Sheep breeding, environmental and non-genetic factors affecting lamb growth under low input systems

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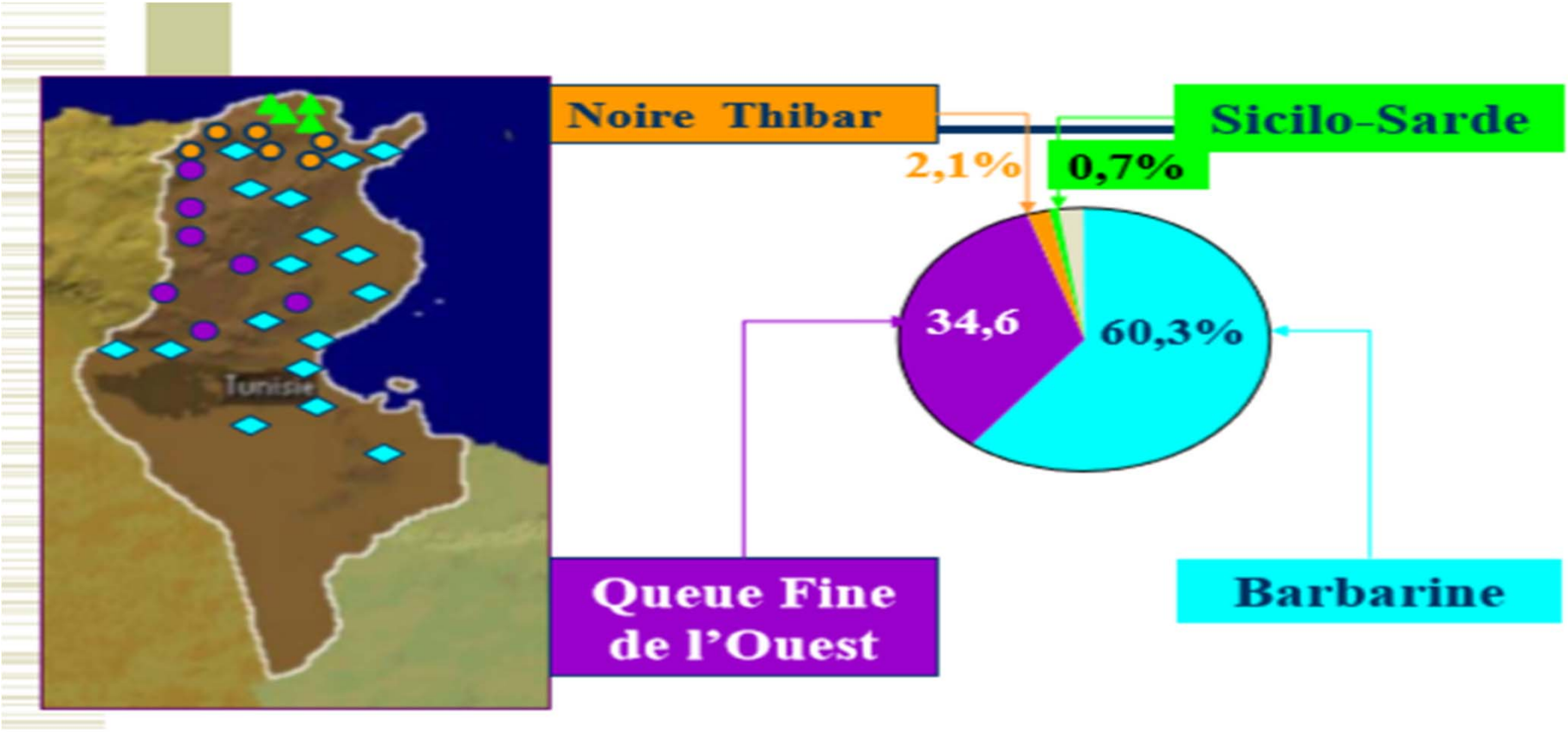
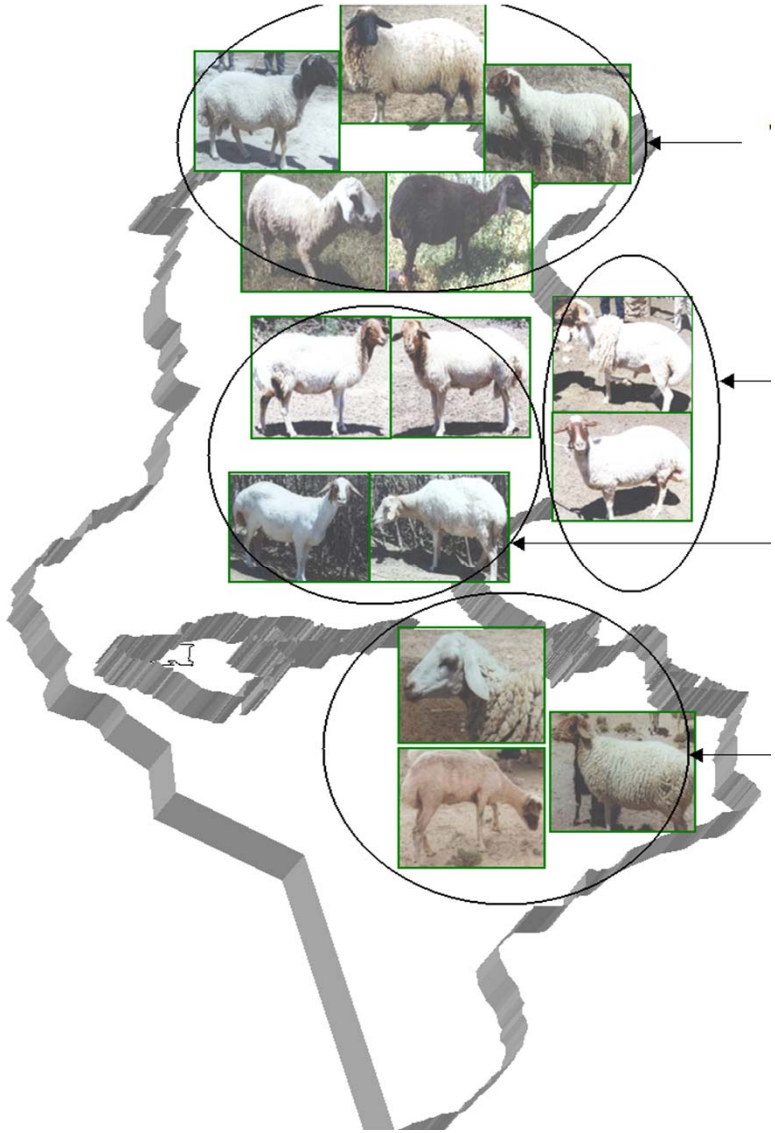
Sheep breeds in Tunisia

- Total ewes = 4 millions
- Number of breeds = 4



Justifications: Importance of the Barbarine breed



North types

Littoral types

Center types

South types

Justifications: Importance of the Barbarine breed

- **Since the sixties, Tunisia established its national Sheep identification and recording program providing information to select improved rams (the program was run by INRAT and later by Office de l'Elevage et des Paturages (OEP))**

- **Even though this program is still running, lamb growth traits from birth to weaning are still low for a breed with a large phenotypic variability**

Objectives

1) To identify the main sources of variation of different growth traits,

2) To compute adjustment factors for non-genetic effects

Material and Methods

- **Lamb data were provided by the Ministry of Agriculture - Livestock and Pasture Office (OEP).**

- **A total of 204 583 lambs born during the period 2004-2014 in 80 flocks was used.**

- **Flocks belong : 1) State Farms**
  2) Coops
  3) Private

Material and Methods

After editing the data a total of 201 056 lambs was used in the study:

Model

$$Y_{ijklm} = \mu + Sec_i + FYS(Sec)_{ij} + AD_k + ST_l + e_{ijklm}$$

Where:

Y_{ijklm}	: Bw, W10, W30, W70, W90, ADG0-10; ADG10-30; ADG30-70 and ADG30-90
μ	: Population Mean
Sec_i	: Effect of the i^{th} sector (i = 1-8)
$FYS(Sec)_{ij}$	: Flock-Year- Season intra sector
AD_k	: Effect of the k^{th} Age of Dam (k = 2-10)
ST_l	: Effect of the l^{th} Sex - Type of birth (l= 11, 12, 21, 22)
e_{ijklm}	: Residual error

Material and Methods

The following formula was used to compute adjustment factors (Schaeffer, 1983)

$$K_i = M_b / (M_b + S_i)$$

Where:

- K_i : **Adjustment factors**
- M_b : **Mean of factor level taken as a base**
- S_i : **Least square solution for a given factor level**

Results

- **Distribution by sex and type of birth**

Category	N° of lambs	Percentage
Male	98199	48.84
Female	102857	51.16
Simple	167654	83.39
Double	33402	16.61

Results

- **Means and standard deviations of weights and gains of Barbarine lambs**

Growth	Number of lambs	Means	Std Dev
BW (kg)	50 640	4,2	0,42
W10 (kg)	113 096	5,42	1,33
W30 (kg)	161 499	8,37	2,11
W70 (kg)	116 374	14,11	3,41
W90 (kg)	67 885	16,42	3,84
ADG0-30 (g/d)	49 336	126,84	55,79
ADG10-30 (g/d)	111 005	166,38	60,97
ADG30-70 (g/d)	39 562	134,65	45,05
ADG30-90 (g/d)	52 821	135,79	42,64

Results

➢Sources of variation of growth traits

Sources of variation	df	BW	W10	W30	W70	W90	ADG 0-30	ADG 10-30	ADG 30-70	ADG 30-90
Sec	7	***	*** (6)	***	***	***	***	*** (6)	***	***
FYS (Sec)	597	***	*** (918)	*** (1505)	*** (1185)	*** (888)	*** (580)	*** (920)	*** (424)	*** (759)
AD	8	***	***	***	***	***	***	***	***	***
ST	3	***	***	***	***	***	***	***	***	***
R^2 (%)		45	37	46	47	46	47	37	44	46

Results

➢ **Adjustment factors for sex-type of birth**

	BW	W10	W30	W70	W90	ADG 0-30	ADG 10-30	AD 30-70	ADG 30-90
ST									
11	1	1	1	1	1	1	1	1	1
12	1.09	1.3	1.3	1.2	1.2	1.6	0.99	1.2	1.2
21	1.01	1.05	1.04	1.05	1.05	1.07	1.08	1.05	1.07
22	1.1	1.4	1.3	1.3	1.3	1.7	1.03	1.3	1.2

Results

➢ **Adjustment factors for age of dam**

	BW	W10	W30	W70	W90	ADG 0-30	ADG 10-30	AD 30-70	ADG 30-90
Age of Dam (Yrs)									
2	1.04	1.1	1.1	1.09	1.09	1.2	1	1.09	1.07
3	1.01	1.03	1.03	1.03	1.03	1.05	1.01	1.03	1.03
4	1	1.01	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1
6	1	1.01	1.01	1.01	1.01	1.01	1	1.01	1
7	1.01	1.02	1.02	1.02	1.02	1.05	1	1.03	102
8	1.02	1.03	1.05	1.04	1.04	1.1	1	1.06	1.04
9	1.03	1.06	1.08	1.07	1.07	1.1	1.03	1.1	1.08
10	1.04	1.09	1.1	1.1	1.09	1.2	1.06	1.1	1.09

Results

➢ **Adjusted average growth traits of the Barbarine breed**

Growth trait	Mean	Std Dev
BWc (kg)	4.33	0.5
W10c (kg)	5.97	1.41
W30c (kg)	9.18	2.26
W70c (kg)	15.41	3.57
W90c (kg)	19.44	4.06
ADG0-30c (g/d)	146.83	63.67
ADG10-30c (g/d)	172.41	62.92
ADG30-70c (g/d)	146.17	48.26
ADG30-90c (g/d)	148.27	47.38

Conclusions

- **Non genetic factors are real sources of variation even under low input production systems.**

- **Non genetic factors adjustments are essential to optimize selection of future candidates for reproduction.**

- **There is an urgent need to reexamine the National recording program and the methods of selecting rams and replacements.**

Thank you

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