INTRODUCTION TO

ANIMAL BREEDING

Case study Nr 1

Domestication and development of genetic resources

Selection - The example of chicken

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Domestication, constitution of genetic resources

The chicken production and its organisation

Evolution of performances

Value of local breeds

Summary

Periods of domestication

Rabbit

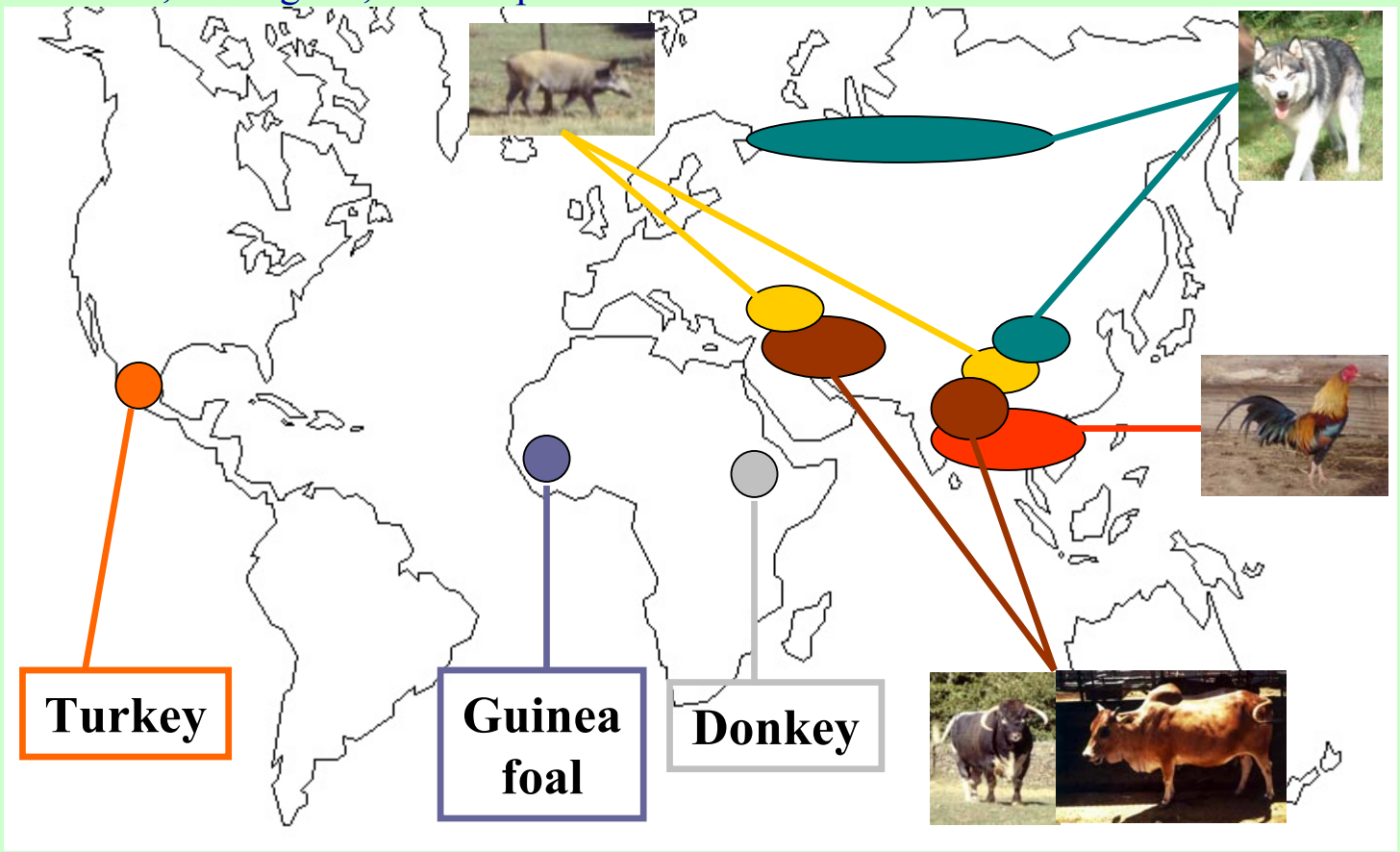
- 15 000 - 10 000 years - 5 000 0

Photos: E. Verrier, X. Rognon

Present time

Locations of domestication

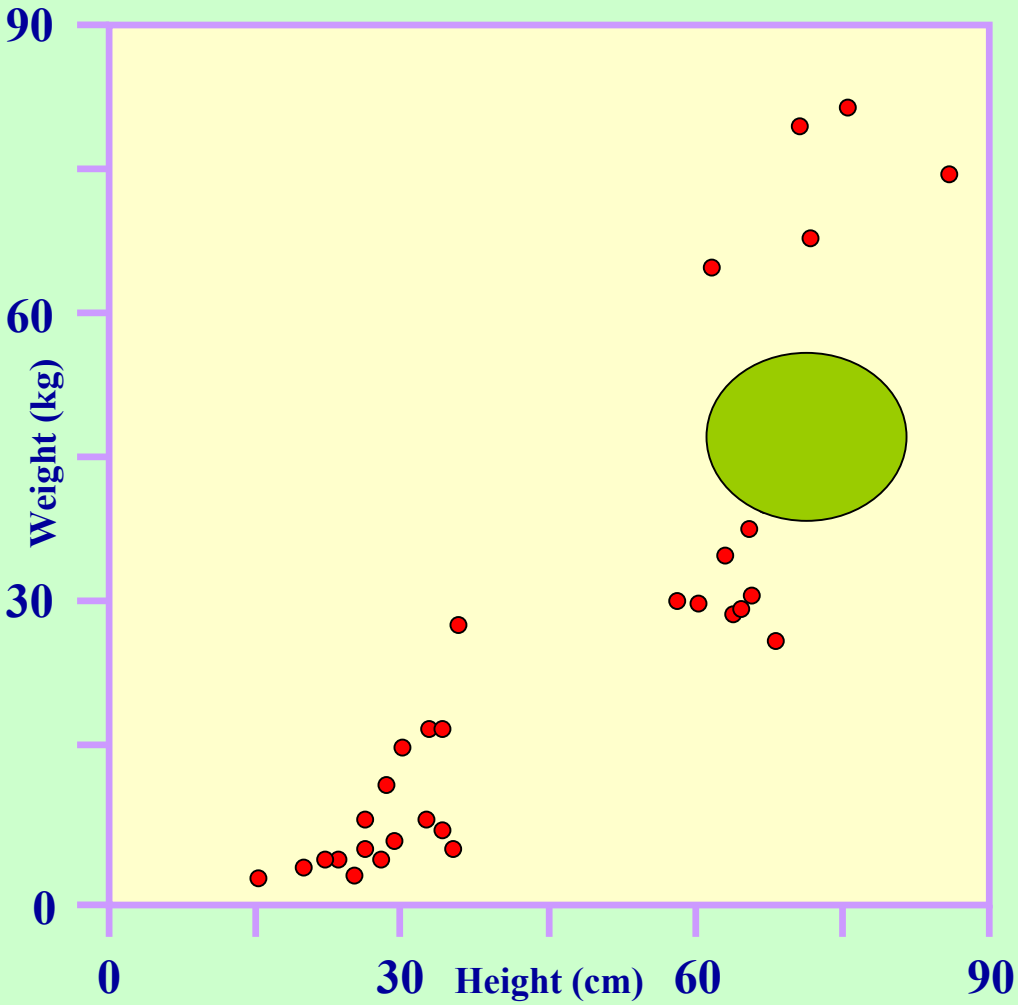
Photos: E. Verrier, X. Rognon, J.M. Duplan



One or several centres of domestication → Expension

Consequences of domestication

The example of dog



Wolf (3 sub-species)

Dog

Sample of 35 breeds

Source: Société Centrale Canine

Consequences of domestication

The example of chicken

Photos: J.C. Periquet. http://perso.wanadoo.fr/volaillepoultry/







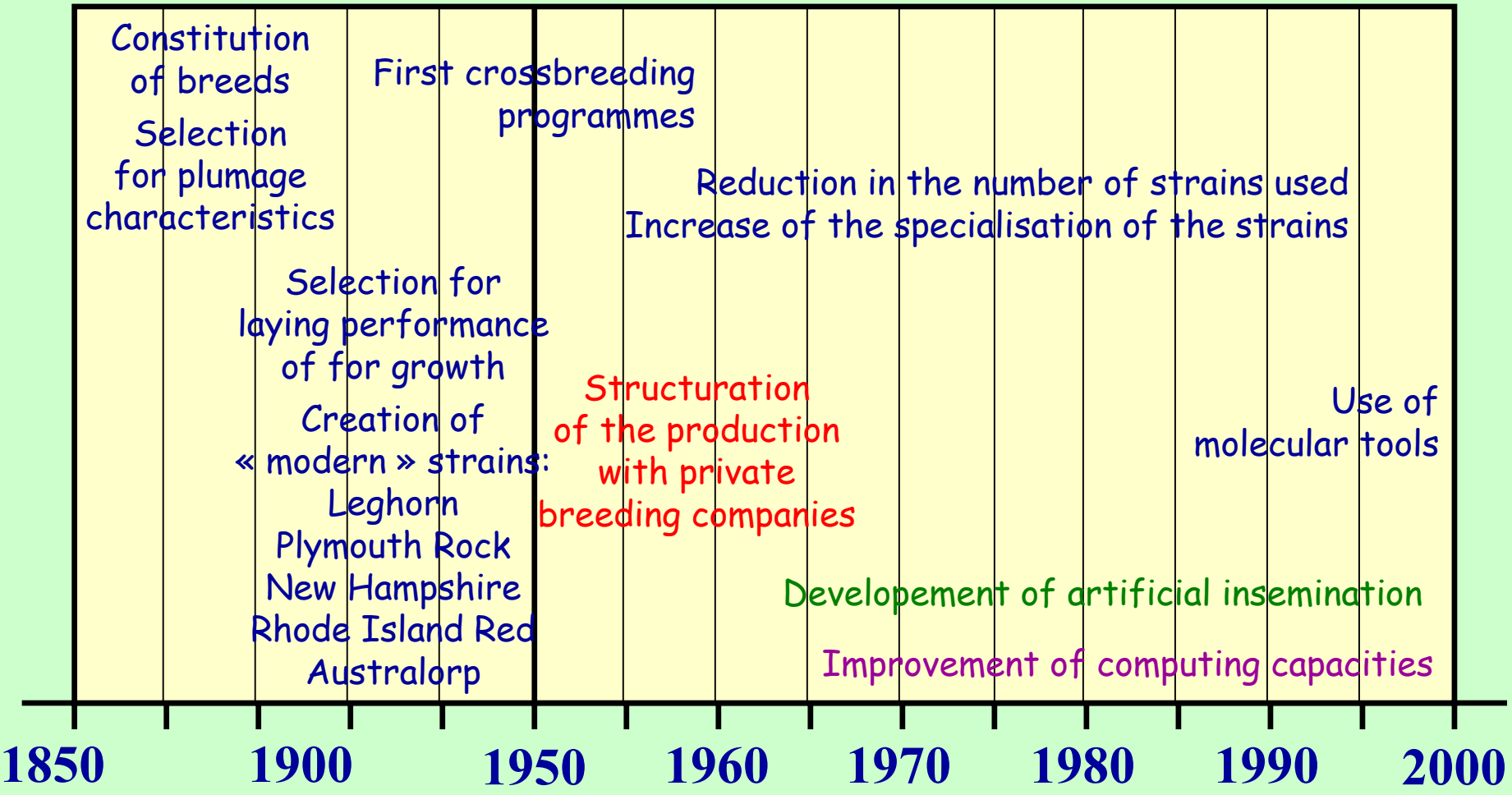






Short history of chicken selection

Europe and Northern America



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Evolution of the production

Hen egg production (Millions tons)

Countries	1961	1982	2003
Asia	2.9	7.6	32.7
North. Cent. America	4.3	5.5	7.9
European Union (25)	3.8	6.2	6.2
World	**14.4**	**27.5**	**55.8**

Source: FAOSTAT

Evolution of the production

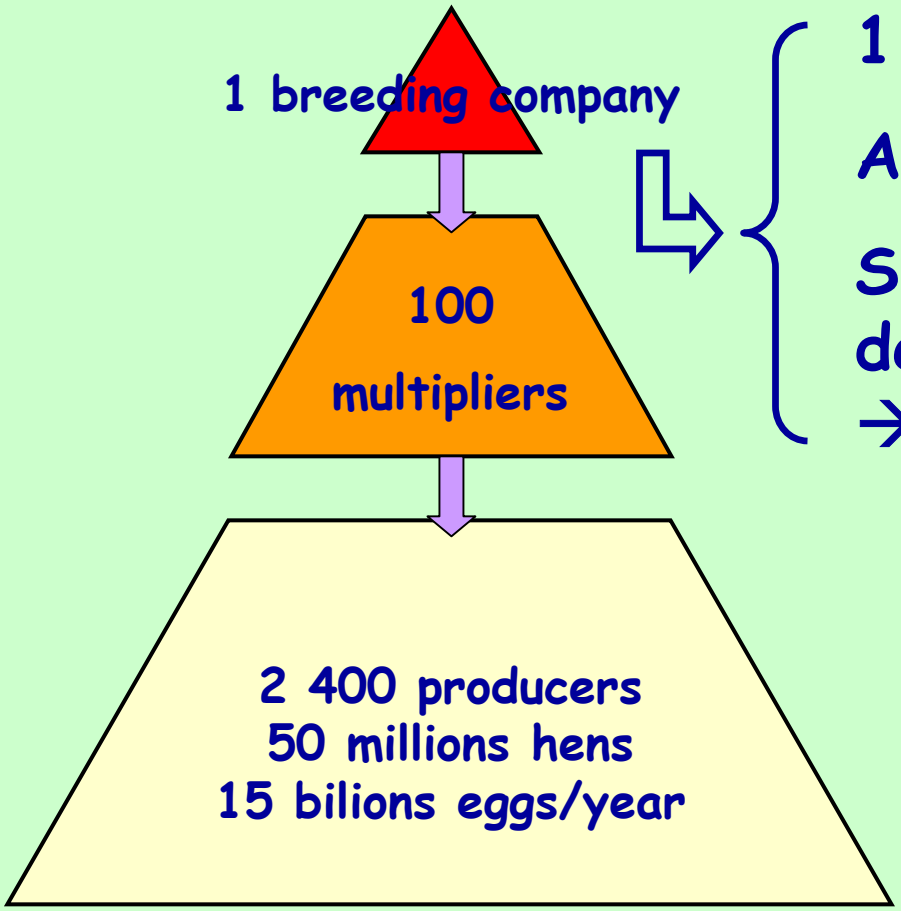
Broiler production (Millions tons)

Countries	1961	1982	2003
Asia	1.2	5.1	20.4
North. Cent. America	3.0	7.0	18.9
Southern America	0.3	2.8	11.4
European Union (25)	1.6	5.3	8.0
World	**7.6**	**25.2**	**65.0**

Source: FAOSTAT

Organisation of selection and production

The example of egg production in France, in 2000



1 single centre for decisions

Animals homogeneously managed

Short time between selection decisions and production
→ a way to monitor the breeding programme

The main world chicken breeding companies

Source: Besbes (2003)

	% of « standard » market		
Company	**White eggs**	**Brown eggs**	**Broiler**
Lhoman (GER)	45	15	
ISA (FR)	30	60	
HPB (NL)	20	15	
Arbor/Ross – (GB/USA)		5	40
Hubbard (USA)			25
Cobb (USA)			15
Avian/Peterson (USA)			10
Euribrid (NL)			5

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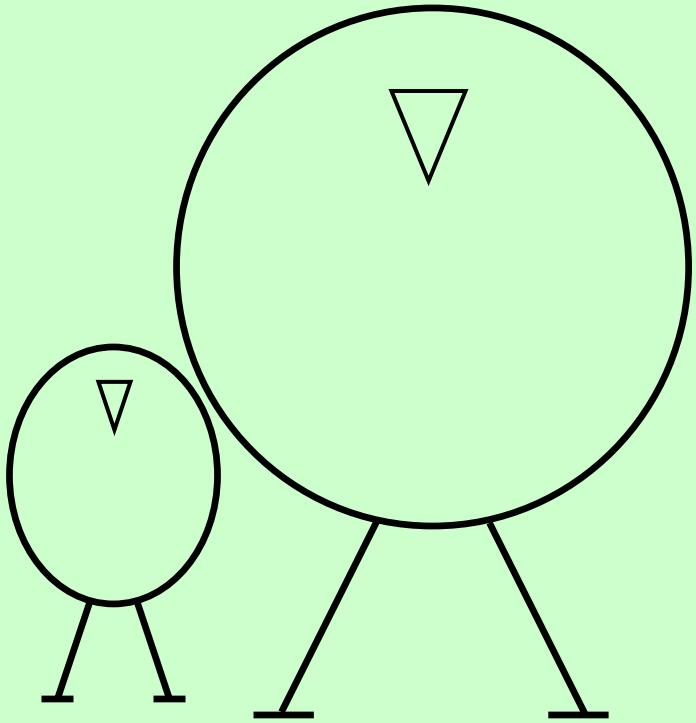
Very large genetic changes

Laying hen strain



Broiler strain

Age of both animals = 6 weeks

Annual phenotypic progress

Egg production: + 3 eggs

Live weight (42 days old): + 45 g

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Different kinds of broilers

(France)

Product	Fattening duration	Strain
Standard	6 weeks	Fast growing
Label	12-15 w.	Slow growing
Bresse *AOC*	16-21 w.	Slow growing

Splitting of the food chain → Adapted Genetic strains

Economic results (France, 2002)

Label = 100 Millions Chickens per year
= half the consumption as whole carcass

Bresse AOC = 1.4 Millions chickens per year

€ / kg	Standard	Label	Bresse AOC
Price at the gross market	1.6	2.7	
Price paid to the producer			4.0

Source: OFIVAL, CIVB

Production under hot conditions

Under the tropics or under sub-tropical conditions, local breeds =

- 80% of chickens
- 25 to 70% of meat production
- 12 to 36% of egg production

Production under hot conditions

Maroco
Photo: IAV

Taiwan
Photo: CF Chen

Viet Nam
Ha Giang Province
Photo: E. Verrier

Results of research work on local tropical chicken breeds

- Importance of genotype x environment interactions
- Tolerance of local breeds vis-à-vis environmental fluctuations: temperature, feeding, …
- Better disease resistance of some local breeds e.g. the Fayoumi breed

Photo: INRA UMR GDA

- Potential interest of some major genes e.g. the naked neck gene

Summary

Chicken is a very differenciated species

Deep concentration of the selection organisations

Very large genetic progress under standardised conditions

Value of local breeds for

- Adaptation to environmental constraints and support for the development of production (potentially in complement with « industrial » strains)
- Niche products