Equine Science looking forward *to match the challenge of a growing industry*

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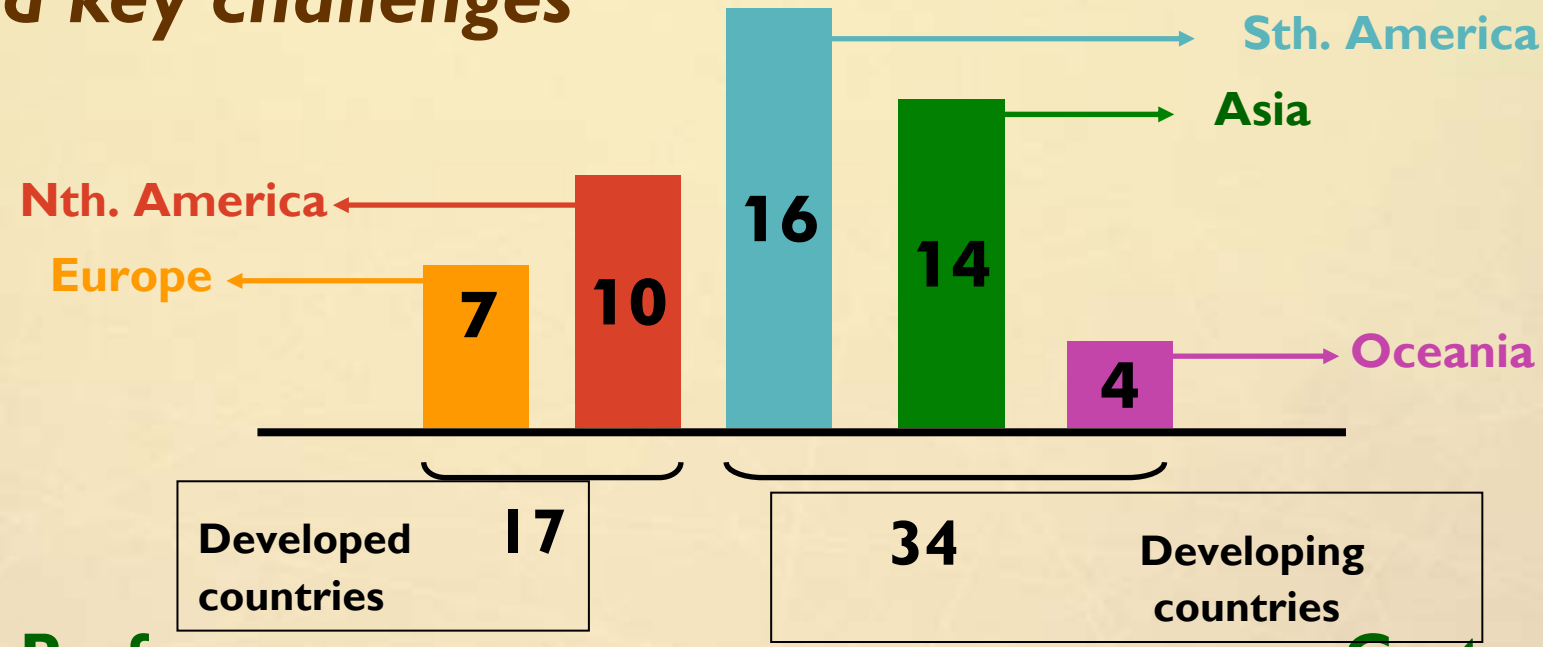
Plan

- Key challenges for equine population in the world
- Key challenges for developed countries
- Main achievements to meet these challenges
- New prospects
- Main issues / challenges

Equine population in the world (millions) and key challenges



Performance
Health
Welfare

Key Challenges

Cost
Health
Robustness

Developed countries: EUROPE

Equids industry : indicators

15 WEC

4.3 millions horses	+12 CEEC →	7 millions
3.5 millions Ha	→	> 3.5 millions
0.2 full time people	→	> 0.2 people
6.2 millions riders	→	> 6.2 millions

→ Demand ↗

WEC: Western European Countries
CEEC: Central-Eastern European Countries

Developed countries: ***EUROPE***

Equids industry: activities

- Races
- Sports
- Leisure
- Hobby farming

Main activities

- Social cultural events
- Agritourism
- Medical therapy
- Social rehabilitation

New activities

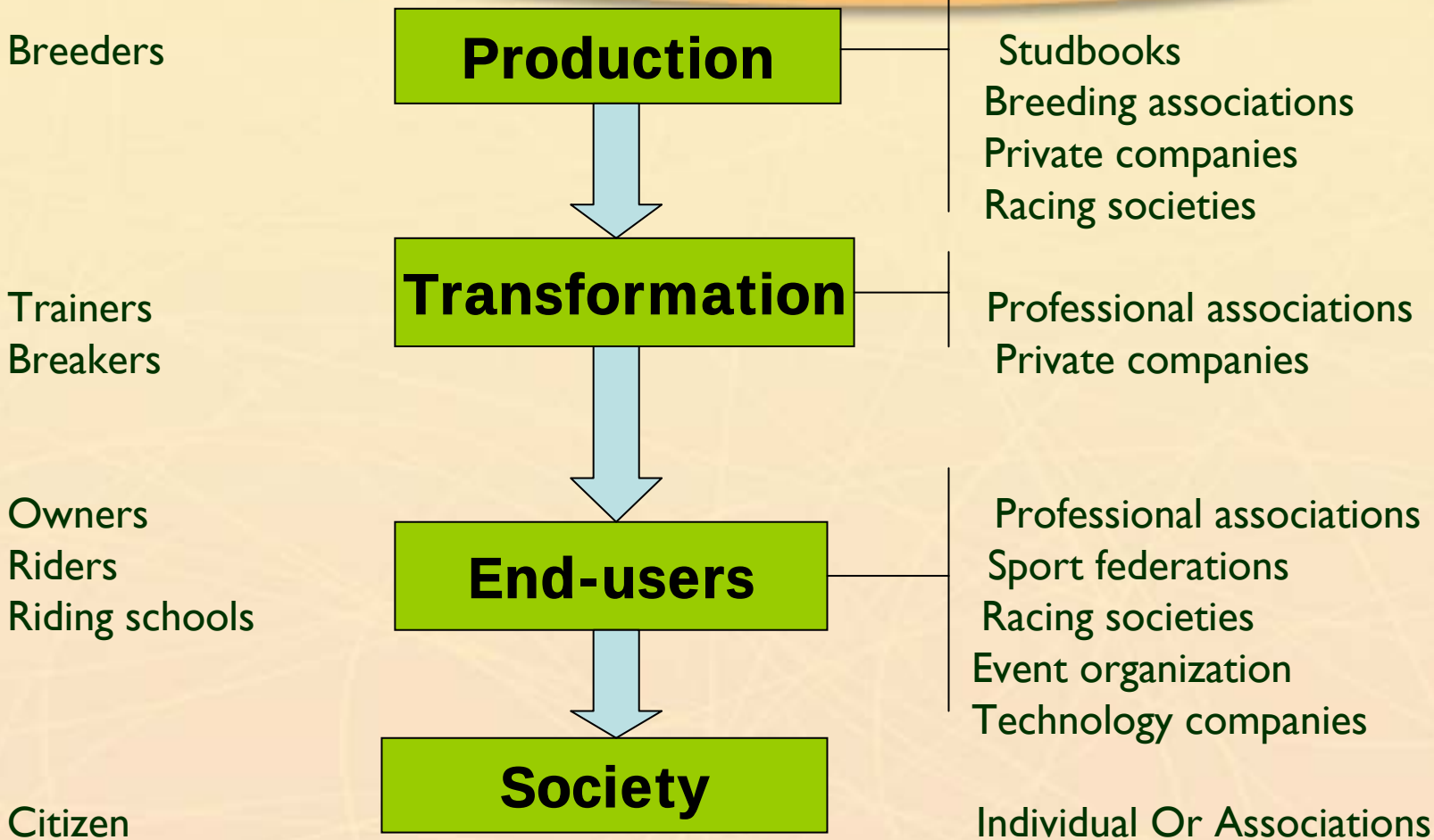
- Meat or milk

Niche activities

1st pillar CAP

Developed countries: EUROPE

Equids industry: organization of the chain



Developed countries: EUROPE

Equids industry / multifunctionality

Utilization of the territories

Grass = grazing 6 to 10 months

+

Forages= feeding 30 to 70 percent of total nutritional requirements

→

- **Added value to land**
- **Maintain rural landscape**
- **Maintain population + socio-economic activities in rural area**

} **2nd pillar CAP**

Developed countries: EUROPE

Key challenges

ANIMAL DIVERSITY

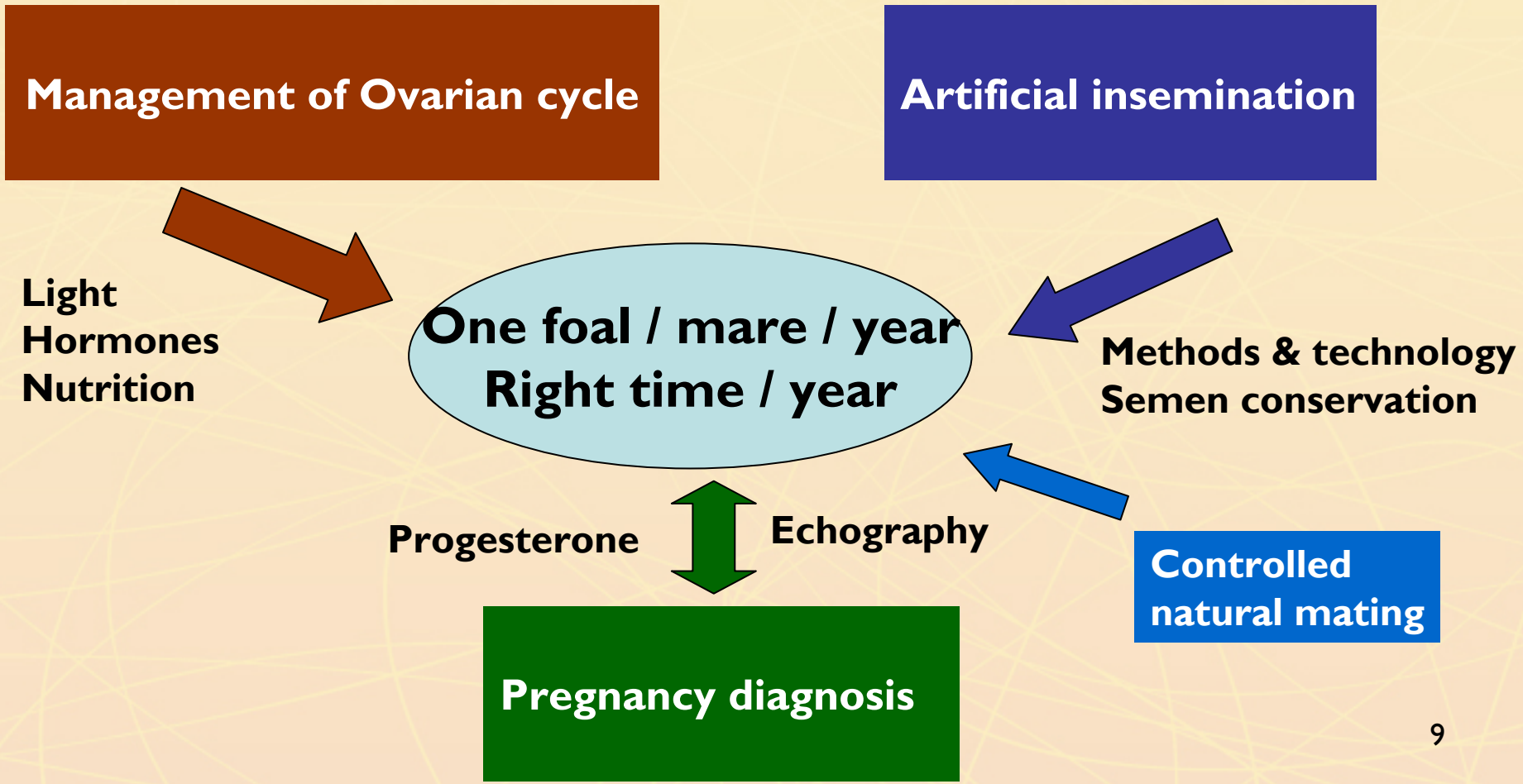
COMPETITION HORSE
Maximisation / Performance
Health

LEISURE HORSE
Optimisation/cost
Welfare

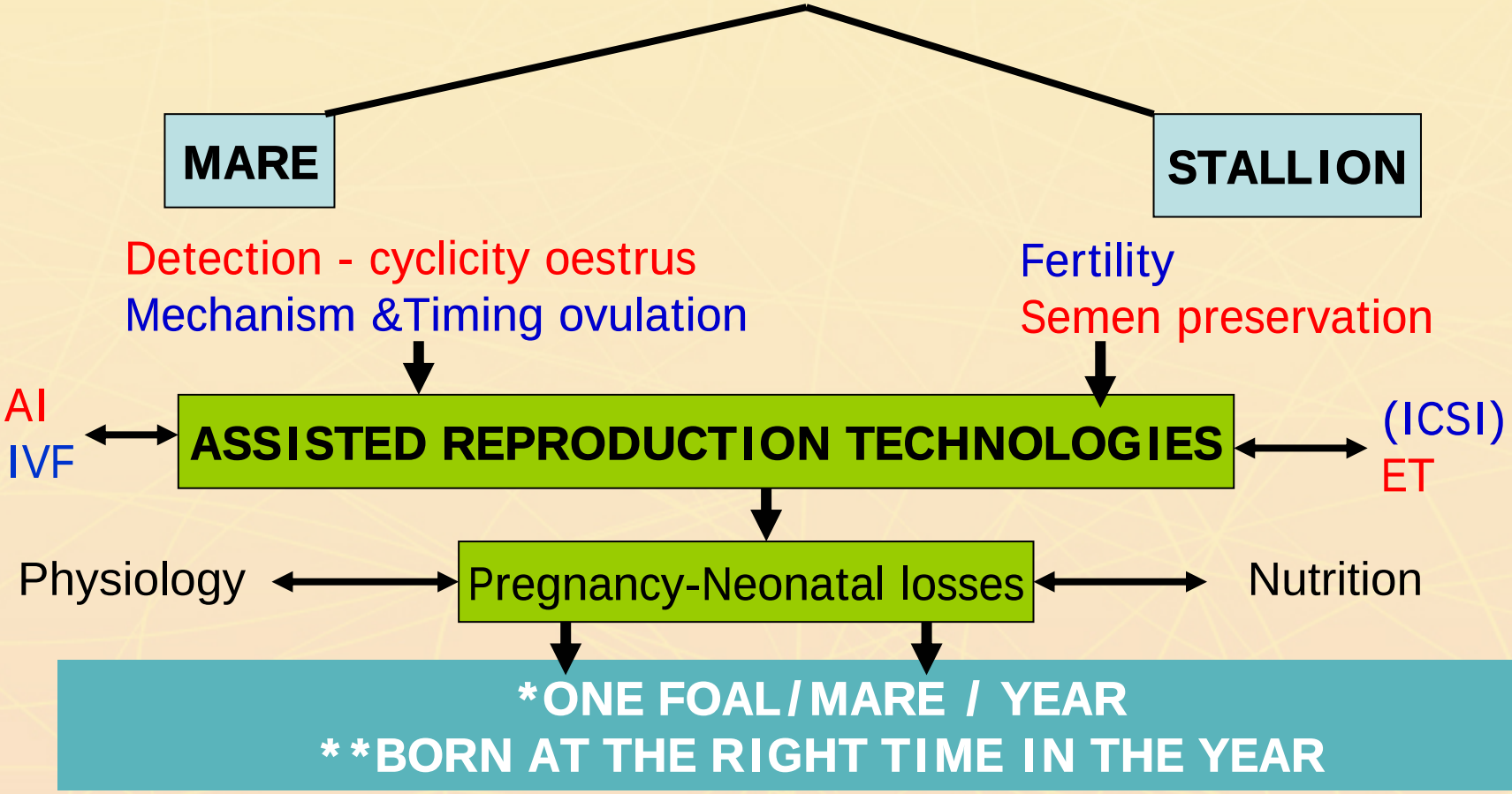
EQUIDS for Alternative products

PRESERVATION ENVIRONMENT

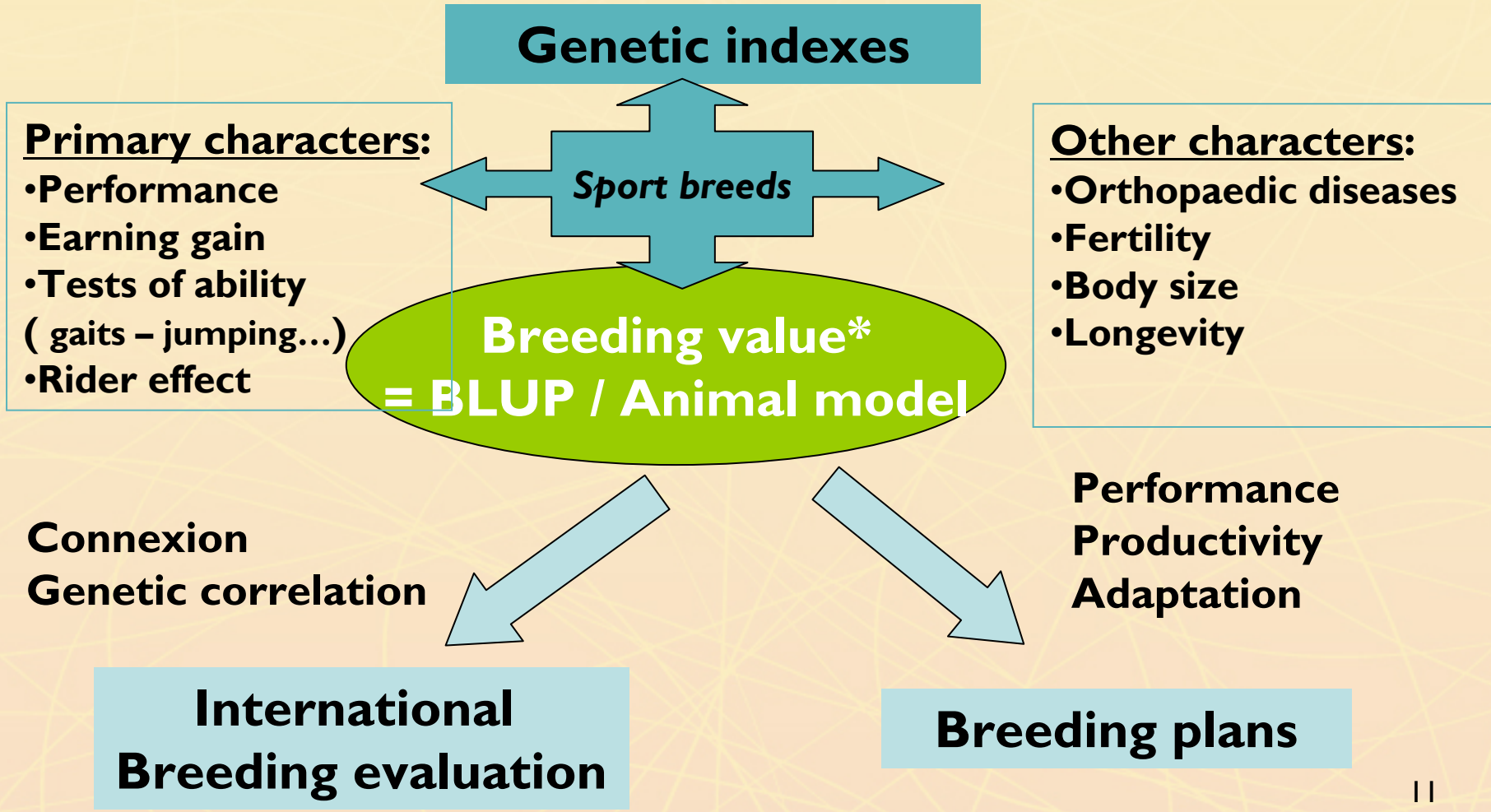
Main achievements
= RE PROD UCTION



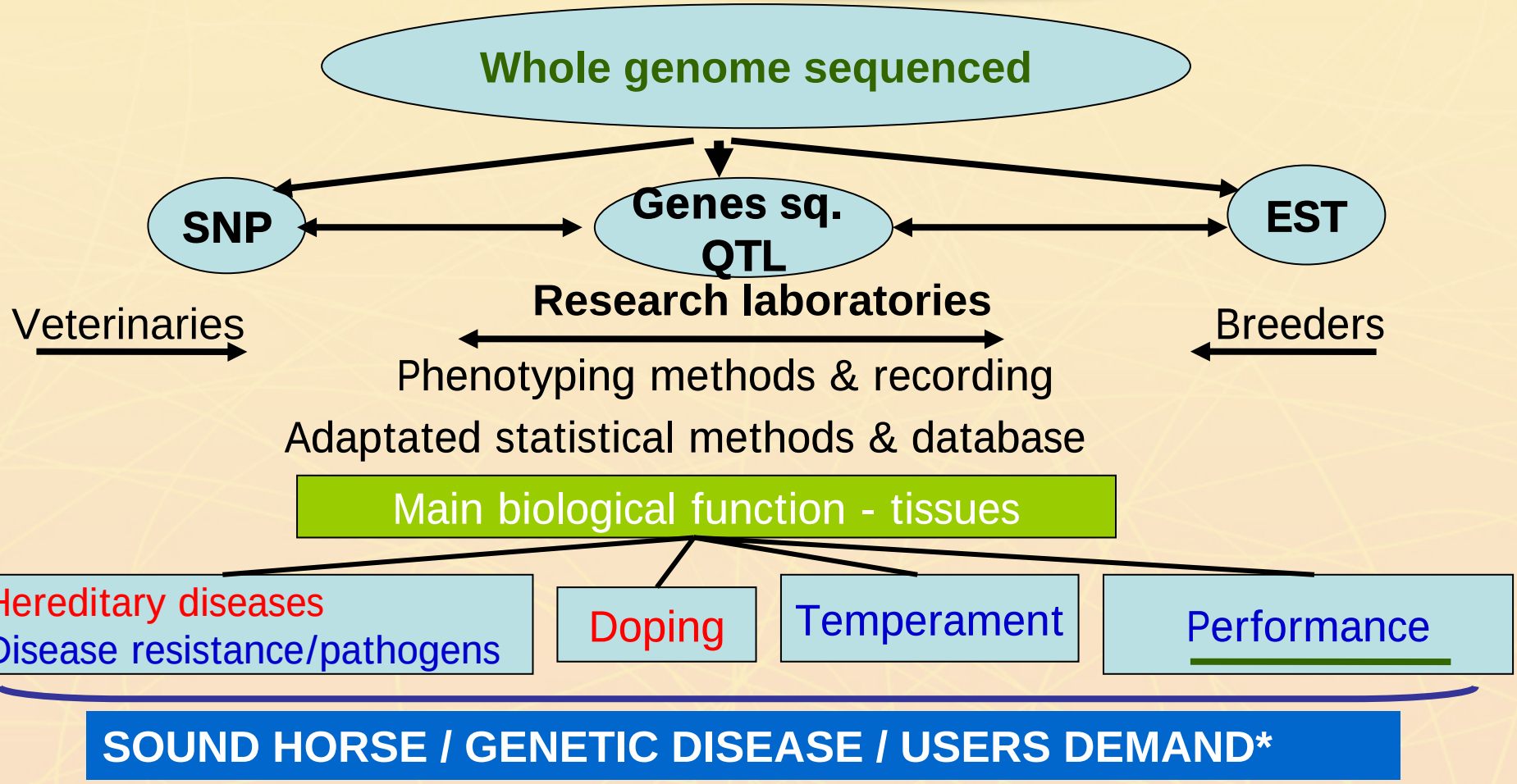
New prospects
= RE PROD UCTI ON



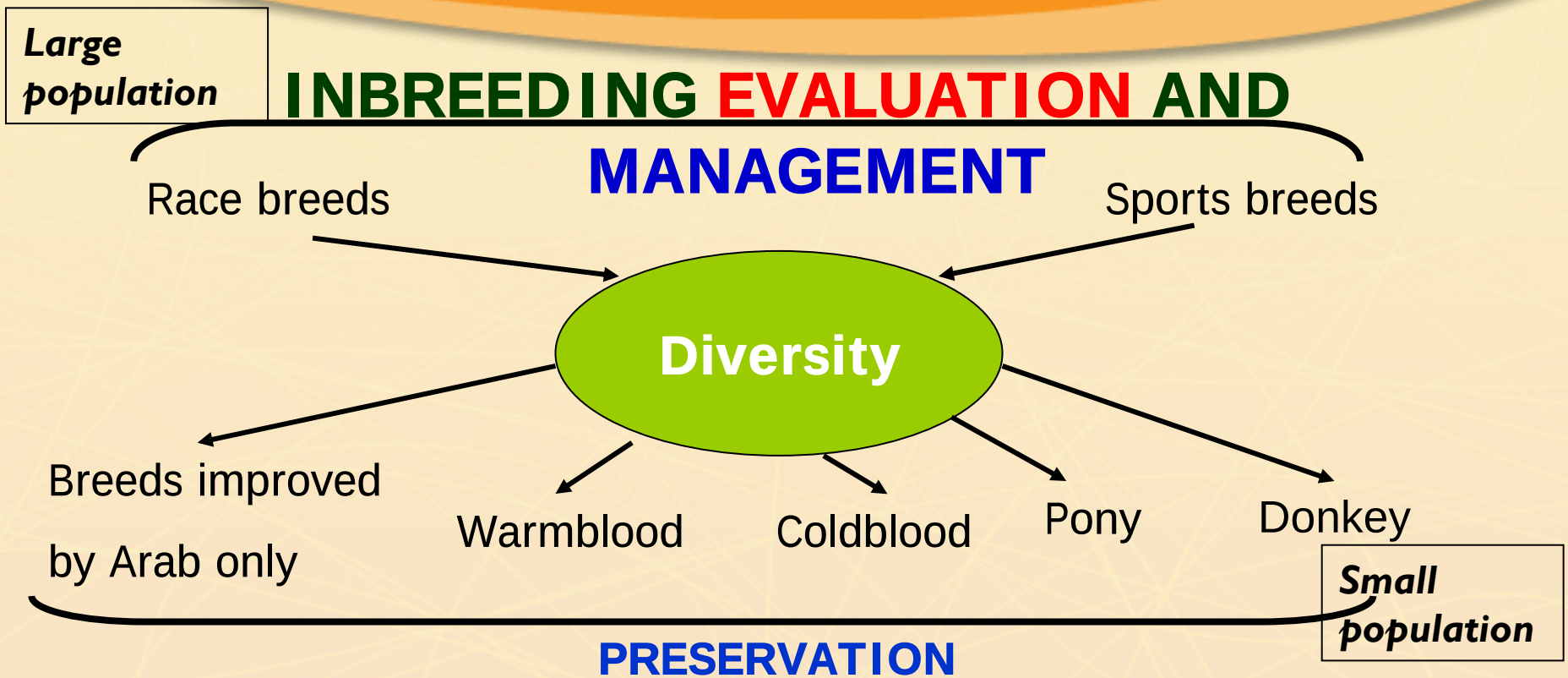
Main achievements
=GENETICS & BREEDING



New prospects
=GENOMICS & BREEDING



New prospects
=GENOMICS & BREEDING



Key challenges

Phenotyping: *expertise – recording*
Genotyping: *identification – comparison*
Reproduction: *AI - ET*

INBREEDING
EVALUATION

Main achievements = NUTRITI ON

Nutrients requirements

New concepts for evaluating the nutritive value of feedstuffs

ENERGY

DE system	NRC	(1978 – 1989 – 2007)
NE system	INRA	(1984 – 1990 – 2010)

NITROGEN

CP system	NRC	(1978 – 1989 – 2007)
MADC system	INRA	(1984 – 1990 – 2010)

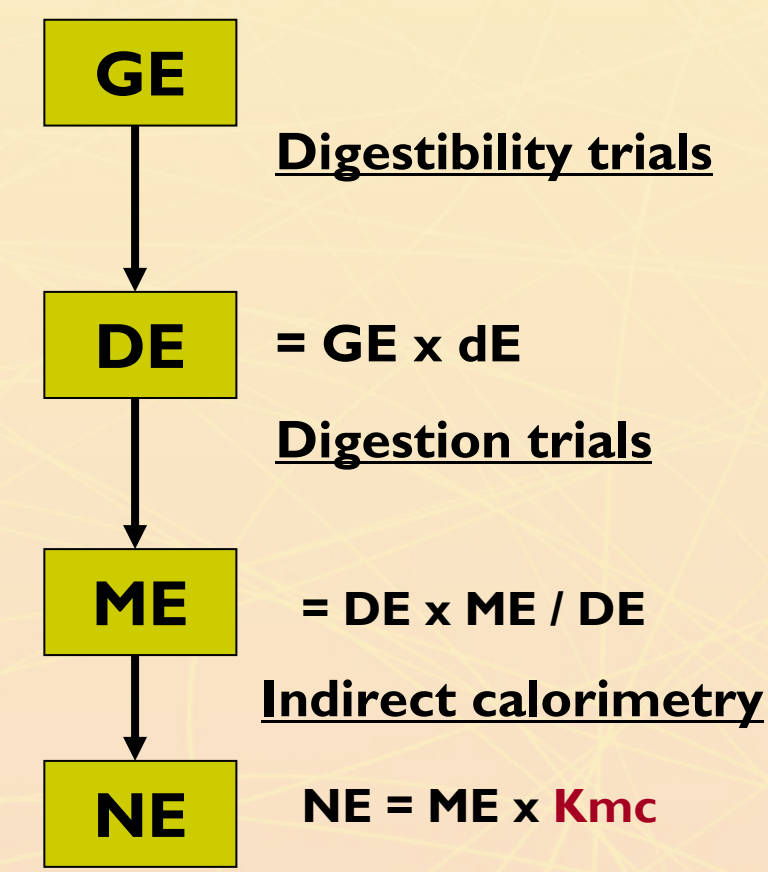
Main achievements = NUTRITION

Nutrients requirements

Energy value of feeds

NRC

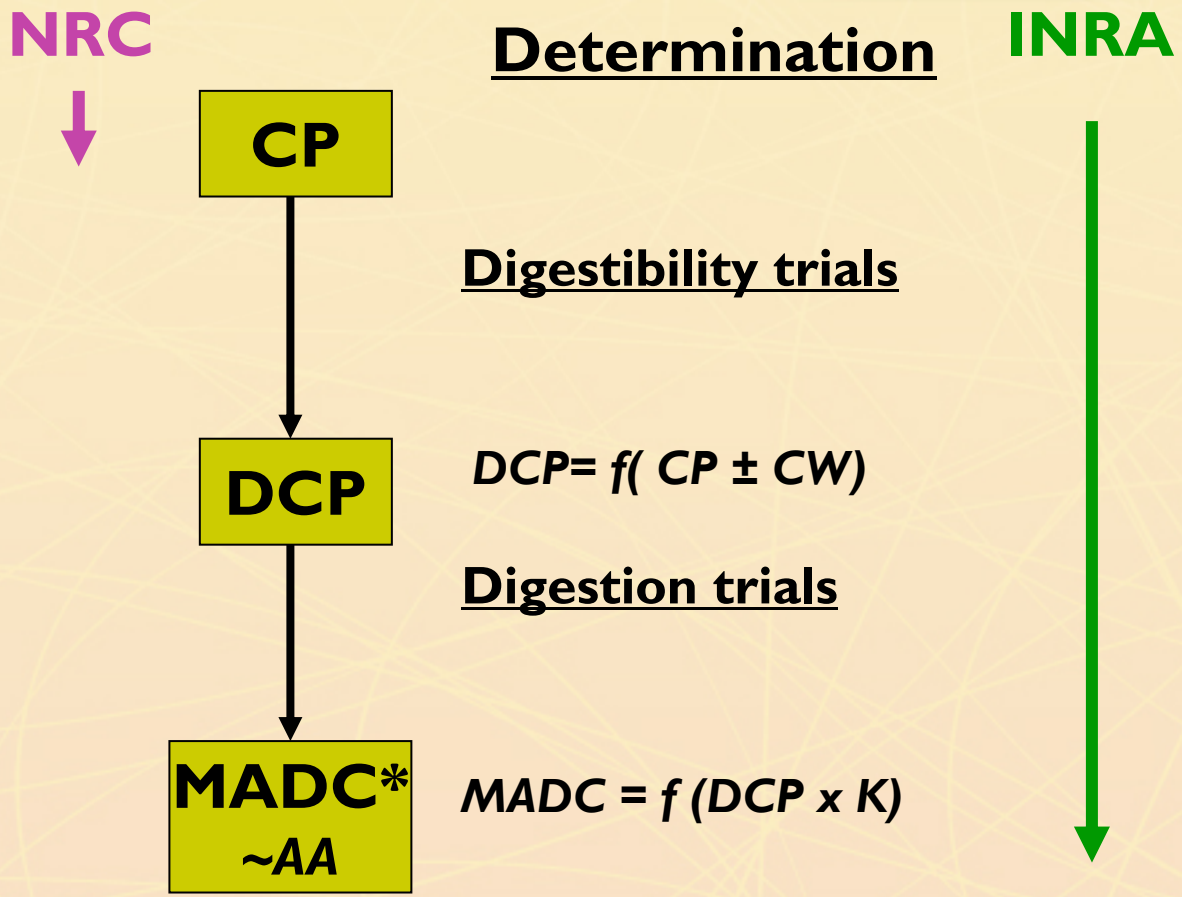
INRA



Main achievements = NUTRITION

Nutrients requirements

Nitrogen value of feeds



*MADC = HDCP= Horse Digestible Crude Protein = Amino Acids

Main achievements = NUTRITION

Nutrients requirements

Prediction *of energy & nitrogen value*

NRC

Feeds composition Tables

INRA

Feeds composition Tables
and / or

NE = f(Chemical composition ± Digestible components)
MADC = f(Chemical composition ± Digestible Crude protein)

- **Forages : graminea / Legumes ……Equations 1 to 8**
- **Concentrates: ingredients / compound feeds …Equations 9 to 18**

Set of

New prospects

= NUTRITION

Nutrients requirements

INRA

NUTRITIVE VALUE OF FEEDS:
Nitrogen

MADC System

MADC = AA from Small intestine for host requirement
+
Nμ microbial synthesis in large intestine

Nitrogen Requirements

Total requirements	=	ANIMAL: Host	+	ECOSYSTEM: Bacteria
		Small intestine = Ideal protein ?		Large Intestine =To be evaluated…

News prospects =NUTRITION

Nutrients requirements

INTAKE

Physico – chemical ← **Ingestibility of forages** → Forage classes

X

Energy req. – Body size ← **Intake capacity of horses** → Animal classes

X

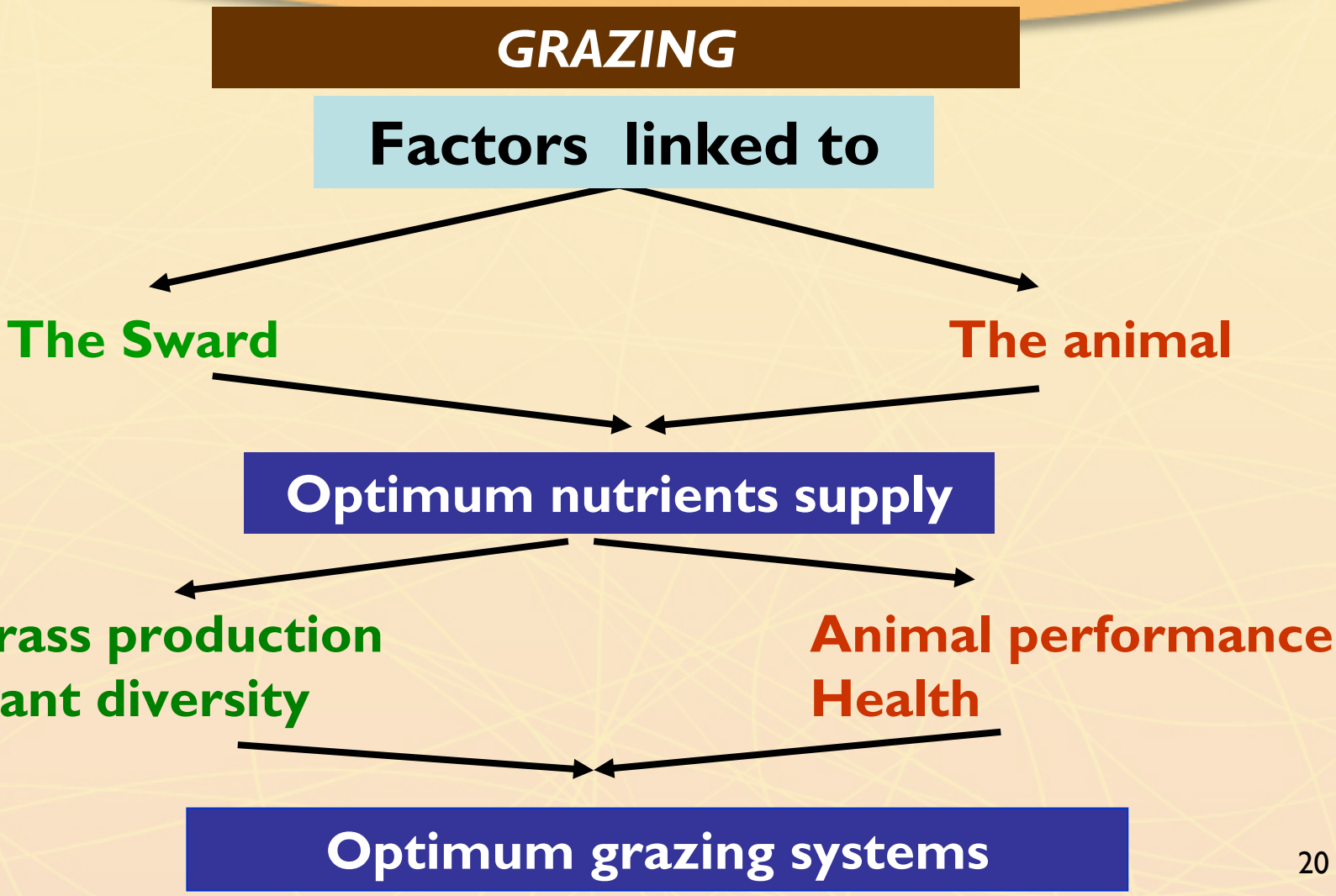
Diets ← **Substitution rate Forage/ Concentrate** → Requirements

=

***System for predicting intake**

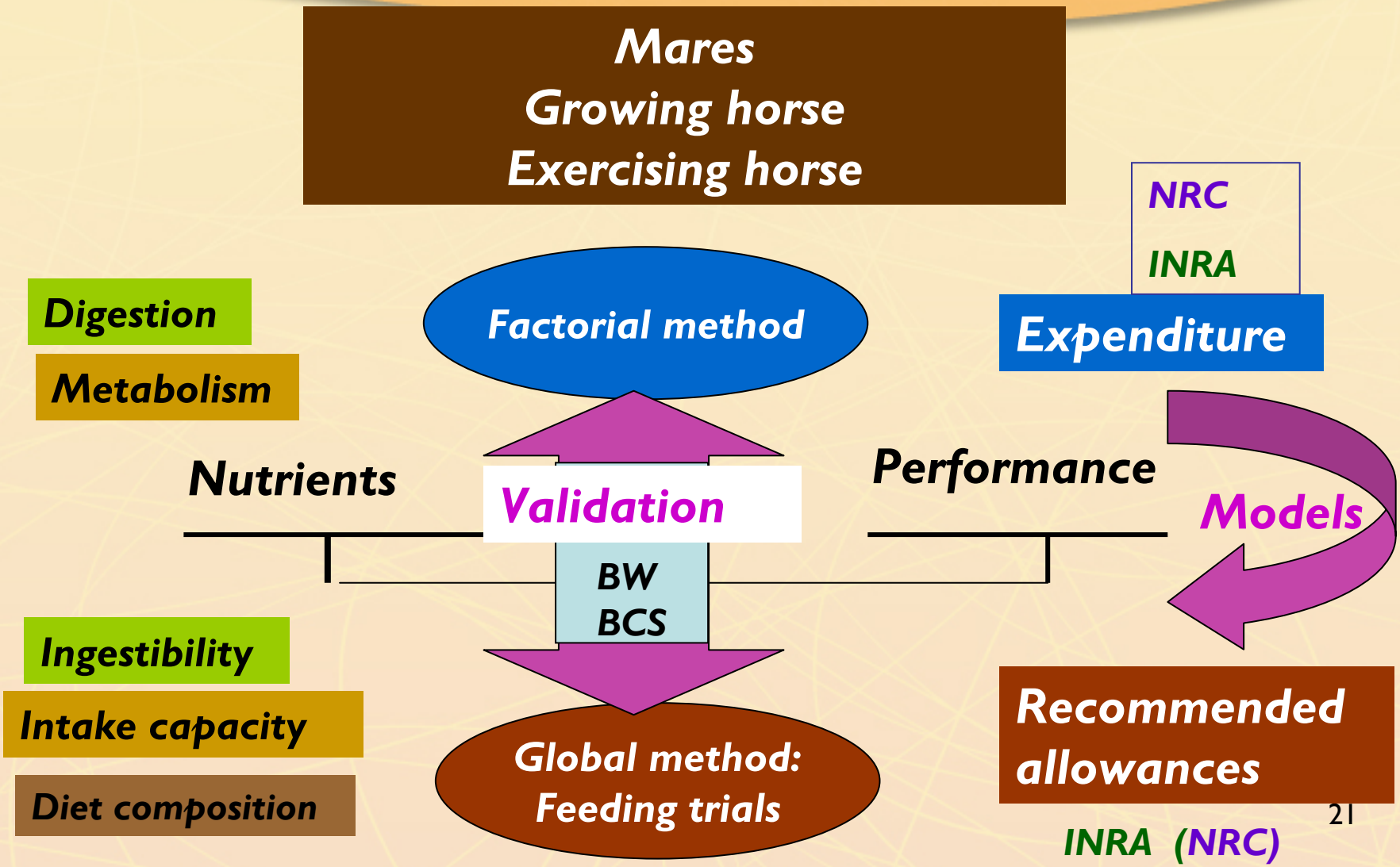
News prospects =NUTRITION

Nutrients requirements



Main achievements = NUTRITION

Nutrients requirements



Main achievements & News prospects

=SPORTS MEDECINE

Physiology

Organs

Locomotion

Gait – stride…

Performance

Tissues

Organs
Tissues

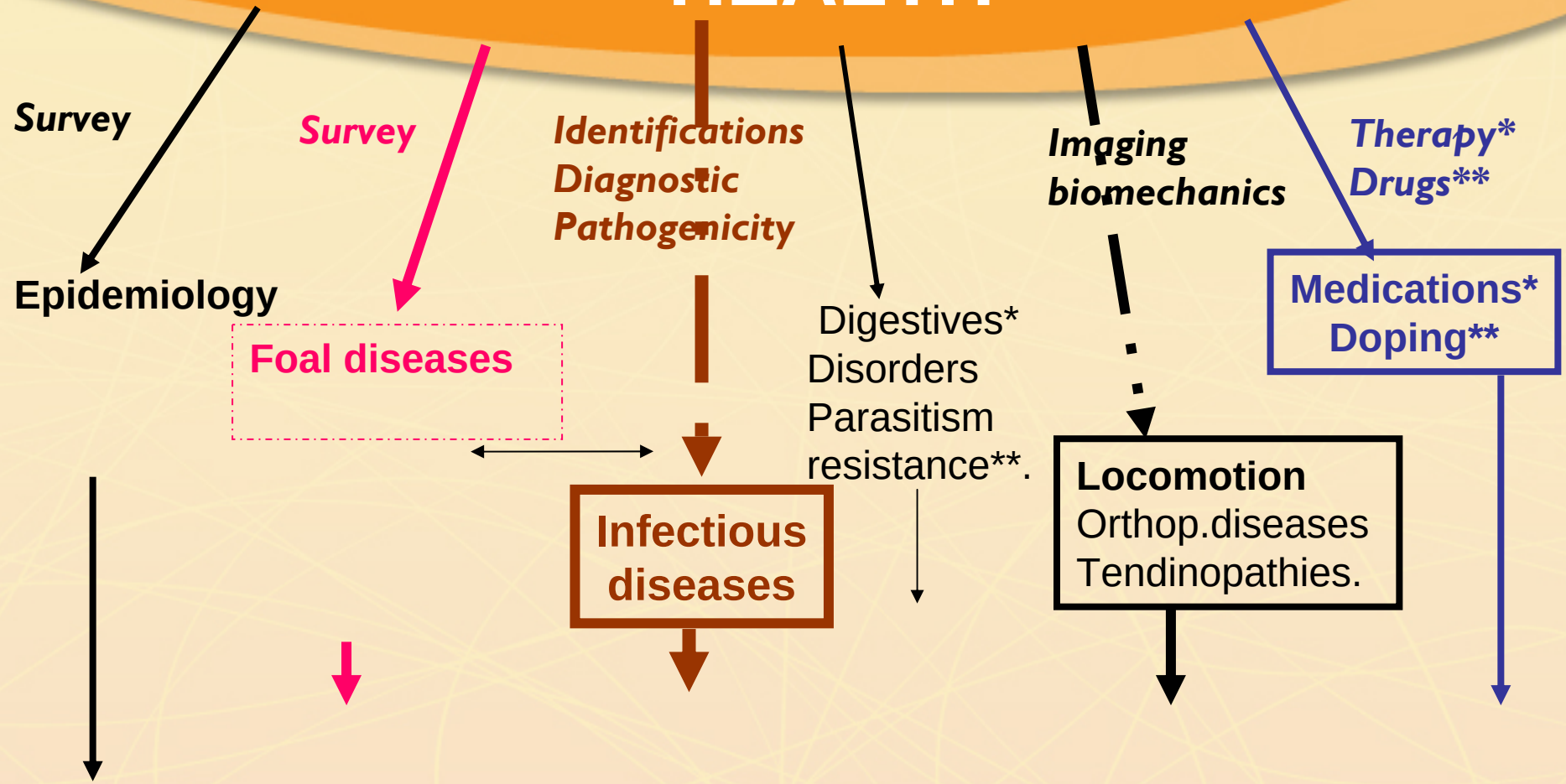
Metabolism

Doping

Disorders

Main achievements

= HEALTH



***Healthy horse / healthy environment**

New prospects

= HEALTH

Epidemiology
- Plans
- strategies
- Models

Prediction
Management

Foal diseases

- Infectious
- Nutrition/health
- Therapeutic adaptations

Mortality
limitation

Infectious diseases

Genetic diversity
Molecular markers of pathogenicity
Vaccines

Digestives*
Disorders
Parasitism
resistance**.

Nutrition*
Immunology**

Locomotion
Orthop.diseases
Tendinopathies.

Interactions:
Nutrition
Exercise
Track ground

Medications*
Doping**

Timing*
MRLevel**

Healthy horse / healthy environment

Main achievements = BEHAVIOUR & WELFARE

***Horses: fit well / competition or leisure need**

Behaviour profile

Temperament

Learning ability

Age

Management

Behaviour

Welfare

New prospects
= BEHAVIOUR & WELFARE

Horses: well adapted / competition or leisure need

Behaviour profile

Learning ability

Behaviour

Welfare

Human impact

Environmental factors ↔ ***Health***

Training
Competing
Transportation

Life conditions

Working conditions

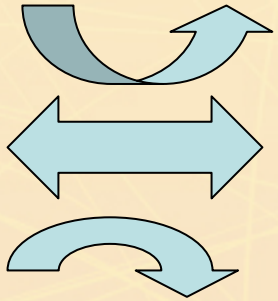
***Horses well managed / Raising - Riding**

New prospects = Genetics - Breeding -Behaviour

Quantitative genetics

and Behaviour characteristics

BREEDING PROGRAMME



Traits:
Temperament**
Behaviour profile

Key challenges:
•Performance…*Competition*
•Easy riding…… *Leisure*

Exp. studies:
Criteria, tests
Heritability /
Husbandry & Riding systems

Expertise

Ethology
Training
Riding

Recording data:
Testing stallion
Testing Young horse

News prospects
= NUTRITION x SPORT MEDECINE

Exercising horse

Requirements ⟷ **Recommended allowances**

- ***Races***
  gallop – trot
- ***Sports***
  endurance – jumping – eventing

Body reserves ⟷

Metabolism ⟷

Endocrine regulation ⟷

Exercise

Feeding trials

Training Programme

Experiments

coupling **Nutrition** + **Sports medicine** = **Performance**

New prospects

= ENVIRONMENT

Wastage

Manure → *Optimisation* / *Digestion* / *Rationing* → **Nitrogen- minerals**, **Compost**, **Energy: methane**

Plant diversity

- **To optimize nutrients intake = "natural feeding"**
- **To preserve plants species/ natural zone**

Global heating ??

Technical &Socio economic evaluation of the chain components

Sectors
- *Actors*
- *Products*
- *Structure*

Challenge
Market dynamic

Structures
- *Production*
- *Utilisation*

Technical economic indicators
Data / network
Modelling of data
Tools for decision

Territories

Activities:
- *Role*
- *Practices*

Utilization territories

Jobs Employment
- *Identification*
- *Evolution*

Dynamics of the systems

Public policy / Country - European policy (CAP)

Developed countries: **EUROPE**

Main issues / challenge

***Equines** have or should have*

a farm animal status

Developed countries: EUROPE

Main issues / challenge

***EU NETWORK**

- Across scientific disciplines
- Interactions with Equine industry
- Across all the countries

Knowledge
Technology
Funding

EAAP – Horse Commission

- 5 Working groups: *Breeding-Nutrition-Behaviour & Welfare…*
- Workshops/seminars: *Interstallion/ Equine nutrition / Behaviour…*
- Connections with WBFSH – ICAR

= Breeding evaluation → Comparability/countries

- Connections with Feeds industry

= Nutritional systems → Harmonisation/ countries

- Horse network website: *EAAP Gen. Secretariat in Rome*

Developed countries: EUROPE

Main issues / challenge

EU NETWORK

***HIGHER EDUCATION** ⟺ **EAAP Horse commissio**
(working group)

- European Master of Equine sciences
- Extension service

TRANSFERT OF TECHNOLOGY

- To CEEC namely : to secure , develop equids population

- To all EU countries: to manage adequately innovation originated by research

⇒ to promote equines production & utilization in EU and its competitiveness in the world

Thank you for your attention