Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria

iSAGE Innovation for Sustainable Sheep and Goat Production in Europe

Optimal breeding strategies to enhance adaptability and profitability

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Researchers






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Innovation for Sustainable Sheep and Goat Production in Europe

Introduction

- Technological advances in nutrition, health, reproduction, management and genetics have had a positive impact on increasing productivity in small ruminant species as well as other livestock species.

- Genetic selection improves level of production in a cummulative manner.

- Genetic selection requires: **WELL ORGANIZED BREEDING SCHEME**

Breeding schemes in temperate environments and stable (simple) markets

- **Milk (performance) recording scheme**

+

Pedigree recording in both sides:
Genetic markers

Genetic tools: **BLUP** (Milk yield)
IA with +++ sires

Max (PROFIT) = Max (OUTPUT)

Breeding schemes in temperate environments and changing markets

Milk recording scheme +
recording of traits control costs (fertility, morfología mamaria, scc)

+

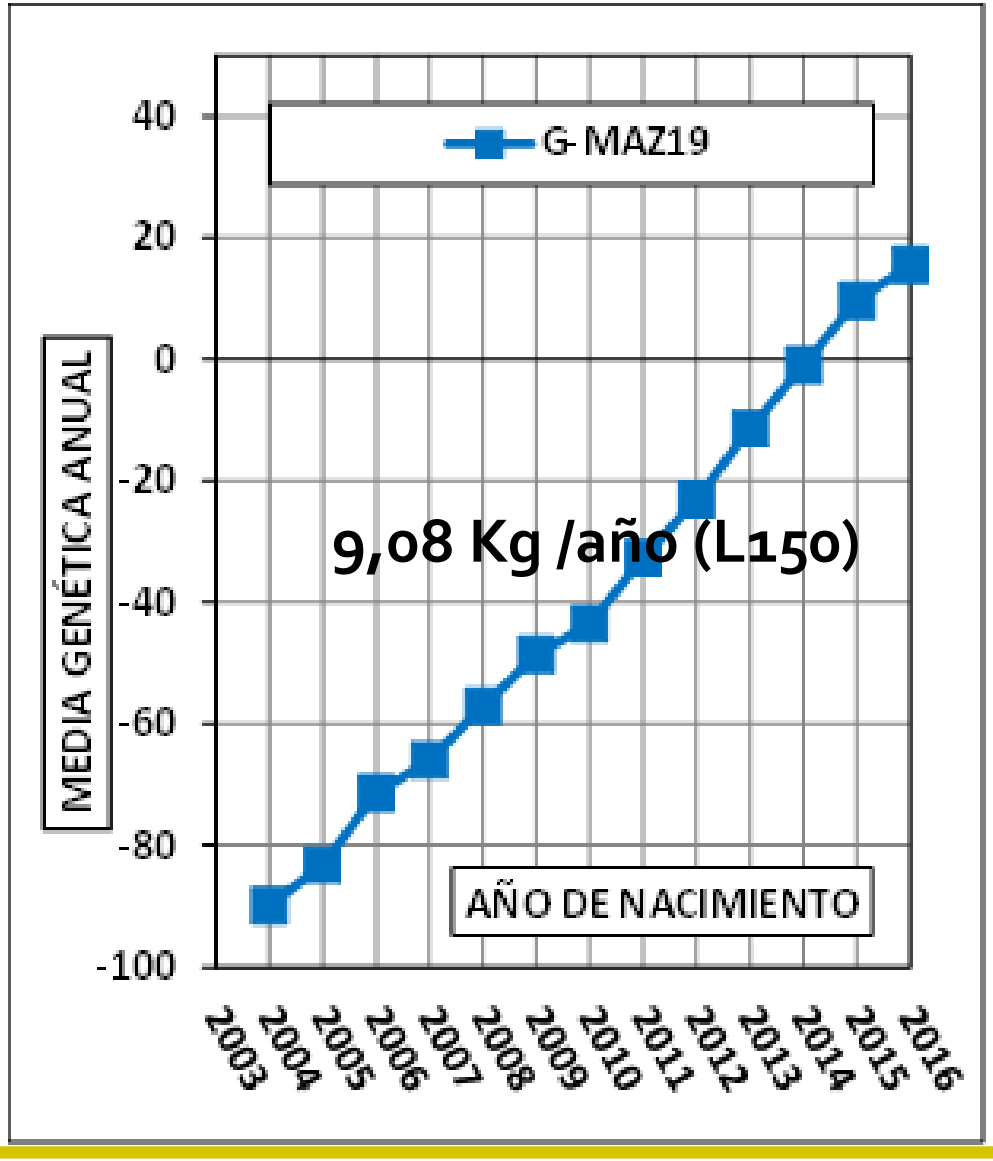
Pedigree recording in both sides:
Genetic markers

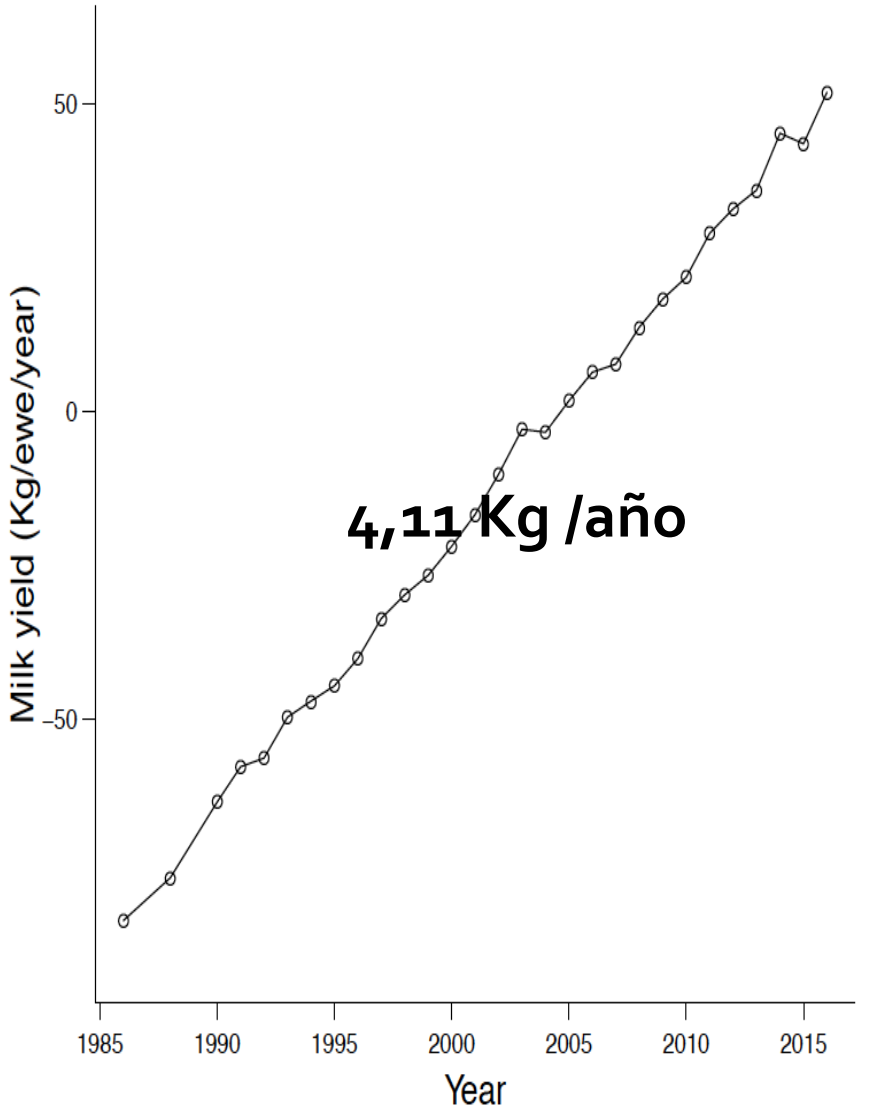
Genetic tools: **BLUP** (Index combining production traits + functional)

IA with +++ sires

Max (PROFIT) = max (OUTPUT)/min(costs)

Assaf: Milk yield Manchega: Milk yield





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Breeding schemes under climate change: harsh environments

Milk recording scheme + recording of traits control costs (fertility, morfología mamaria, scc)

+

Pedigree recording in both sides:
Genetic markers

+

Metereological Data

Genetic tools : **EBVs/enviroment**
(Index to combine traits)
IA with +++ sires/environmet

? (PROFIT) = ? (OUTPUT)/?(costs)

Local vs Selected Breeds

Manchega

T_{avg0} (□)	Intercpt	slp0	slp4	slp8	Slp12	slp16	slp20	slp24	slp28	slp30
Intercpt	**0.13**	0.14	0.16	0.17	0.16	0.13	0.10	0.08	0.06	0.05

Assaf

	Intercpt	slp-4	slp0	slp4	slp8	slp20	slp24	slp28	slp31
Intercpt	**0.14**	0.16	0.11	0.04	-0.05	-0.45	-0.55	-0.60	-0.62

Selection for production traits decreases heat tolerance. Local is a balance.

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What is the scenario under heatstress ?

Characterisation of productive response to thermal load (TL) – Top vs. Average animals

Average slopes of decay (g/d, ºC) at different T_{avg} for all , 1 and 0.1% top animals for Assaf and Manchega breeds

		Assaf				Manchega			
		15ºC	20ºC	25ºC	28ºC	15ºC	20ºC	25ºC	28ºC
Milk	All	20,43	12,19	0,09	-9,02	6,33	4,92	2,71	0,99
	Top 1%	20,51	12,23	0,10	-9,03	6,32	4,90	2,69	0,96
	Top 0.1%	20,52	12,24	0,11	-9,02	6,32	4,90	2,69	0,96
Fat	All	0,30	-0,18	-1,15	-1,97	0,10	-0,03	-0,20	-0,30
	Top 1%	0,55	-0,34	-1,72	-2,79	0,05	-0,13	-0,35	-0,48
	Top 0.1%	0,66	-0,28	-1,72	-2,82	0,06	-0,12	-0,33	-0,46
Protein	All	0,44	0,14	-0,44	-0,92	0,16	0,06	-0,10	-0,22
	Top 1%	0,70	0,23	-0,52	-1,11	0,10	-0,04	-0,24	-0,38
	Top 0.1%	0,72	0,25	-0,50	-1,09	0,09	-0,05	-0,25	-0,40

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What is the scenario under heatstress ?

Characterisation of productive response to thermal load (TL) – Top vs. Average animals

Average slopes of decay (g/d, ºC) at different T_{avg} for all , 1 and 0.1% top animals for Assaf and Manchega breeds

		Assaf				Manchega			
					C				
Milk					99				
					96				
					96				
Fat					30				
					48				
	Top 0.1%				46				
Protein	All	0,44	0,14	-0,44	-0,92	0,16	0,06	-0,10	-0,22
	Top 1%	0,70	0,23	-0,52	-1,11	0,10	-0,04	-0,24	-0,38
	Top 0.1%	0,72	0,25	-0,50	-1,09	0,09	-0,05	-0,25	-0,40

Continued selection for higher productive levels will decrease heat tolerance in selected and local breeds

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Conclusions

- **Selection to increase productivity under temperate environments with a market for products is achievable if and only if farmers make use of genetic tools.**

- **Climate change impose a challenge to all programs.**
  - Local breeds should monitor effects of HS on production
  - Selected breeds should imposed a restriction on HS tolerance losses.