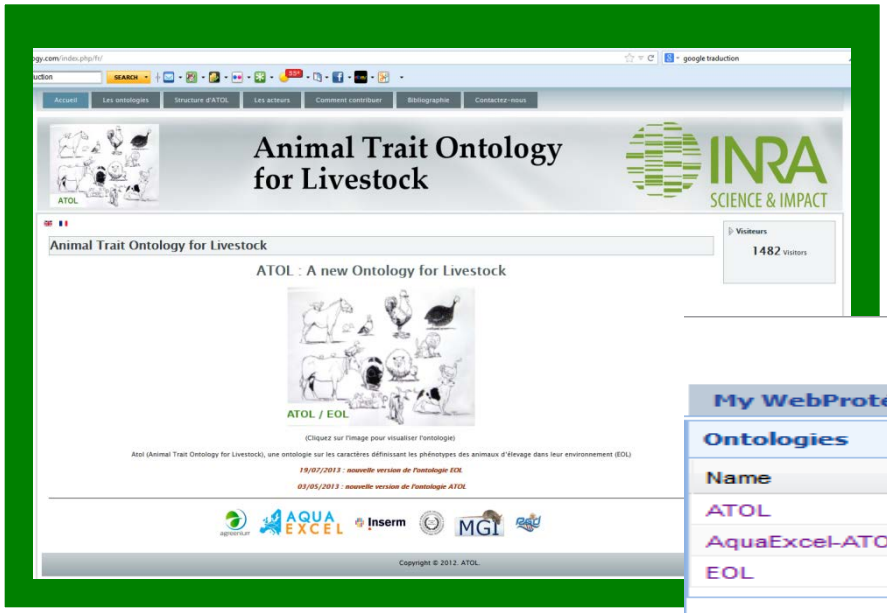
EOL : a new ontology for livestock system and rearing conditions



My WebProtégé

Ontologies

Name	Description
ATOL	ontology of animal trait for livestock
AquaExcel-ATOL	ontology of fish trait for livestock
EOL	ontology of environment for livestock

L Joret, J Bugeon, J. Aubin, JP Blancheton, M Hassouna, C. Hurtaud, S Kaushik, F Médale, MC **Meunier-Salaün**, *J. Vernet, A. Wilfart, JY Dourmad, PY Le Bail*

INRA SCIENCE & IMPACT

Context : New challenges
Precision Livestock Farming – Phenotyping

Precision Livestock Farming challenges: to have

*** Animals :**

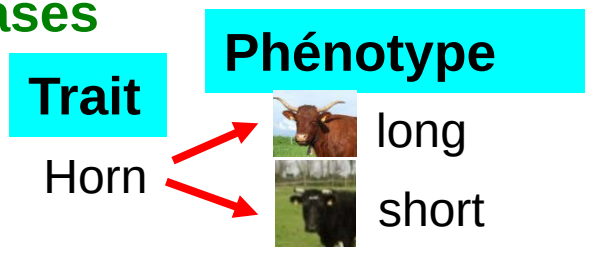
- efficient in regards to feeding resources
- robust and adaptable to climate changes / diversity of production systems

*** Farming systems** :

efficient management of the production to generate high level of products for consumers and society issues

Exploitation of phenotype databases

Identification of phenotypes



The phenotype is the resultant of the expression of the genotype (G) and the influence of the environment (E) and epigenetic mechanisms (Epi)

P=G+E+Epi

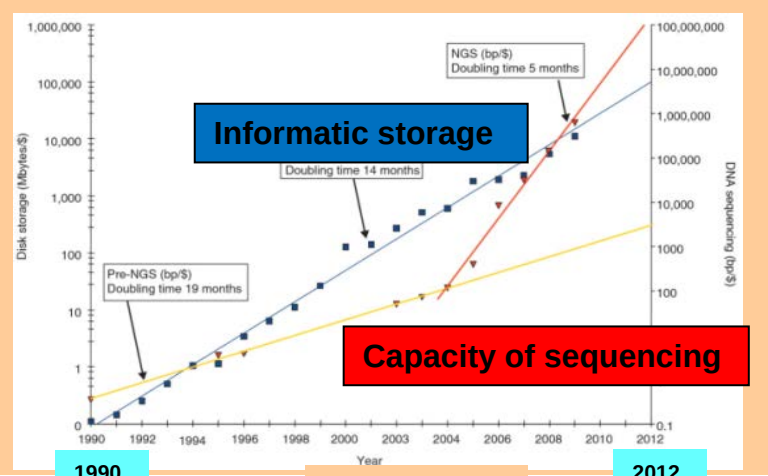
A tool for new challenges
Precision Livestock Farming and Phenotyping

* knowledge on biological mechanisms

more and more complex

* increasing amount of informations

* diversification of community of users



➡ Need to store and analyse huge mass of information
on the basis of a language understood by computer and any users

Necessity to have standardized and shared language

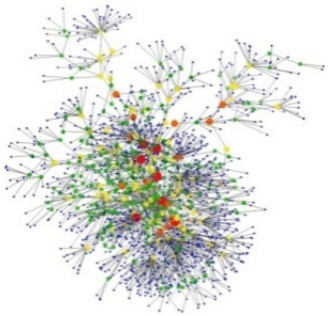
Ontology tool

INRA SCIENCE & IMPACT

What is an ontology ?

Definition:

formal representation of concepts and of relationships between these concepts within a subject or a specific area.



Characteristics :

- The concepts and the relationships are **clearly defined**
- The meaning of an item is used in **an unequivocal way.**
- The concepts are organized in **a structural way** (often an hierarchy)
- The items have to **be easily used by computer**

ATOL-EOL : ontologies for farm animal and environment applied to productions targets

www.atol-ontology.com

My WebProtégé

Ontologies

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Animal issue

Farming systems issue

ATOL
Animal Trait Ontology for Livestock

2048 normalized traits 07/2013
phenotypic traits
multispecies

EOL
Environment Ontology of Livestock
environmental conditions of animal productions

630 parameters 07/2013

EAAP 2012

INRA SCIENCE & IMPACT

How was the EOL ontology built ?

- Check the current ontologies on the **environmental features and habitats** (especially ENVO : environmental ontology)

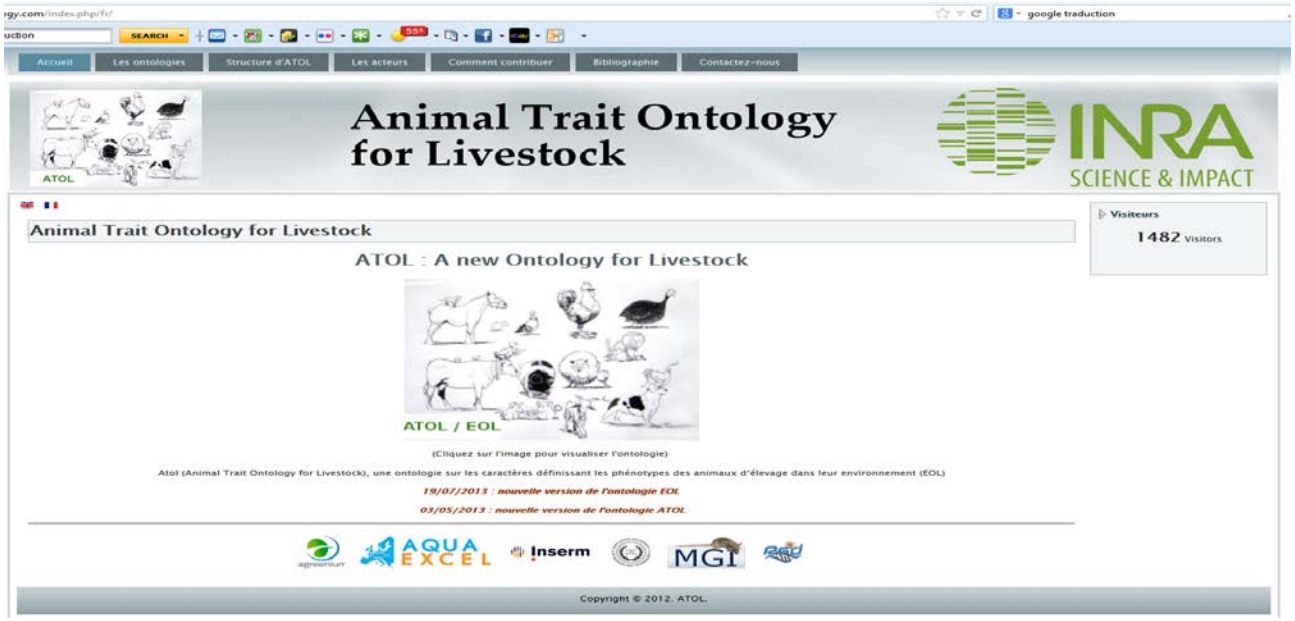
- Parameters on environment of fish species identified within the european project **AQUAEXCEL (Aquaculture infrastructures for excellence in European fish research)**

- Bibliographic analysis (books, papers) : new parameters

- Experts group from INRA : first draft of an hierarchy for aquatic and terrestrial animal productions

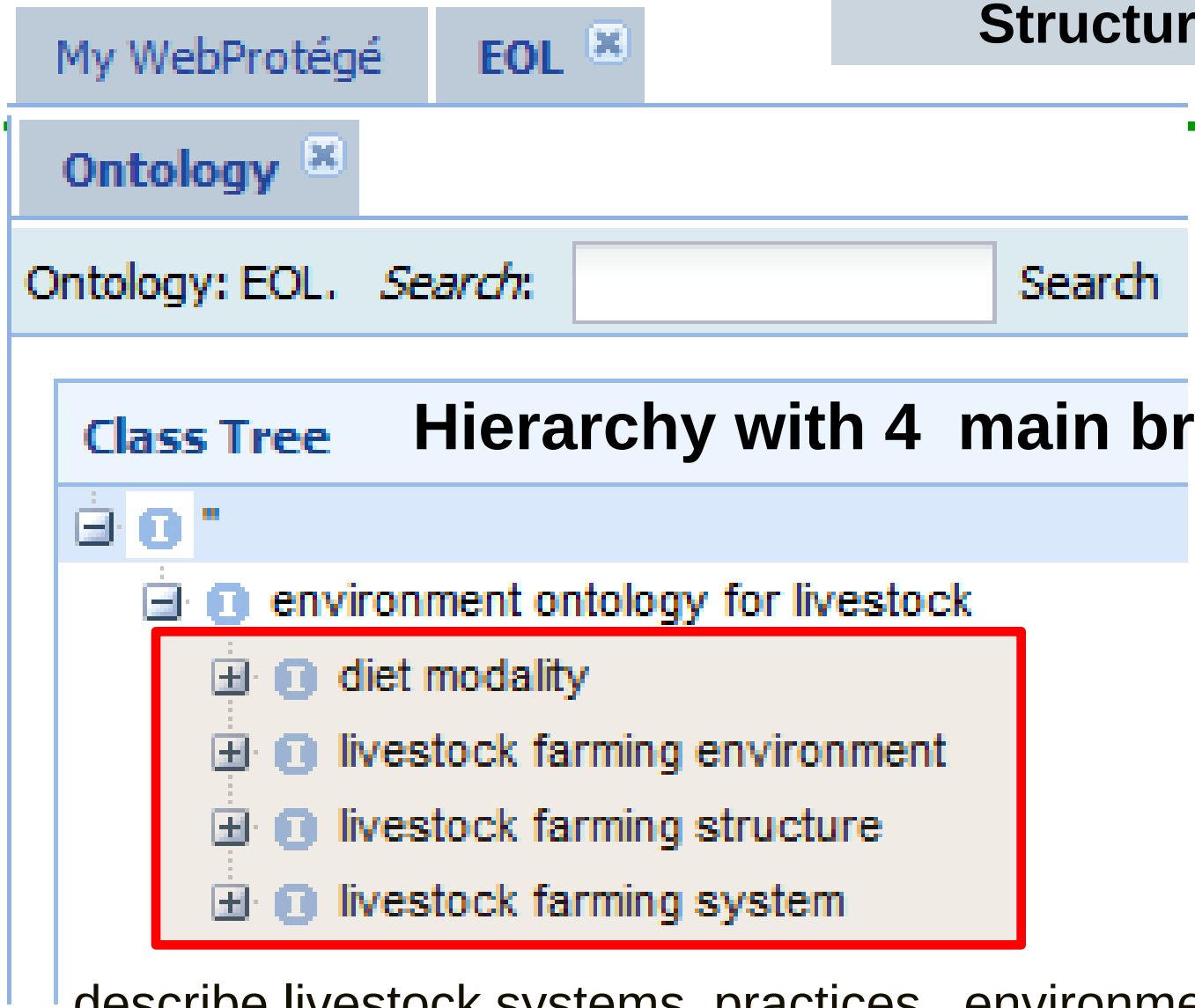
- Validation of the hierarchy for aquatic productions by experts of AQUAEXCEL project

EOL on line : www.atol-ontology.com



current progress : ontology completed by new parameters concerning especially the terrestrial productions (ruminant, pig, poultry)

Structure of EOL



describe livestock systems, practices, environmental conditions

➔ EOL : a reference for the environment parameters

Hierarchy of EOL ontology : more details …

EOL Tab

CLASS BROWSER

For Project:

Class Hierarchy

- " (36)
- "
- 'environment ontology for livestock' 1 (31)
  - 'diet modality' 2 (29)
    - 'diet delivery' 2 (18)
    - 'livestock feeding' (9)
  - 'livestock farming environment'
    - 'rearing living environment'
    - 'rearing physicochemical environment'
  - 'livestock farming structure'
    - 'rearing structure material'
    - 'rearing structure physical dimension'
    - 'rearing structure type'
  - 'livestock farming system'
    - 'aquatic farming system'
    - 'terrestrial farming system'

Diet characteristics delivery conditions

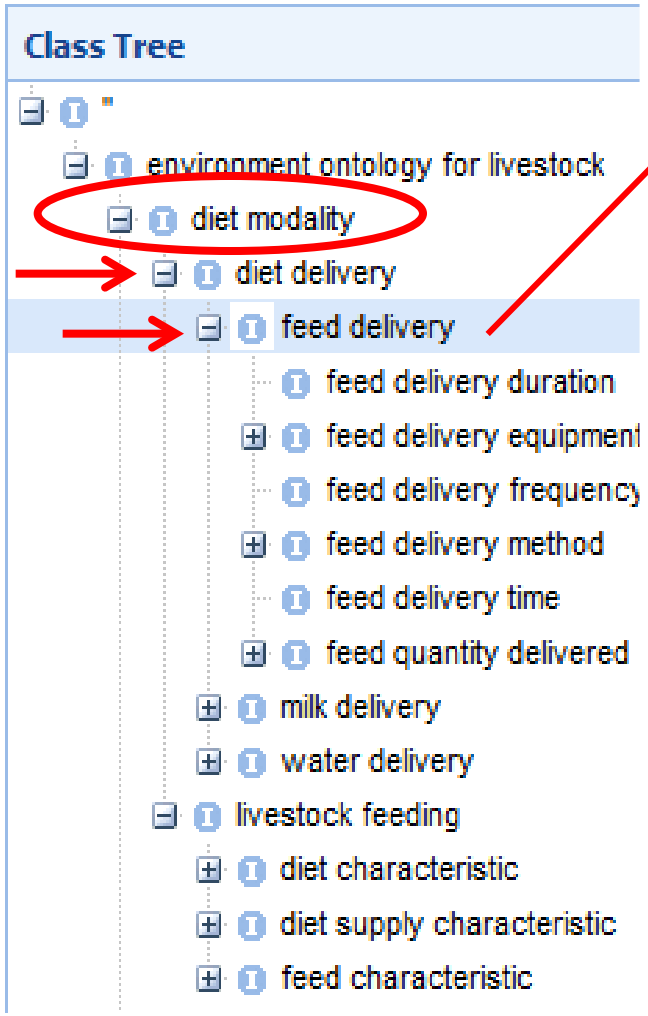
Life surrounding

Physical characteristics of the structure where animals live

Livestock system where animals are raised

➔ **information used to investigate how the livestock environment and practices impact the phenotypic traits of the animals (ATOL)**

What information by parameter ?



ID, name and definition

Identifiant: EOL:0001757

Name: feed delivery

Similar to: Ref of similar parameter in an another ontology

Definition: any measurable or observable cha

any measurable or observable characteristic related to the delivery process of feed to livestock

Source: INRA:PHASE "INRA PHASE"

Synonyms other name or synonym used

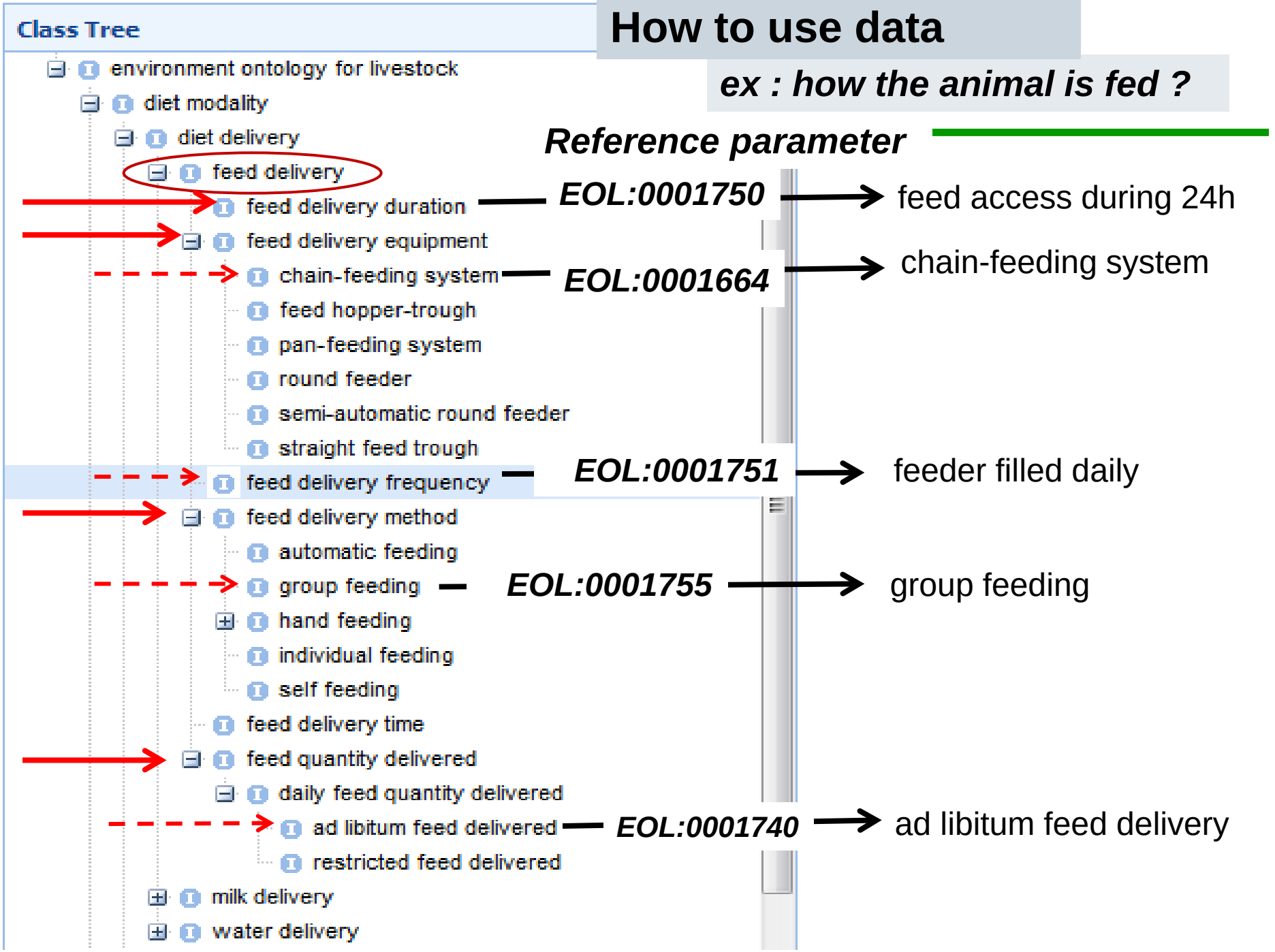
Links to databases or publications

Comment on definition, species specificity, …

Measure Methods *standardized procedure*

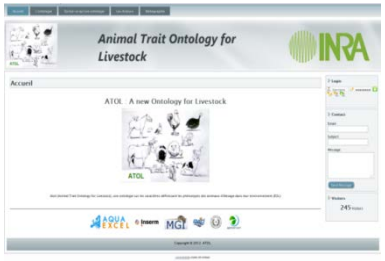
How to use data

ex : how the animal is fed ?



What applications of the ATOL/EOL ontologies

databases for users, index for scientific journal, modelling approach



ATOL

Animal Trait Ontology for Livestock

Animal trait

EOL

Rearing environment

Livestock systems

Environment of trait

RSOP

Referential of Standard Operating Procedure

How to measure the trait

Reference index

animal trait, environmental parameter, measure method

Experimental research

Phenotype databases

Metaanalysis, modelling approaches

Semantic research

Automatic research in scientific and technical documents

Ontologies – Phenotyping databases shared language for combined datasets

EX

Datasets on the 1 year- weight of trouts raised

Trial 1

at 10°C

number	Liveweight
1	360
2	420
…	

at 12°C

number	Liveweight
11	640
12	390
…	….

Trial 2

at 12°C

number	Liveweight
21	350
22	415
…	129

at 15°C

number	Liveweight
31	622
32	388
…	….

ATOL
ontologie of animal traits

Metadata
trials 1 and 2

EOL
ontologie of livestock environment

ATOL:0000351: Body Weight
ATOL:0000088: Age *(1 year)*

EOL:0000034 : Water temperature
(10˚C - 12˚C - 15˚C)

➔ ATOL/EOL ontologies allow the annotation of phenotyping databases with shared language

in conclusion

on line

www.atol-ontology.com

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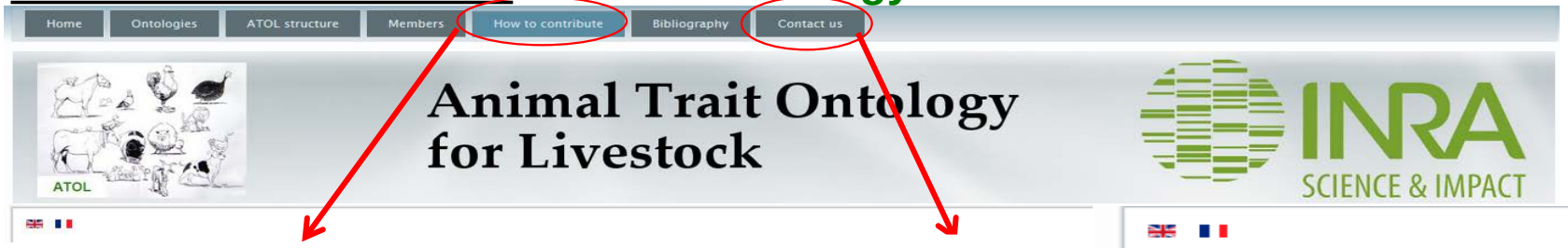
☞ **to extend the ontology Animal Trait Ontology for Livestock**
➔ impact of environment on the phenotypic trait

☞ **to promote standardized and shared language useful for the diversity of users**

How to contribute in improving and evolving ATOL and EOL ontologies

Wecome to the website : **www.atol-ontology.com**



How to contribute

Contact us: comments

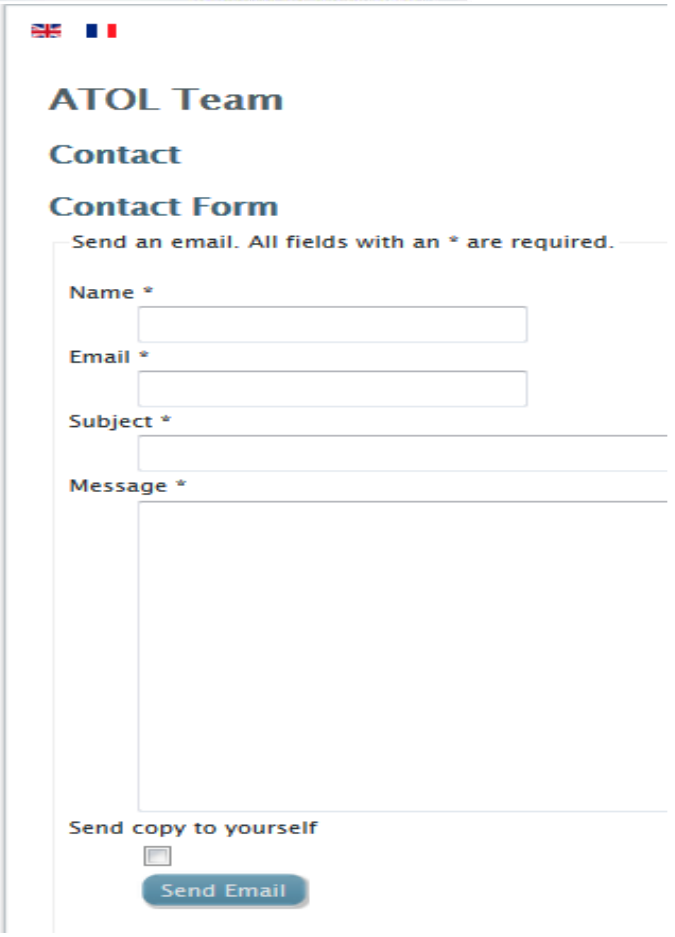
Contribute as experts in animal sciences

Contact the coordinator of the project
Pierre-Yves.LeBail@rennes.inra.fr

1)Asking for login and password

- Send an email to Pierre-Yves LeBail including:
- Your first name, your last name and your organism (e.g. INRA).
- The ontology to which you wish to contribute (there may be several).
- Your domains of interest and expertise.
- Species of interest as appropriate.

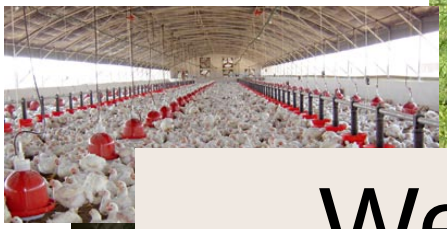
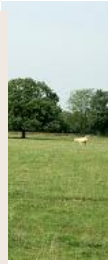
You will receive an username, a password and an address to connect to the collabora



Thanks for your attention











Wecome to the website

www.atol-ontology.com

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