Breeding for Meat Sheep in France

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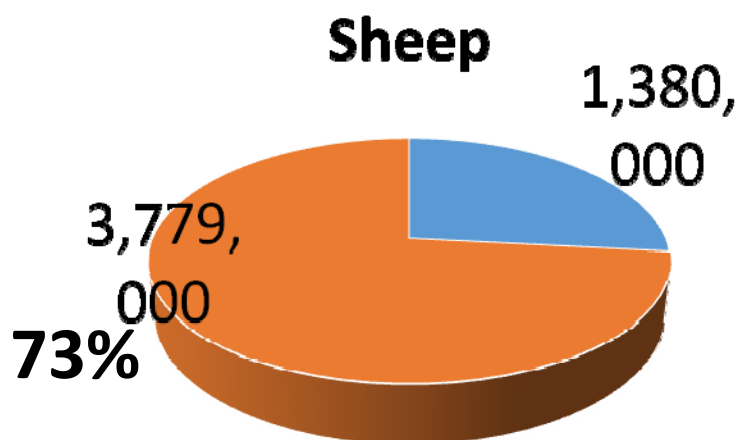
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42nd ICAR Conference, Auckland (New Zealand)

Workshop: Identification, Meat & Reproduction Recording in Sheep & Goat in ICAR Member Countries
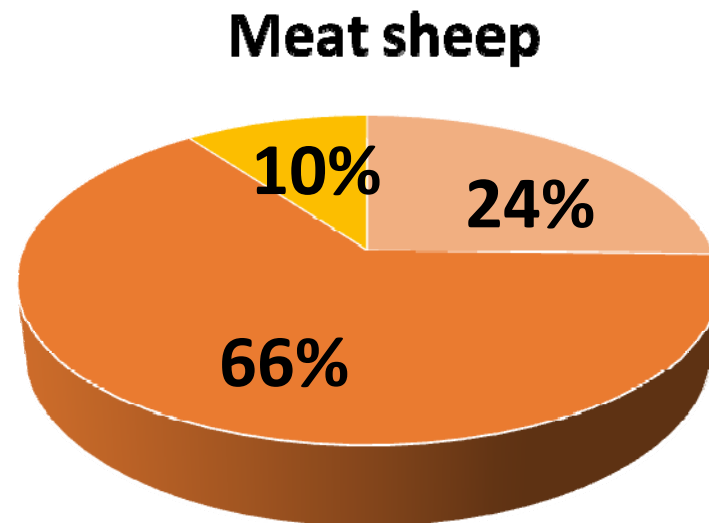
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Meat sheep in France

Size of population
(*Source*: FGE 2017)

Sheep

1,380,000

3,779,000

73%

- ■ Dairy production
- ■ Meat production

Meat sheep

10%   24%

66%

- ■ Specialized meat breeds
- ■ Hardy meat breeds
- ■ Meat cross-breeds
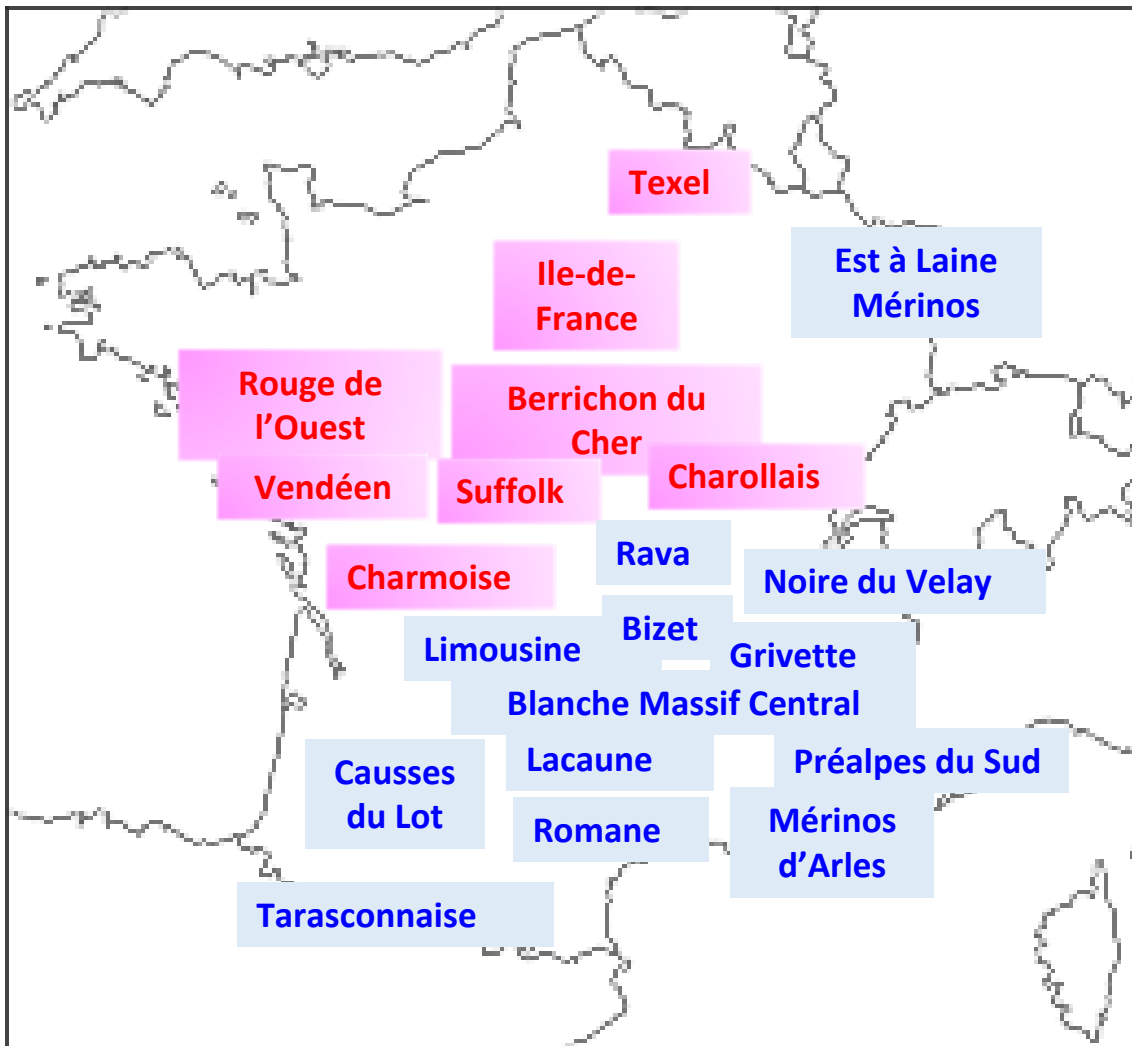
Meat sheep breeds in France

47 breeds with at least 1 flock in performance recording
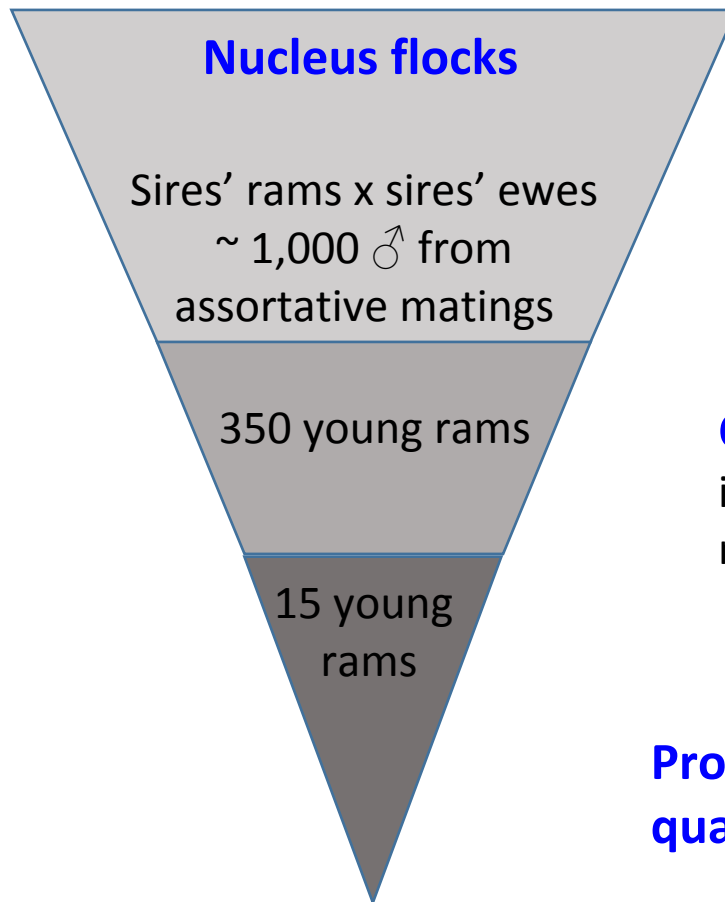
8 Specialized Meat Breeds

13 Hardy Breeds

26 Underutilized Breeds

Mérinos Rambouillet   Martinik
Thône-et-Marthod   Raiole
Caussenarde Garrigues
Berrichon Indre
Montagne Noire   Romanov   Cotentin   Castillonnaise
Bleu du Maine   Finnoise
Boulonnaise   Avranchin   Aure-et-Campan
Mourerous   Dorset down
Southdown   Solognote
Lourdaise   Hampshire
Barégeoise   Clun   Roussin
Rouge Roussillon   Ouessant   Forest

Texel

Est à Laine Mérinos

Ile-de-France

Rouge de l'Ouest

Berrichon du Cher

Charollais

Vendéen   Suffolk

Charmoise

Rava

Noire du Velay

Bizet

Limousine   Grivette

Blanche Massif Central

Causses du Lot   Lacaune   Préalpes du Sud

Romane   Mérinos d'Arles

Tarasconnaise

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Organization of selection in French meat sheep (typical selection scheme)

Nucleus flocks

Sires' rams x sires' ewes ~ 1,000 ♂ from assortative matings

350 young rams

15 young rams

5 elite rams

On-farm recording/evaluation: prolificacy, mothering ability, growth
=> Connection and/or maternal progeny-testing

Central Test Station:
individual evaluation for growth & meat quality

Progeny-testing for meat quality

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On-farm performance recording: maternal abilities
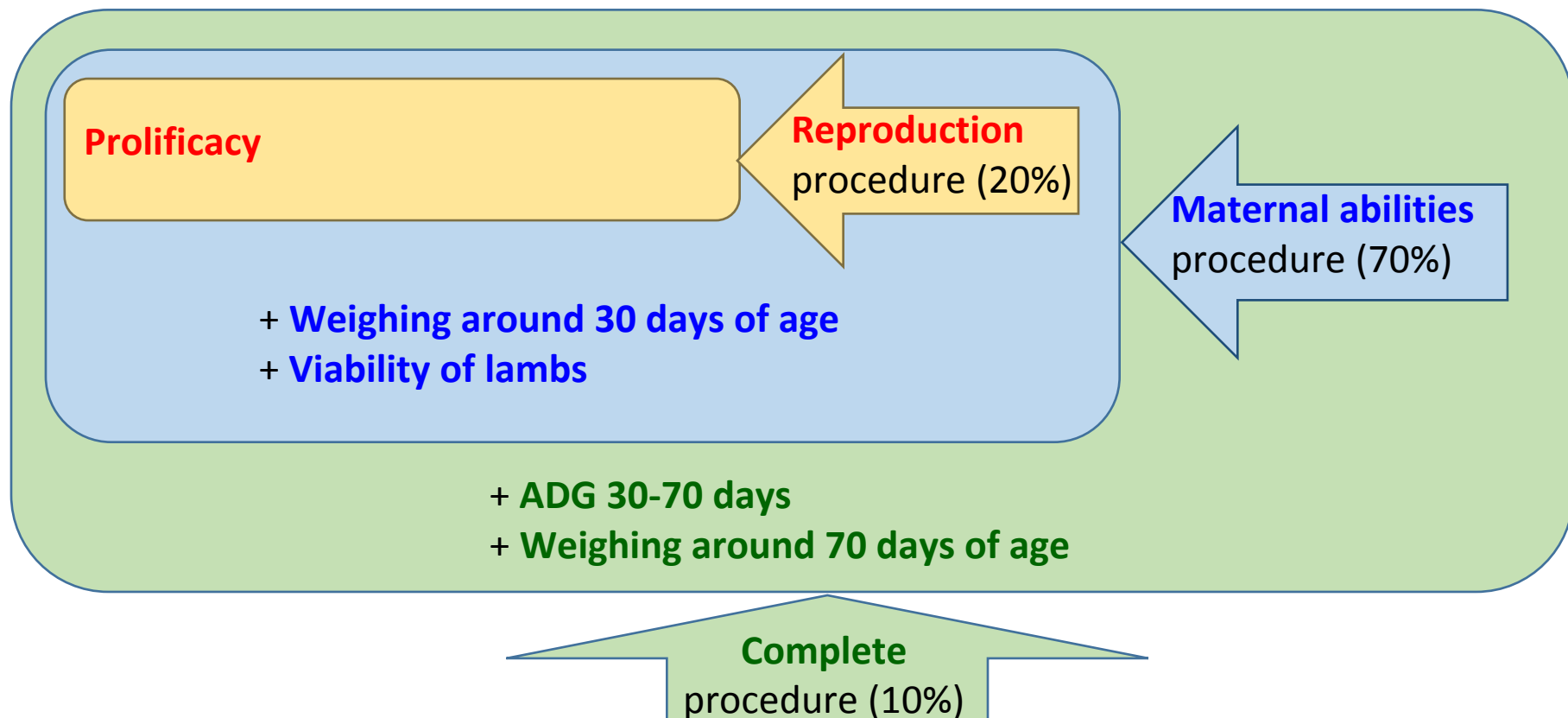
The national farm recording system

- 330,312 ewes with on-farm recording (**8.6% of meat sheep**) in 1,267 flocks

      85% of the recorded flocks engaged in a breed society

- 149,599 ewes inseminated (**3.9% of meat sheep**) by meat rams

On-farm performance recording: maternal abilities

3 levels of performance recording

Prolificacy

Reproduction procedure (20%)

Maternal abilities procedure (70%)

+ **Weighing around 30 days of age**
+ **Viability of lambs**

+ **ADG 30-70 days**
+ **Weighing around 70 days of age**

Complete procedure (10%)

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On-farm performance recording: maternal abilities

Genetic evaluation & selection criteria
(*Source*: Loywyck & Tortereau, collection results Idele 2016)

Reproduction procedure
(prolificacy PROL)

$$PROL = a\ PROL_{nat\ oestrus} + b\ PROL_{induced\ oestrus}$$

Maternal ability procedure
(PROL + **ewe ability EWAB**)

$$EWAB = a\ (1/2\ WEIGHT_{dir} + WEIGHT_{mat}) + b\ VIAB_{mat}$$

Weight at 30d WEIGHT
Viability lambs VIAB

Complete procedure
(PROL + EWAB + **growth 30-70d GROW**)

$$GROW = 1/2\ ADG_{30\text{-}70} + 1/2\ WEIGHT_{70}$$

$ADG_{30\text{-}70}$
$WEIGHT_{70}$

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Performance recording in Central Test Station: meat qualities

35 breeds with gathering station

-13 with whole protocol in central test station

-22 with only breeding center

- A major tool for collective management of the breed
- Scrapie-resistant rams born from dams of sires and sires of sires
- Individual selection on growth, feed efficiency, fat, muscle
- 3,500 young rams each year

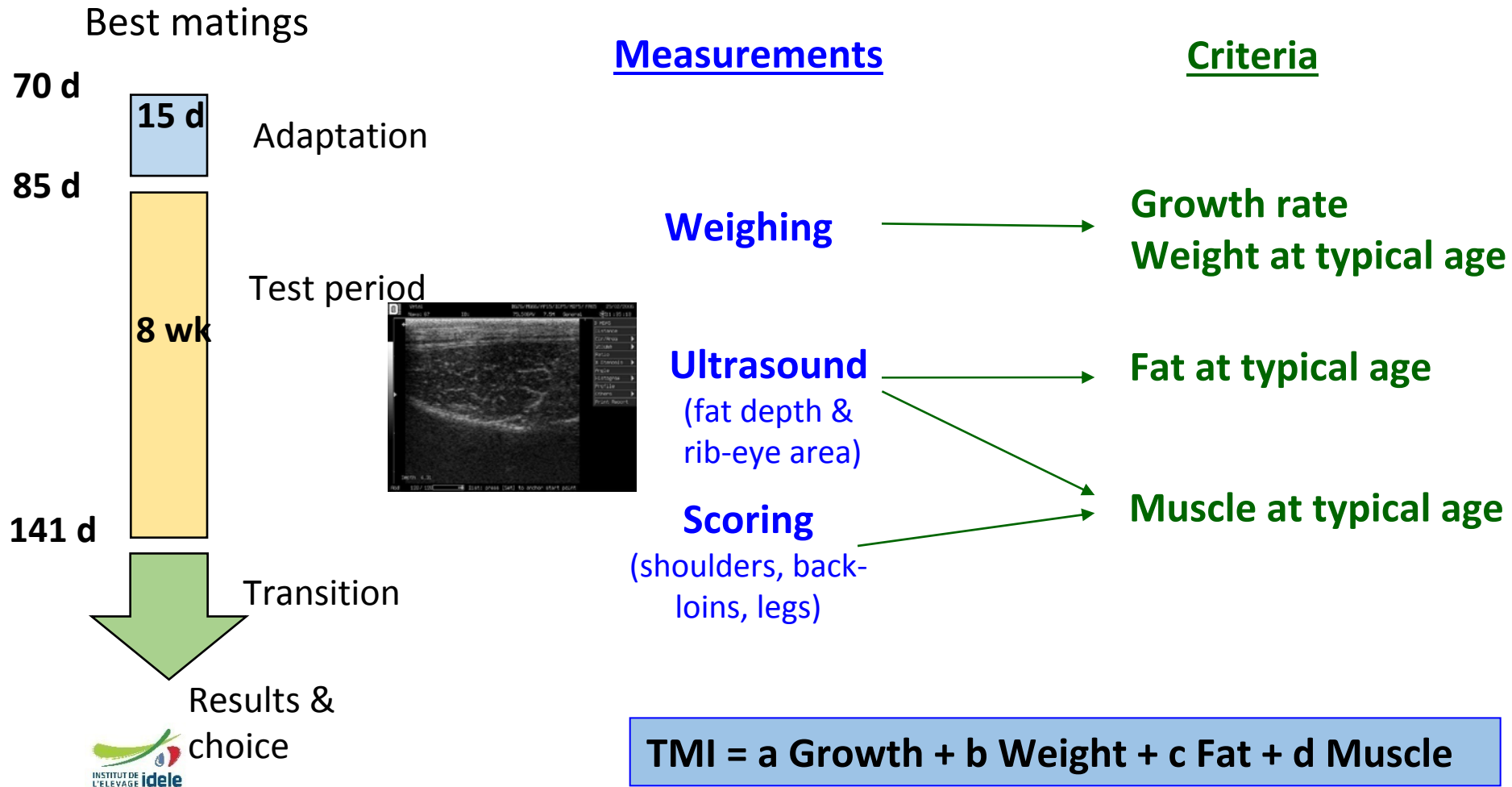| 20% eliminated	Recommended for natural mating	++
	Commercial flocks	Selection flocks

Selected for AI

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Performance recording in Central Test Station: meat qualities

Traits collected and evaluated (*Source*: Tiphine et al., EAAP 2011)

Best matings

Measurements   **Criteria**

70 d

15 d Adaptation

85 d

Weighing → **Growth rate**
Weight at typical age

Test period

8 wk

Ultrasound → **Fat at typical age**
(fat depth &
rib-eye area)

141 d

Scoring → **Muscle at typical age**
(shoulders, back-
loins, legs)

Transition

Results &
choice

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TMI = a Growth + b Weight + c Fat + d Muscle

Progeny testing for meat qualities

Dual objective : lambs' meat quality + decrease of production costs
(reduce selling age)

Carcass quality:
✓More muscle
✓Less fat

Increase of feed efficiency
through growth & fat

Aim : produce the sires of sires of the breed

Progeny testing for meat qualities

Traits collected and evaluated (*Source*: Tiphine et al., EAAP 2011)

Best 10-15 rams from Central Test Station   35-50 AI per sire   30 progeny per sire

[Around 110 days]

Lambs gathered at weaning for fattening

Slaughtering at fixed weight (females 33kg males 39kg)

Fattening station	Slaughterhouse

Measurements and scores

~ 30days (lambs born from dairy ewes)
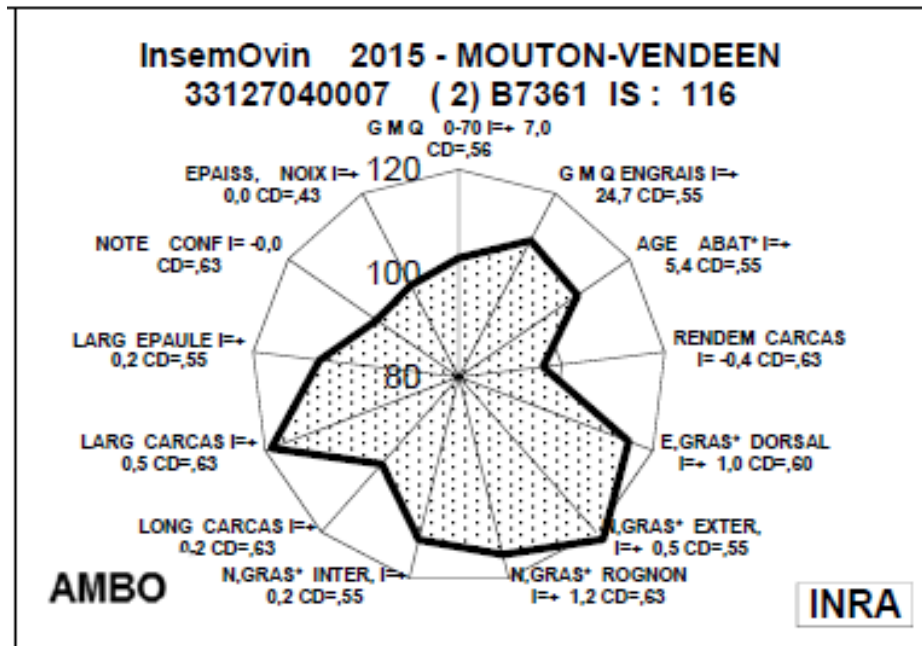~ 70days (lambs born from meat ewes)

Weekly weighing

- Carcass weight
- Conformation score
- Fat score (external)
- Fat score (internal)
- Amount of loins fat
- Back fat depth
- Shoulder width
- Rump width
- Carcass length
- Rib eye area or muscle depth

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Progeny testing for meat qualities

Spider chart representation of EBVs

(*Source*: Cheype et al., collection results Idele 2016)

$$\textbf{TMI} = a\ \textbf{ADG}_{\text{0-slaughter}} + b\ \textbf{FAT} + c$$
$$\textbf{CONFORMATION}$$

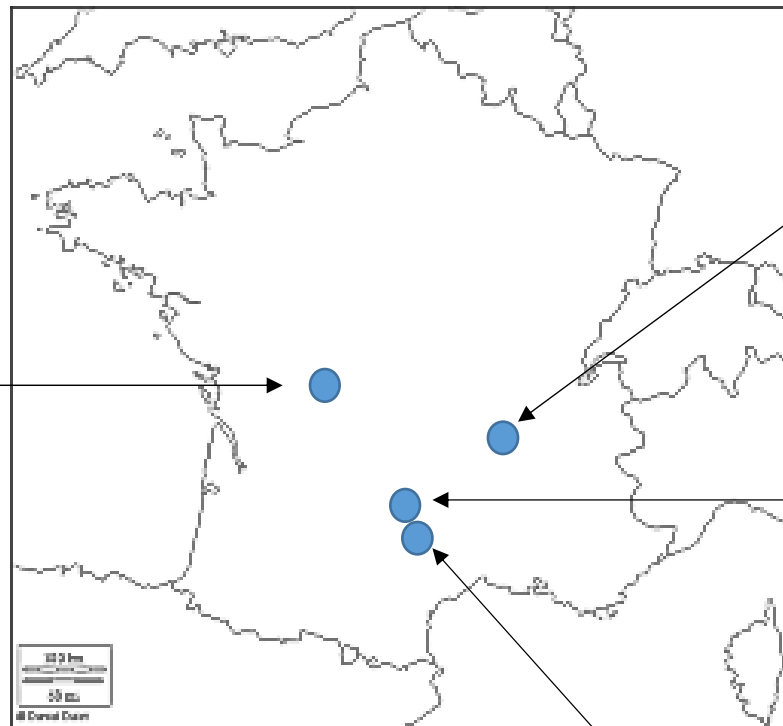**FAT** = f (fat score[external], fat score[internal], amount of loins fat, back fat depth)

CONFORMATION = f(shoulder width, rump width, carcass length, conformation score,
rib eye area, muscle depth)

Progeny testing for meat qualities

Fattening stations and breeds (*Source*: Cheype, 2017)

**130 rams
progeny-tested**

20 Ile-de-France
10 Berrichon du Cher
10 Suffolk
11 Rouge de l'Ouest
18 Blanche du Massif Central

11 Vendéens
16 Charollais

22 Meat Lacaune
"Ovitest"

12 Meat Lacaune
"GID"

Novel traits investigated

✓ Semen production
-EBVs released once a yr (volume, concentration, motility, number spz)

✓ Resistance to internal parasites
-Experimental infestation on central station

✓ Maternal behavior
-In progress in experimental farm

✓ Lamb survival / lamb vigor
-R&D project => common way of registration

✓ Functional longevity
-R&D project in-progress

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Major genes genotyped, collected and managed

Major gene	Trait	# genotyped animals	# genotyped animals in 2017
PrP	Resistance to scrapie	> 1,004,000 since 1999	30,990
FecX^L	Prolificacy	1,235	17
FecL^L		21,230	3,900
FecB^B		1,161	286
GDF-8 (double-muscled Lacaune)	Muscularity	3,086	389

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Organizational issues

- ✓ French selection of meat sheep based on a **large number of organizations**:
  - 18 breed societies (some of them ruling several breeds)
  - 63 performance recording organizations
  - 9 AI centers
  - Genetic evaluation run by INRA so far
  - Diffusion of EBVs run by IDELE
  - Collective breeding programs => actual efficiency of selection

- ✓ The **EU Animal Breeding Regulations** (2016/1012) deeply changes the organization: →breed societies will manage all aspects of selection, including performance recording and genetic evaluation (**NEW** in France)

- ✓ This new rule is the main **challenge** of the upcoming years, regarding the sustainability of collective breeding programs, their efficiency and their economic model.

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Conclusion

✓ Importance of performance recording (330,000 ewes)

✓ Difficulty to maintain AI

✓ Collective breeding programs with management of rams in central test stations and AI centers

✓ Efficient tools to respond to urgent matters such as resistance to scrapie issue

✓ A lot of breeds => biodiversity +

✓ ICAR Certificate of Quality obtained for meat sheep in France in 2017

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