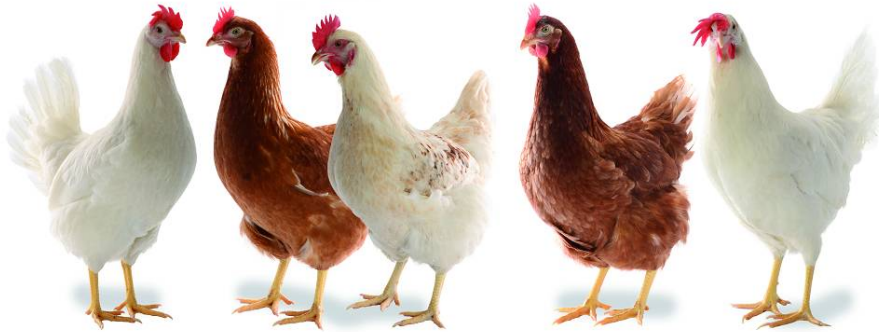




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Welcome to Nantes

Global layer breeding with special focus on sustainability

Presented by:

Prof. Dr. Rudolf Preisinger

EAAP Conference, Nantes, August 2013



World hunger



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- Progress in production is urgently required in several parts of the world!
- Dual purpose hampers the progress of productivity (biological antagonism leads to higher losses in improvement)
- The rate of genetic progress is correlated with population size (small populations are less competitive)



How can genetic diversity contribute?



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- Chronic hunger in third world countries
- Lower productivity in agriculture
- Low input systems are not the solution but a delusion!!
- Local breeds should have special advantages in
 - ❖ *Vitality*
 - ❖ *Nutritional requirements*
- Relevance of a variety of breeds are being overrated (genetic difference in phenotype is used as marker for biodiversity)



Poultry Breeding I



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- Programmes and genetic stocks owned by private companies
- Intensive selection and reproduction within large closed gene pools
- Comprehensive phenotypic data recording
 - pure lines (high biosecurity)
 - cross lines (commercial farms)
- The science of genomics might have advanced greatly, but it is still very expensive – relative to the actual value of a breeding bird!



Poultry Breeding II



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- Hybrids of multiple line crosses are used for table egg and meat production worldwide.
- Cross-line birds have better:
 - fertility (parents)
 - livability (parents and commercials)
 - egg production
- Birds have to perform in a wide range of environments



Layers have to be ...



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- Adaptable to different environments (housing systems, climate, feed quality)
- Feather or colour-sexable as day-olds
(if commercials are used for breeding, there will be a significant drop in performance and the possibility to perform easy sexing will be gone)



Globally active layer breeding companies



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Group of co.	Breed	Year of acquisition	Breeding farms	No. white strains	No. brown strains
EW Group	LTZ	1959	D, DK, CA	4	6
	H&N	1987	D	2	3
	Hy-Line	1978	USA	2	3
Hendrix/ISA	Bovans	1991	NL	2	3
	Hisex	1998	NL	1	2
	Dekalb	2000	NL	2	2
	ISA	2005	F	1	1
	Babcock	2005	CA	1	-
	Shaver	2005	CA	1	1
Tetra	Tetra	2004	HU	1	4
Grimaud	Novogen	2008	F	2	2



Rate of genetic progress

- Comprehensive and precise performance testing
- The testing environment and the production environment should be similar

Tests in the following environments:

- ↪ Cage housing
- ↪ Aviary housing
- ↪ Free-range

(Genotype and Environment Interaction)

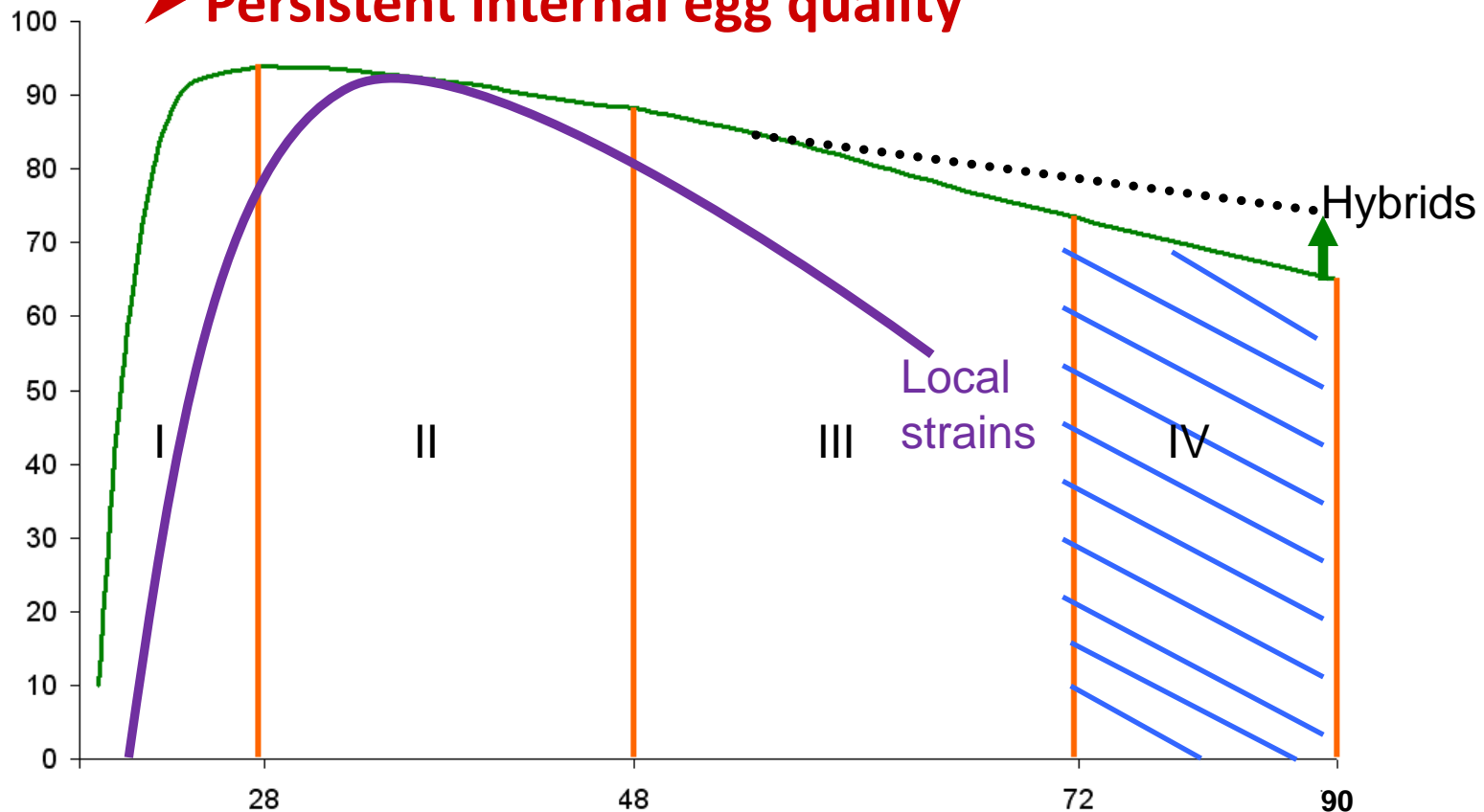


More saleable eggs per hen housed



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- More persistent rate of lay
- Persistent shell quality
- Persistent internal egg quality



Data recording in practical breeding



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Housing conditions which challenge undesired behaviour:

- High light intensity
- Without beak trimming
- Family cages with 4 or 12 half-sibs in each cage



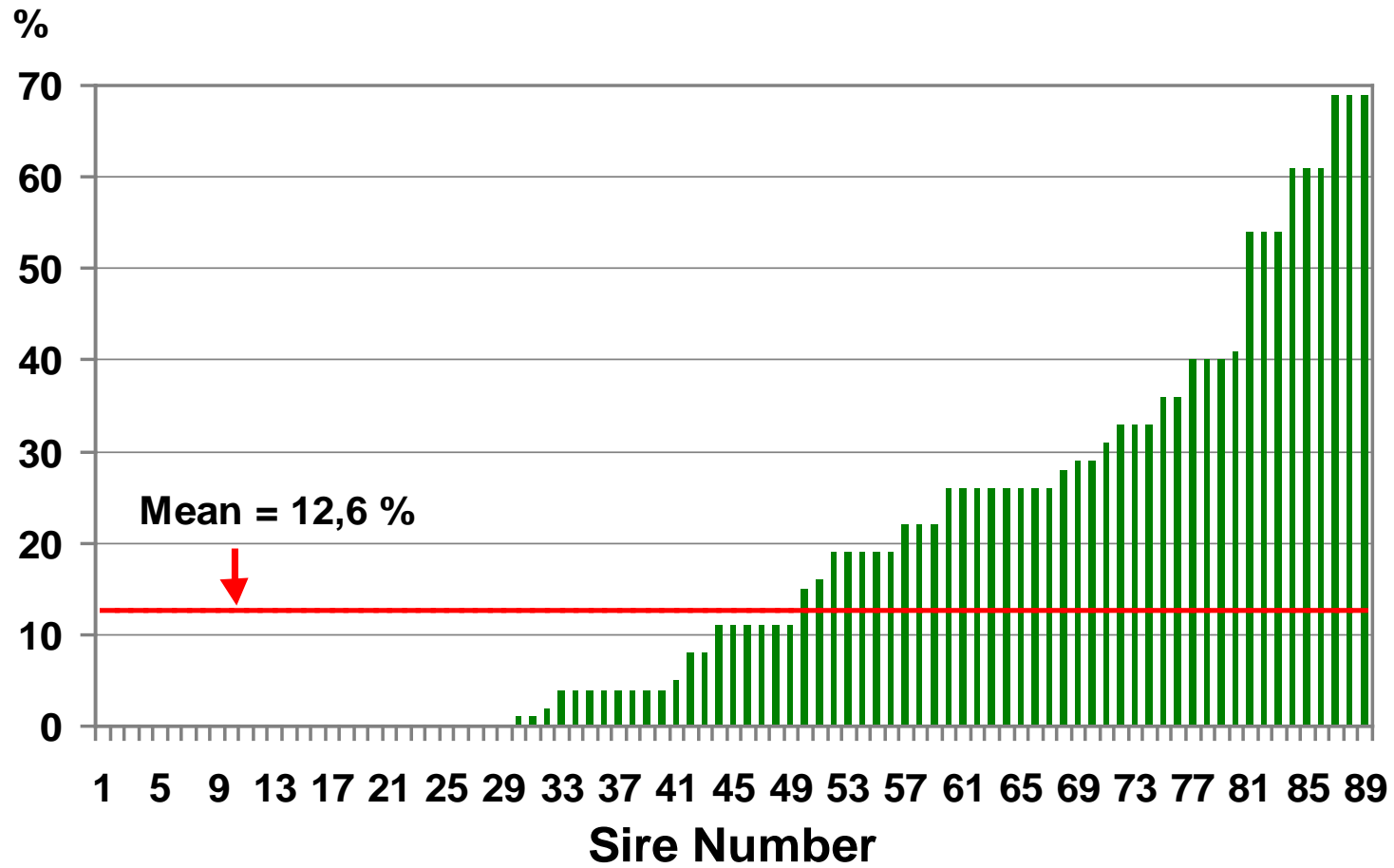
Agressors and victims within one cage originate from the same family.



Losses per family for line 1 as a result of cannibalism among non-beak trimmed hens at high light intensity



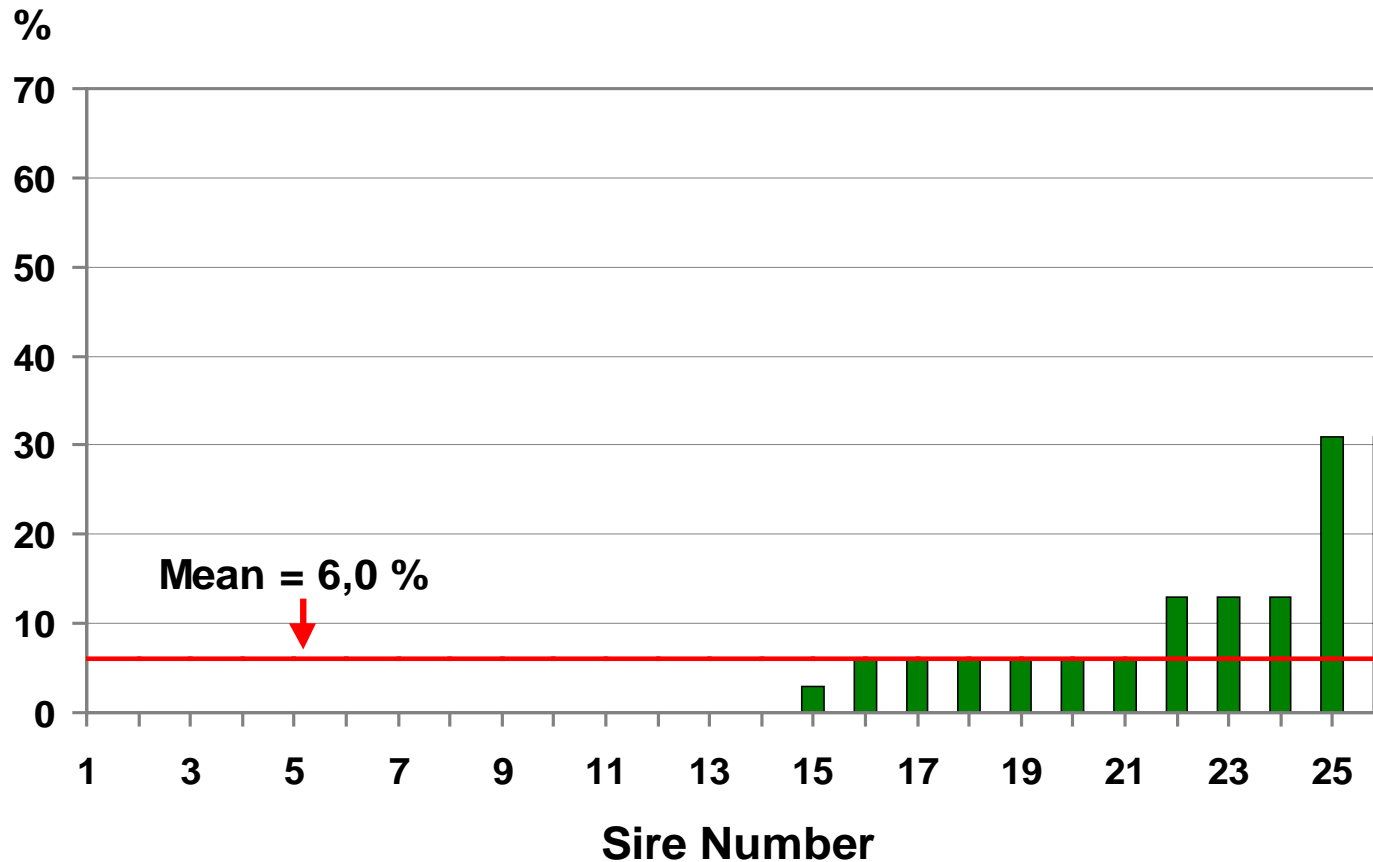
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Losses per family for line 2 as a result of cannibalism among non-beak trimmed hens at high light intensity



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Selection



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- Combination of single, group, family cages and small aviaries:
 - Vitality
 - Laying performance of each hen housed
- Combination of floor, aviary and free-range housing
 - Single nest
 - Family nest

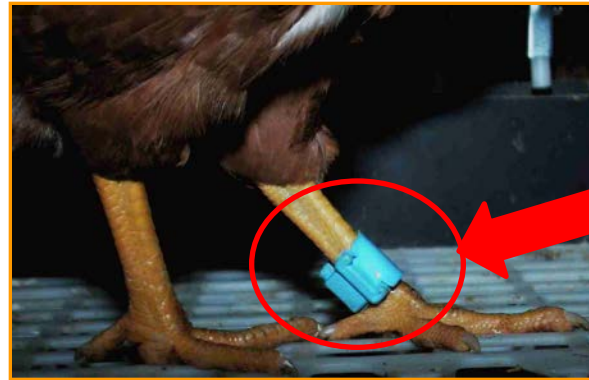
(Floor eggs, length of stay in the nest, usage of the free-range area)



Phases of a nest visit



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Transponder



Entry



Oviposition



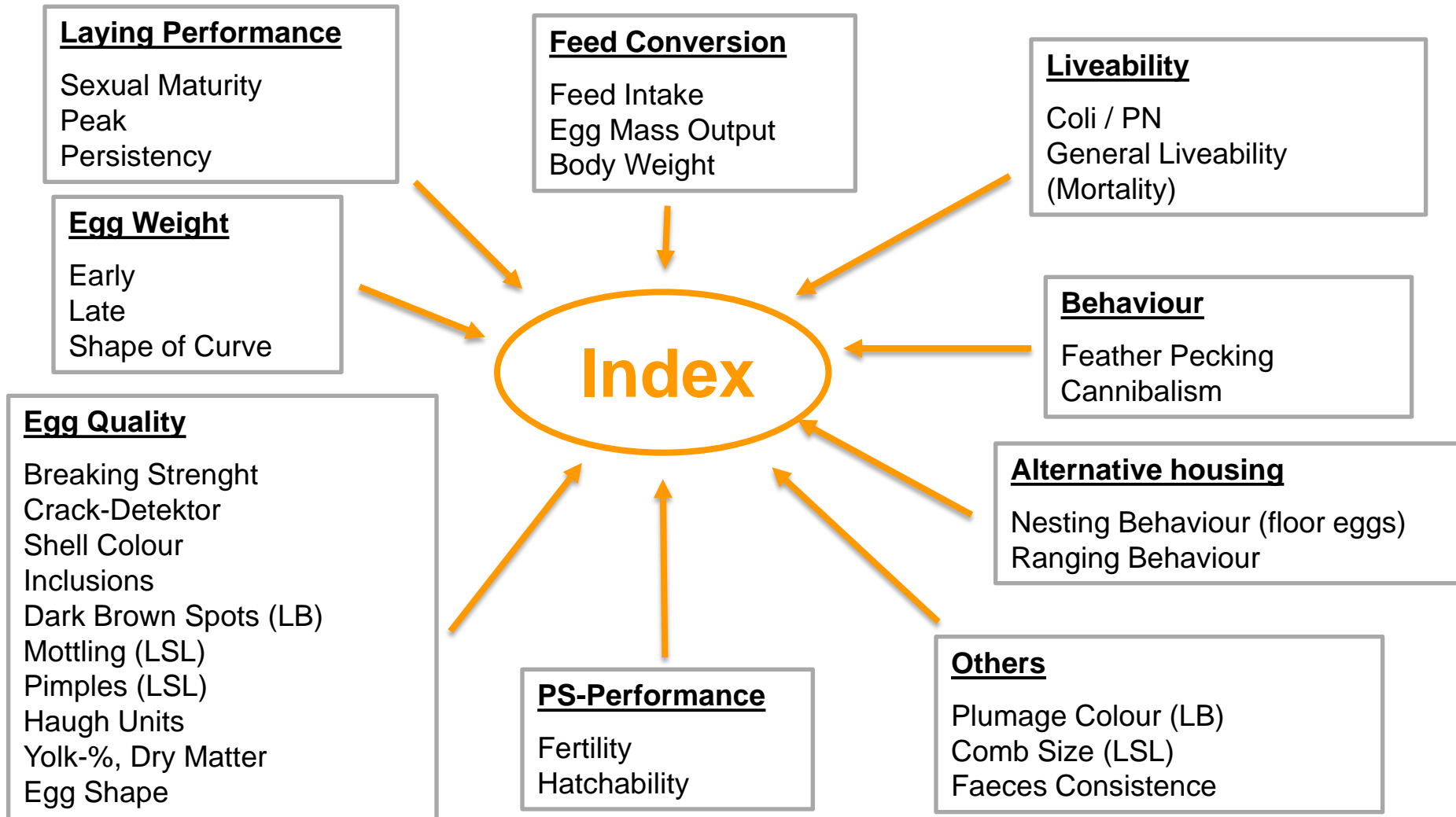
Exit



Selection for Overall Performance Index



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Local breeding programmes

- Parent stock can be distributed worldwide (as hatching eggs or day-olds)
- A new generation every year
- Local breeding programmes in Asia are based on European or North American genetic stocks
- In Africa, local strains still contribute a significant share to chicken production (dual purpose)



Local programmes



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- If balanced diets are available, local strains will be replaced by imported parent stocks – a general trend
- Major difference in feed efficiency and egg quality (size and shell strength)
- Lack of infrastructure for reliable performance testing as major input for selection and annual progress



Future market needs



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- To forecast needs for producers and consumers, at least 5 years ahead of market realisation
- Diverse markets can be served by different line combinations (mainly male lines)
- Extensive gene pools with a variety of elite lines to generate specific commercial products



Sustainable programmes

- Continuous genetic progress in pure lines (annually)
- Limited increase in inbreeding
(large pure lines, special mating scheme)
- Developing new lines
- High costs for testing, selecting, reproduction
 - Investment: € 150/bird per year
 - Husbandry: € 50 / bird per yearFor 5000 birds = € 1 million / year
- Very good skills in quantitative genetics



Biodiversity



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- Genomic polymorphisms have to be analysed
- Use of high density panels (600 K SNP Array)
- Association studies for performance and vitality traits using local and commercial strains (to preserve the genomic merit) of native breeds



Conclusion

Programmes are only sustainable if;

- The population size is large
 - *3000 birds/line*
- More than 4 lines are available
 - *for brown eggs as well as for white egg stock*
- There are sufficient parent stock sales to cover costs and generate significant revenue
- PS can be imported at any time and with any volume to hatch commercials for growing layer operations





Conclusion

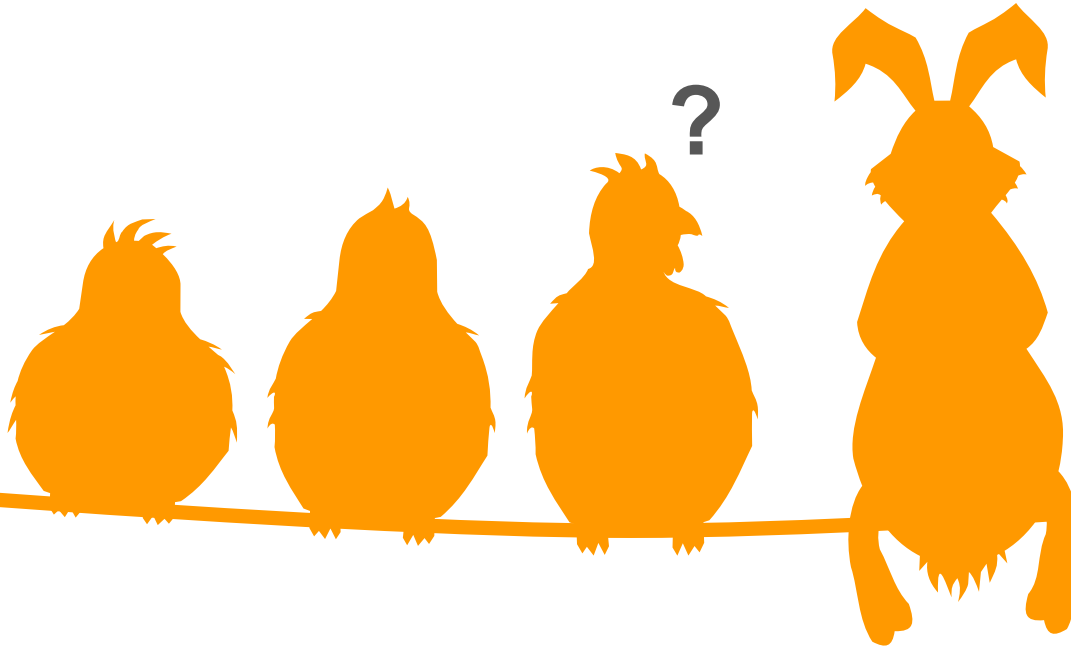
Those who do not test, cannot select and are thus unable to make any progress in breeding.

Only if these test alternatives for all housing systems are available for pure and cross-lines, can continuous genetic progress be achieved!!





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Do you have any questions?

