



## Lactational effects of melatonin during autumn in two breeds of dairy ewes

**UAB**

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de Barcelona

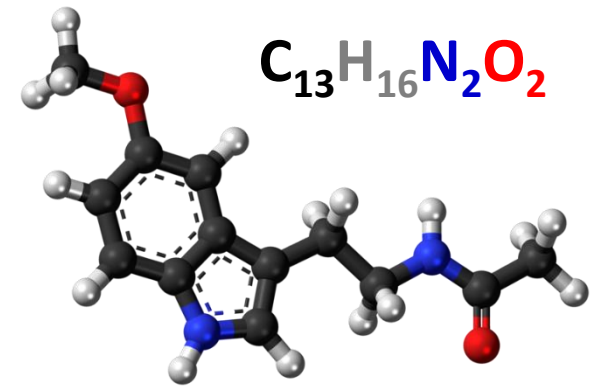
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# Introduction: Melatonin

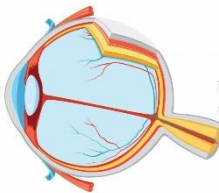
- Melatonin (MEL): a hormone synthesized in the **pineal gland** from the essential AA **tryptophan**.
- The secretion of MEL is a phototransduction process that is stimulated in **darkness**.
- MEL is a **neuroendocrine signal** that transmits the ambient light received by the retina and that is involved in several physiological processes (Borjigin et al., 1999).



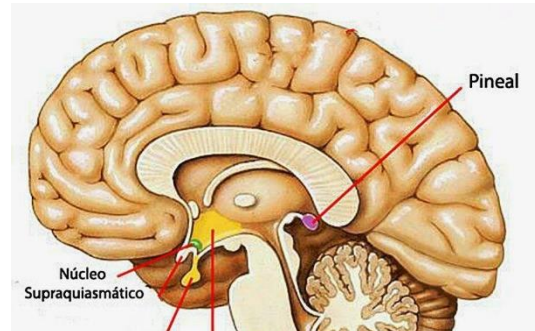
Darkness  
& light



Retina

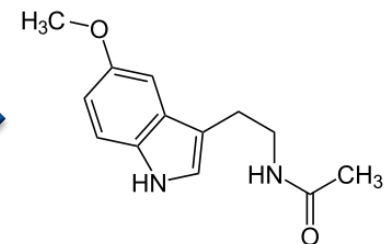


Suprachiasmatic  
nucleus



Pineal  
gland

Melatonin



# Introduction

- MEL administration induces the start of the breeding season in sheep, by imitating the stimulating effect of short days (Chemineau et al., 1996; Abecia et al., 2007).
- MEL implants do not suppress the endogenous MEL production (Zarazaga et al., 2011), and therefore high levels of MEL in the blood are expected.
- Expected negative effects on milk yield, while composition in fat and protein increases, due to the effect of short days in dairy ewes, as previously reported in grazing dairy ewes (Bocquier et al., 1997).
- But, the application of MEL implants during autumn-winter in intensive dairy ewes in Spain (Assaf and Lacaune) did not reduce milk yield (Abecia et al., 2005).
- No information available on milk composition.

# Objectives

To evaluate the effects of subcutaneous MEL implants (18 mg, Melovine, Ceva Animal Health) in early-lactation ( $35 \pm 1$  d) in 2 breeds of dairy ewes (Manchega & Lacaune).

## The variables measured were:

- DM intake.
- Milk yield.
- Milk composition:  
Total solids, fat, protein, lactose and SCC.
- Plasma: Melatonin (MEL) and Prolactin (PRL).



# Materials and methods: Animals and treatments

- **Animals:** 72 lactating dairy ewes of 2 breeds
- **Experimental design:** Factorial  $2 \times 2 \times (6 \times 3)$

Breed	Production-Composition	n	Treatment
<b>Manchega (MN)</b> 73.4 ± 1.9 kg BW	Mid-high	18	Control (CO)
		18	Melatonin (MEL)
<b>Lacaune (LC)</b> 77.7 ± 2.3 kg BW	High-mid	18	Control (CO)
		18	Melatonin (MEL)



# Materials and methods: Measures and sampling

- **DM intake:** TMR (F:C, 40:60) *ad libitum* in groups of 6 ewes:  $DMI_i = DMI_T/6$
- **Milk yield** at each milking (DeLaval MM25).
- **Milk samples** (d -2, 15, 30, 45 and 75) analyzed for total solids, fat, protein, lactose, urea and SCC by MilkoScan.
- **Blood samples** (d 15, 30, 45 and 75) for MEL and PRL analysis (ELISA).



# Materials and methods: Statistics

- **PROC MIXED** for repeated measurements (SAS v. 9.4)
- **Model:**

$$Y_{ijklm} = \mu + M_i + R_j + T_k + M \times R_{ij} + A_l + \varepsilon_{ijklm}$$

$Y_{ijkl}$  = dependent variable,

$\mu$  = mean,

$M_i$  = melatonin treatment fixed effect ( $i = \text{CO y MEL}$ ),

$R_j$  = breed fixed effect ( $j = \text{MN y LC}$ ),

$T_k$  = time fixed effect,

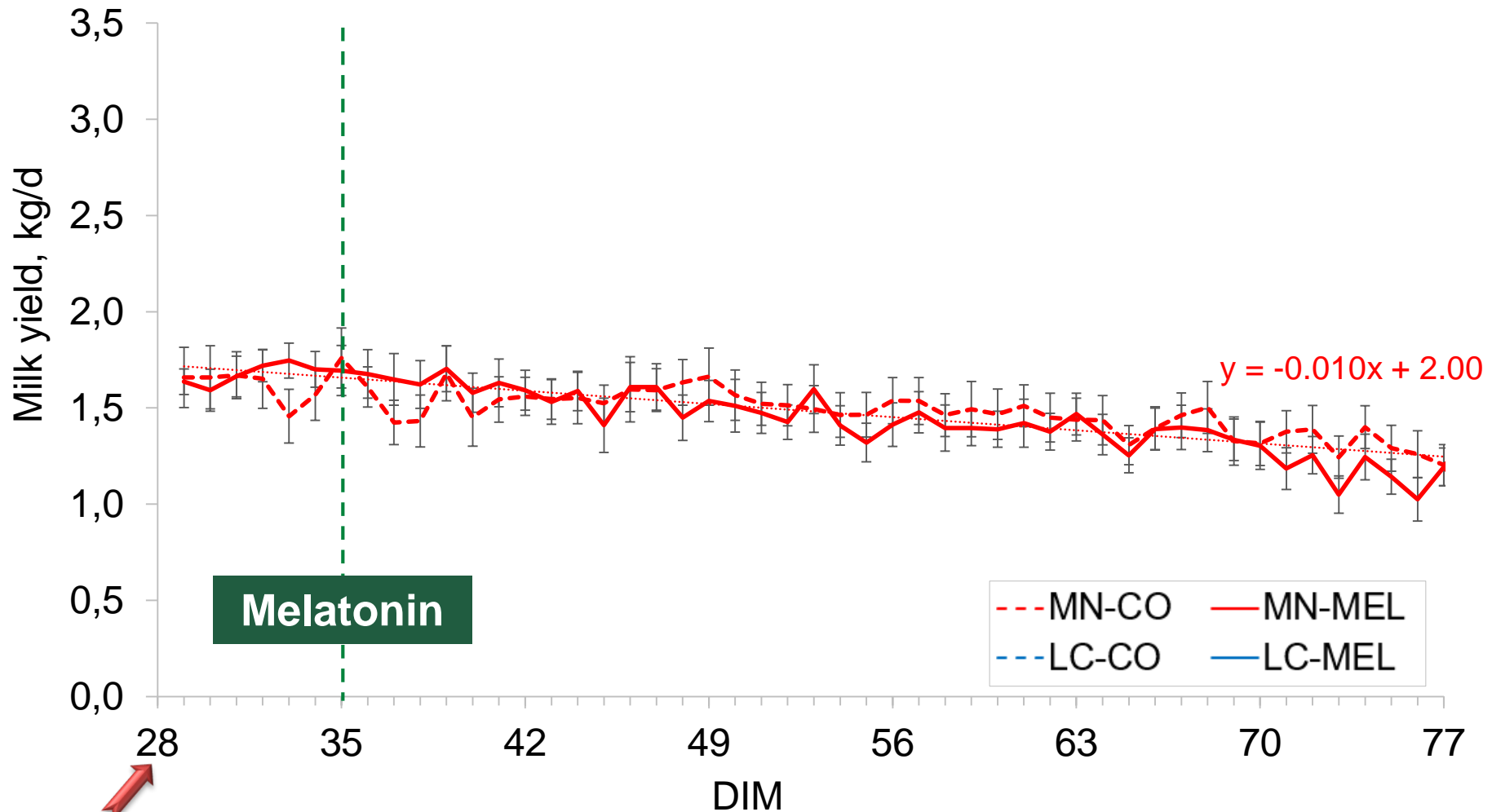
$M \times R_{ij}$  = interaction between treatment  $\times$  breed,

$A_l$  = individual animal random effect ( $l = 1 \text{ a } 72$ ),

$\varepsilon_{ijklm}$  = residual error effect.

# Results: Milk yield

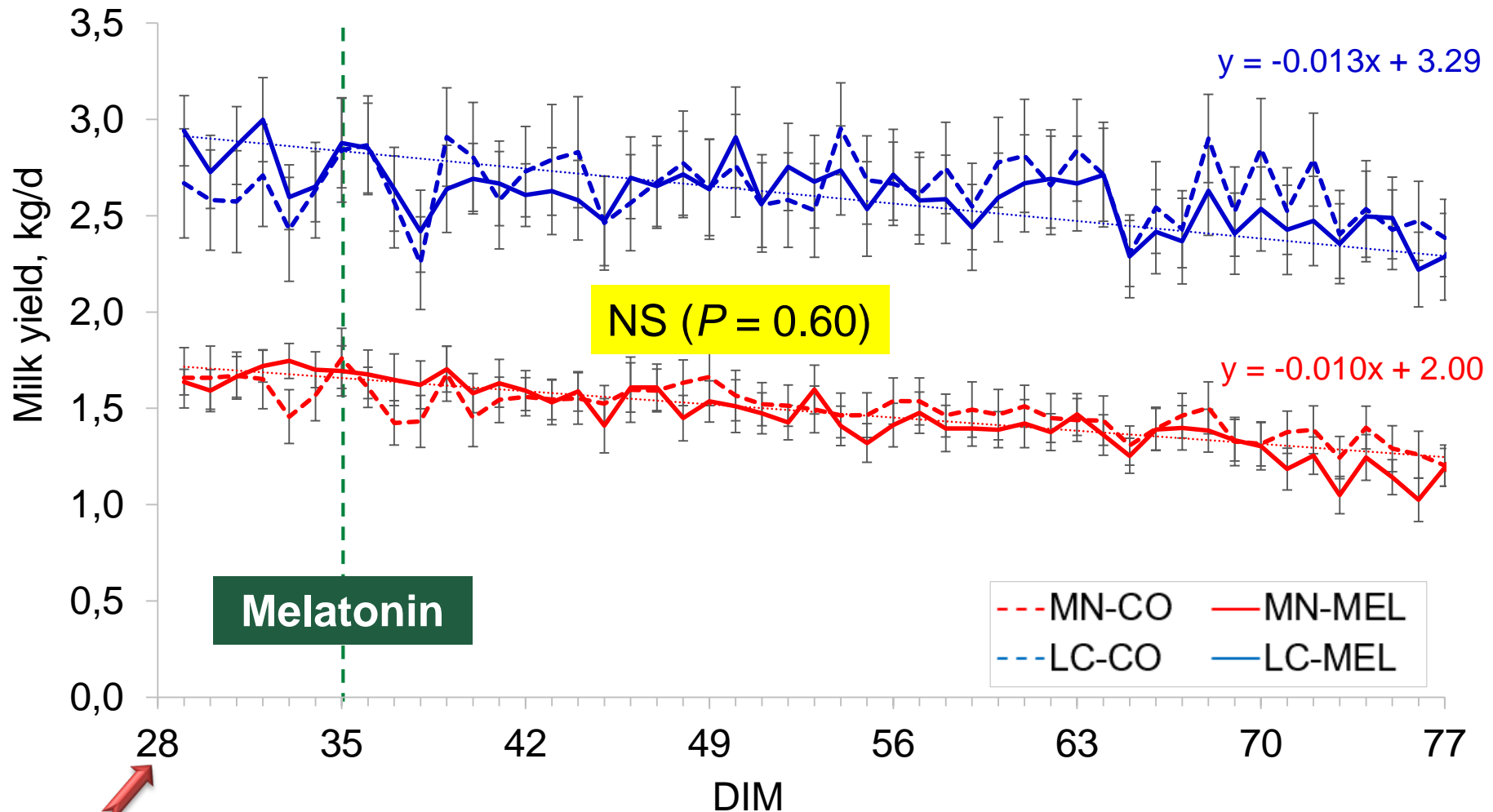
## Effects of melatonin on milk yield of Manchega and Lacaune ewes in early lactation





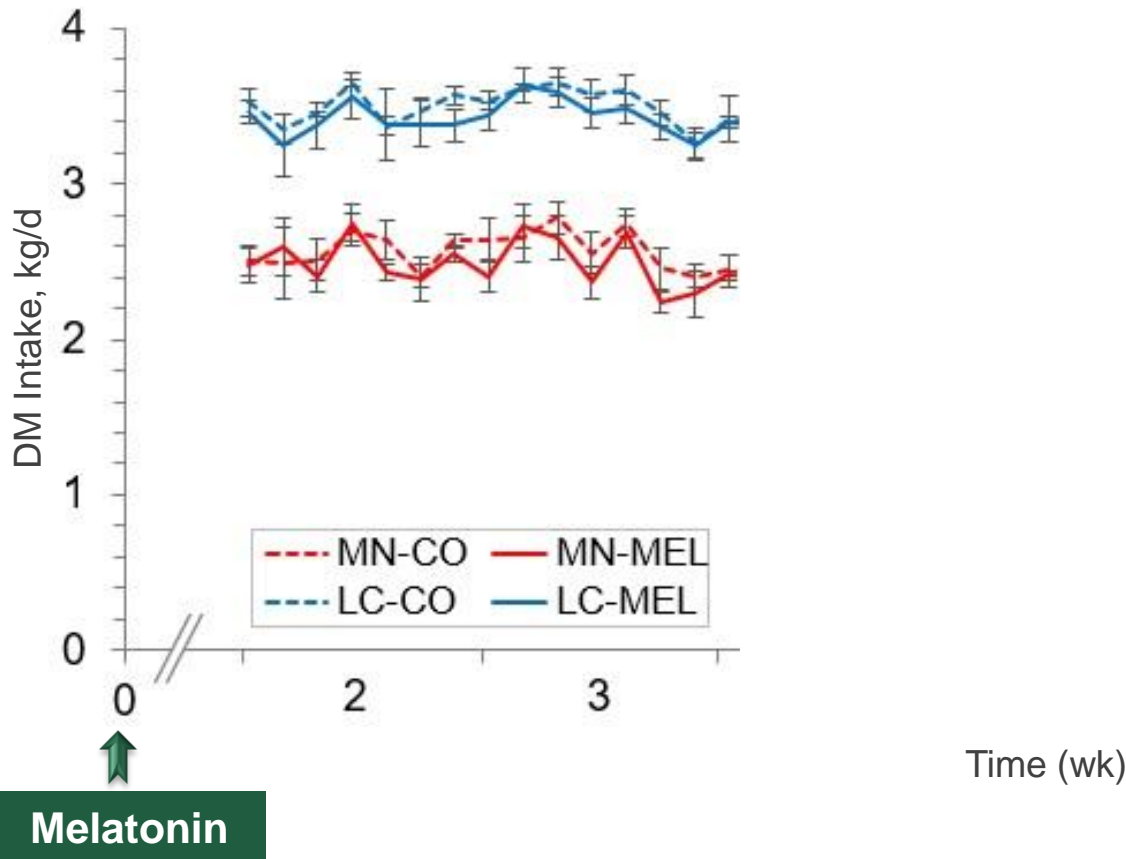
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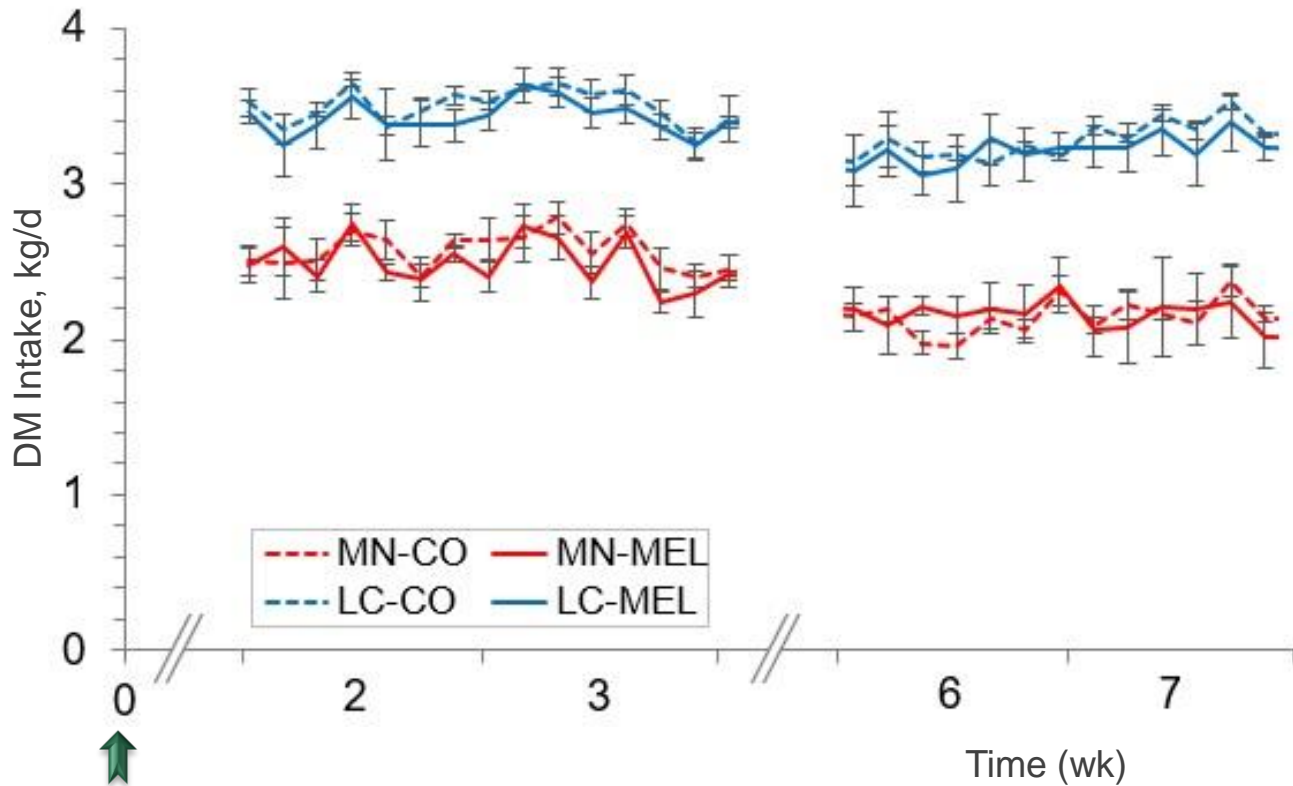
# Results: DM intake

## Effects of melatonin on DM intake of Manchega and Lacaune ewes during lactation



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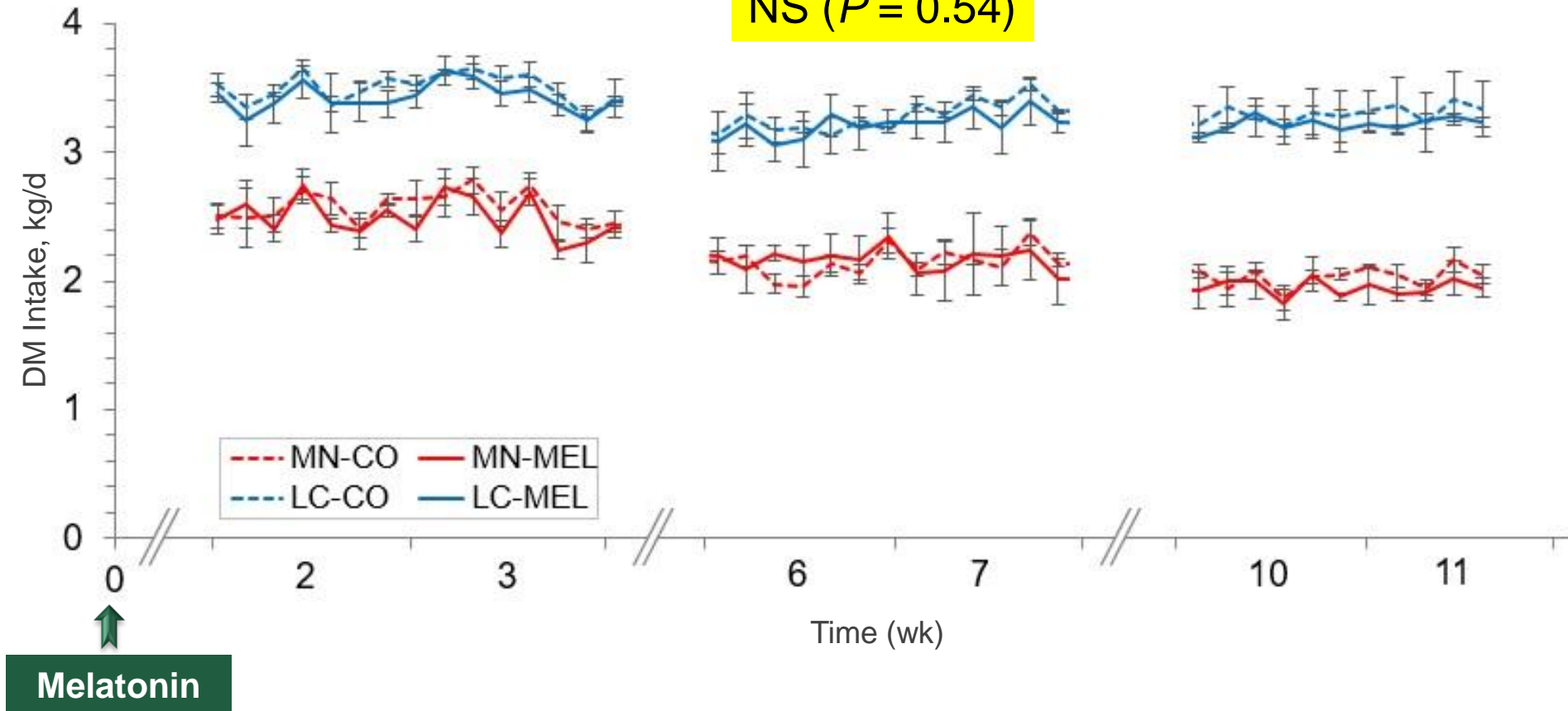


Melatonin

# Results: DM intake

## Effects of melatonin on DM intake of Manchega and Lacaune ewes during lactation

NS ( $P = 0.54$ )



# Results: Milk composition

Effects of melatonin on milk composition of Manchega and Lacaune ewes in early lactation

Item	Manchega		Lacaune		SEM	Effect ( <i>P</i> =)		
	CO	MEL	CO	MEL		Trt	Breed	Trt×B
Fat, %	7.18	7.34	5.75	5.97	0.17	0.25	0.001	0.85
Protein, %	5.89	5.84	5.44	5.46	0.10	0.90	0.001	0.73
Lactose, %	4.77	4.75	4.68	4.70	0.08	0.99	0.40	0.79
TS, %	18.8	18.9	16.8	17.1	0.2	0.47	0.001	0.69
SCC, log/mL	5.69 <sup>x</sup>	5.23 <sup>y</sup>	5.53	5.43	0.16	0.08	0.88	0.25
Urea, g/L	64	66	59	60	1	0.28	0.001	0.81

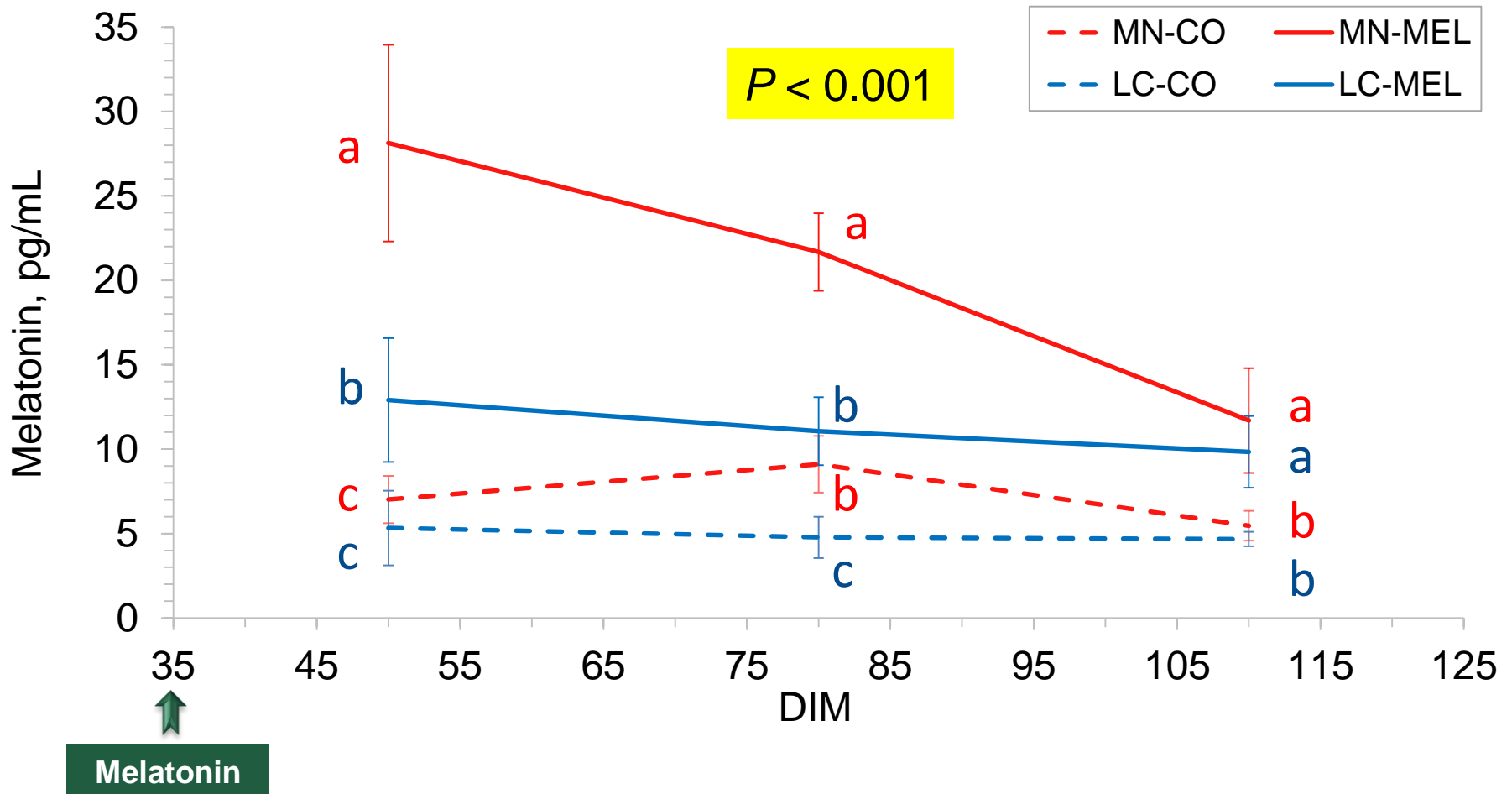
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Fat, g/d	91	87	136	136	10	0.85	0.001	0.83
Protein, g/d	75	70	127	123	8	0.60	0.001	0.97
TS, g/d	239	226	395	389	26	0.71	0.001	0.89

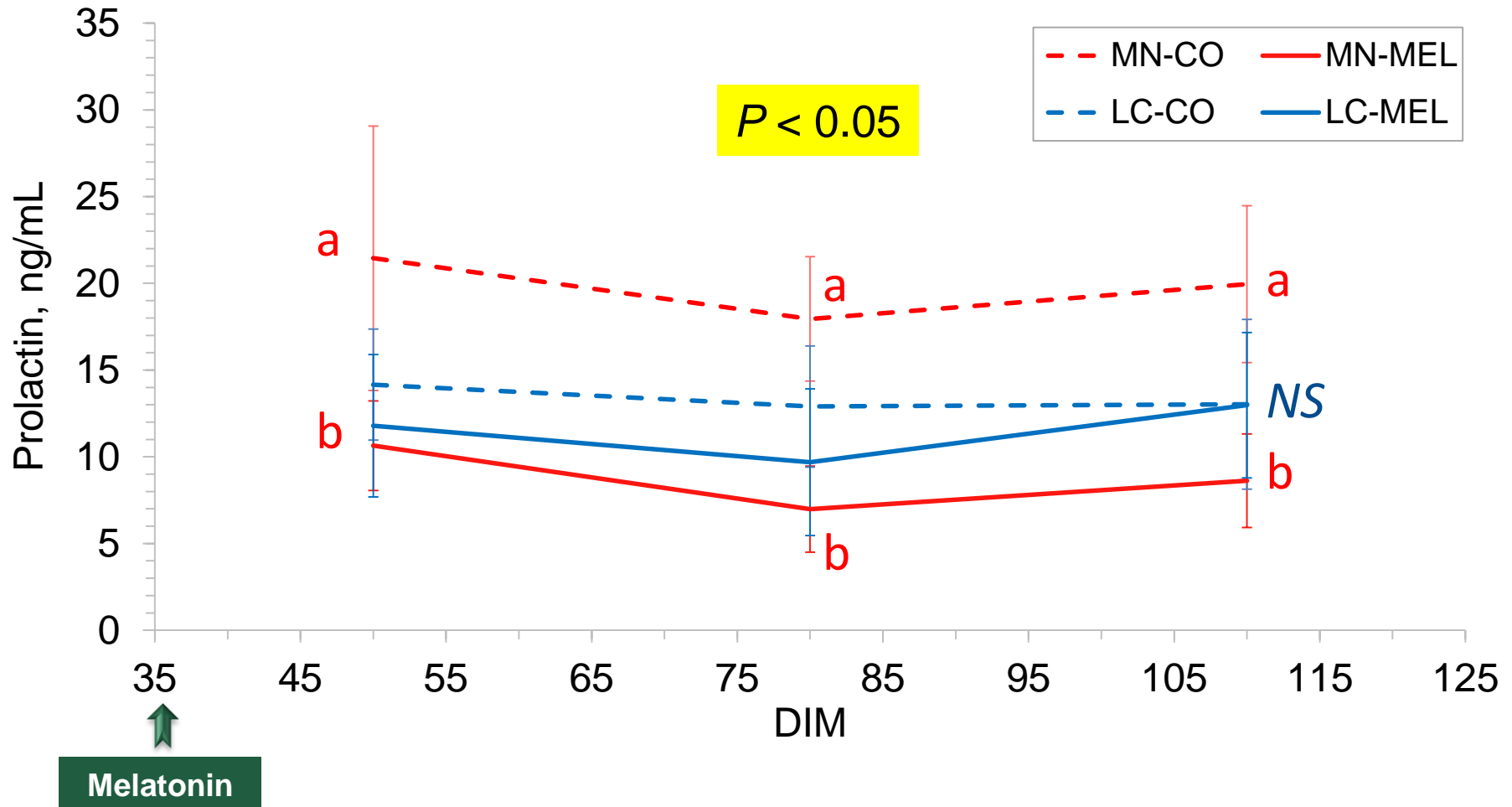
# Results: Blood analysis

## Effects of melatonin treatment on plasma MEL of Manchega and Lacaune ewes



# Results: Blood analysis

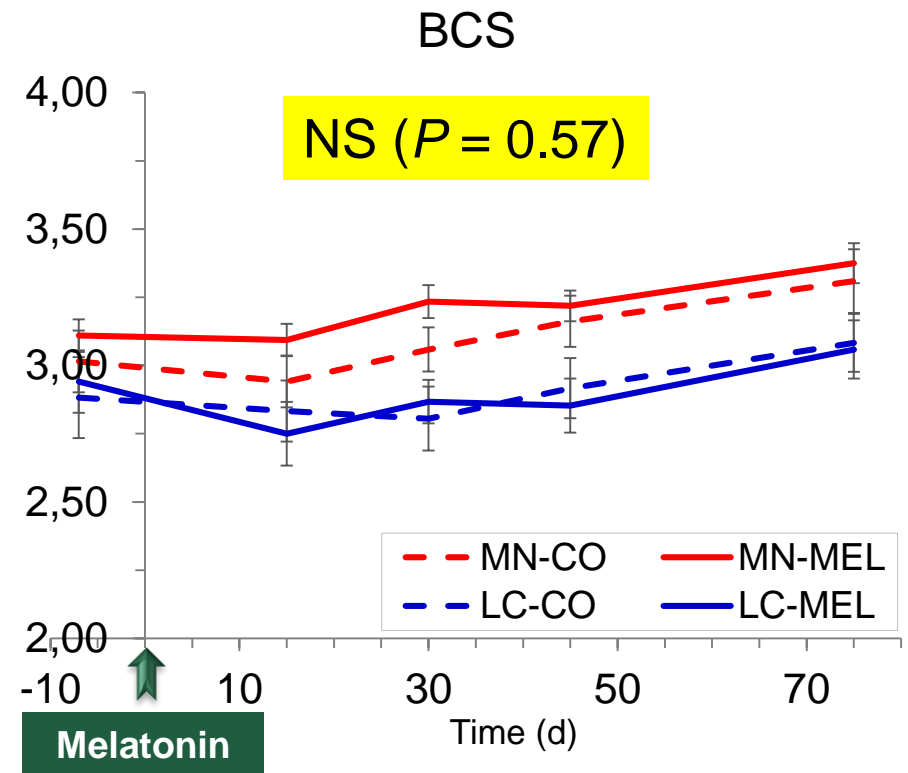
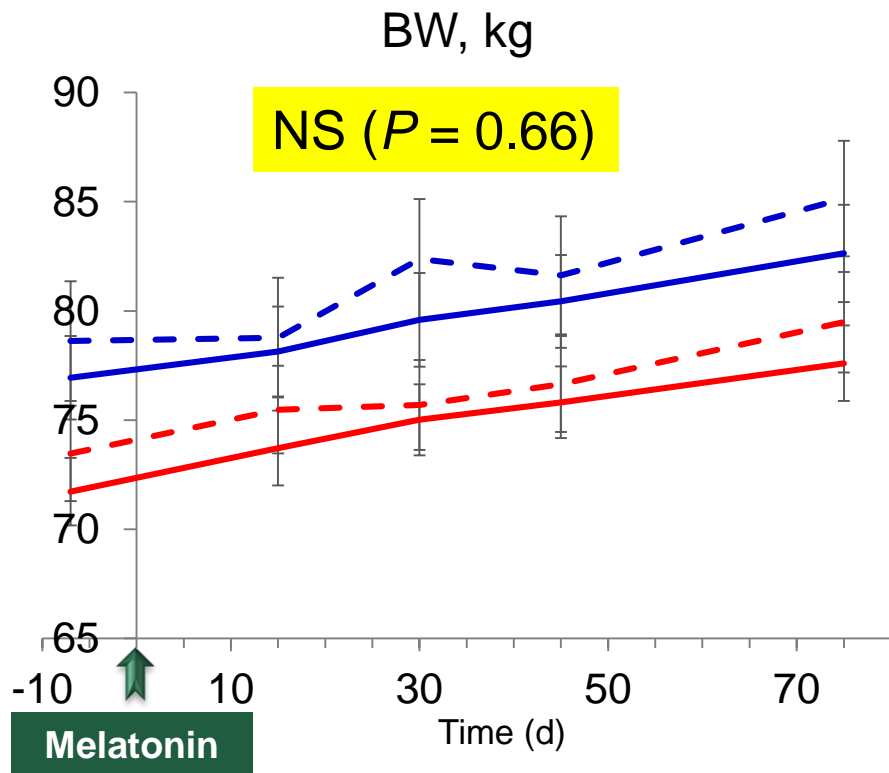
## Effects of melatonin treatment on plasma PRL of Manchega and Lacaune ewes





# Results: BW and BCS

## Effects of melatonin on BW and BCS of Manchega and Lacaune ewes



# Conclusions

The use of exogenous MEL implants, under decreasing photoperiod conditions, in dairy ewes of medium- and high-milk yield level resulted in:

- MEL was metabolized differently according to breed.
- No effect on DM intake.
- No effect on milk yield.
- No effects on milk composition or SCC.
- No effects on body reserves (BW and BCS).

So, the use of Mel implants did not impairs the lactational performances of dairy sheep, despite their level of milk yield.

Thanks for your attention





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