

# Effect of lambing season on milk production and composition between Istrian and Pag sheep in Croatia

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## INTRODUCTION

Milk production in Mediterranean part of Croatia is based on the autochthonous breeds like Istrian and Pag sheep. The production has seasonal character characterized by wet winters and hot dry summers with differences in annual rainfall and wide variations between locations and years.

The objective of this study was to determine the differences in production and milk composition according to season of lambing (month and year) for Istrian and Pag sheep.



## RESULTS

Table 1. Descriptive statistics and LSM  $\pm$  s.e. of MM, FC, and PC by breed

| Trait   | Mean    |      | LSM $\pm$ s.e.  |                 |
|---------|---------|------|-----------------|-----------------|
|         | Istrian | Pag  | Istrian         | Pag             |
| MM (kg) | 111.2   | 90.1 | 107.5 $\pm$ 1.4 | 96.9 $\pm$ 1.8  |
| FC (%)  | 7.32    | 7.57 | 7.78 $\pm$ 0.09 | 7.35 $\pm$ 0.13 |
| PC (%)  | 6.04    | 6.05 | 6.41 $\pm$ 0.08 | 5.86 $\pm$ 0.10 |

Table 2. LSM  $\pm$  s.e of MM, FC, and PC in Istrian and Pag sheep by year of lambing

| Year   | Istrian         | Pag             |
|--------|-----------------|-----------------|
|        | MM (kg)         |                 |
| 2006   | 87.0 $\pm$ 3.2  | 98.9 $\pm$ 2.9  |
| 2007   | 141.3 $\pm$ 2.8 | 98.5 $\pm$ 2.5  |
| 2008   | 121.7 $\pm$ 1.8 | 94.8 $\pm$ 2.4  |
| 2009   | 119.6 $\pm$ 1.7 | 89.9 $\pm$ 2.0  |
| FC (%) |                 |                 |
| 2006   | 7.01 $\pm$ 0.22 | 7.73 $\pm$ 0.21 |
| 2007   | 9.76 $\pm$ 0.19 | 7.40 $\pm$ 0.17 |
| 2008   | 8.96 $\pm$ 0.12 | 7.31 $\pm$ 0.16 |
| 2009   | 8.36 $\pm$ 0.12 | 6.52 $\pm$ 0.14 |
| PC (%) |                 |                 |
| 2006   | 5.16 $\pm$ 0.18 | 6.02 $\pm$ 0.17 |
| 2007   | 8.44 $\pm$ 0.16 | 5.93 $\pm$ 0.14 |
| 2008   | 7.26 $\pm$ 0.10 | 5.67 $\pm$ 0.14 |
| 2009   | 7.13 $\pm$ 0.10 | 5.43 $\pm$ 0.11 |

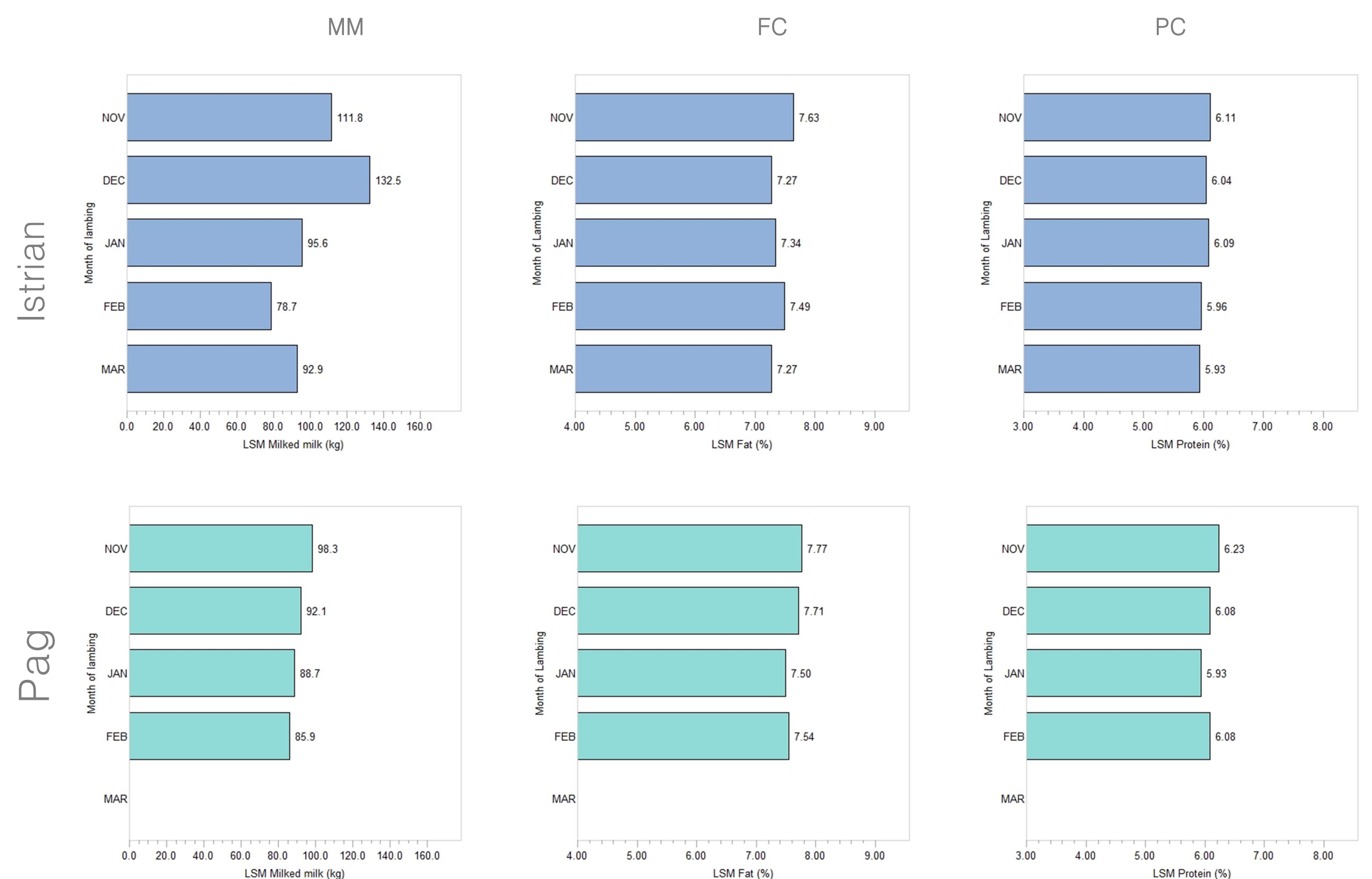


Figure 1. LSM means of MM, FC, and PC in Istrian and Pag sheep by month of lambing

## CONCLUSIONS

- Milk traits were affected by breed and lambing season (month and year)
- Istrian sheep produced more MM with higher FC and PC in comparison to Pag sheep
- MM was the highest for Istrian ewes lambing in December and Pag ewes lambing in November
- Ewes lambing in November had the highest FC and PC for both breeds
- Istrian ewes lambing in 2007 and Pag ewes lambing in 2006 had the highest MM and FC and PC

## MATERIAL AND METHOD

### Traits

- Milked milk (MM), fat (FC), and protein content (PC)
- Central database of Croatian Agricultural Agency
- Number of test-day records: 7.825 (3.391 for Istrian and 4.434 for Pag sheep)
- Number of ewes: 4.911 ewes (2.227 Istrian and 2.684 Pag)
- GLM procedure in SAS / STAT

### Model

$$y_{ijklm} = \text{traits (MM, FC, or PC)}$$

$$\mu = \text{the overall mean,}$$

$$B_i = \text{breed (2 levels),}$$

$$M_{ik} = \text{month of lambing nested with breed (5 levels),}$$

$$Y_{jl} = \text{year of lambing nested within breed (4 levels)}$$

$$e_{ijklm} = \text{residual}$$

