Currently and future prospects of individual animal data interpretation to optimize dairy goat farm management

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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
Ancient shepherds

- Individual animal management
- Individual identification
- Filiation of individuals
- Relevant dates
- Productivity
- Selection based on productivity
Data collection
- Chip reader
- Barcode reader
- Digital camera
- Keyboard for farmer inputs
- Milk control
- Morphological evaluation

Data Processing

Feedback to the farmer
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 matting for low merit animals
  – Identification of the best conception timing
**Objective:** 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)

Lactation (1.80 kg/d or 409 kg total)
Dry period
Next Lactation

Pregnancy

227 d
112 d

339 d = 1.08 lactations / year

1st partum age 16.4 months

Goat’s life 5 years 2.72 lactations

68,353 LACTATIONS; 31,859 GOATS

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

• Decreasing unproductive periods

  – 1st partum age

  – Dry period length
Does 1st partum age affect milk production?

Milk yield 1st lactation

(Kg / lactation)

< 12m: 315
13-14m: 355
14-16m: 358
17-18m: 363
>18m: 349

(Matecón et al., 2013. IV Foro Nacional Caprino)
Implications of 1st partum age

Extra feeding cost = 12,1 €/animal

(Matecón et al., 2013. IV Foro Nacional Caprino)
Effect of Eskardillo on 1st partum age

- 2013
- 2014
- 2015
- 2016

P-values:
- P=0.058
- P=0.08
- P=0.064
- P=0.035
- P=0.024

Graph showing the effect of Eskardillo on 1st partum age across different time periods (2013, 2014, 2015, 2016). The graph indicates a 1 month less in the partum age and a (+49%) increase in the control group compared to the Eskardillo group.
Milk production in 1st lactation

**CONTROL**

**ESKARDILLO**

- 2013
- 2014
- 2015
- 2016

P=0.020 (+7.5%/yr)

**ns**
Dry period length
Does a long dry period increase milk yield?

![Bar chart showing milk yield per lactation by dry period length (days).](image)

- **Milk yield per lactation**
  - <61d: 519 Kg
  - 61-90d: 504 Kg
  - 91-120d: 447 Kg
  - 121-150d: 367 Kg
  - >151d: 265 Kg

(Matecón et al., 2013. IV Foro Nacional Caprino)
Implications of dry period length

![Bar chart showing percentage of animals in different dry period lengths](chart.png)

- **<61d**: 15.0% of animals
- **61-90d**: 40.9% of animals (44% highlighted)
- **91-120d**: 23.1% of animals
- **121-150d**: 8.4% of animals
- **>151d**: 12.7% of animals

Extra feeding cost = 16 €/animal

(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.

<table>
<thead>
<tr>
<th>Feeding cost</th>
<th>Milk price 0.4 €/L</th>
<th>Milk price 0.6 €/L</th>
<th>Milk price 0.8 €/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.40 €/d</td>
<td>1 L</td>
<td>0.67 L</td>
<td>0.5 L</td>
</tr>
<tr>
<td>0.50 €/d</td>
<td>1.25 L</td>
<td>0.83 L</td>
<td>0.62 L</td>
</tr>
<tr>
<td>0.60 €/d</td>
<td>1.5 L</td>
<td>1 L</td>
<td>0.75 L</td>
</tr>
</tbody>
</table>

Below that threshold animals should be dry off and **give birth 2 months after**
Eskardillo: Reproductive plan according to productivity

Lactation curve Type I

Lactation curve Type II

(Matecón et al., 2013.
IV Foro Nacional Caprino)
Effect of Eskardillo on Dry period length

- 20 days less

P=0.04

P=0.077 (+31%)
Effect of Eskardillo on Milk yield (210 DIM)

- Control
- Eskardillo

2013:
- P=0.039 (+1.5%/yr)

2014:
- P=0.011 (+2.8%/yr)

2015:
- (+94%)

2016:
Udder health

SCC (log cells/d)

CONTROL

ESKARDILLO

2013

2014

2015

2016

P=0.079

P=0.016
Longevity / Functional Longevity

- **CONTROL**
  - Longevity (yr)
  - Functional longevity (lactations)

- **ESKARDILLO**
  - Longevity (yr)
  - Functional longevity (lactations)
Effect of Eskardillo on Estimated Breeding Value

Estimated Breeding Value (kg milk)

P=0.001
Reproductive plan (breeding seasons)

CONTROL

ESKARDILLO

A

B

C

D

E

F
Production seasonality (% of goats in milking)

- 2013
- 2014
- 2015
- 2016

CONTROL

ESKARDILLO

* *
Production seasonality (\% of milk production)
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

• Future plans:
  – Precision feeding strategies
  – Economical indicators
  – Animal Health and Wellbeing indicators
Thank you for your attention

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