



GOBIERNO
DE ESPAÑA

MINISTERIO
DE ECONOMÍA, INDUSTRIA
Y COMPETITIVIDAD



Innovation for Sustainable
Sheep and Goat
Production in Europe

EL ESKARDILLO, HERRAMIENTA PARA LA GESTIÓN DE DATOS EN CAPRINO LECHERO

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Curso de formación y Taller iSAGE 10-13 Noviembre 2019, Zaragoza (España)

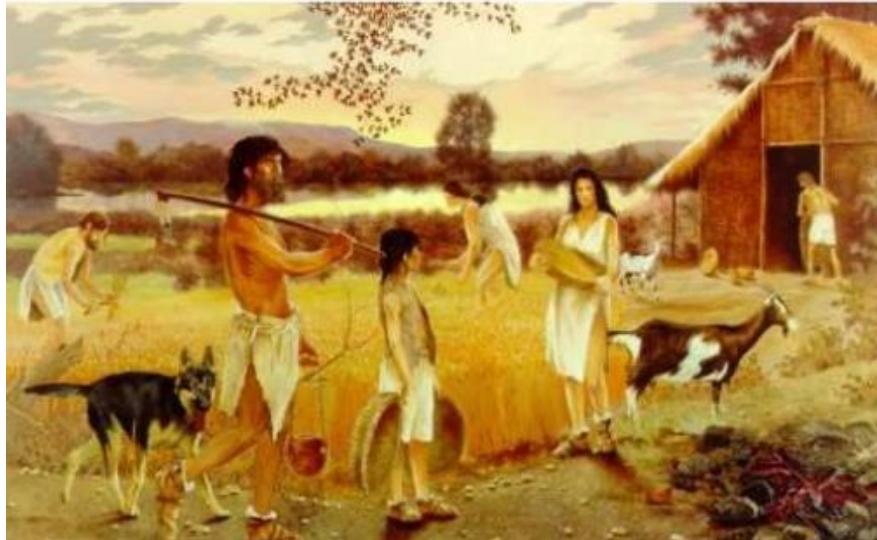
Dairy goat intensification

- Increase in efficiency and productivity
- So far, intensification has focused on:
 - Increasing number of animals per farm
 - Improvements in reproduction (AI)
 - Health programs
 - Milking automation



- Little improvements in farm management

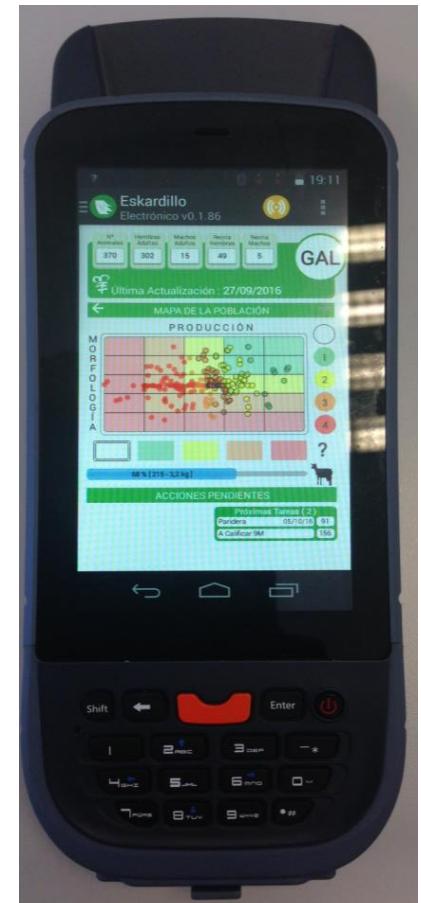
Smart farming



Ancient shepherds

- Individual animal management
- Individual identification
- Filiation of individuals
- Relevant dates
- Productivity
- Selection based on productivity

Precision Livestock Farming

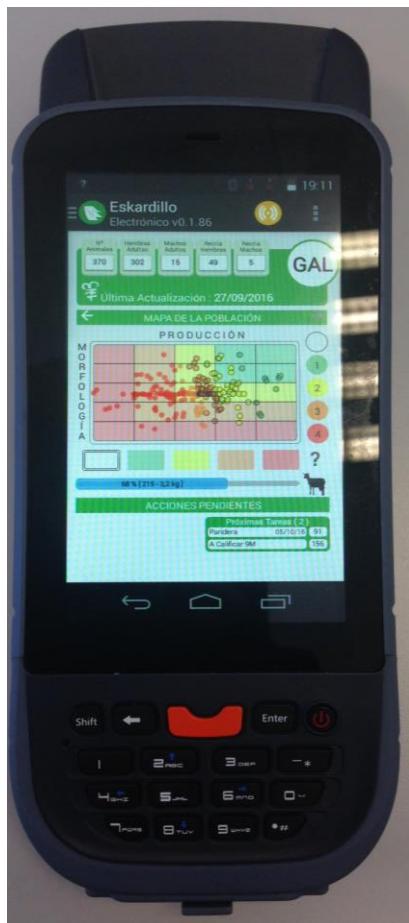


ESKARDILLO



Problem of monitoring animals

- Intensive systems
- Semi-intensive livestock



Data collection

Chip reader
Barcode reader
Digital camera
Keyboard for farmer inputs
Milk control
Morphological evaluation

Data Processing

Feedback to the farmer



6 functional modules

Farm management



Módulo Gestión
Ganadera



Módulo Control de
Rendimiento

Productivity

Genetic evaluation
Gene bank



Módulo
ADN-Genético



Módulo Económico
Técnico Ambiental

Economic / Environmental

Breeding



Módulo Centro de
Sementales



Módulo
Administración y
Gestión

Administration

1-Farm management module



Info display

- Number of animals
- Type of animals
- Animal ranking
- Actions required



Management

- Inventory
- In and outs
- Replacement
- Culling
- Parturition period
- Drying off
- Natural mating
- AI management
- Pregnant scan

12:30

← Alta (Recria) ENVIAR

53P 70M ♀ +104 55★

83 EC 82 EL 85 Patio 3
SM 84 PP 83 R.LG RD

ABC13138 ✓ ES010011556996

XI07084 ✓ ES130000093376

ABC09069 ✓ ♂ ES010000567672

453 - H - [31/01/2018] MACHO: ABC15173 >

Patrón racial

IP 18 Tatuaje GENERAR

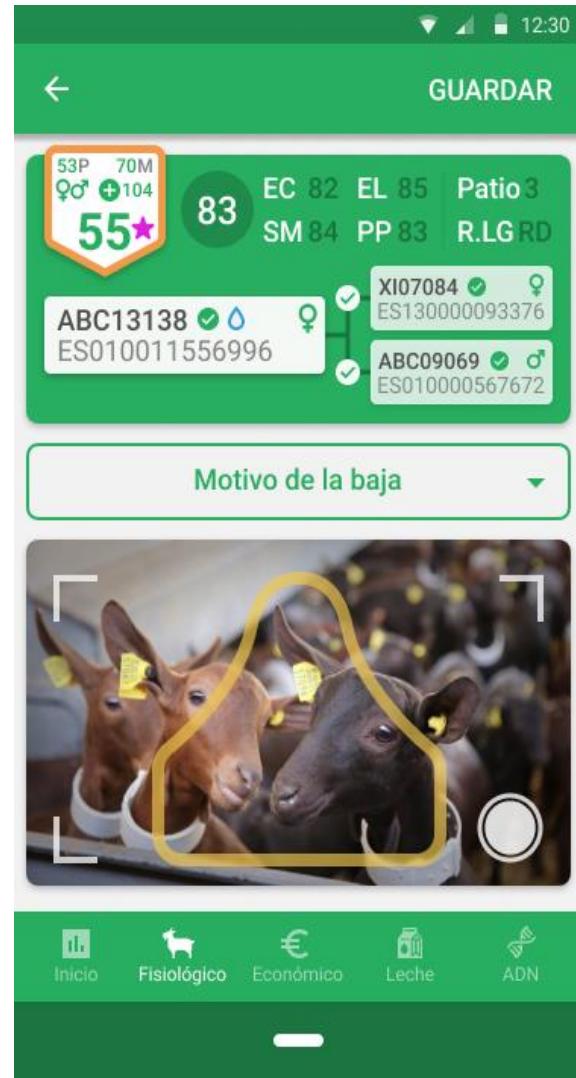
Microchip

Muestra de sangre

Eliminar identificación

Inicio Fisiológico Económico Leche ADN

Entrants



Exiting animals

12:30

GUARDAR

53P 70M ♀ +104 55★

83 EC 82 EL 85 Patio 3
SM 84 PP 83 R.LG RD

XI07084 ✓ ES130000093376

ABC13138 ✓ ES010011556996

ABC09069 ✓ ♂ ES010000567672

Fecha de parto < 16 / 04 / 2018 >

Total
HEMBRAS 5 MACHOS 2

Recria
HEMBRAS 1 MACHOS 2

36H 15M, 16M

Maternidad dudosa

Número de Lote < 1 >

Muertos < 0 >

Crías con defecto de capa < 0 >

Crías con malformación < 0 >

Crías con otros defectos < 0 >

Eliminar parto

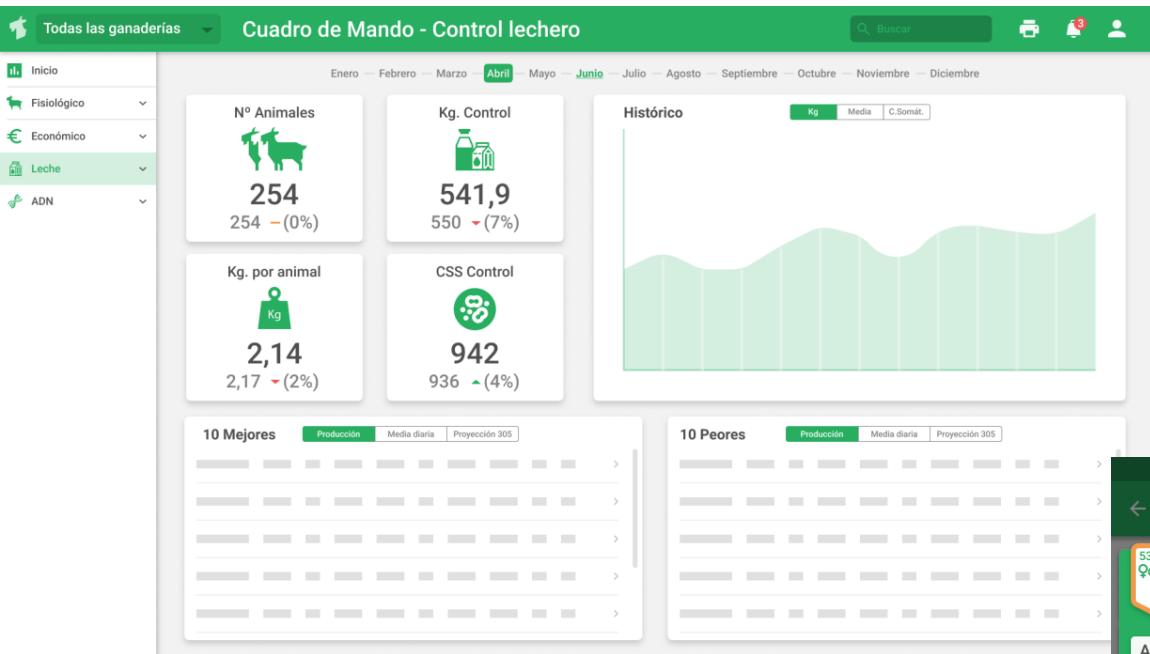
Inicio Fisiológico Económico Leche ADN

Breeding group



Módulo Control de Rendimiento

2-Productivity module



Registrar peso

53P 70M 90+104 83 EC 82 EL 85 Patio 3
SM 84 PP 83 R.LG RD

ABC13138 ES130000093376
ES010011556996

ABC09069 ES010000567672

23943 56,2 kg

Cancelar Aceptar

23943 74 +104 N° total de controles 0

← Calificación CONFIRMAR

53P 70M 90+104 83 EC 82 EL 85 Patio 3
SM 84 PP 83 R.LG RD

ABC13138 ES130000093376
ES010011556996

ABC09069 ES010000567672

Primípara Multípara Macho

Estructura y capacidad

Estatura Bajo Alto

62 cm	64 cm	66 cm	68 cm	70 cm	72 cm	74 cm	76 cm	78 cm
-------	-------	-------	-------	-------	-------	-------	-------	-------

Estatura Bajo Alto

62 cm	64 cm	66 cm	68 cm	70 cm	72 cm	74 cm	76 cm	78 cm
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Estatura Bajo Alto

62 cm	64 cm	66 cm	68 cm	70 cm	72 cm	74 cm	76 cm	78 cm
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Management

- Milk control (kg, comp. SCC)
- Body weight
- Morphology evaluation

3-Genetic evaluation module



Management

- Genetic evaluation (EBV)
- Parental test
- Genomic information



4-Economic/Environmental module



Management

-Incomes (milk, meat, youngstock, manure)

-Expenses (feed, labour, medicines)

-Economic indexes

-GHG emissions

-Carbon sequestration

-Carbon footprint

AMALTEA project

5-Breeding module



Módulo Centro de
Sementales

- Male catalogue
 - Elite males
 - Tested males
 - Males in evaluation



Módulo
Administración y
Gestión

6-Administration module

Todas las ganaderías ▾ Gestión de usuarios

Buscar

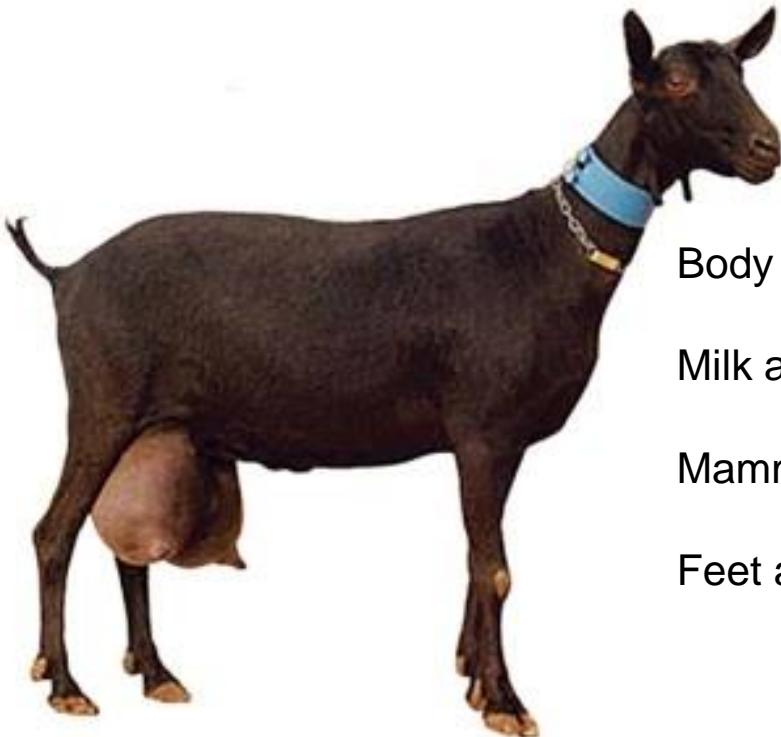
Inicio Fisiológico Económico Leche ADN

	Información		Permisos								+ AÑADIR USUARIO	
	Nombre	Usuario	Paridera	Alta	Validación	Cubrición	Inseminación	Secado	Inventory	Control lechero		
AGC	Alberto González Caballero	Veterinario	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
AGC	Alberto González Caballero	Calificador	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AGC	Alberto González Caballero	Veterinario	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
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AGC	Alberto González Caballero	Veterinario	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
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Management

- Users management
- Access management
- Actions management
- Configuration
- Reports and questions

Morphological evaluation



Body conformation

Milk aptitude

Mammary system

Feet and legs

kalifaDroid Calificación Lineal v..

EC 83 EL 85 SM 78 PP 82

ABC09190 - 67803 (7) 17/10/2016

81

Estructura y Capacidad

1	2	3	4	5	6	7	8	9
Bajo					Alto			

1	2	3	4	5	6	7	8	9
Estrecha					Ancha			

1	2	3	4	5	6	7	8	9
Poco Profunda					Muy Profunda			

1	2	3	4	5	6	7	8	9
Estrecha					Ancha			

1	2	3	4	5	6	7	8	9
Derribada					Corregida			

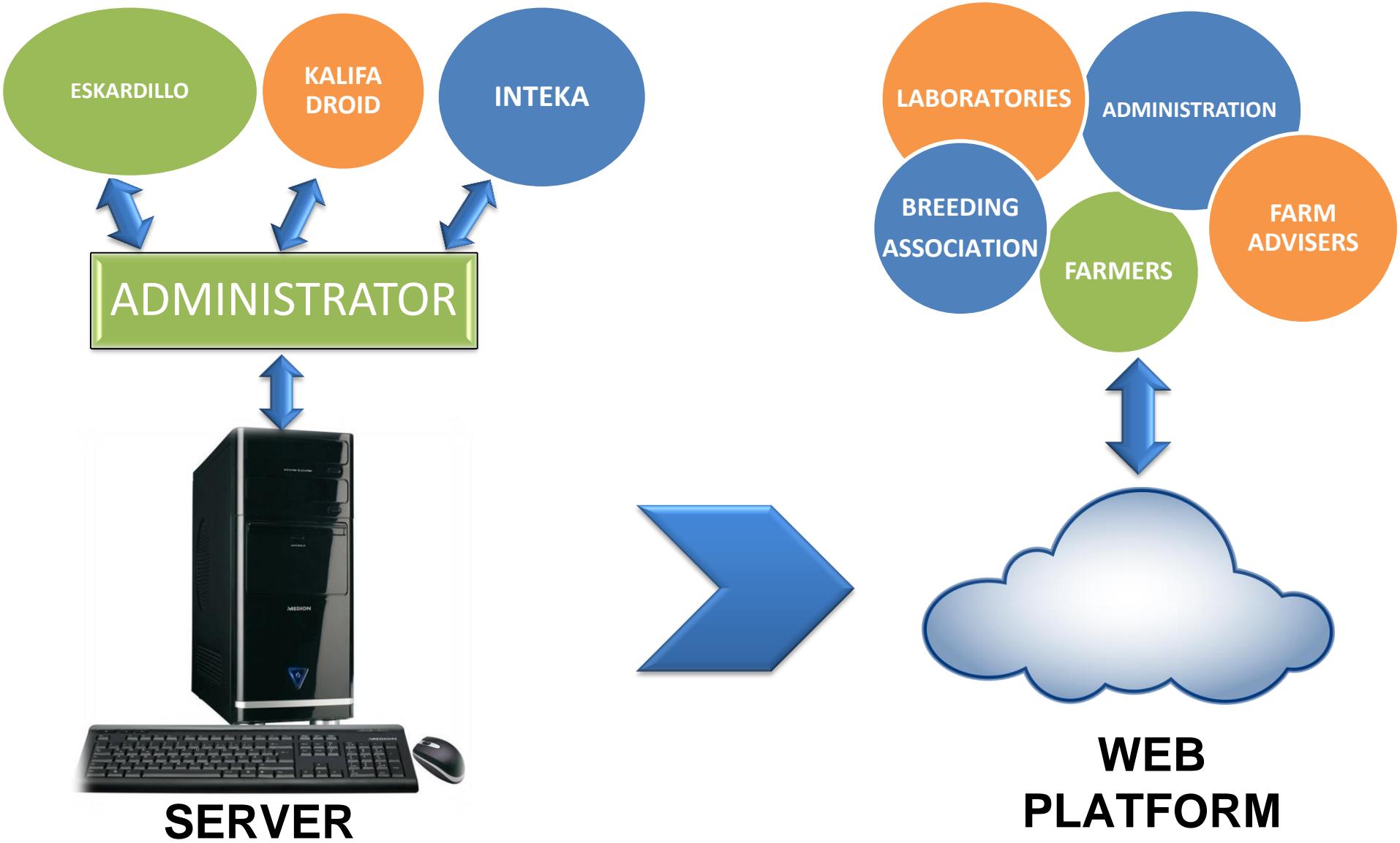
Estructura Lechera

1	2	3	4	5	6	7	8	9
Redondeada					Angulosa			

1	2	3	4	5	6	7	8	9
Raso v redondo					Piano v nítido			

< O □

On going improvements



Decision making based on big data

- Culling strategy
 - Low productivity (quantity / quality)
 - Reproductive and health problems
 - Old animals
 - Selection of replacement animals
 - Genetic value
 - Morphology
 - Correct filiation
 - Breeding strategy
 - Artificial insemination for high merit animals
 - Natural mating for low merit animals
 - Identification of the best conception timing



Objetive: Evaluate the effectiveness of the ESKARDILLO on the management of conventional farms

Material and methods

12 farms WITH ESKARDILLO

- Murciano-Granadina breeding association
- Eskardillo implemented in 2014 (pioneers)
- Forward-thinking farmers
- Monitoring results from 2013 to 2016 (4 years). Using 2014 as reference
- Absence of sanitary problems or changes in farm management

12 farms without Eskardillo (CONTROL)

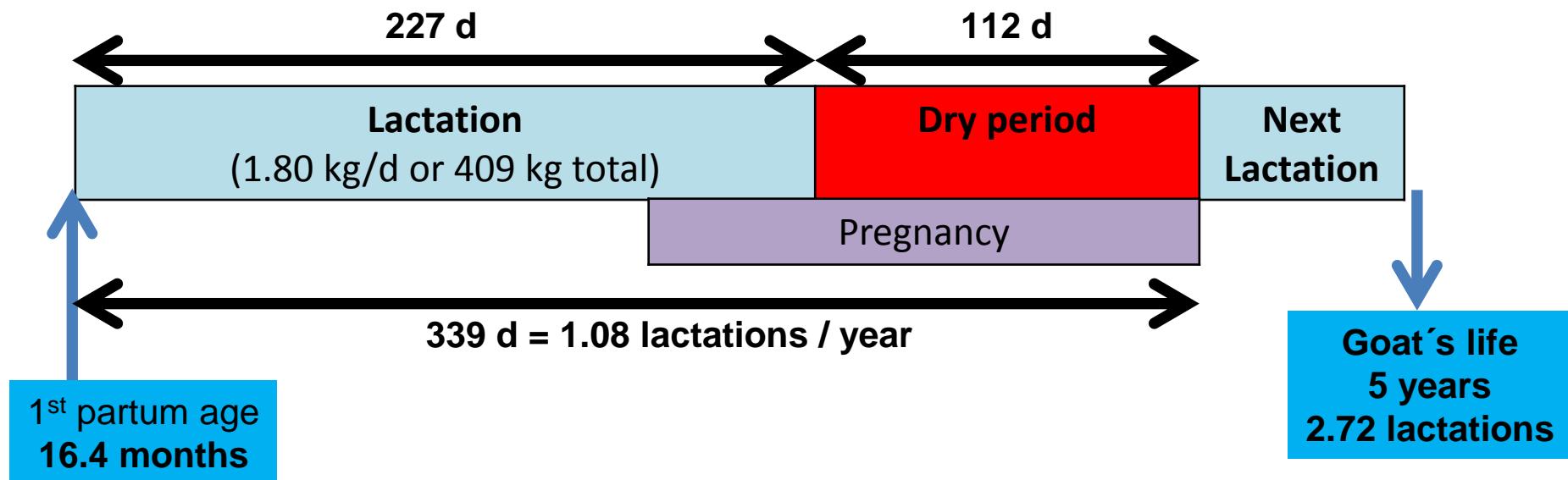
STATS: Farms as experimental units

Effects on

- Productivity
- Genetic progress
- Seasonality of production



Situation before ESKARDILLO (2013)



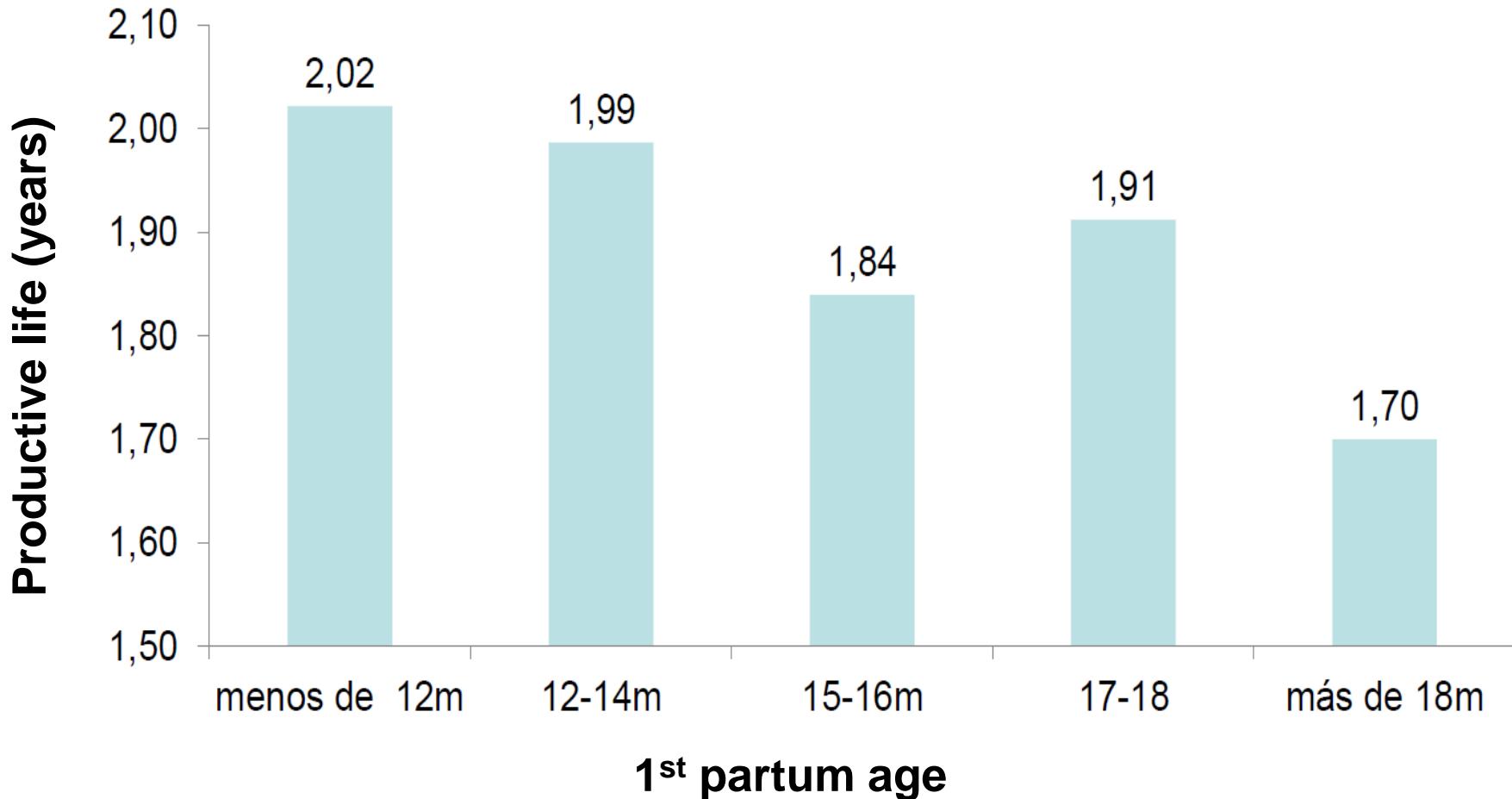
68,353 LACTATIONS; 31,859 GOATS

Optimizing farm management

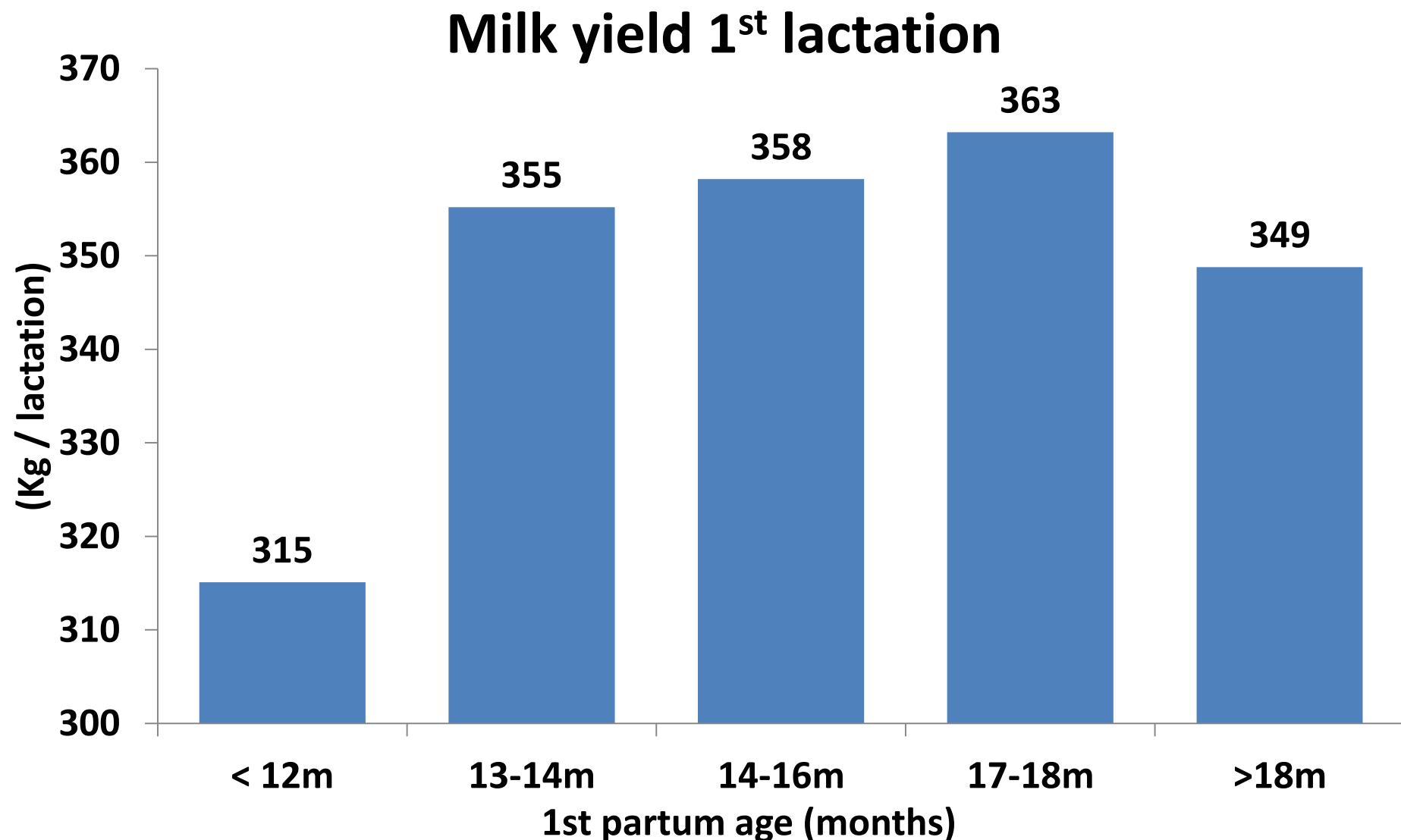
- Decreasing unproductive periods
 - 1st partum age
 - Dry period length

Does 1st partum age affect productive live?

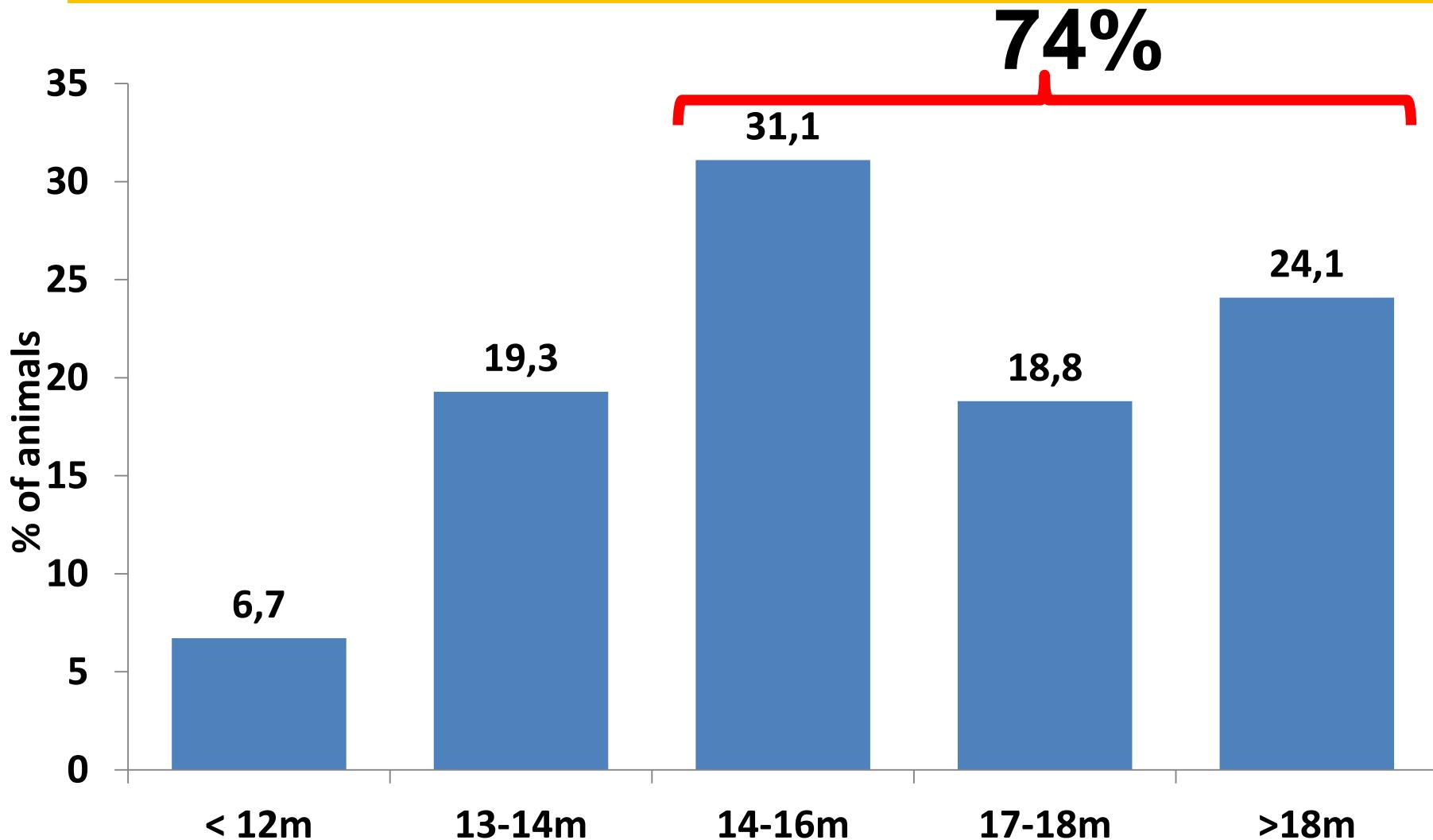
Productive life = Age at death – Age at 1st partum



Does 1st partum age affect milk production?



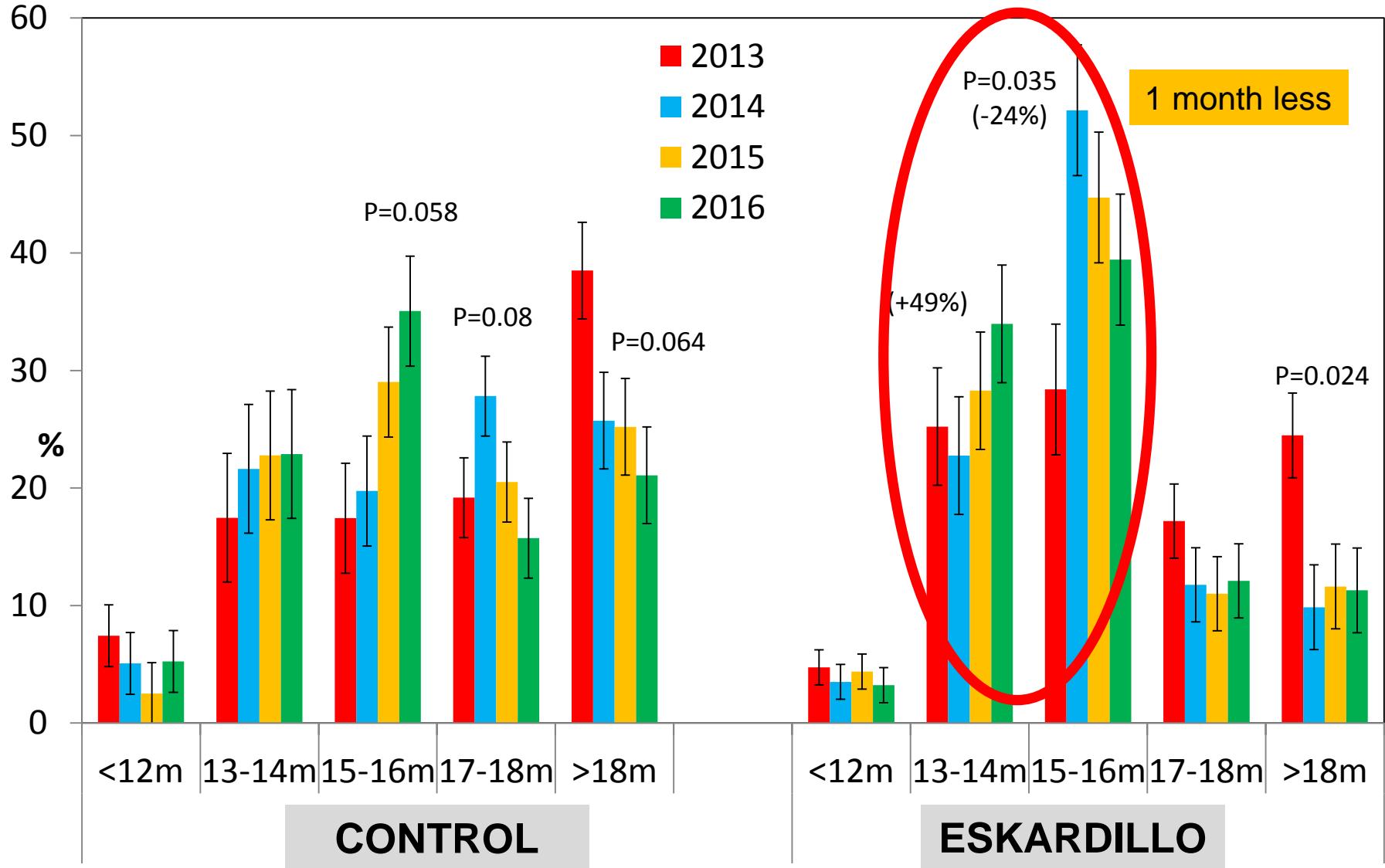
Implications of 1st partum age



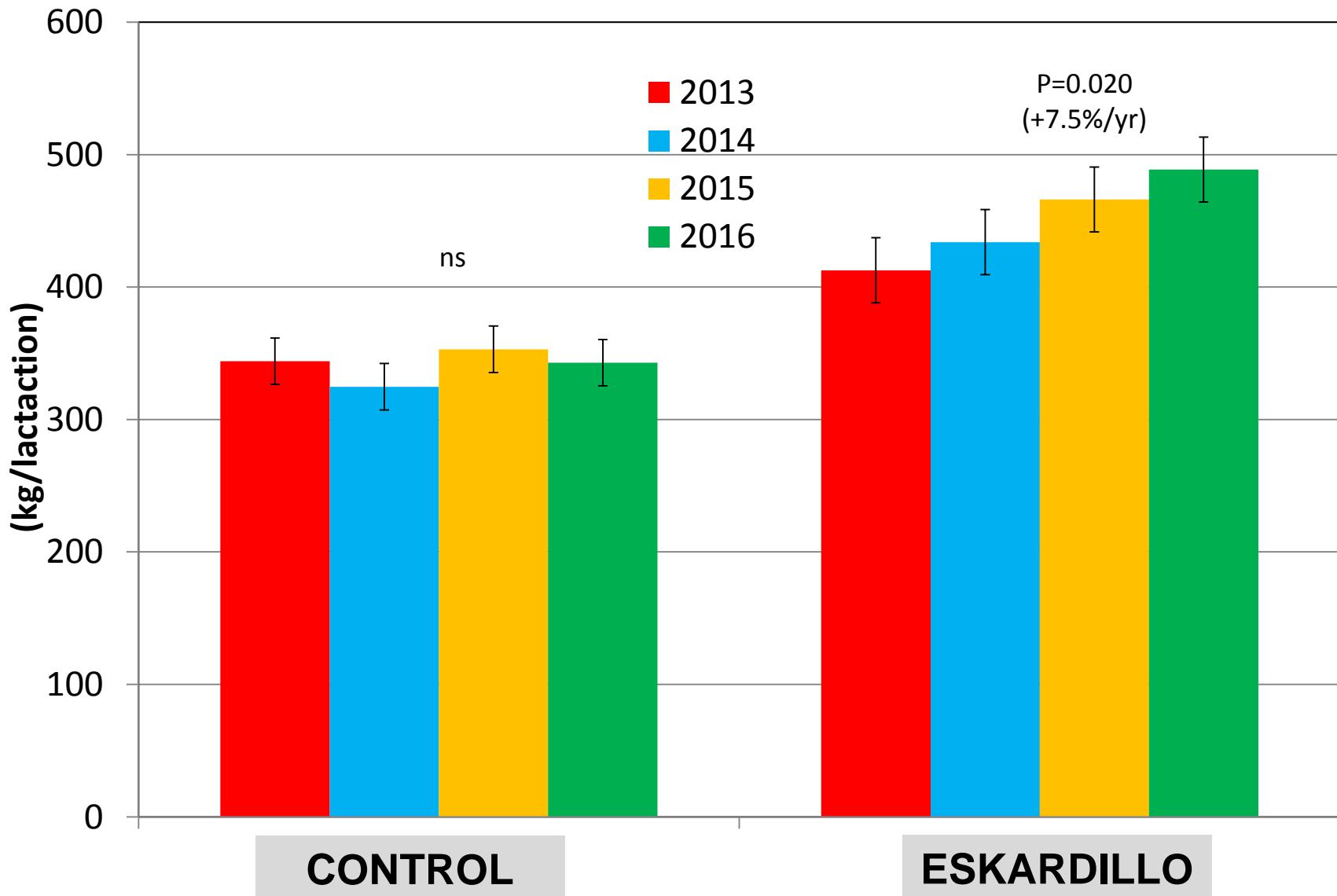
Extra feeding cost = 12,1 €/animal
Objective 1st partum at 13-14 mo.

1st partum age (months)

Effect of Eskardillo on 1st partum age

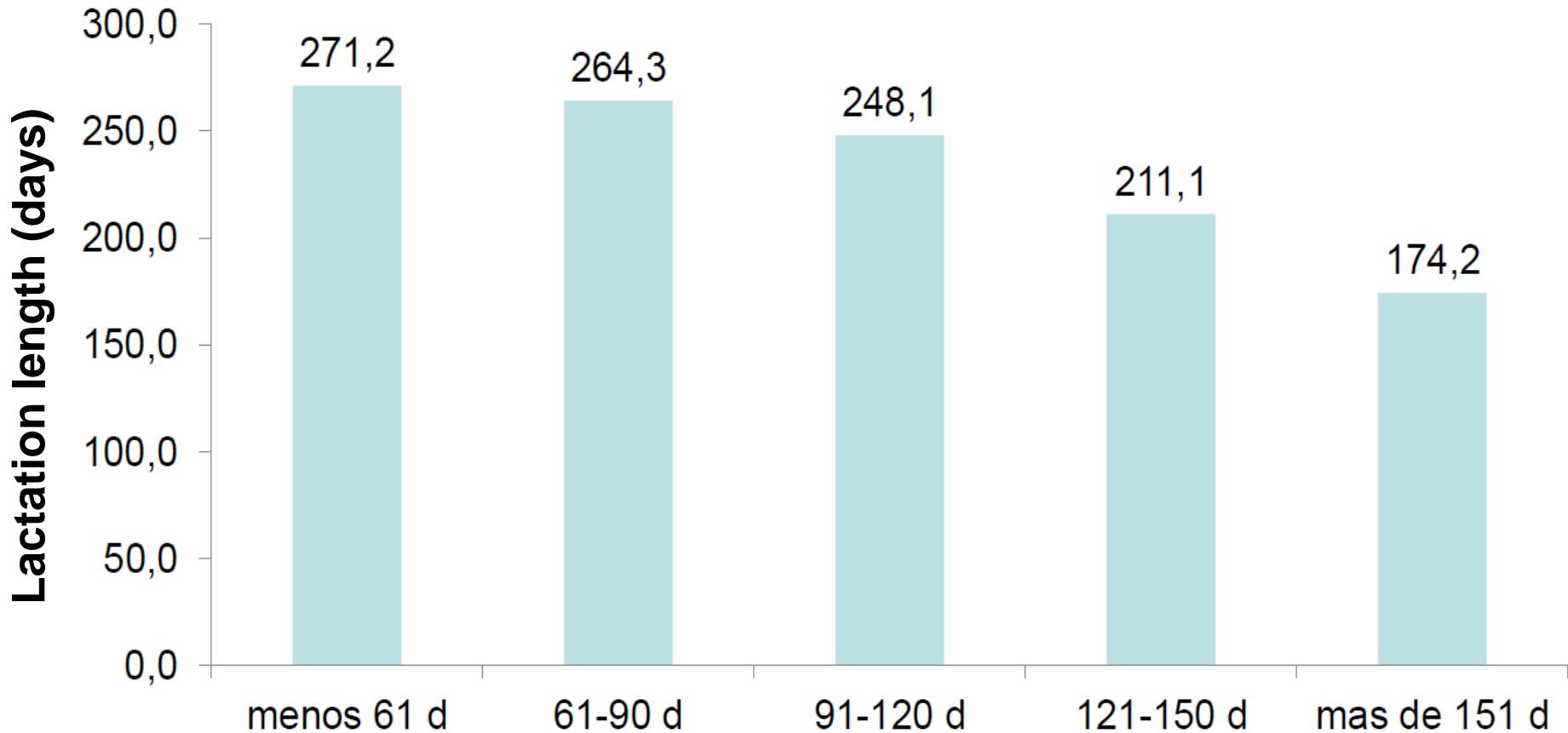


Milk production in 1st lactation



Dry period length

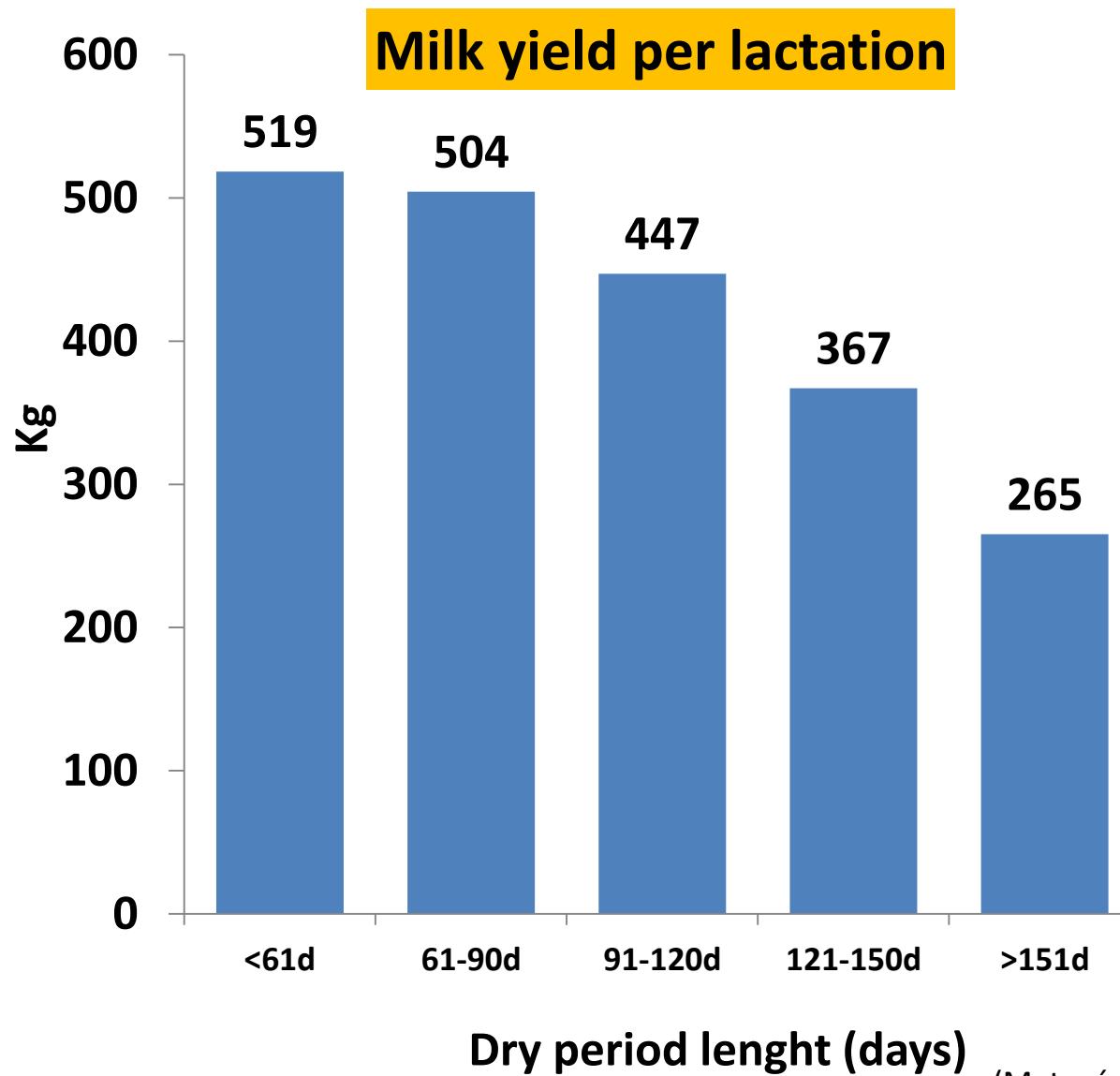
Dry period and lactation length



Most farms aims to have one partum per animal per year

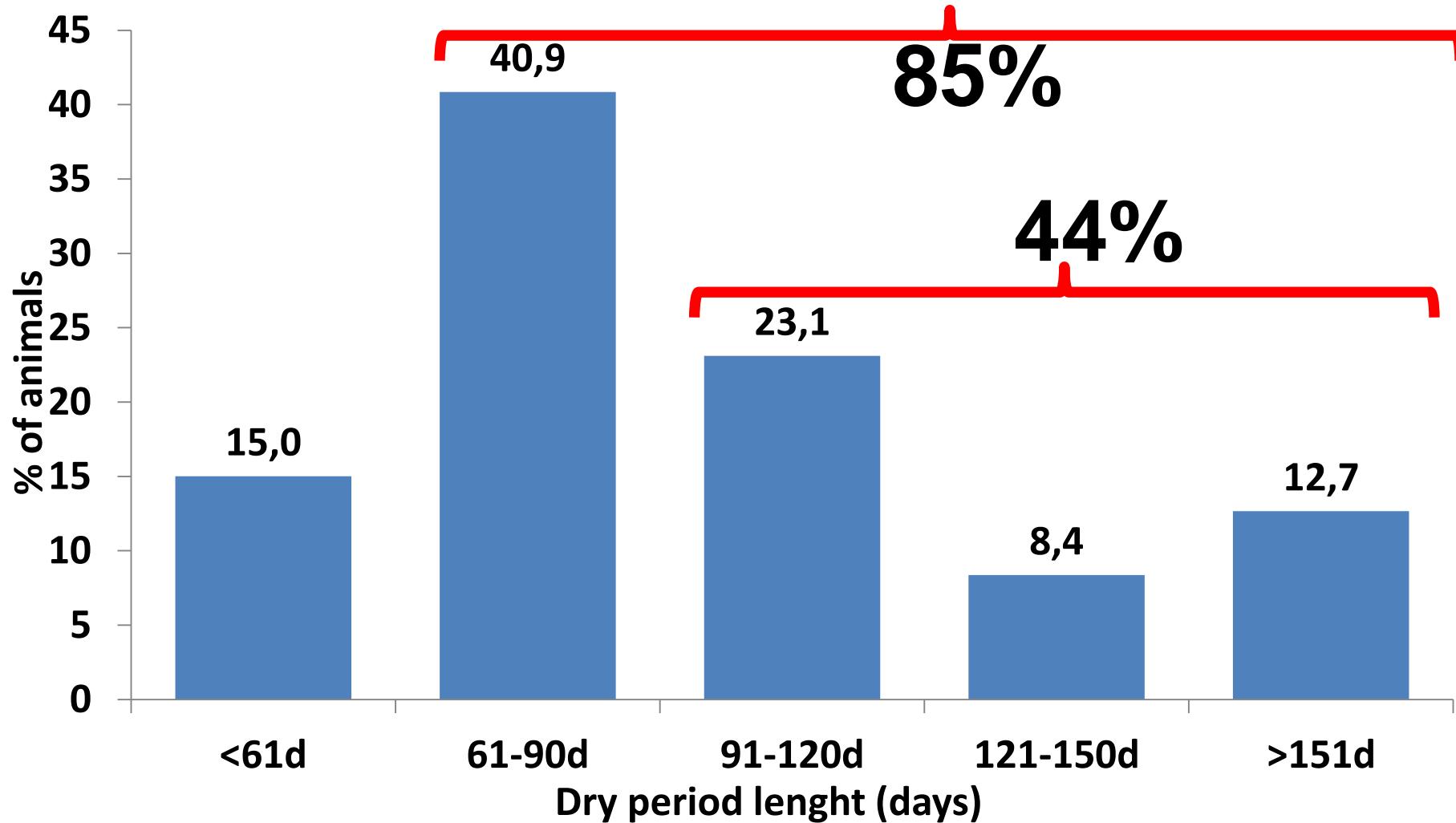
Mating is conducted at a fix time without considering production

Does a long dry period increase milk yield?



(Matecón et al., 2013. IV Foro Nacional Caprino)

Implications of dry period length



Extra feeding cost = 16 €/animal

Objective: 2 months of dry period

(Matecón et al., 2013. IV Foro Nacional Caprino)

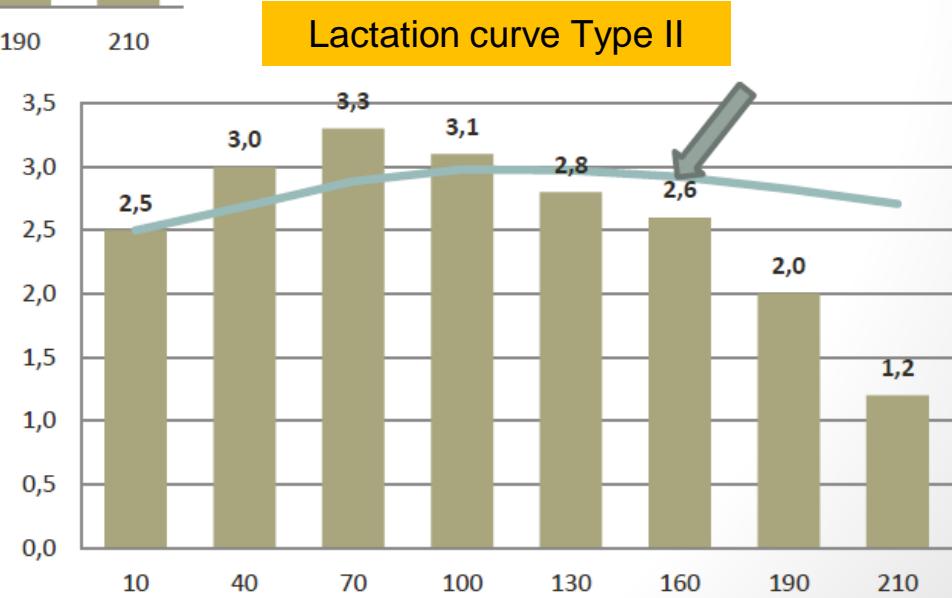
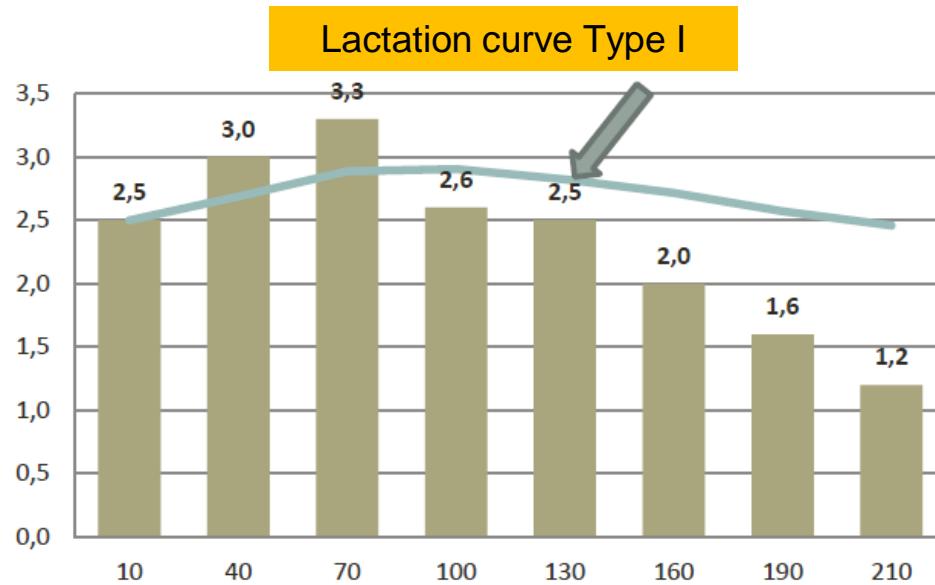
How long a lactation should be?

As long as you make money with it.
There is a profitability threshold.

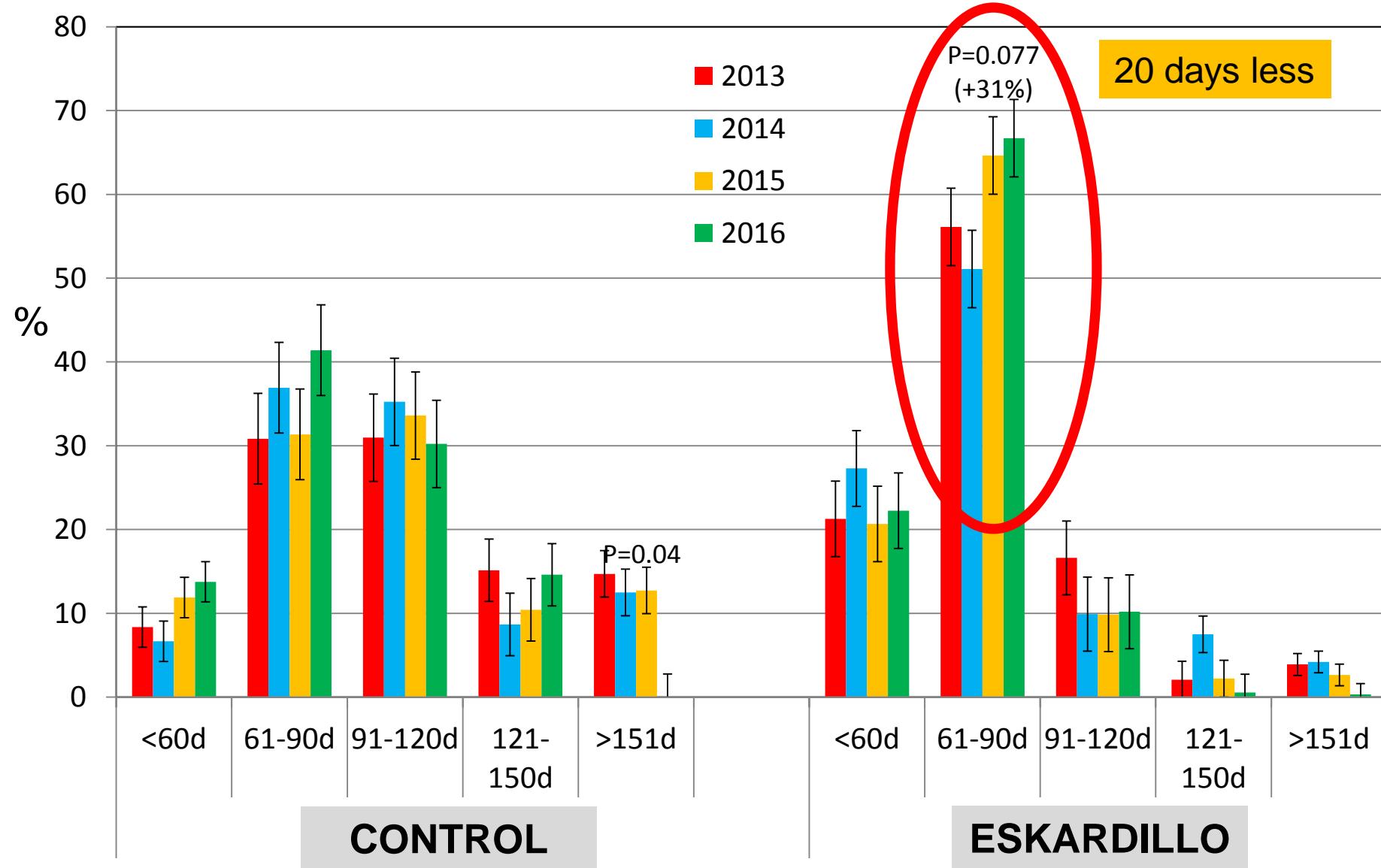
Feeding cost	Milk price		
	0.4 €/L	0.6 €/L	0.8 €/L
0.40 €/d	1 L	0.67 L	0.5 L
0.50 €/d	1.25 L	0.83 L	0.62 L
0.60 €/d	1.5 L	1 L	0.75 L

Below that threshold animals should be dry off
and give birth 2 months after

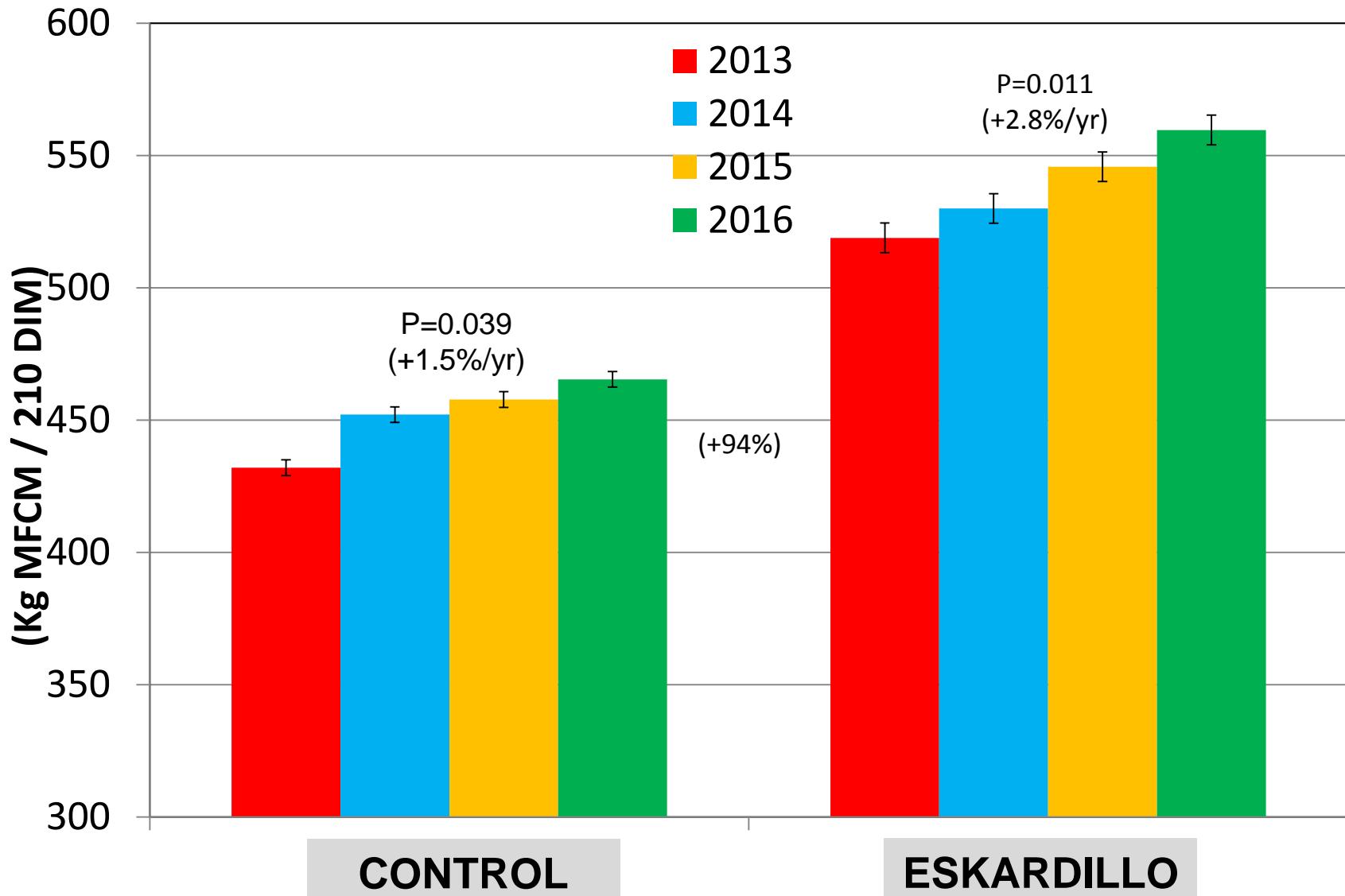
Eskardillo: Reproductive plan according to productivity



Effect of Eskardillo on Dry period length

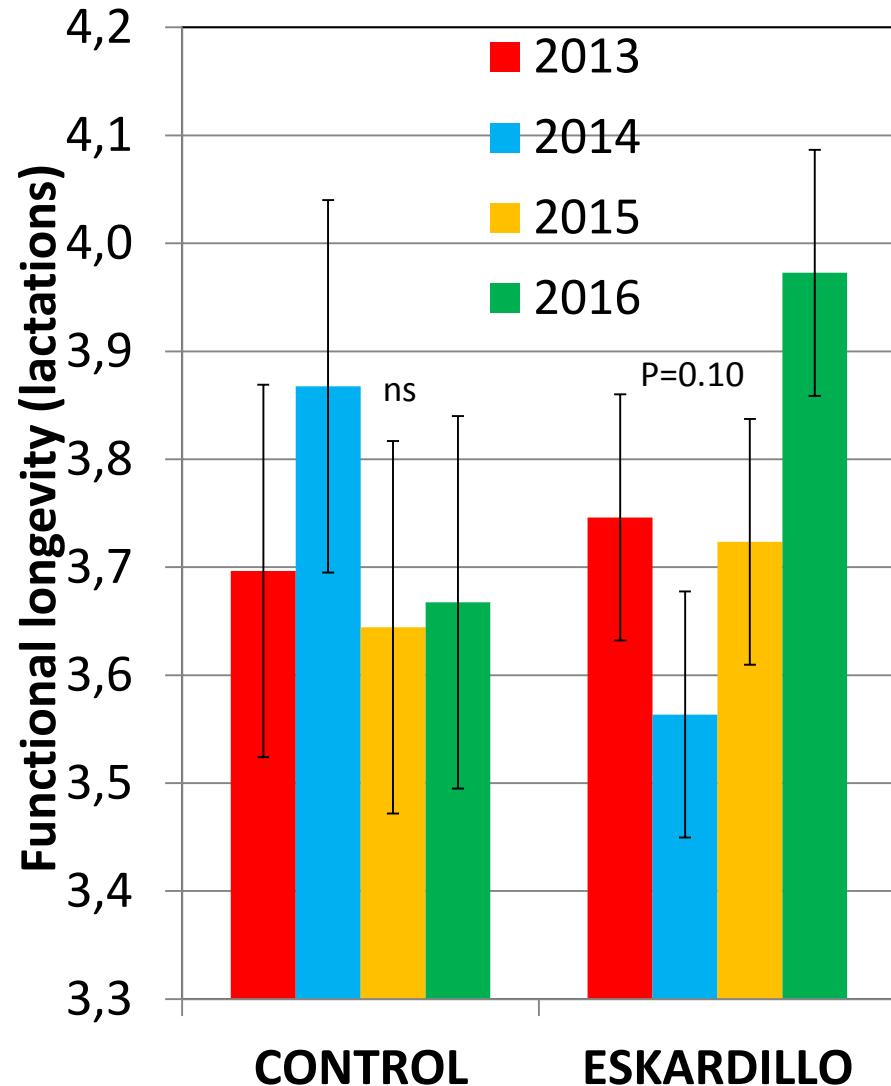
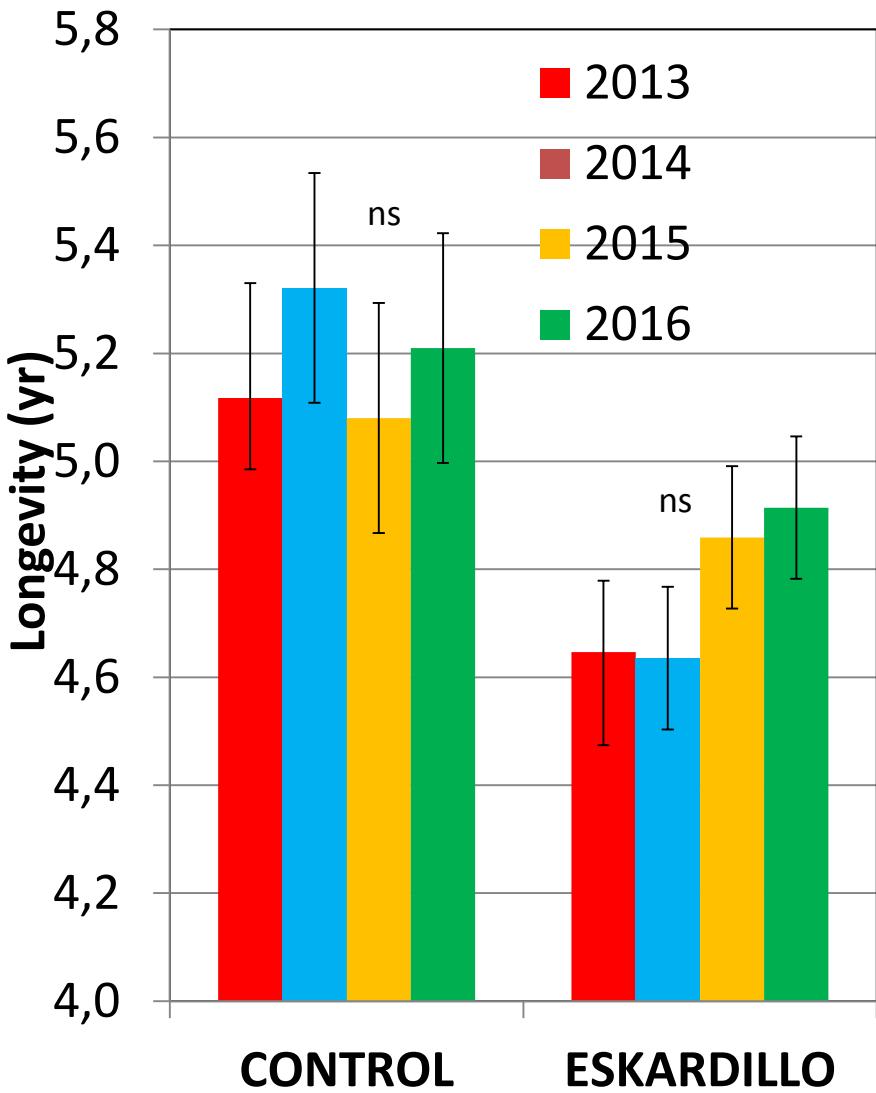


Effect of Eskardillo on Milk yield (210 DIM)

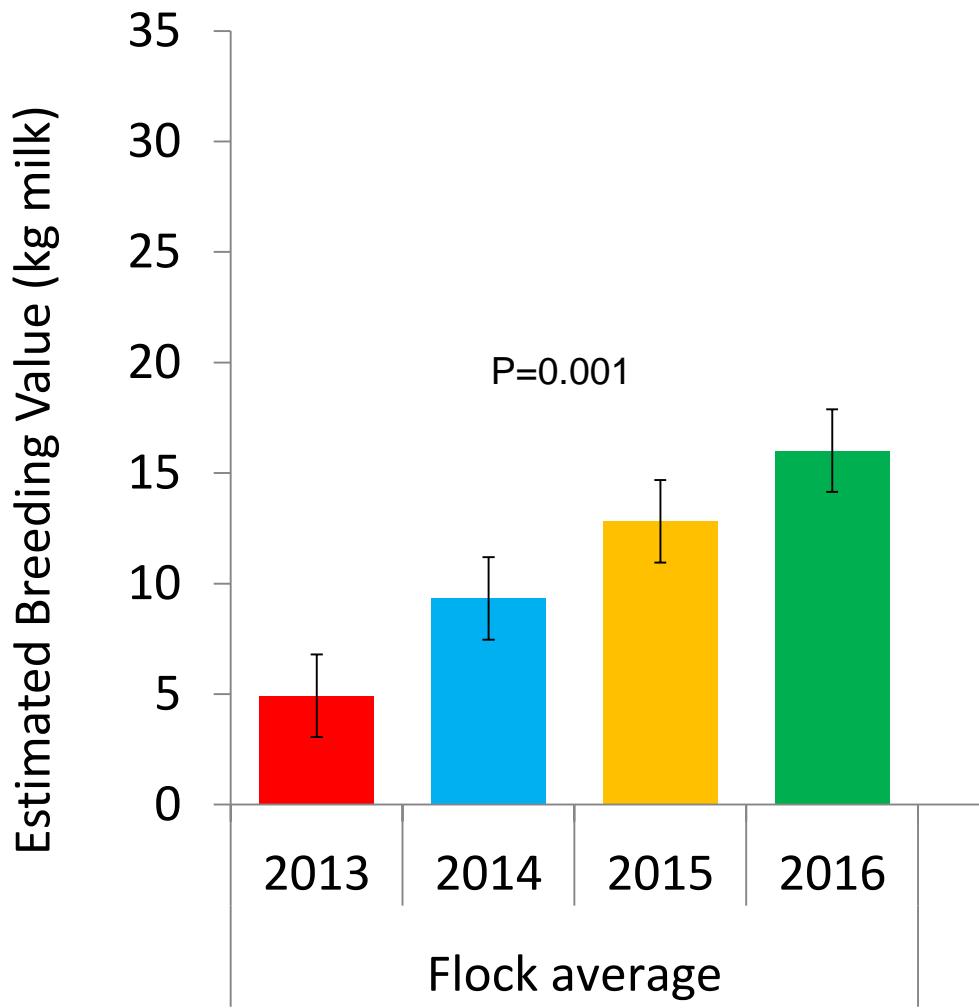


Longevity

Functional Longevity

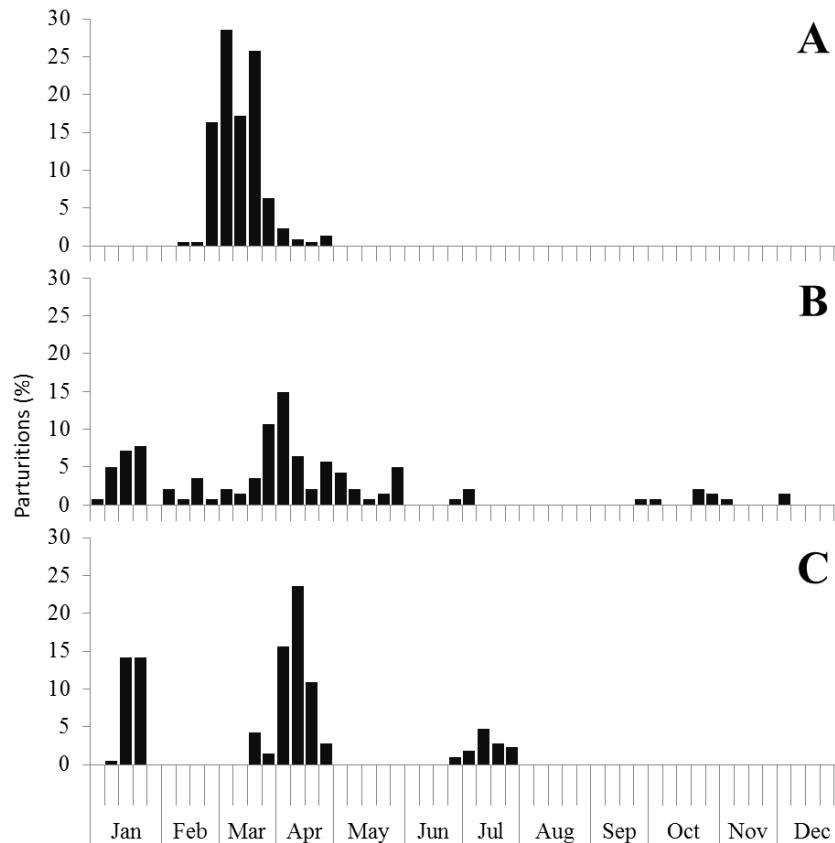


Effect of Eskardillo on Estimated Breeding Value

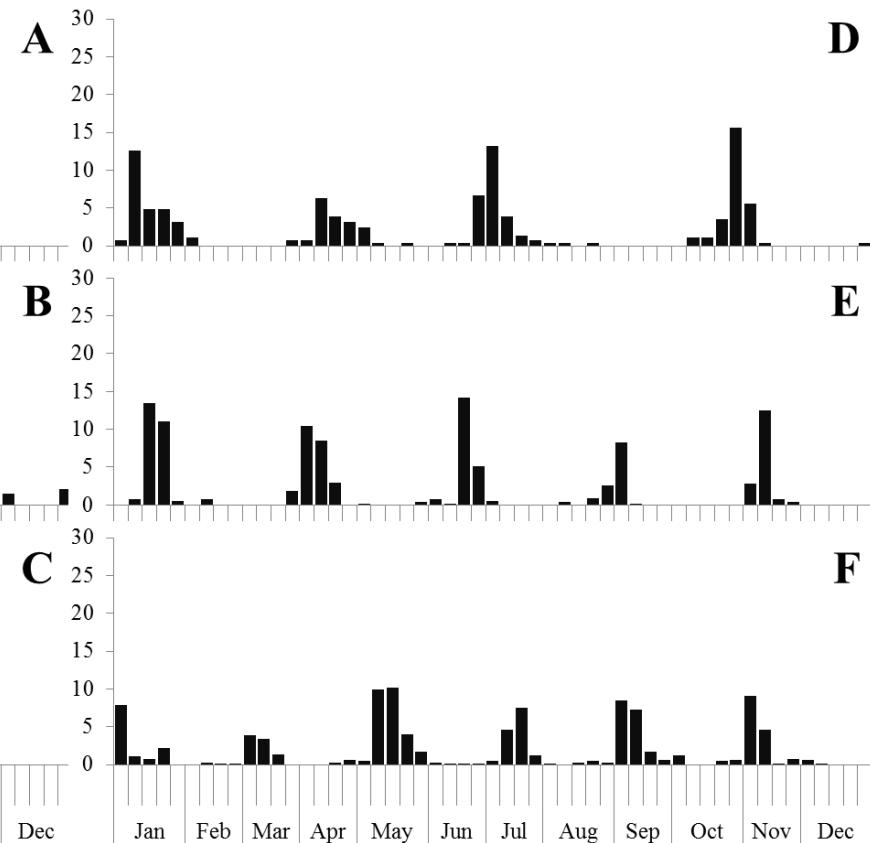


Reproductive plan (breeding seasons)

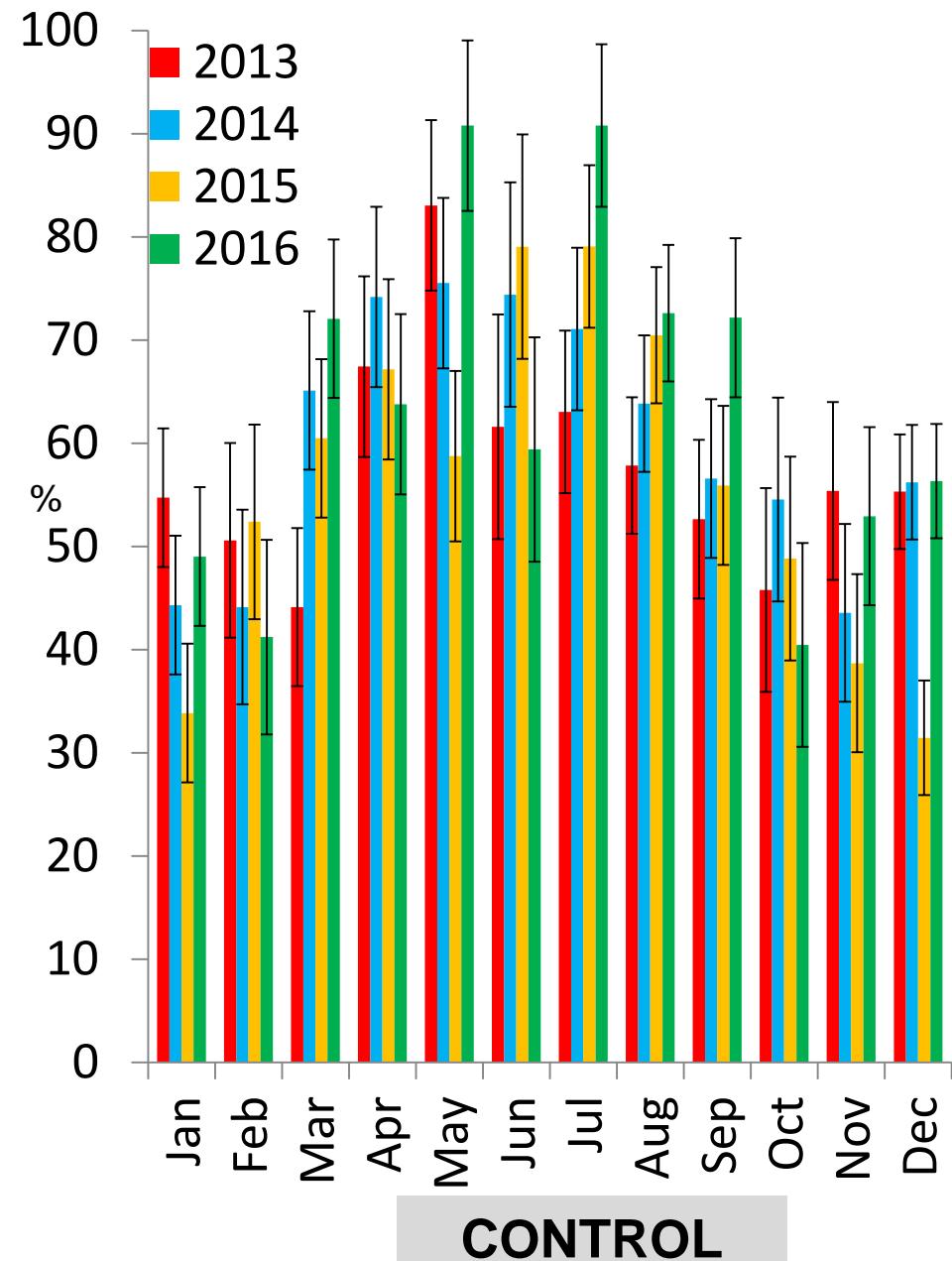
CONTROL



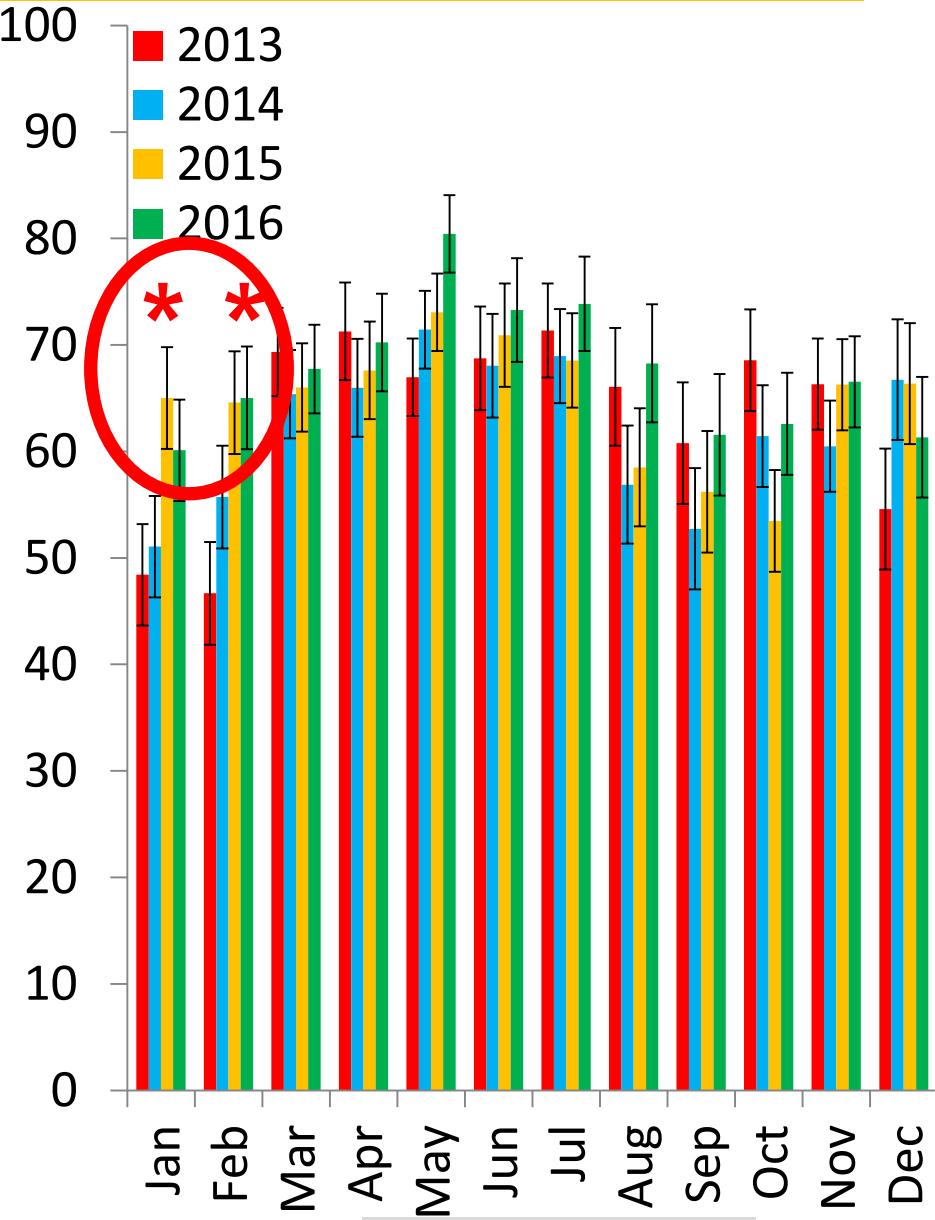
ESKARDILLO



Production seasonality (% of goats in milking)

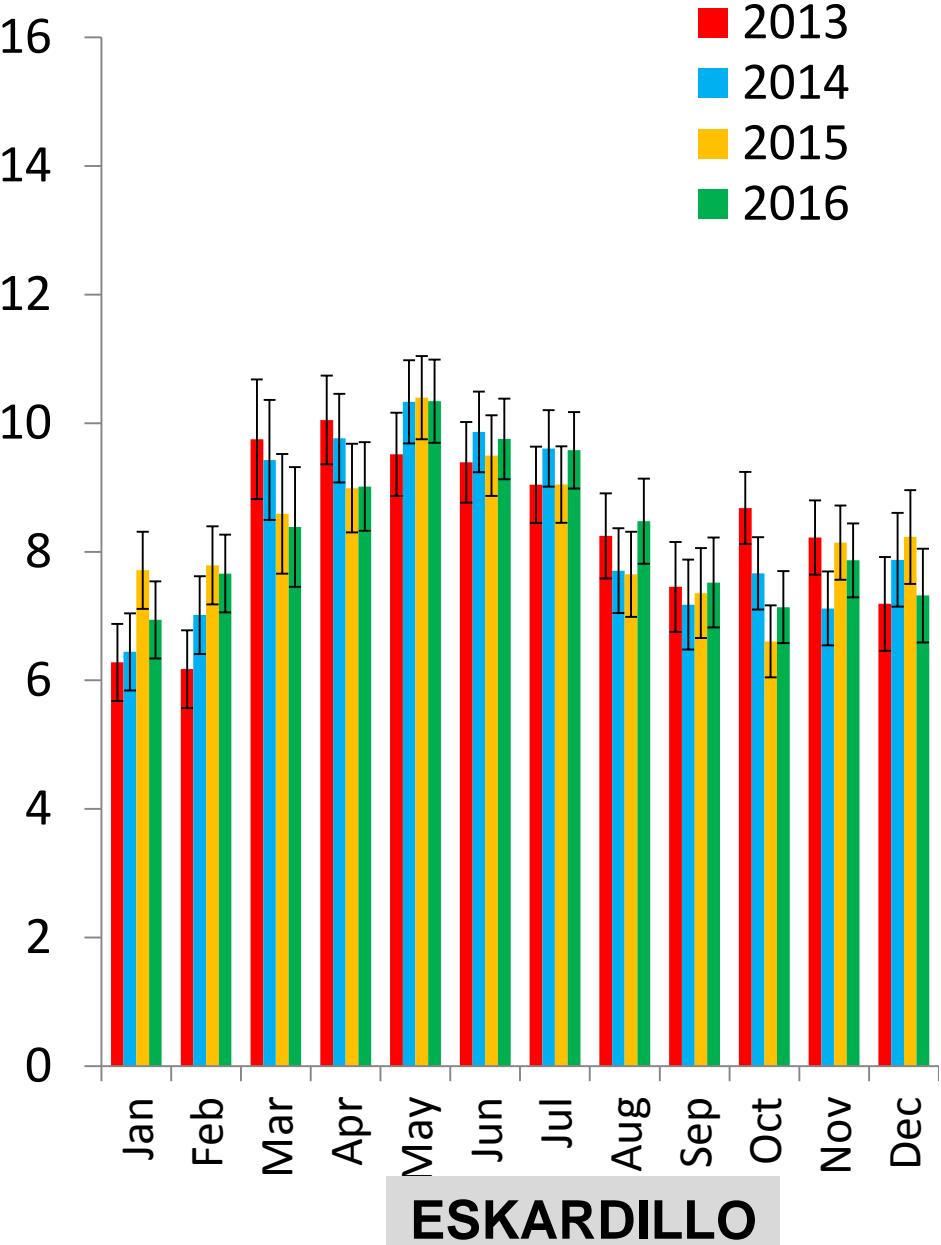
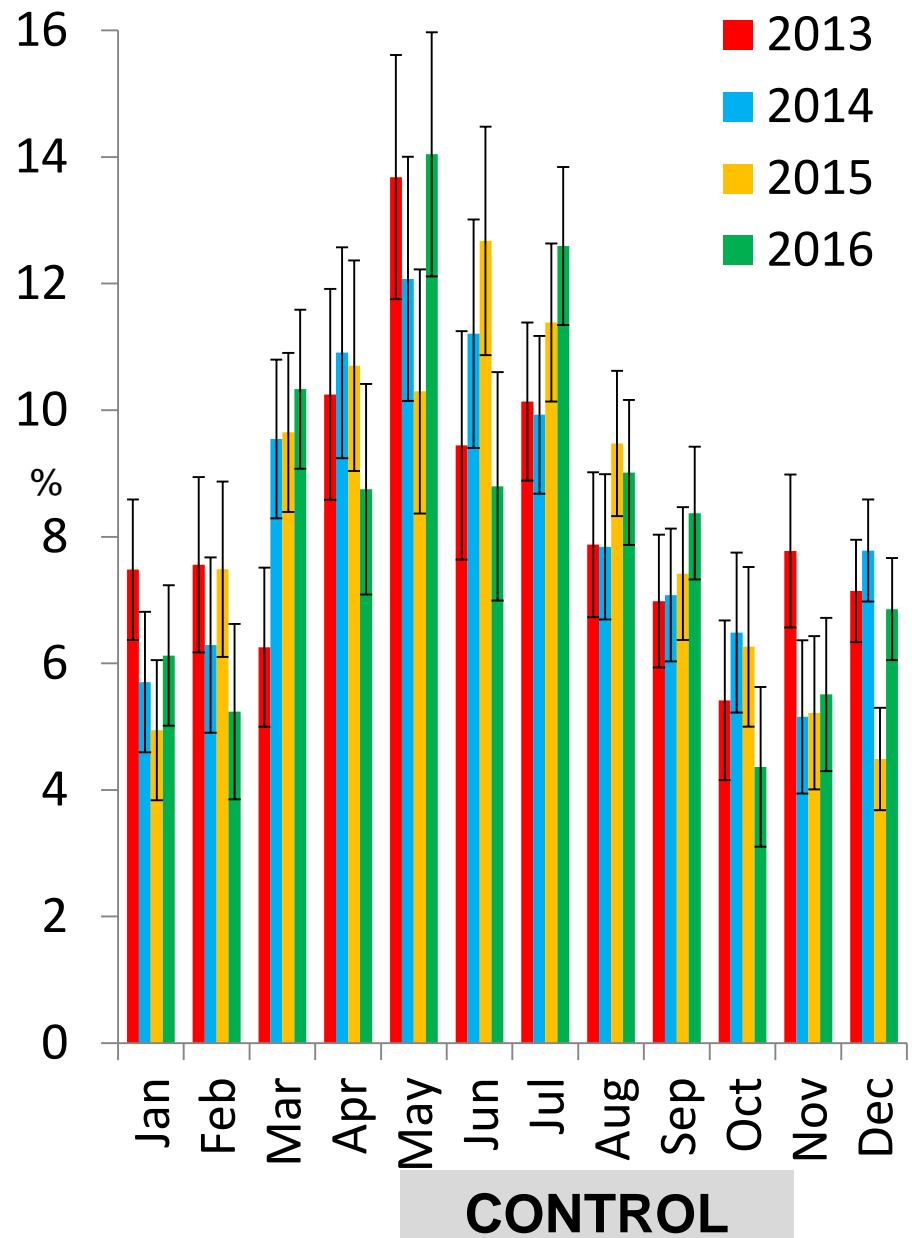


CONTROL



ESKARDILLO

Production seasonality (% of milk production)



Sustainability

Overall
P=0.839

—Conventional

—Eskardillo

Natural behaviour

Animal welfare management

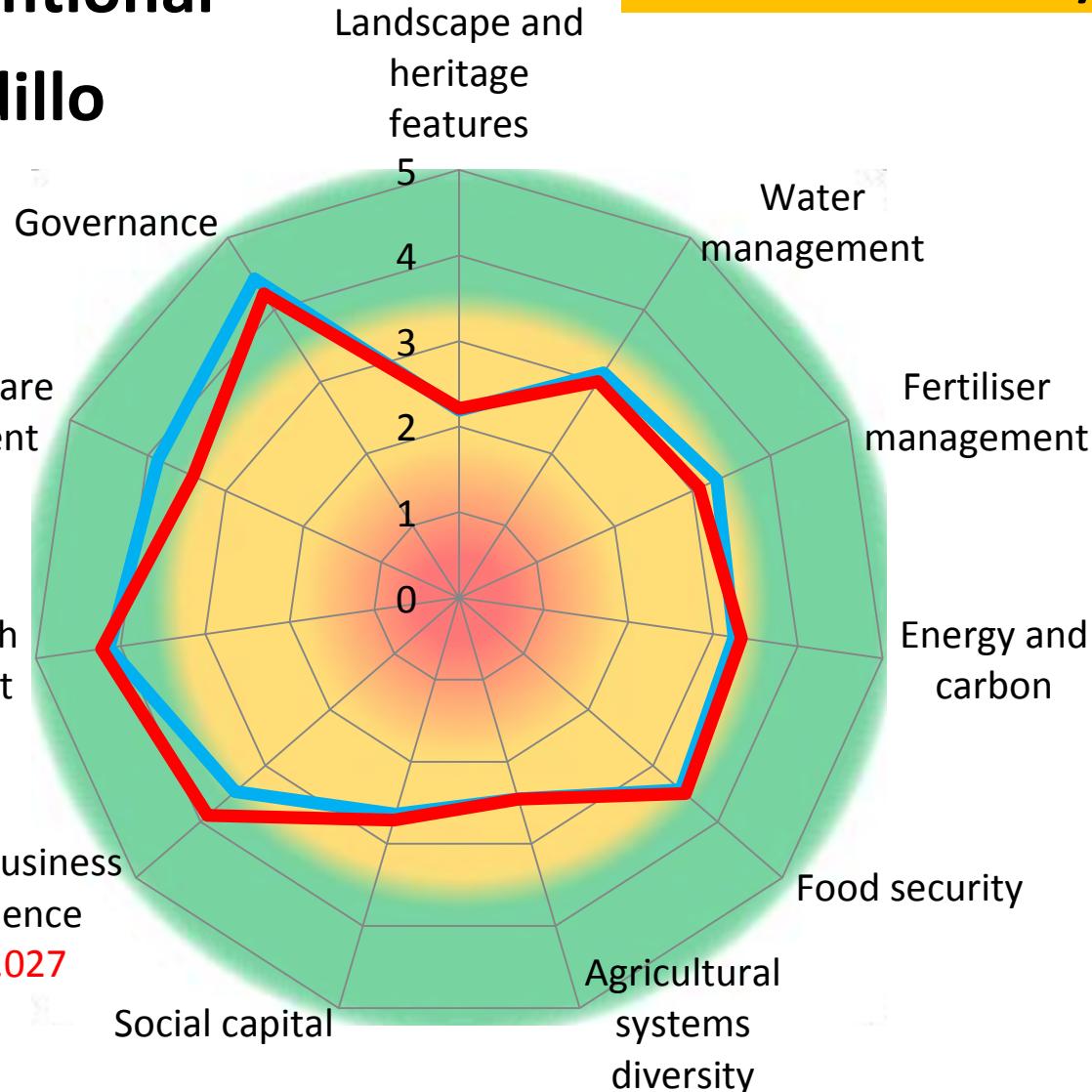
P=0.036

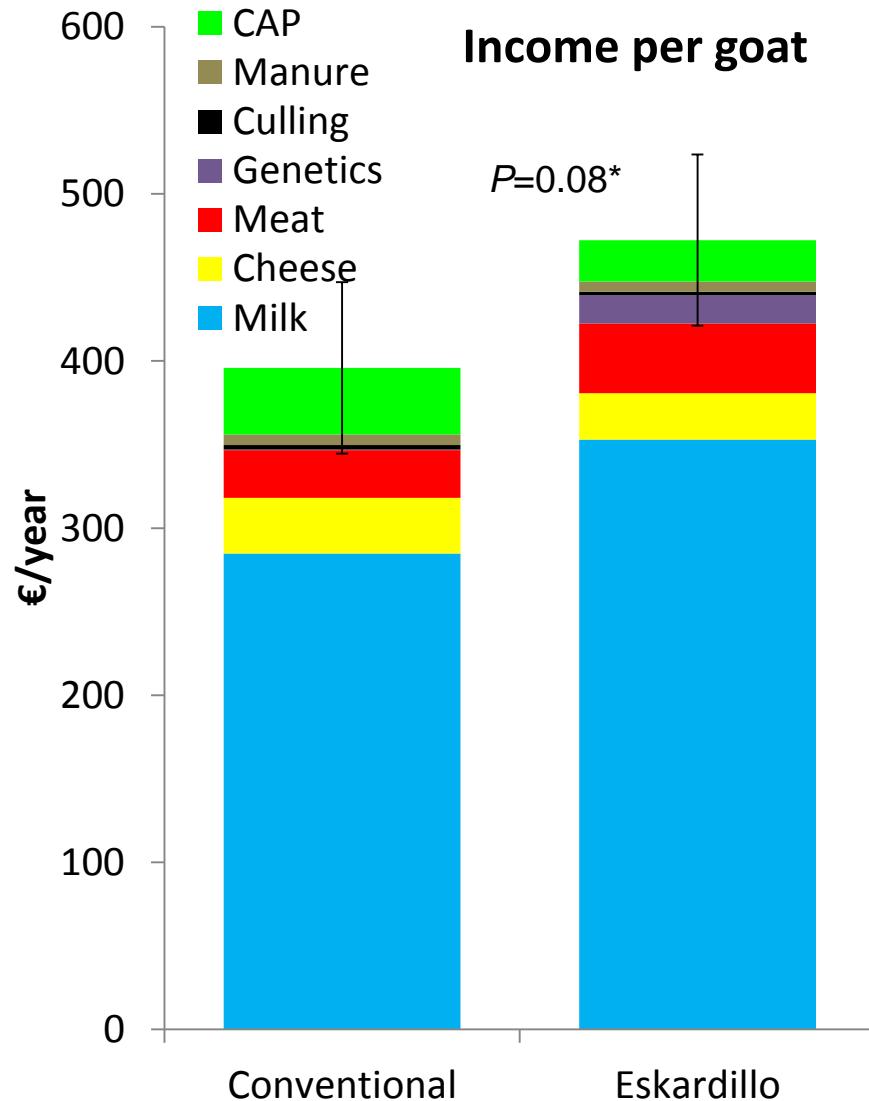
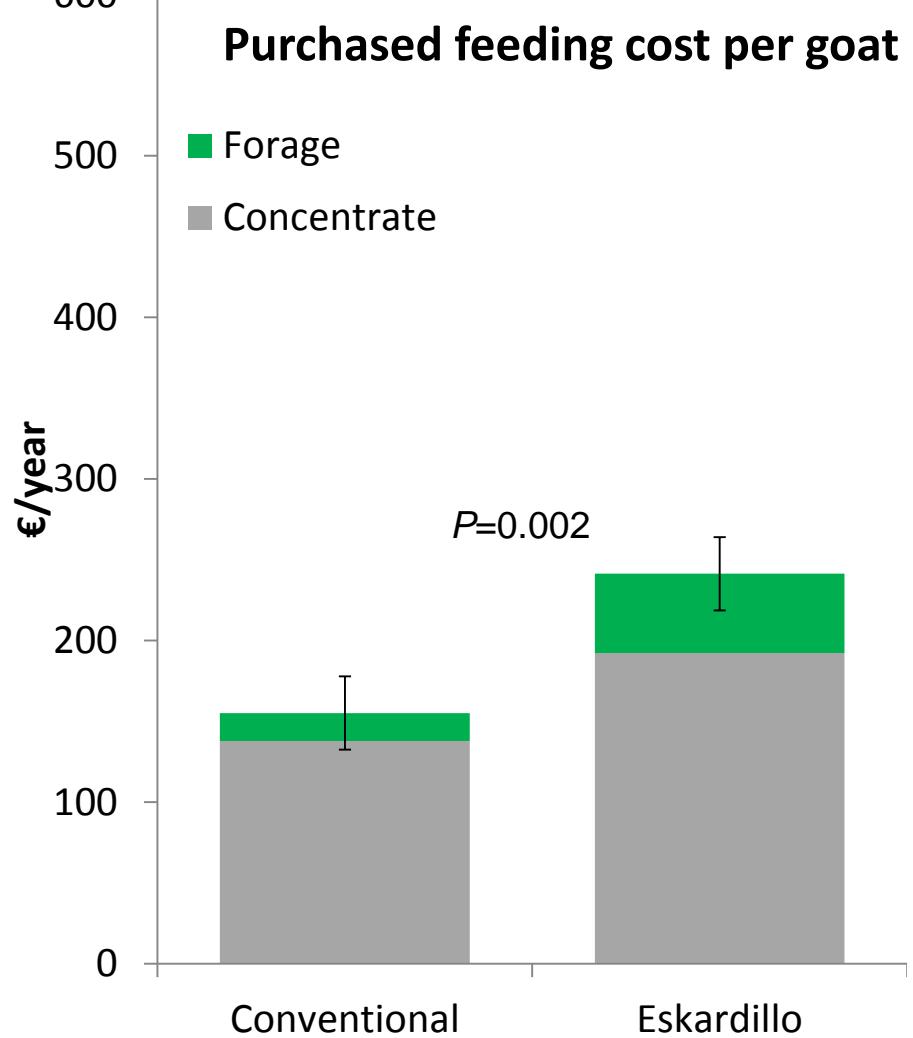
Animal health management

Farm business resilience

P=0.027

Vision/Strategy Networking





Limitations of this innovation

This innovation requires a well established data collection system is needed, which implies:

1. Constant inputs from the farmer to keep updated animal data
2. A continuous and updated milk control program
3. A breeding program with detailed information about
 - Phylogenetic information
 - Breeding value
 - Morphology evaluation
4. Technical support from the breeding association
5. All hardware and software for an efficient information flow

Main constraints of this innovation

This innovation is getting very popular (>80% of Caprigran farmers)

Some farmers are reluctant to use due to:

- The investment may not be profitable in very low income farms
- The additional time required for the data collection and reproductive intensification
- The need for versatile facilities to house increasing number of groups of animals with different physiological requirements
- Difficulty of adopting this innovation by farmers which are not familiar with new technologies
- The farmers' feeling of interference or intrusion of the Eskardillo in their decision making process

Conclusions

This study demonstrated that farm management based on a data-driven decision making is an effective strategy to:

- **Decrease unproductive periods**
- **Improve milk production**
- **Decrease production seasonality**
- **Without compromising the farm sustainability**

As a result, it facilitates farm management towards a sustainable intensification

Thank you for your attention



Innovation for Sustainable
Sheep and Goat
Production in Europe

