



HAL
open science

Clustering of lactation curves on French dairy goats

Mathieu Arnal, Christèle Robert-Granié, Helene Larroque

► **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

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Analysis of goat lactation curves in France

Mathieu Arnal
mathieu.arnal@idele.fr

Hélène Larroque
Christèle Robert-Granié



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



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

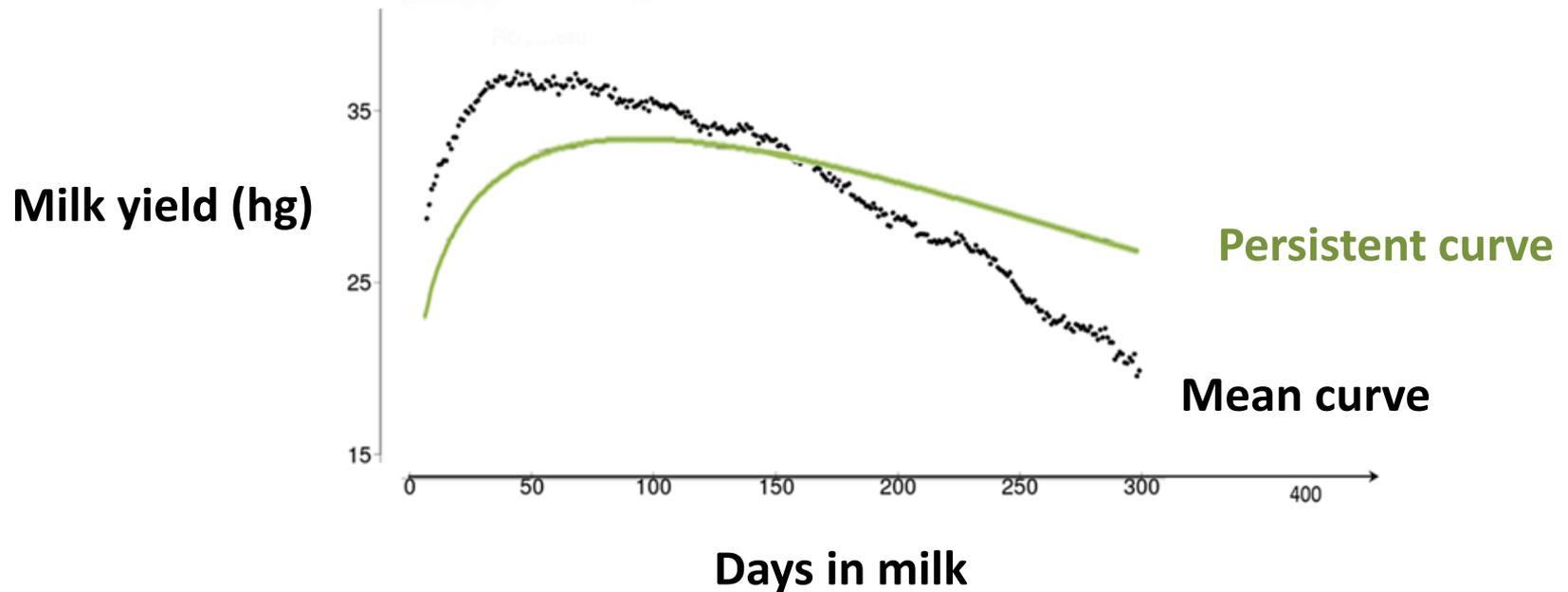


INRA
SCIENCE & IMPACT



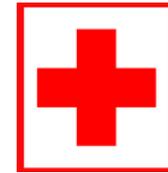
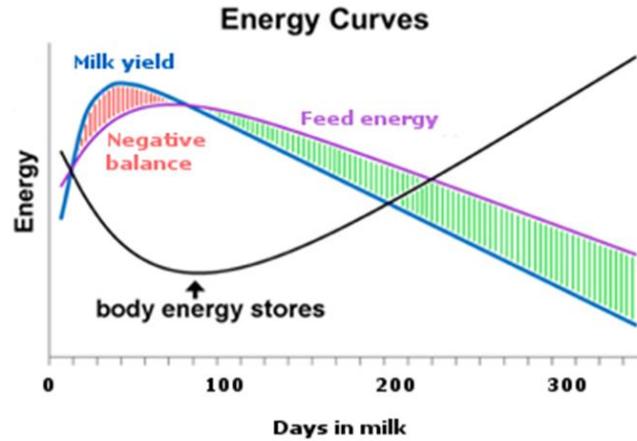
A lactation curve represents the daily production according to the lactation stage

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



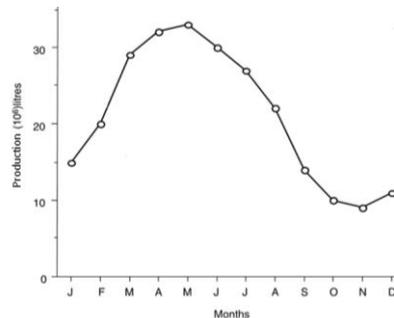
The shape of the lactation curve is of interest for the repartition of feed needs

From Strucken et al. (2015)

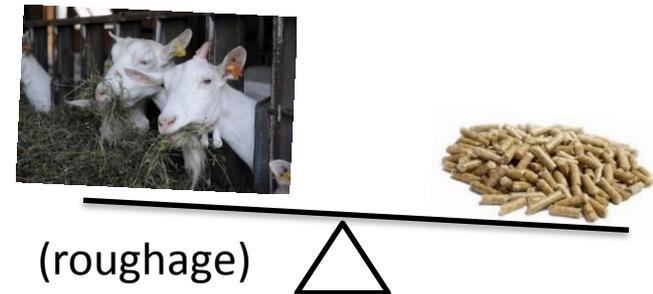


Importance of negative balance

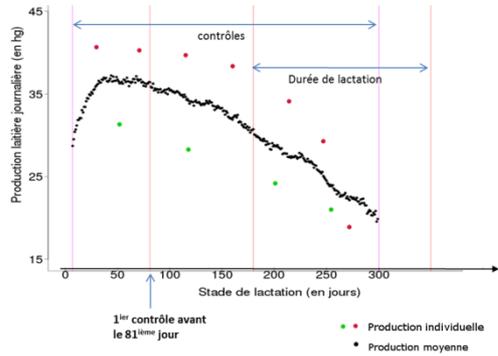
Repartition of milk production



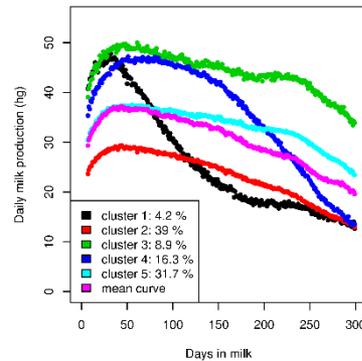
From Chemineau et al. (1996)



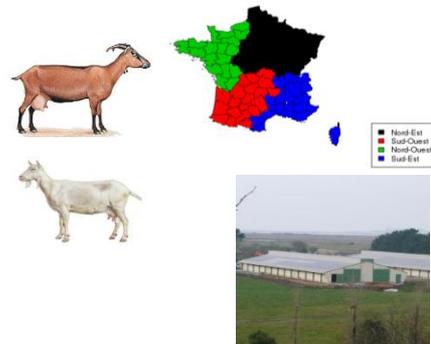
This presentation focuses on the shape of the lactation curve



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

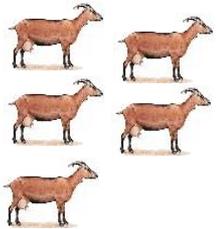
Data: Selection from the national dairy test-day database

Production of about 2000 herds measured every 4 to 5 weeks



2 weighings per check

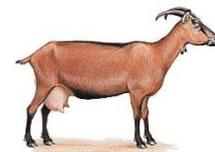
At least 4 controls per lactation



5 goats of the same breed per herd per control



Saanen



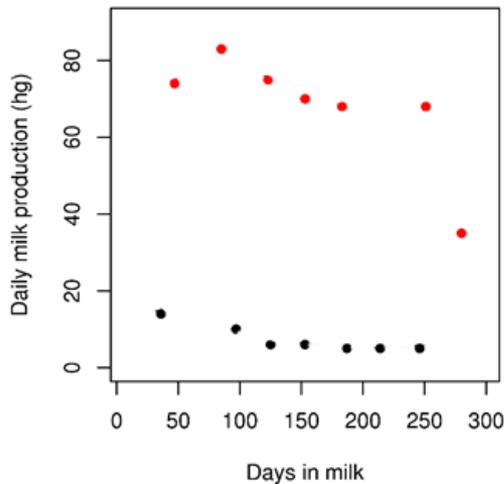
Alpine

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

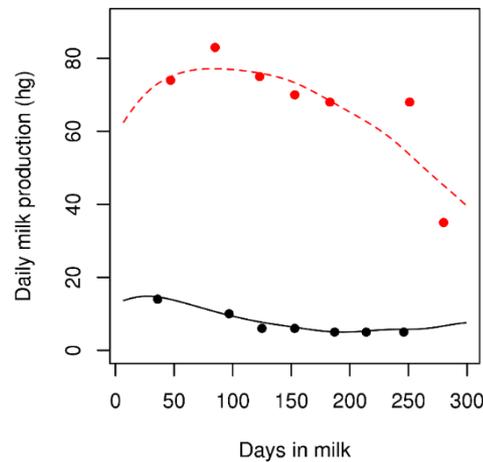
Functional data



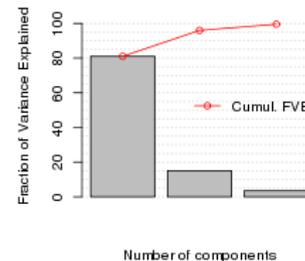
Local linear regression



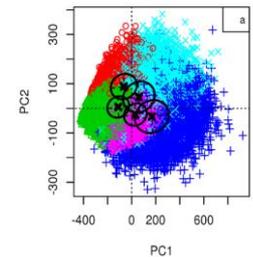
Package R "fdapace" (Dai et al., 2016)



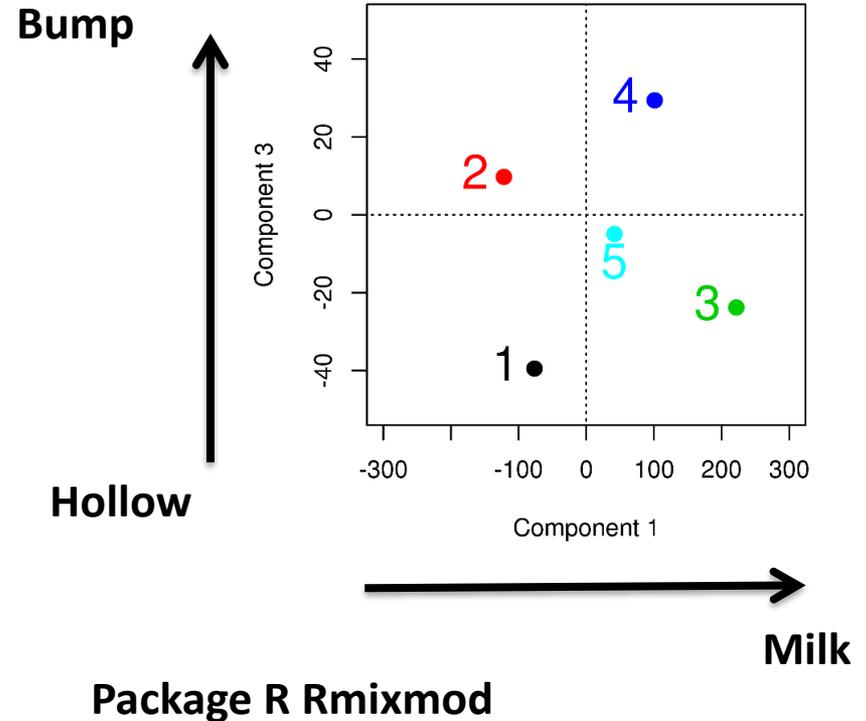
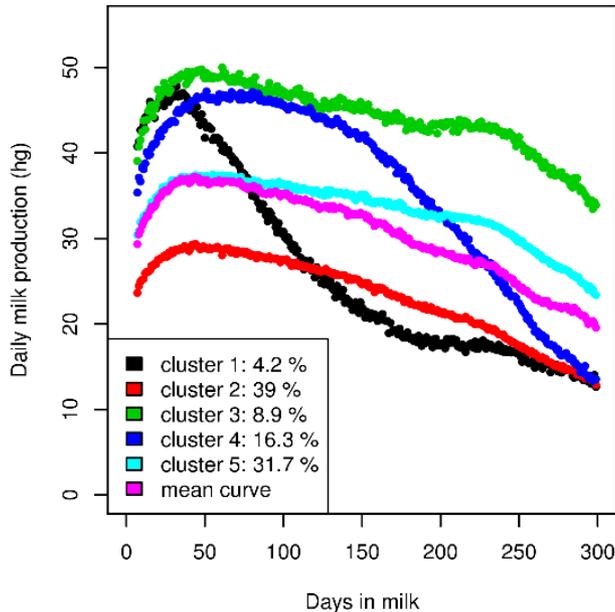
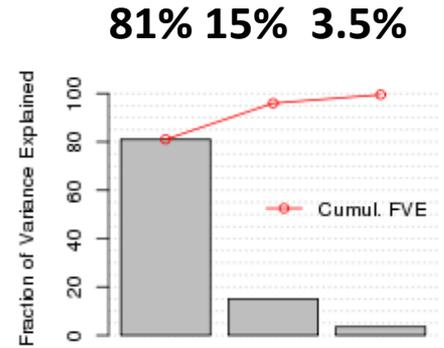
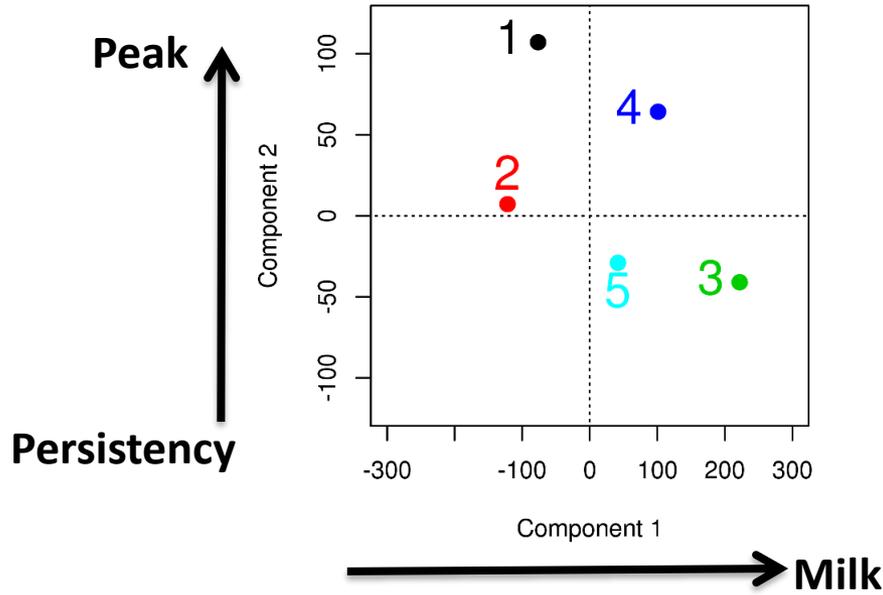
PCA



Clustering



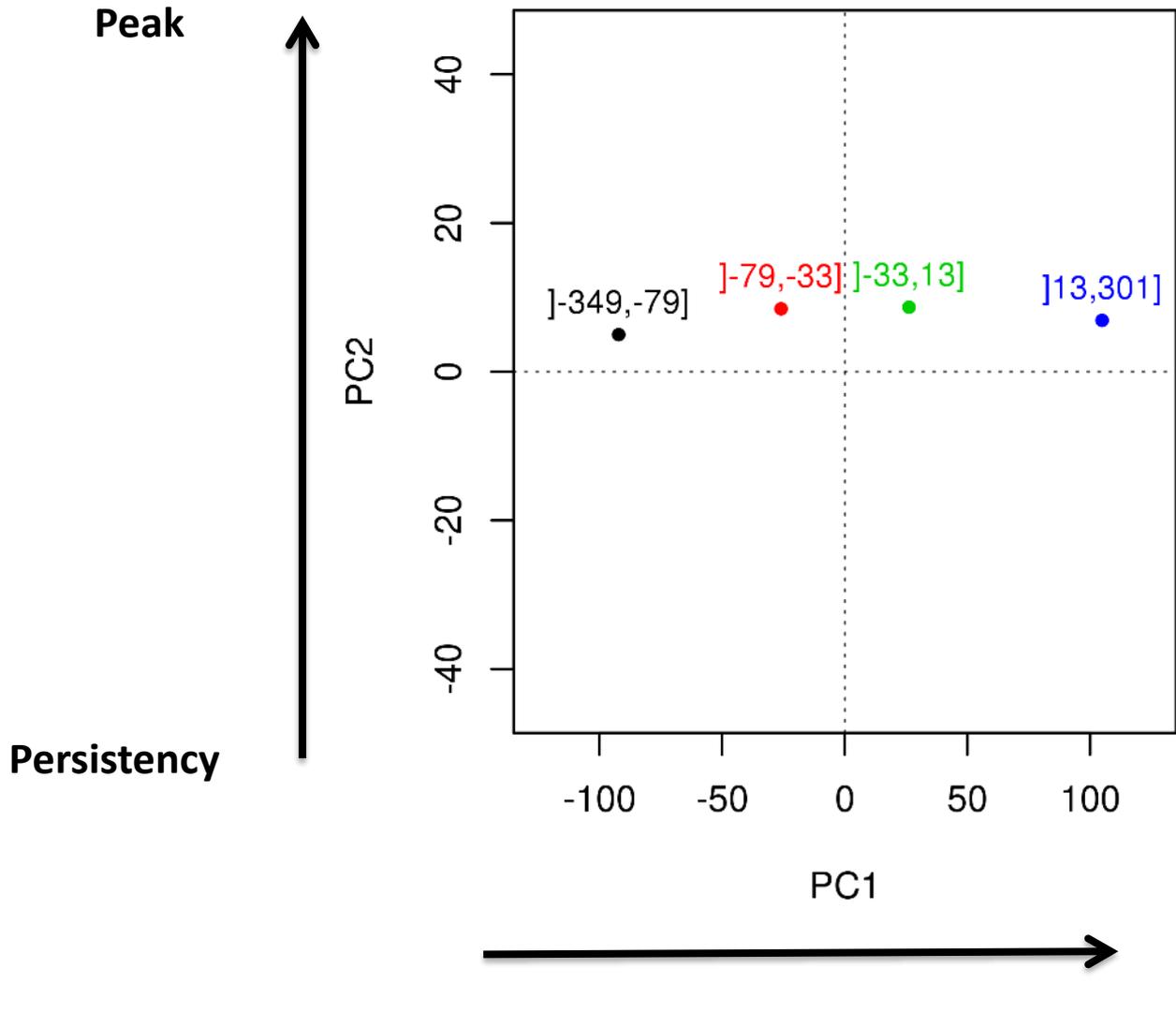
5 different curves after the classification of lactations according to the 3 components



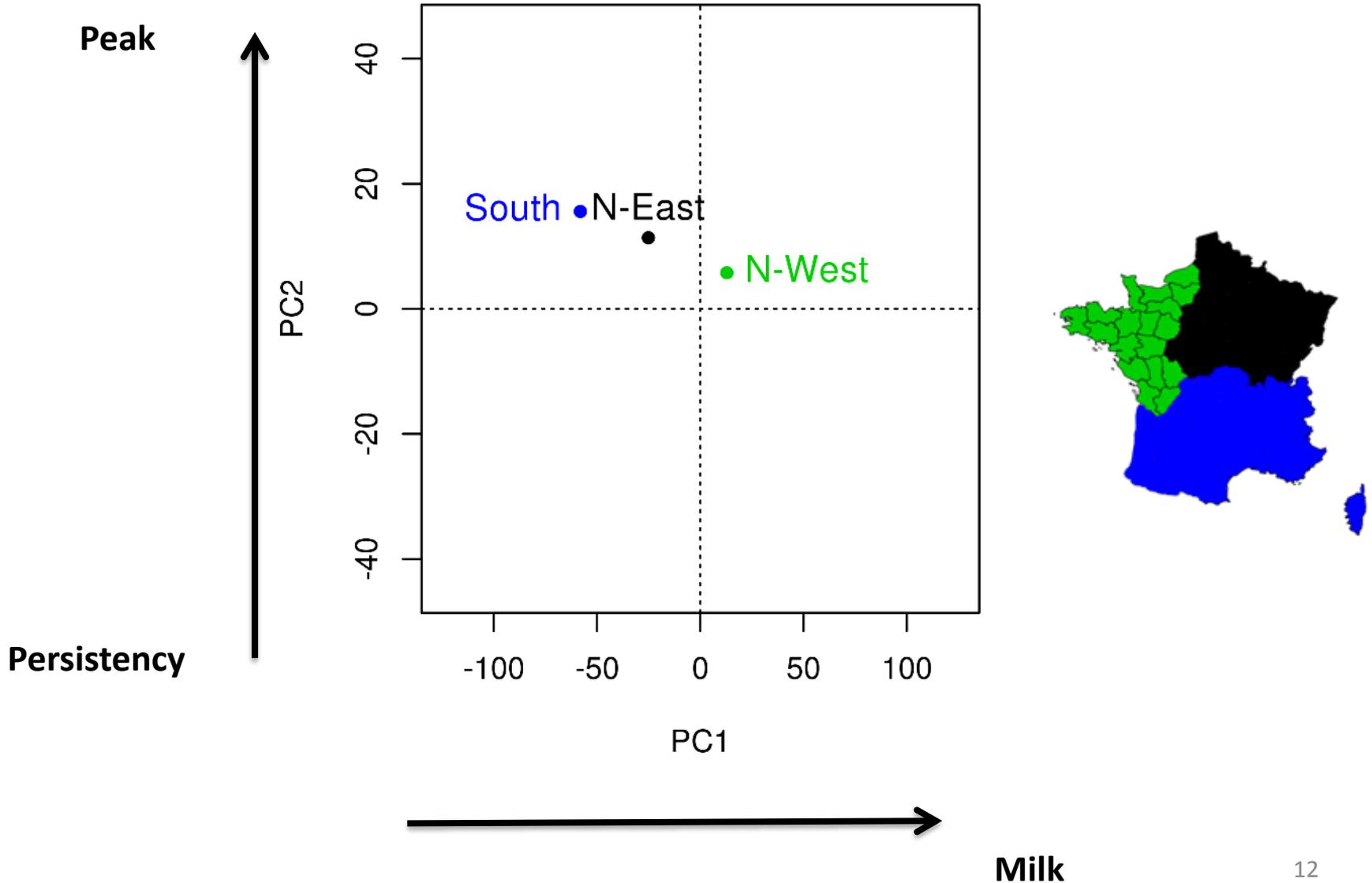
Relations between different factors and the shape of lactation curves

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

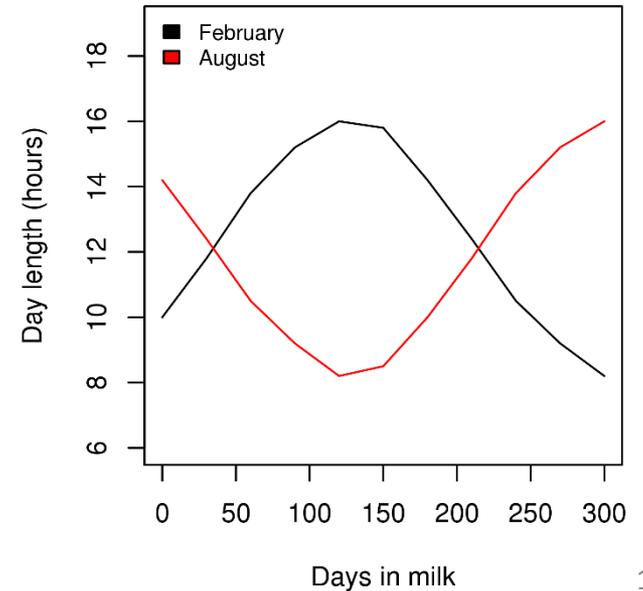
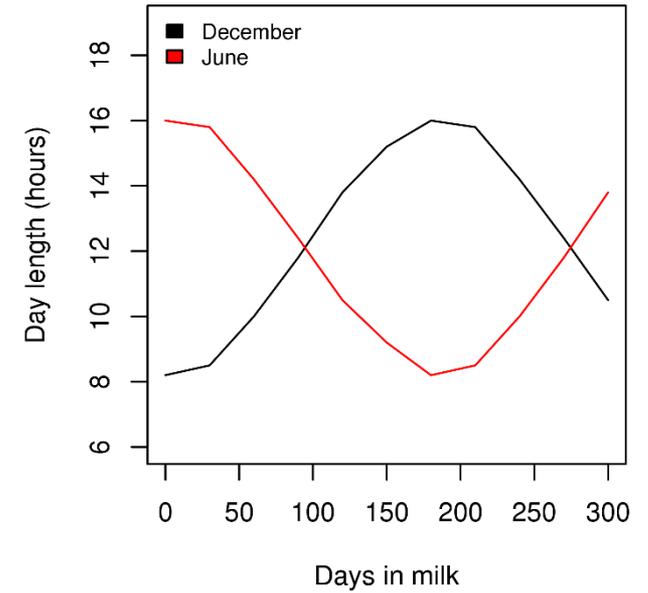
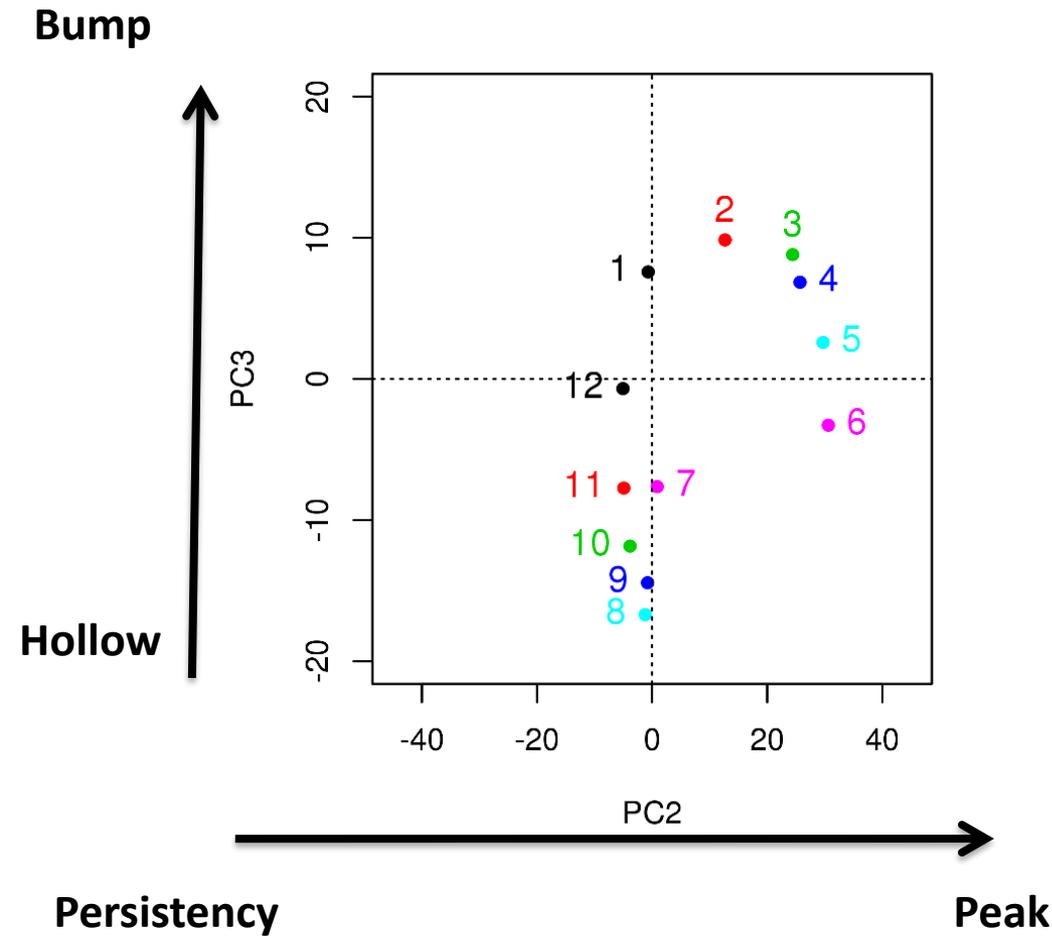
Milk Genetic index is the factor the most related to the level of production



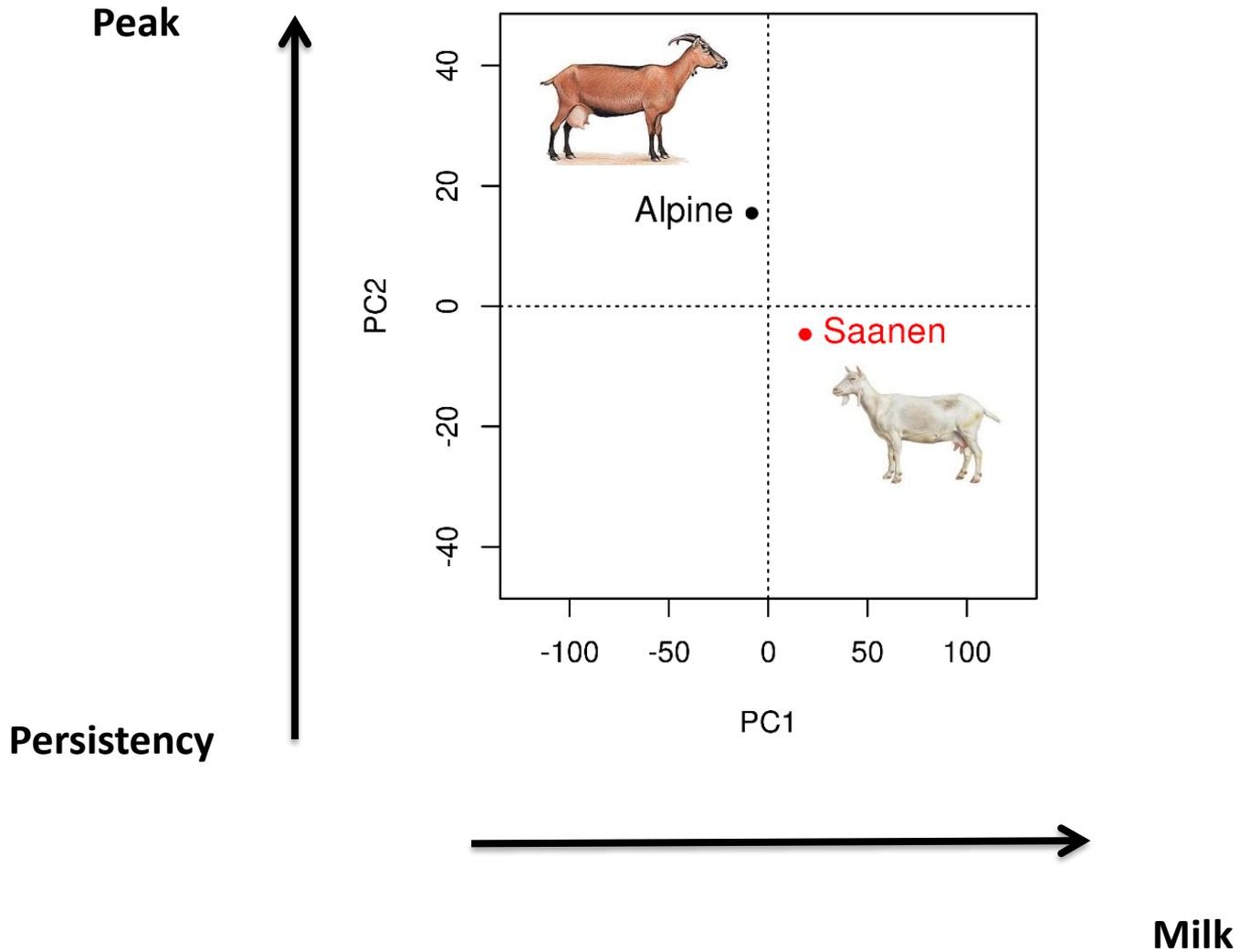
Region is one of the factors most related to the level of production



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

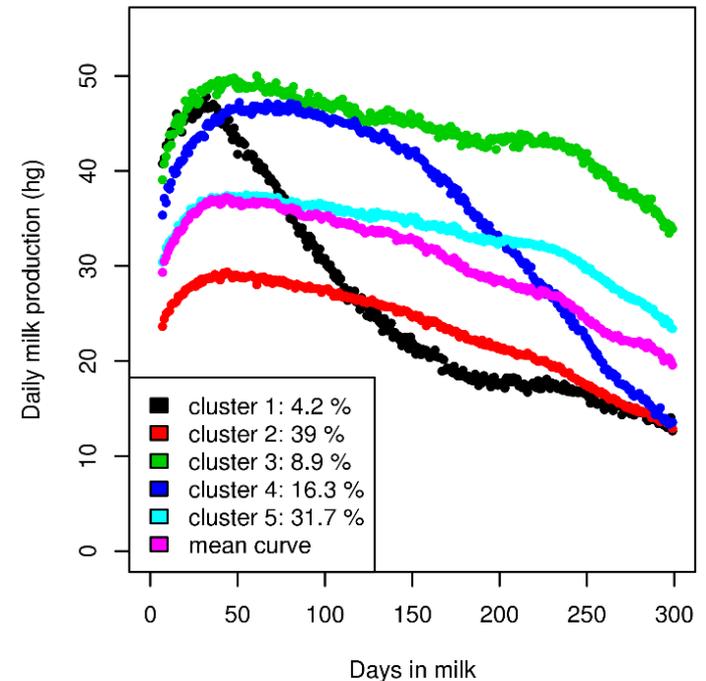


The breed is one of the factors most related to the persistency :



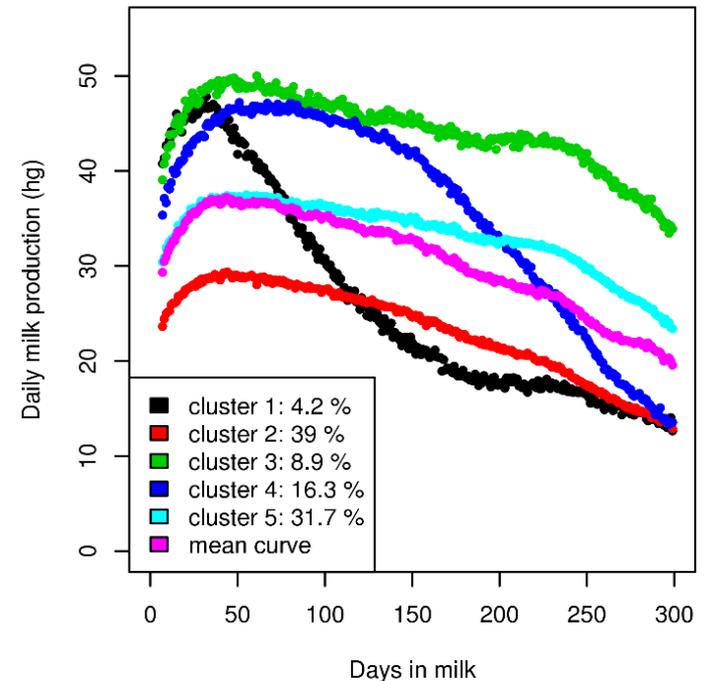
It was possible to summarize curves with a PCA, to do a classification and to study impacts of environmental factors

- **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 ?