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## Clustering of lactation curves on French dairy goats

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► **To cite this version:**

Mathieu Arnal, Christèle Robert-Granié, Helene Larroque. Clustering of lactation curves on French dairy goats. FAO/CIHEAM Network for Research and Development in Sheep and Goats. Joint Seminar of the Subnetworks (Nutrition and Production systems) and Innovation for Sustainability in Sheep and Goats (iSAGE), Oct 2017, Vitoria-Gasteiz, Spain. hal-02736426

**HAL Id: hal-02736426**

**<https://hal.inrae.fr/hal-02736426>**

Submitted on 2 Jun 2020

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# Analysis of goat lactation curves in France

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**FAO-CIHEAM Seminar on Sheep and Goats, Vitoria-Gasteiz (Spain), 3-5 October**



**Food and Agriculture  
Organization of the  
United Nations**

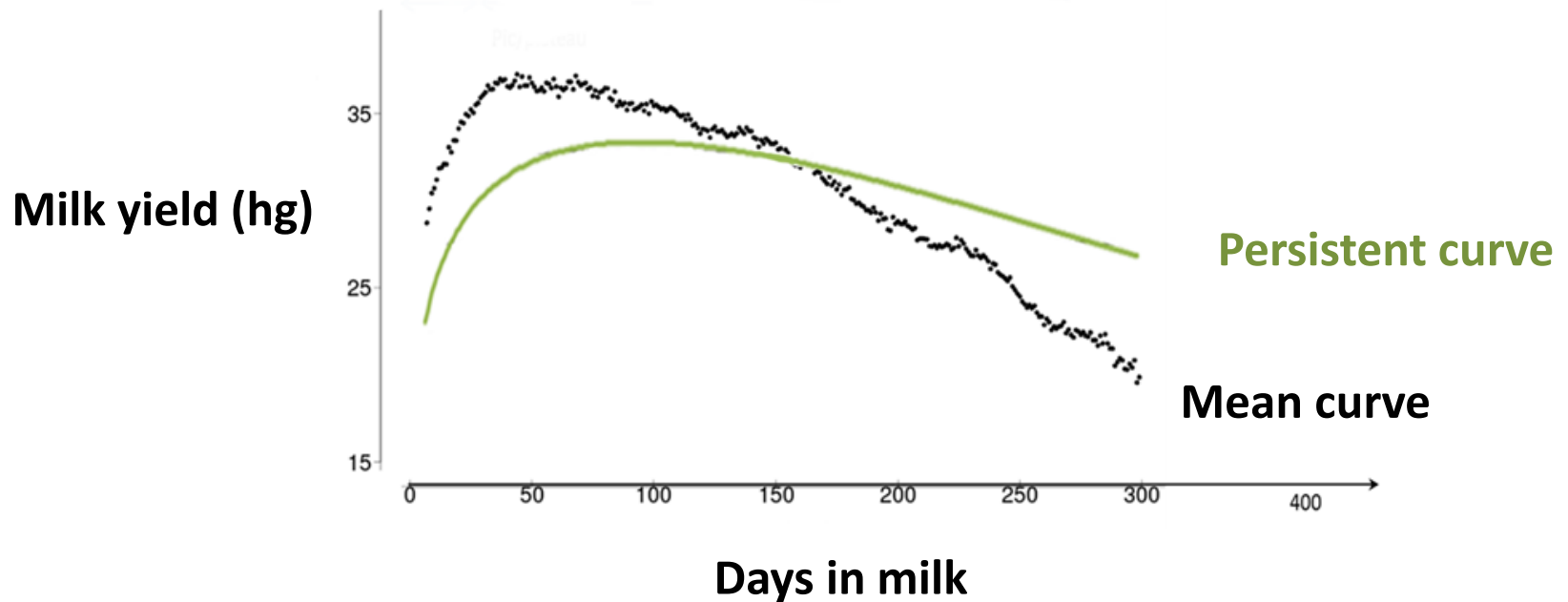


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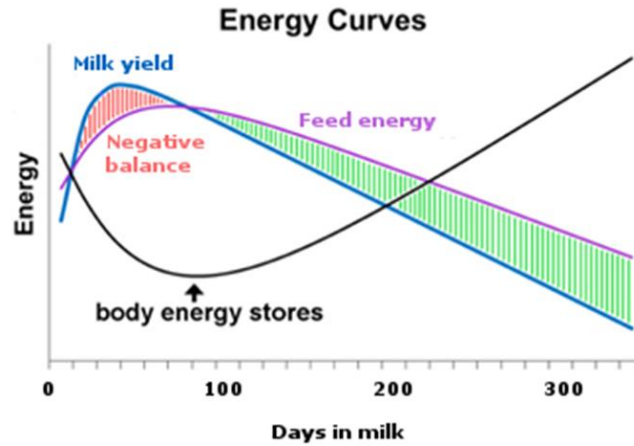
# A lactation curve represents the daily production according to the lactation stage

Daily production weight (hg)  
according to the days in milk



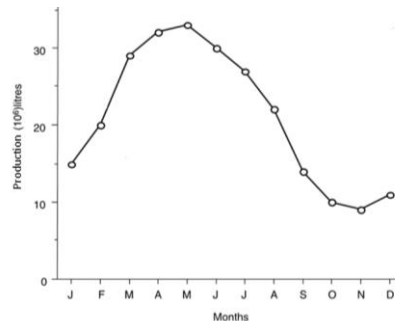
# The shape of the lactation curve is of interest for the repartition of feed needs

From Strucken et al. (2015)

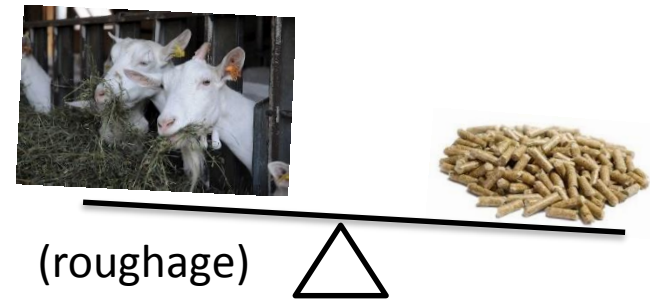


Importance of negative balance

Repartition of milk production

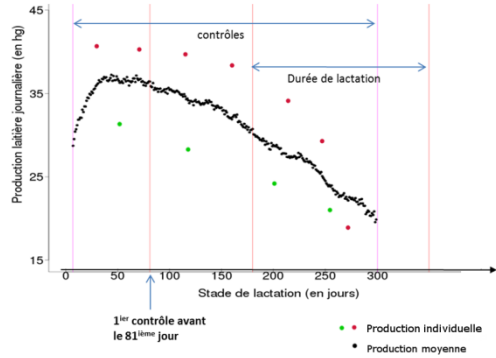


From Chemineau et al. (1996)

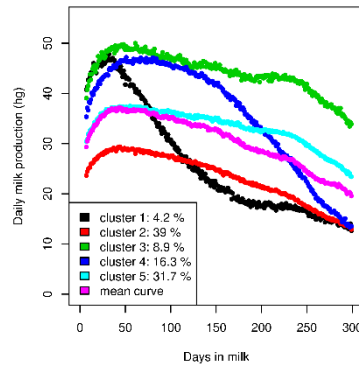


(roughage)

# This presentation focuses on the shape of the lactation curve



## Data presentation



## Clustering of lactation curves based on their shapes



## The impact of different factors on the shape of lactation curves

# Data: Selection from the national dairy test-day database

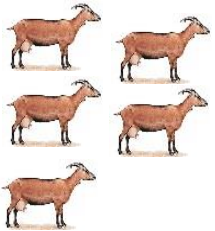
# Data: Selection from the national dairy test-day database

Production of about 2000 herds measured every 4 to 5 weeks



2 weighings per check

At least 4 controls per lactation



5 goats of the same breed per herd per control



**Saanen**



**Alpine**

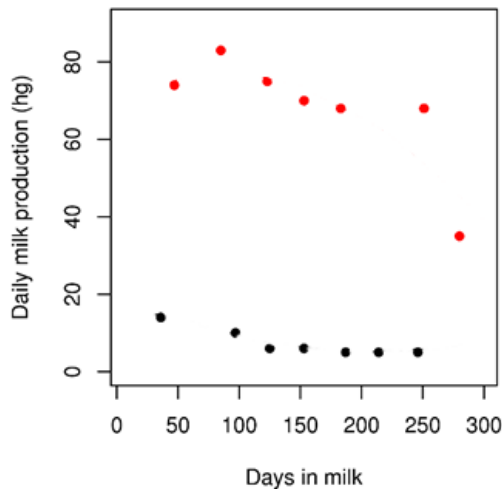
Final data : Years 2009 to 2011 (213 000 goats, 324 547 lactations)

# Curves classification



# Goat milk production is not measured at the same lactation stage but the information is not averaged by period

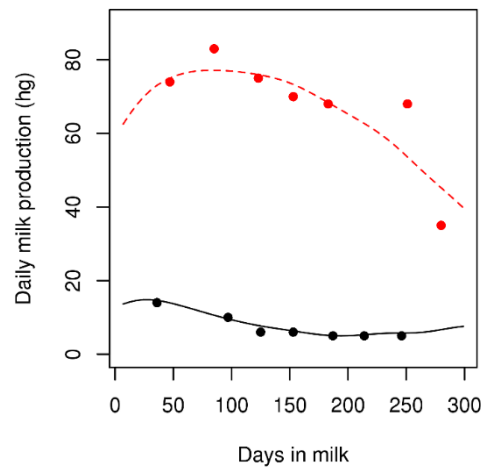
## Functional data



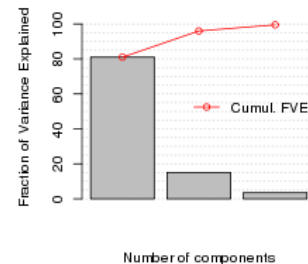
Local linear regression



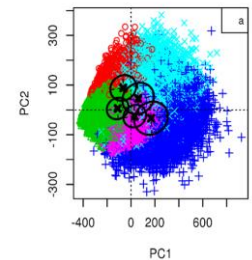
Package R "fdapace" (Dai et al., 2016)



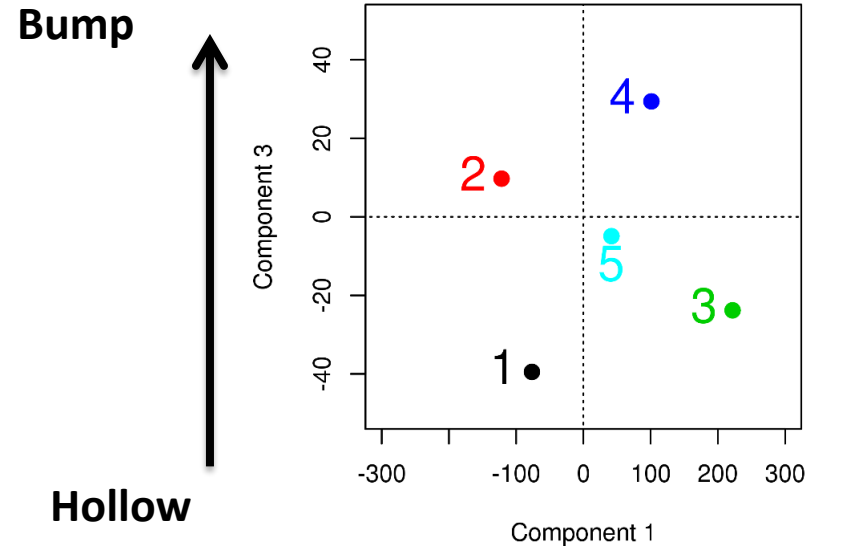
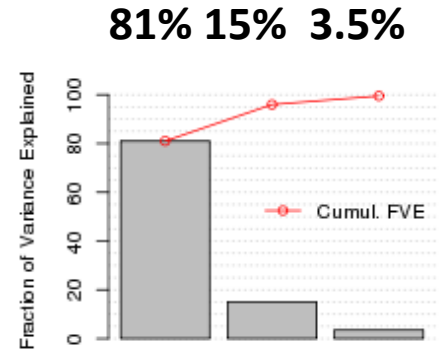
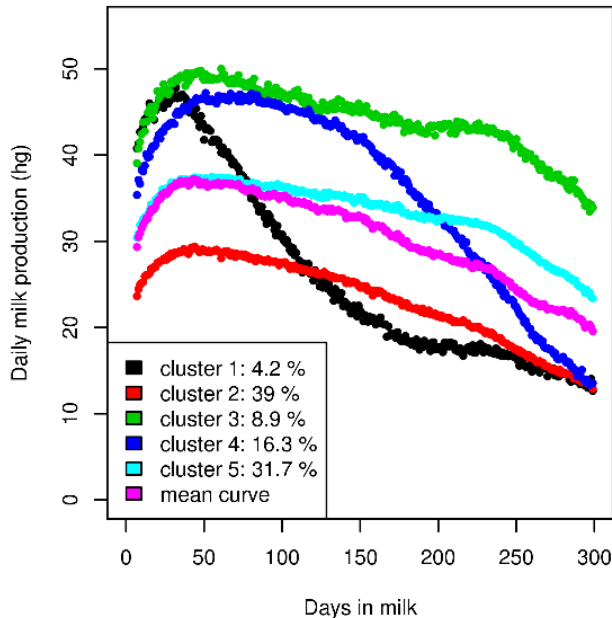
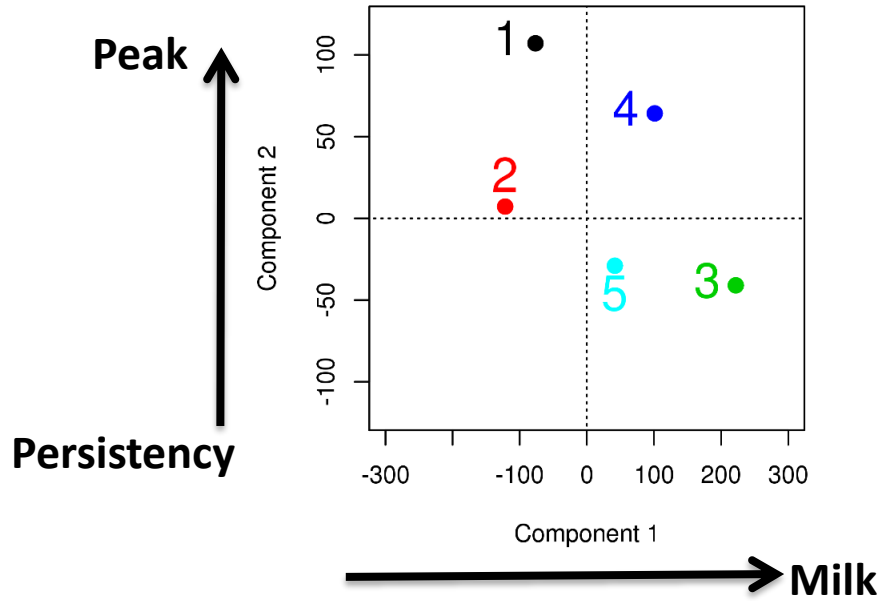
PCA



Clustering



# 5 different curves after the classification of lactations according to the 3 components

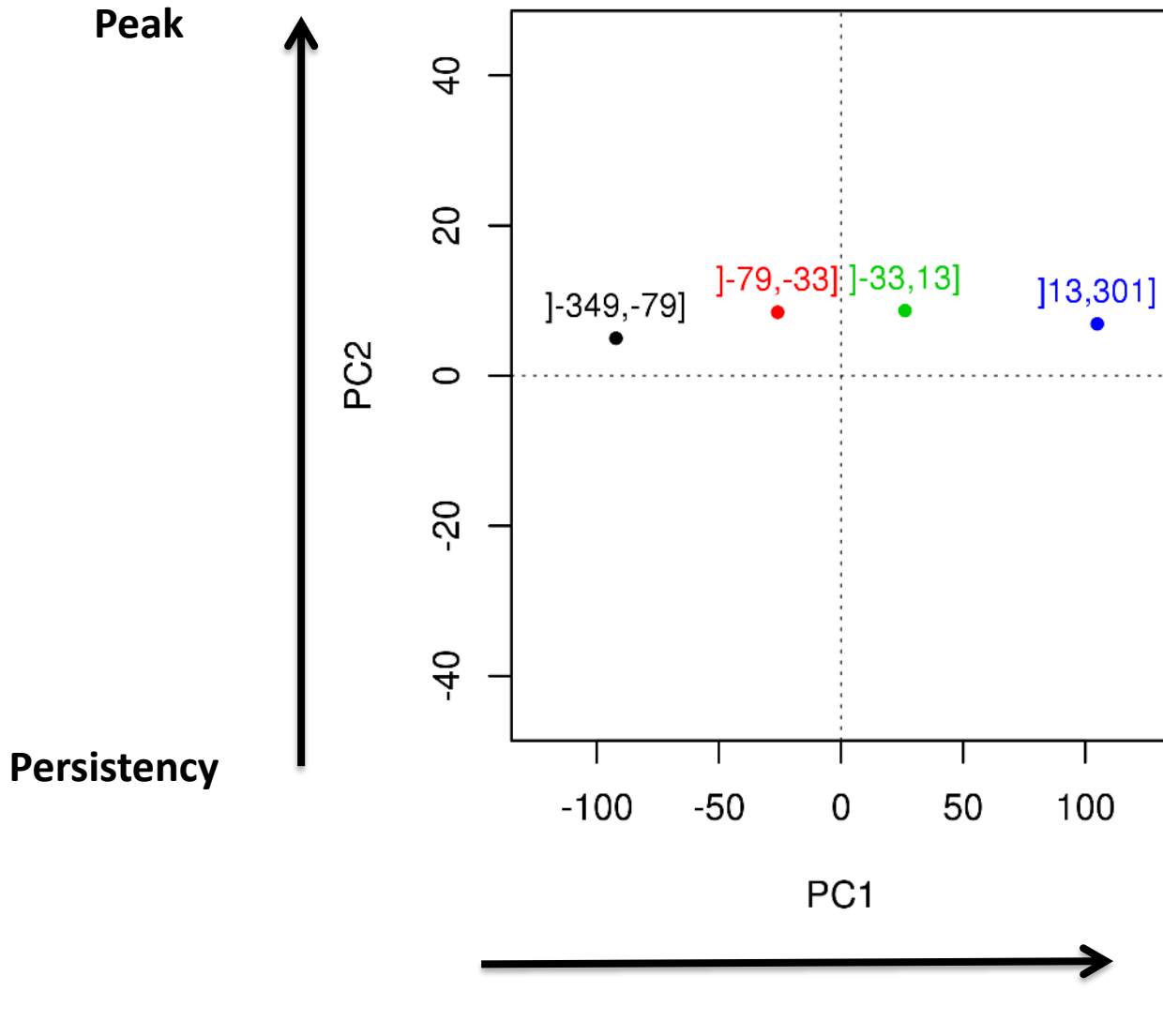


Package R Rmixmod

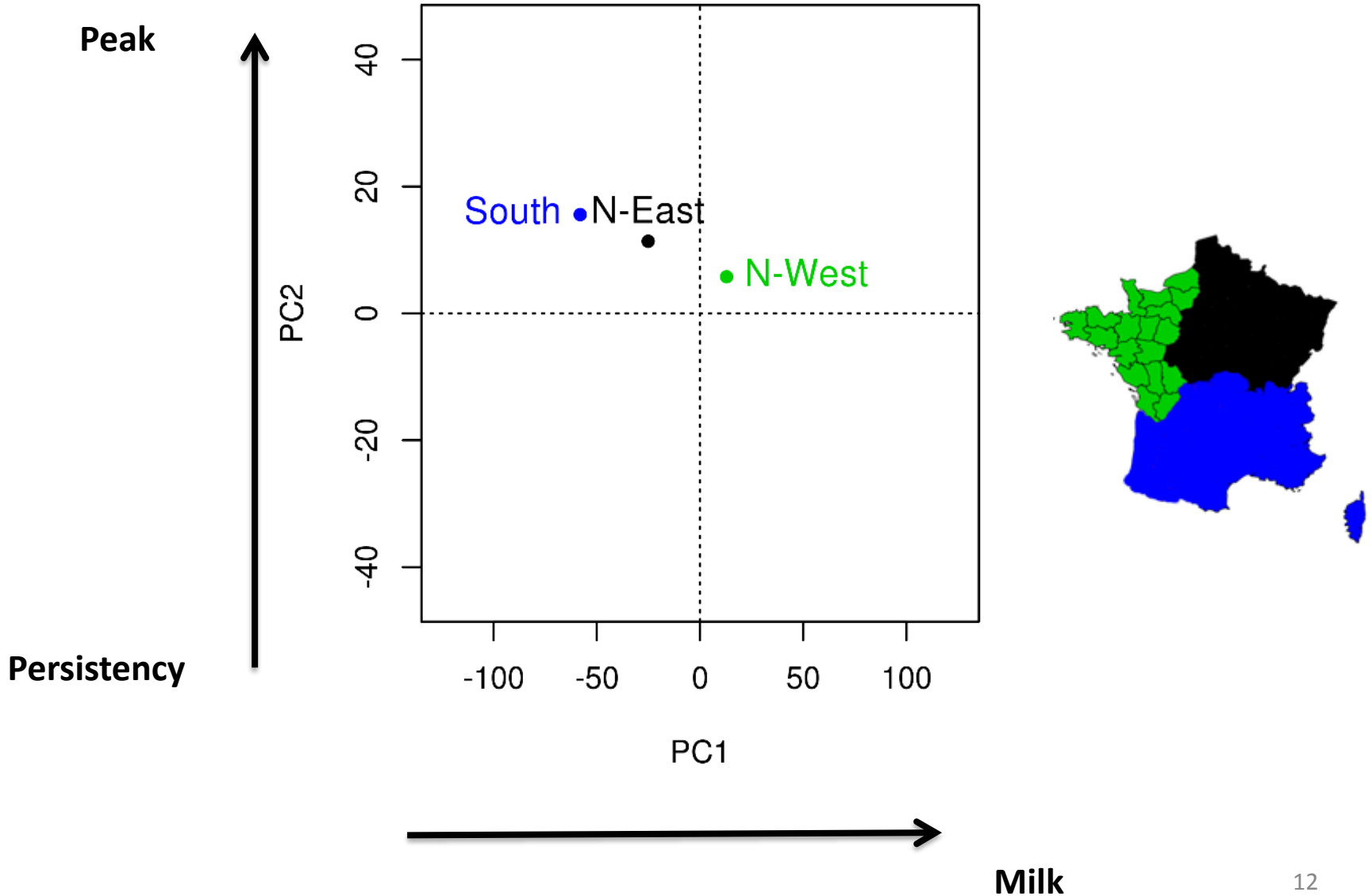
# Relations between different factors and the shape of lactation curves

- **Parity**
- **Age at kidding**
- **Kidding month**
- **Dry-period length**
- **Gestation stage**
- **Breed**
- **Milk EBV**
- **Somatic Cell Score EBV**
- **Region**

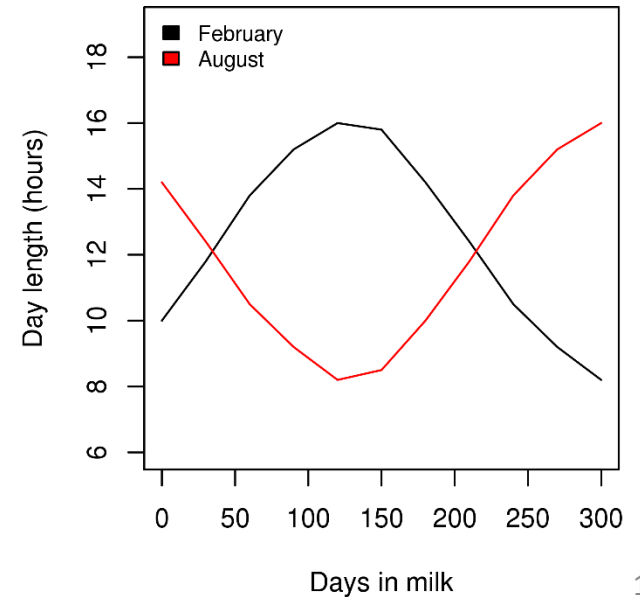
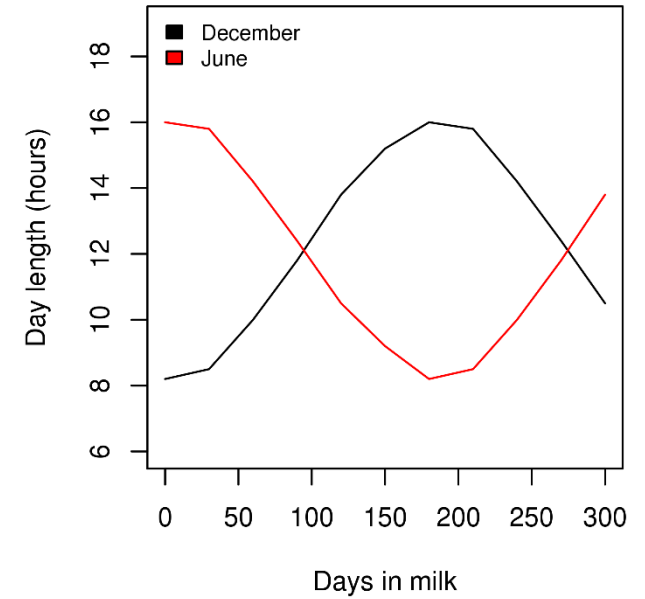
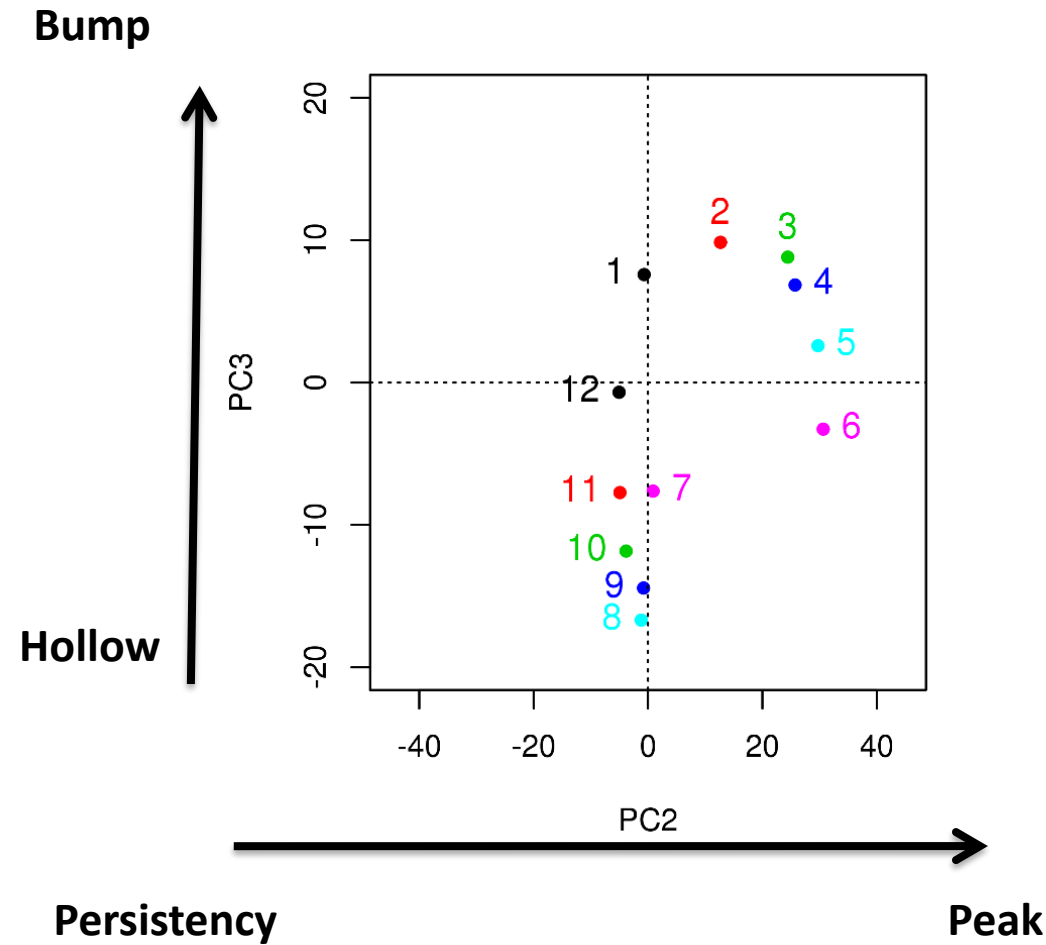
# Milk Genetic index is the factor the most related to the level of production



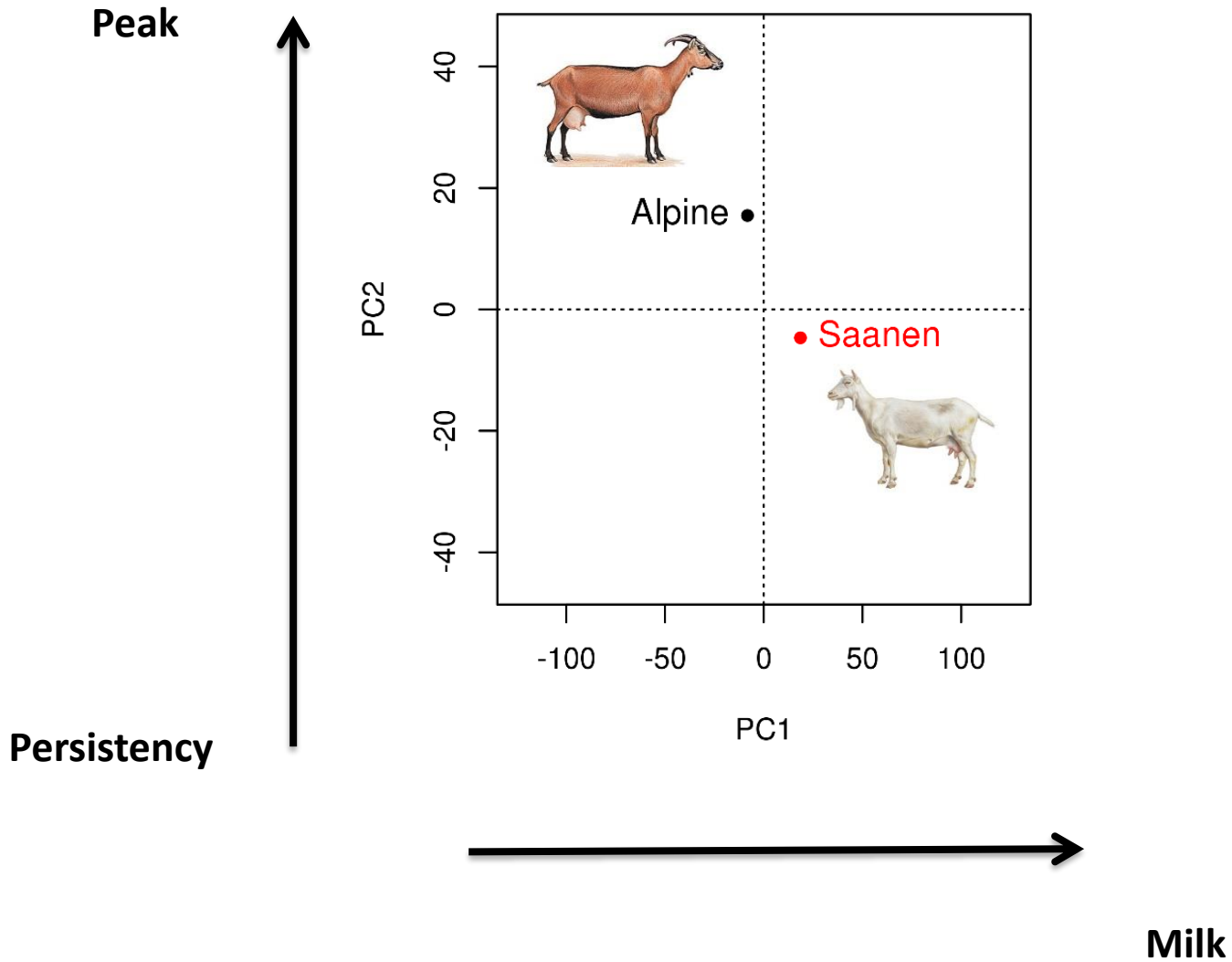
# Region is one of the factors most related to the level of production



# The kidding month is the factor the most related to the persistency and to the curvature at the middle of lactation:

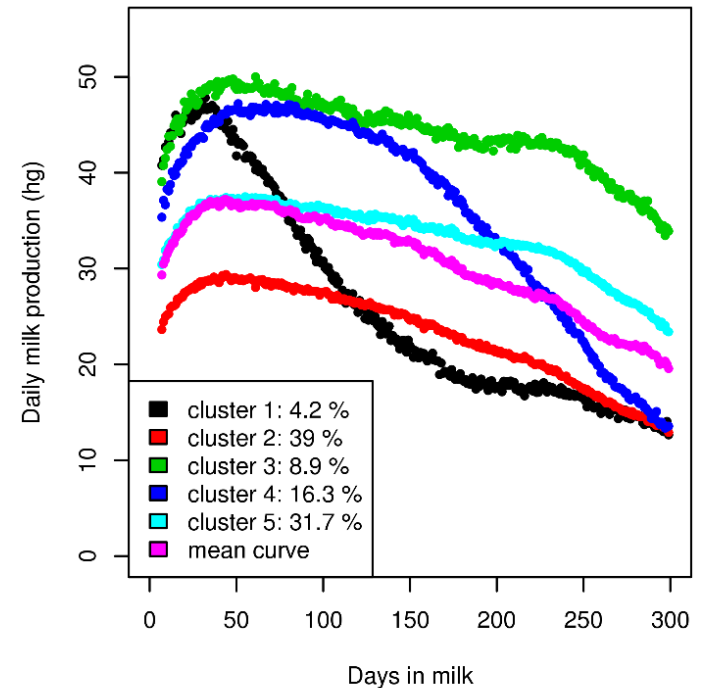


# The breed is one of the factors most related to the persistency :



# It was possible to summarize curves with a PCA, to do a classification and to study impacts of environmental factors

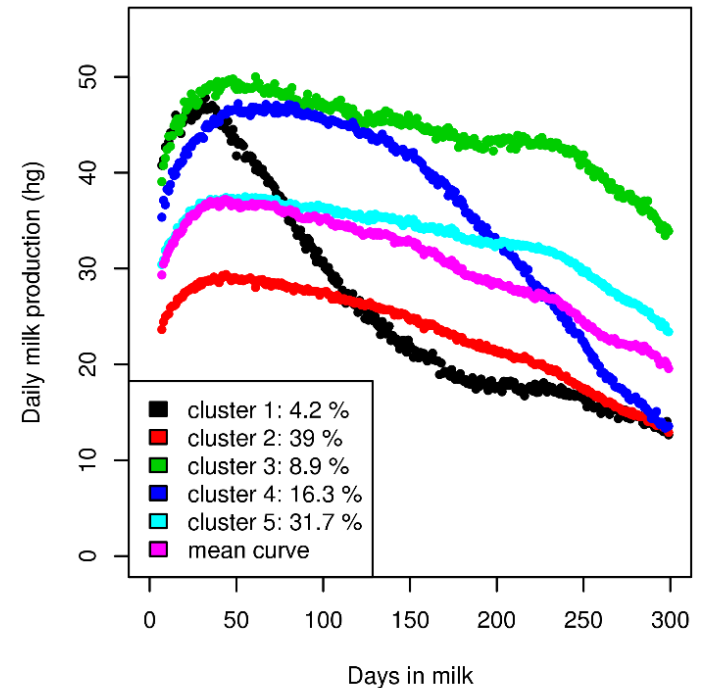
- **5 different shapes of curves**
- Impact of different factors :
  - **Level of production:** genetics (milk), region
  - **Persistency** : kidding month, breed
  - **Curvature at the middle of lactation:** kidding month





# It was possible to summarize curves with a PCA, to do a classification and to study impacts of environmental factors

- **5 different shapes of curves**
- Impact of different factors :
  - **Level of production:** genetics (milk), region
  - **Persistency :** kidding month, breed
  - **Curvature at the middle of lactation:** kidding month



Questions ?