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Clustering of lactation curves on French dairy goats

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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**



CIHEAM

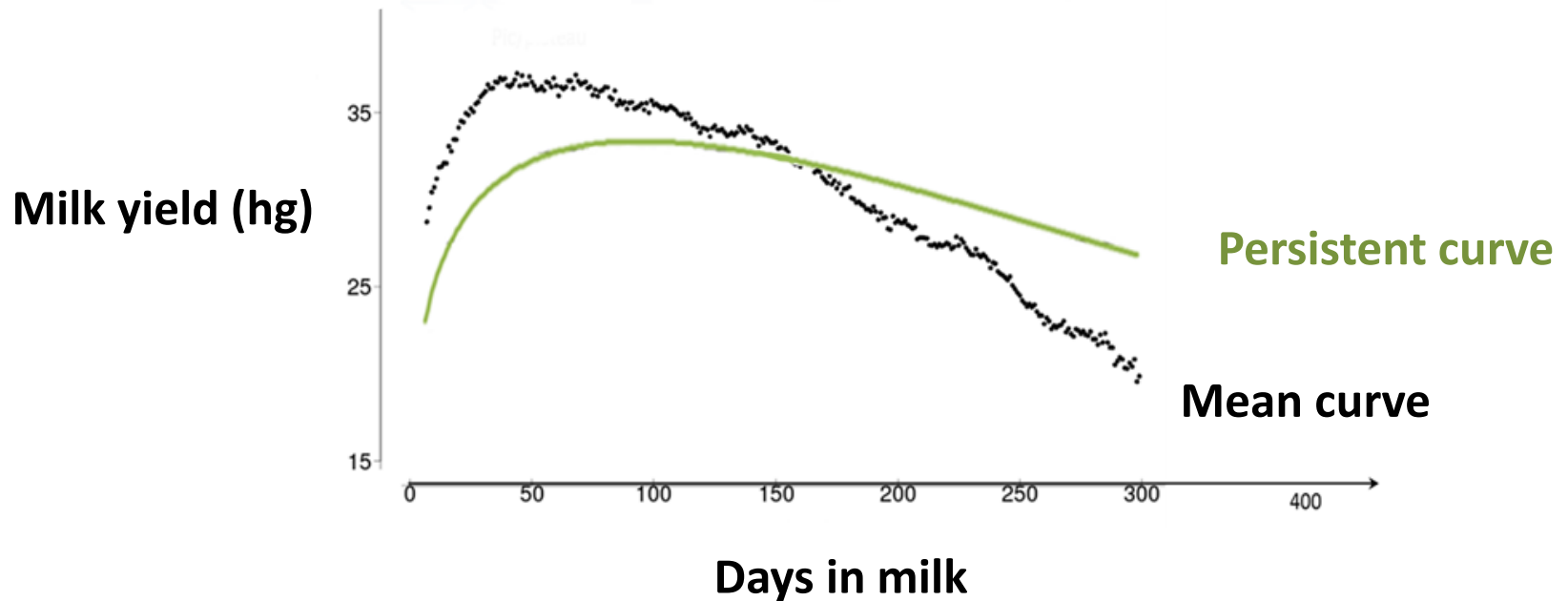


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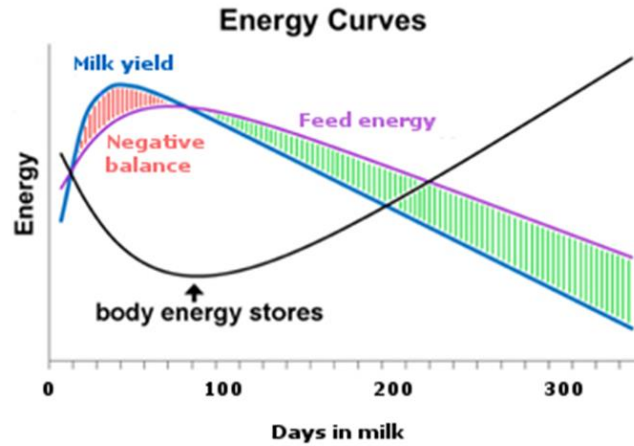
A lactation curve represents the daily production according to the lactation stage

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



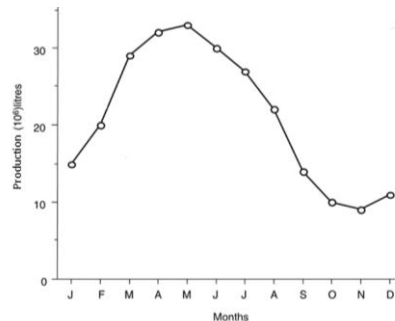
The shape of the lactation curve is of interest for the repartition of feed needs

From Strucken et al. (2015)

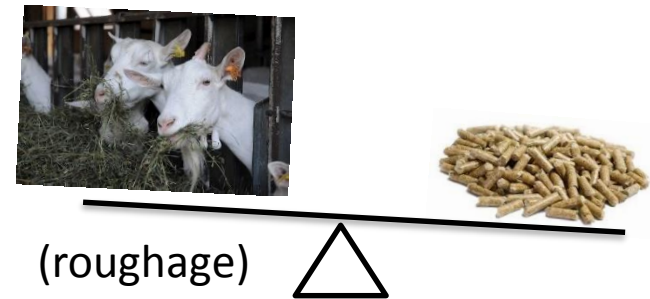


Importance of negative balance

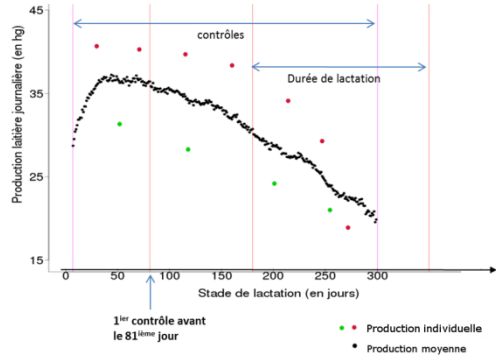
Repartition of milk production



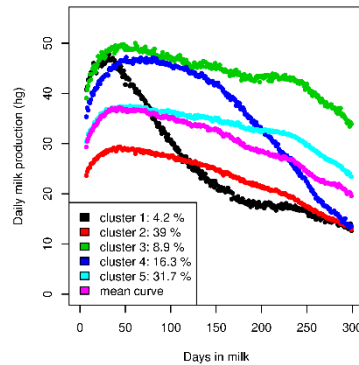
From Chemineau et al. (1996)



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

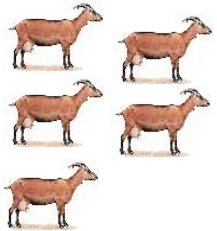
Data: Selection from the national dairy test-day database

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



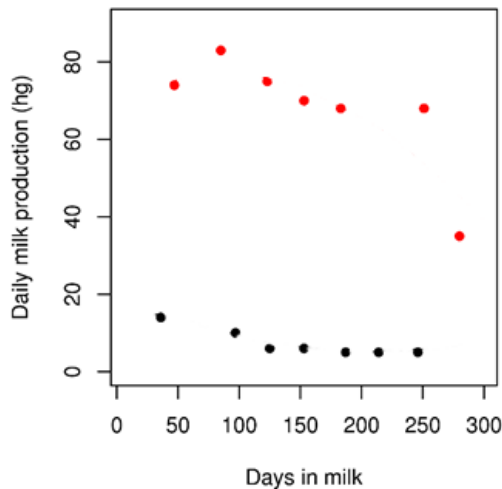
Alpine

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

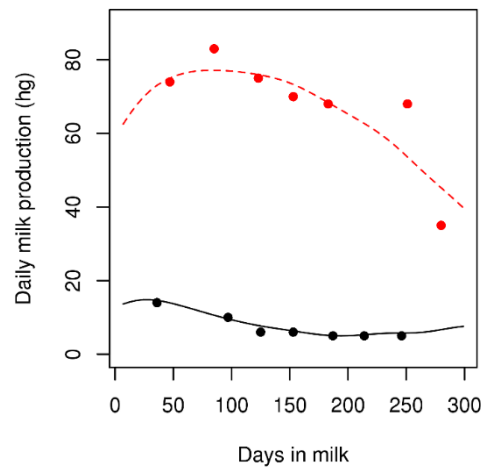
Functional data



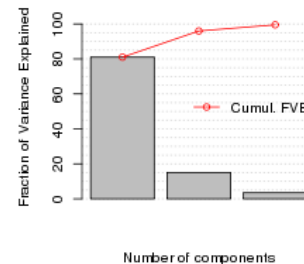
Local linear regression



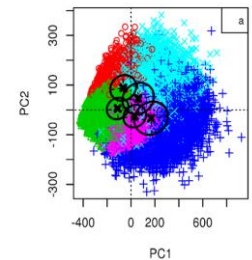
Package R "fdapace" (Dai et al., 2016)



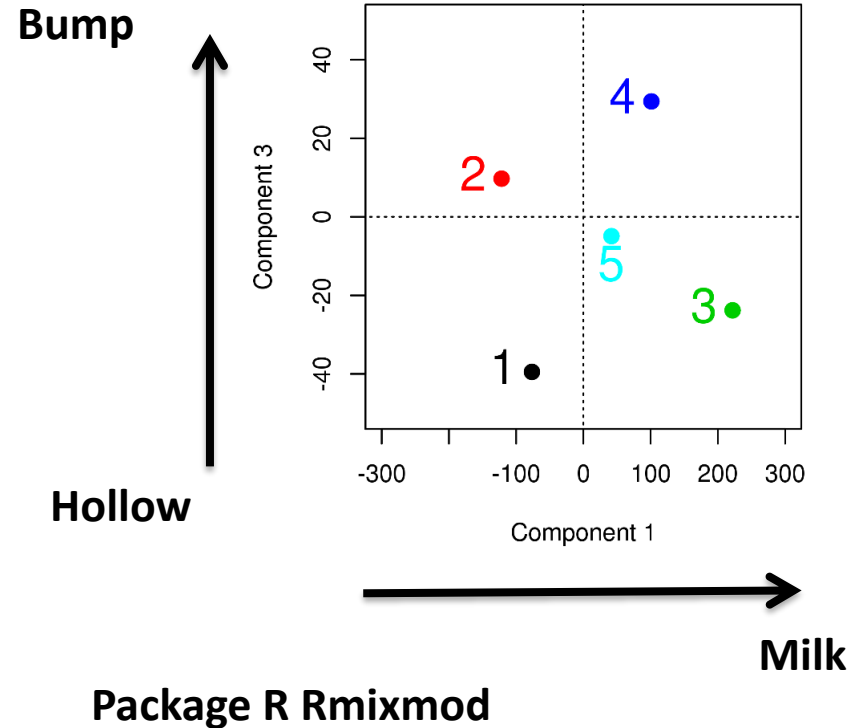
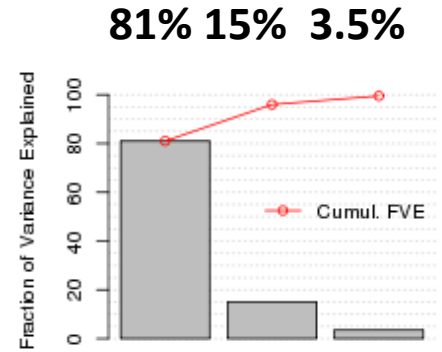
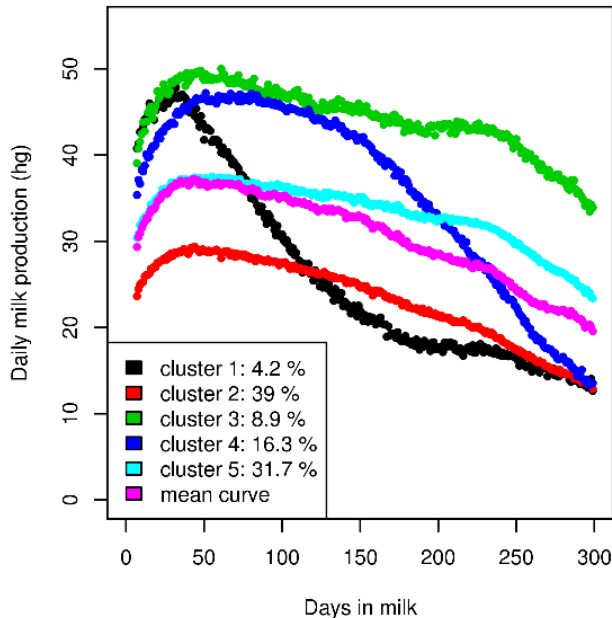
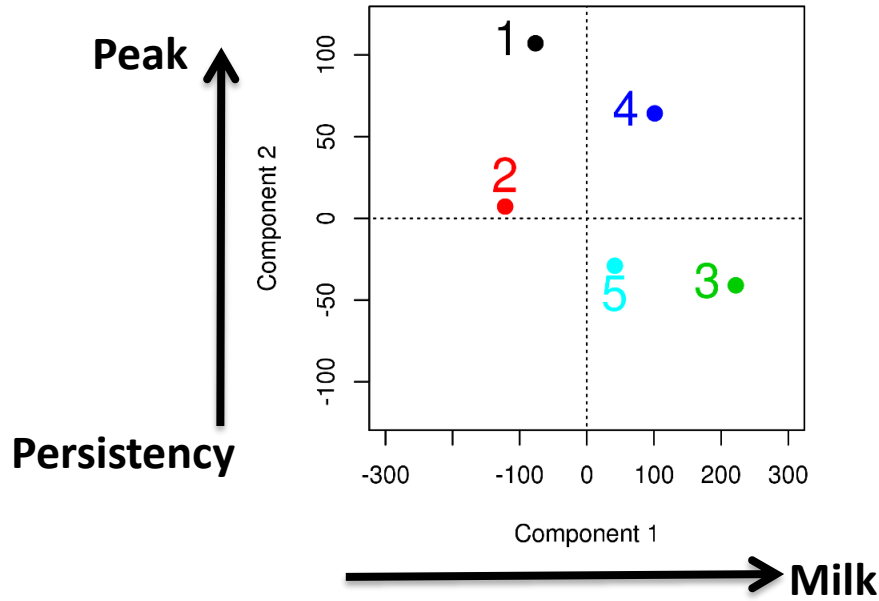
PCA



Clustering



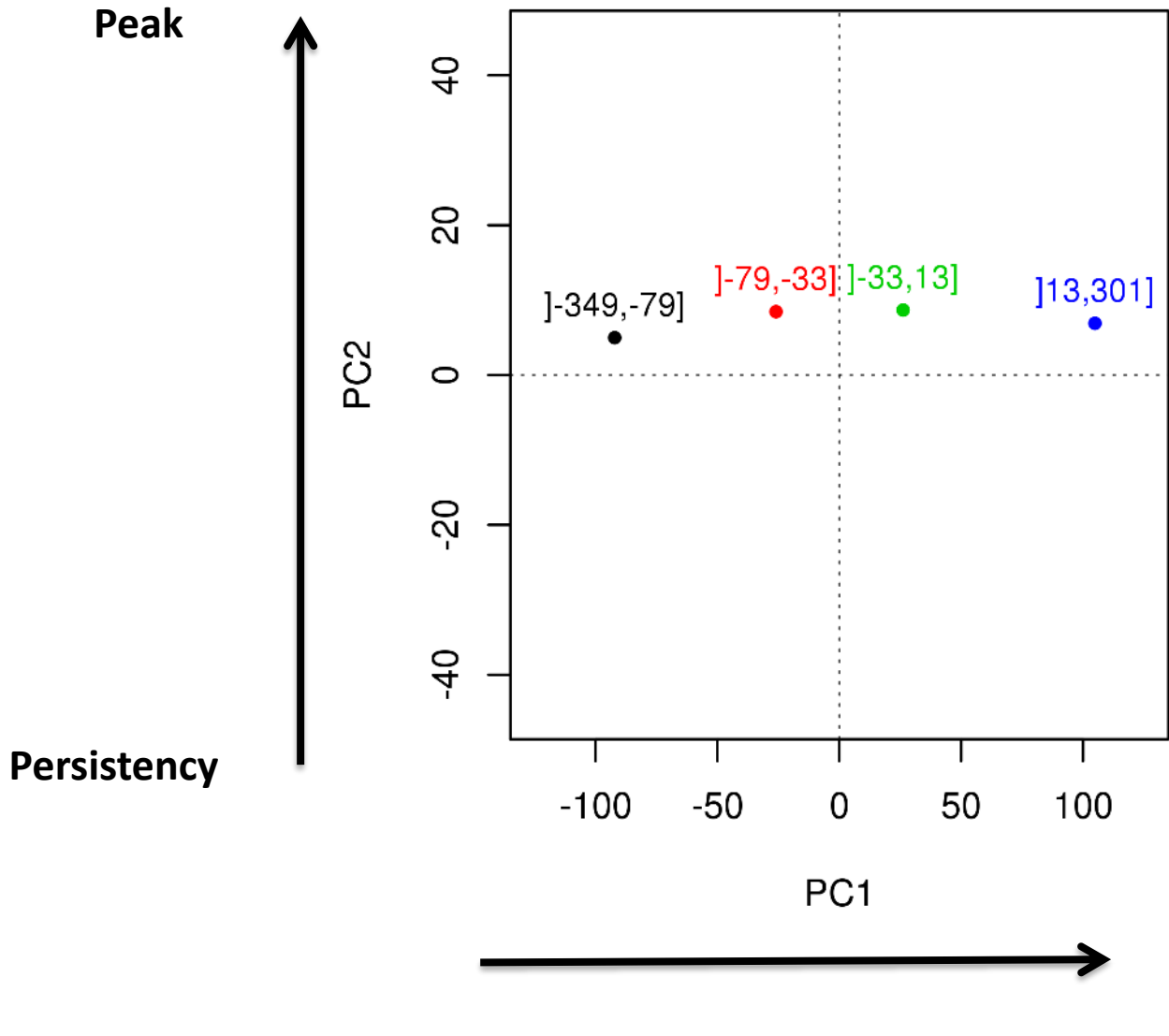
5 different curves after the classification of lactations according to the 3 components



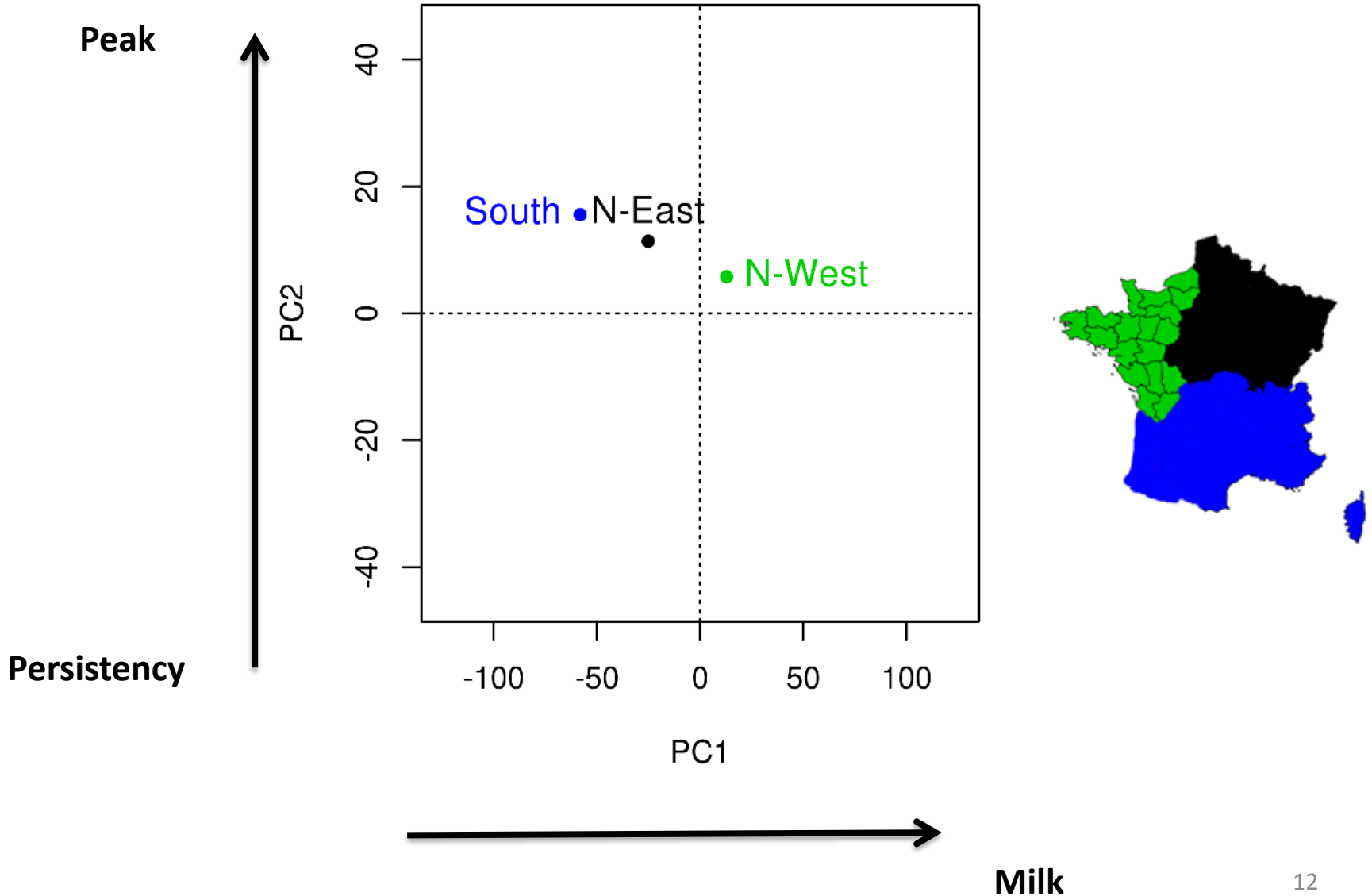
Relations between different factors and the shape of lactation curves

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

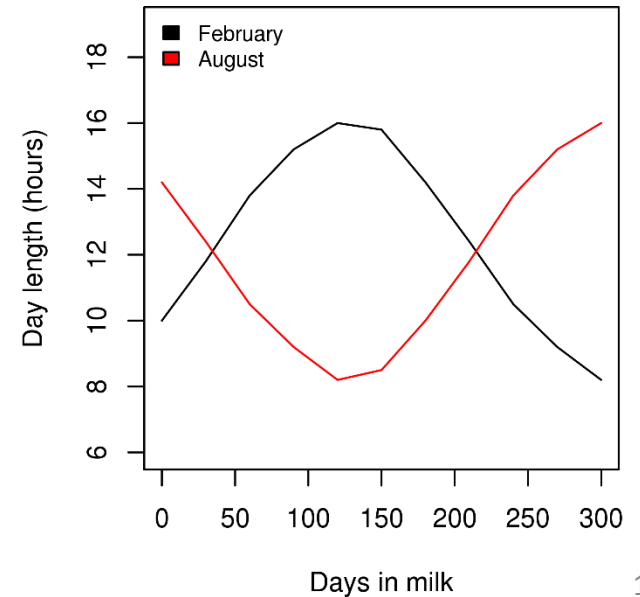
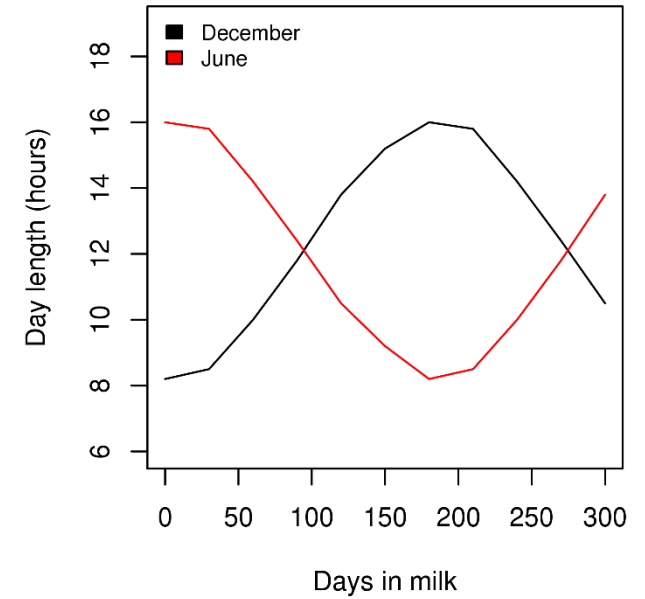
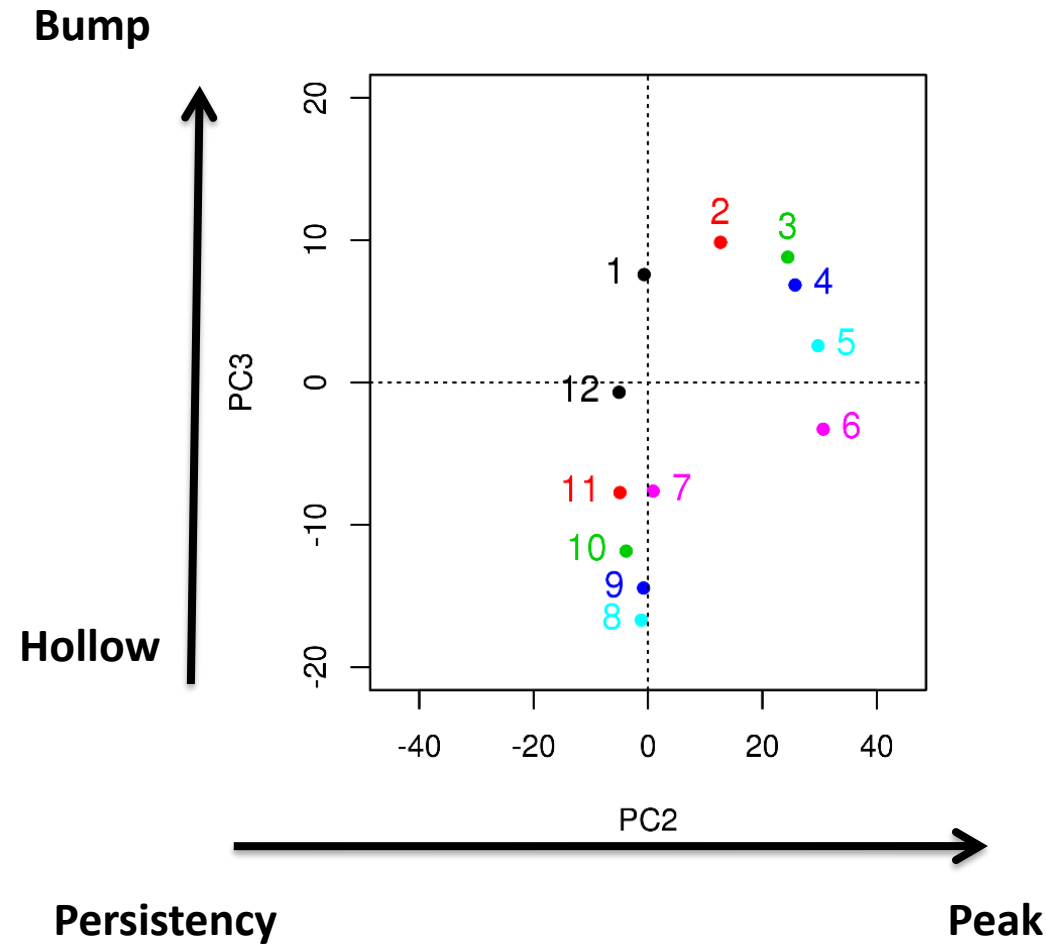
Milk Genetic index is the factor the most related to the level of production



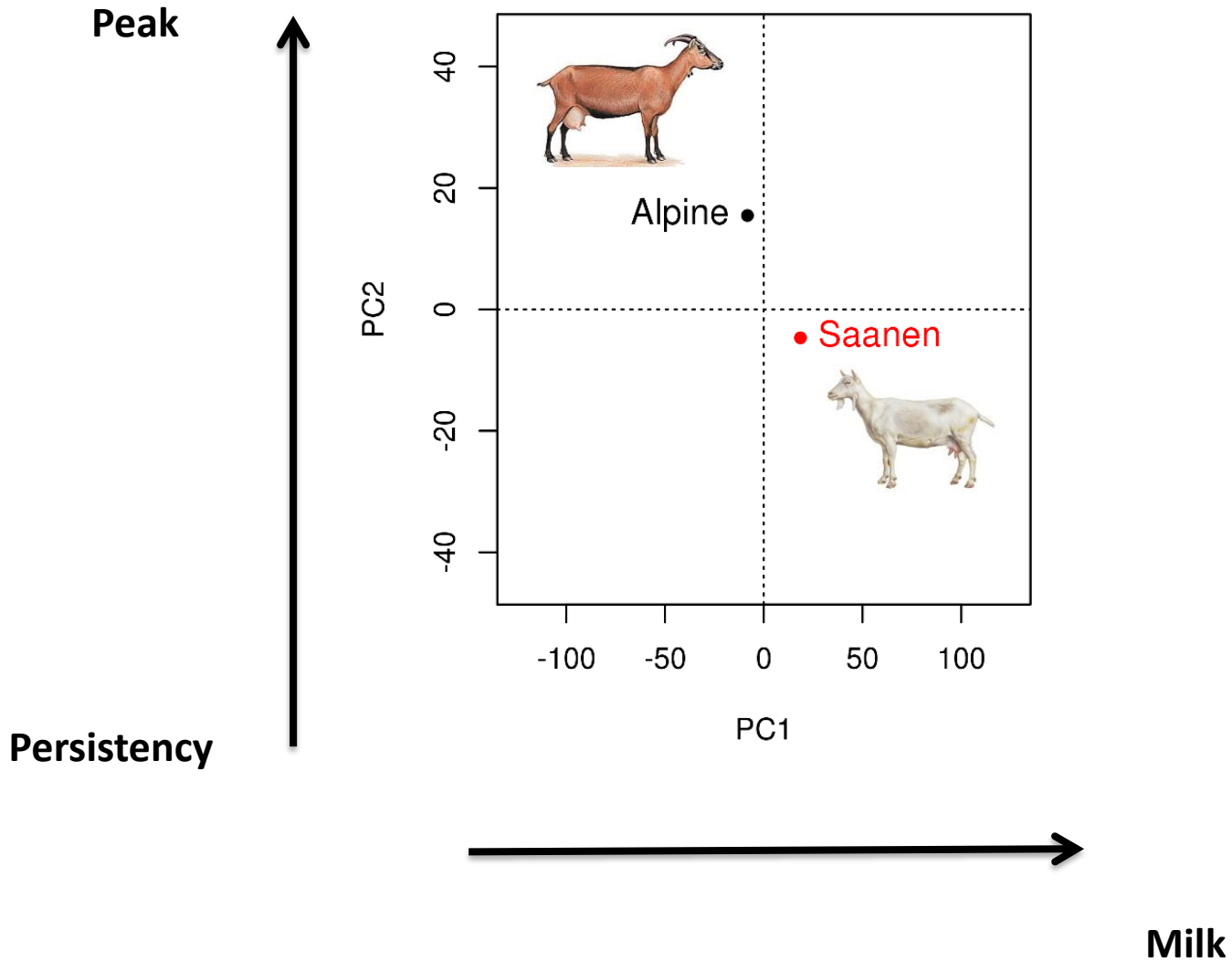
Region is one of the factors most related to the level of production



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

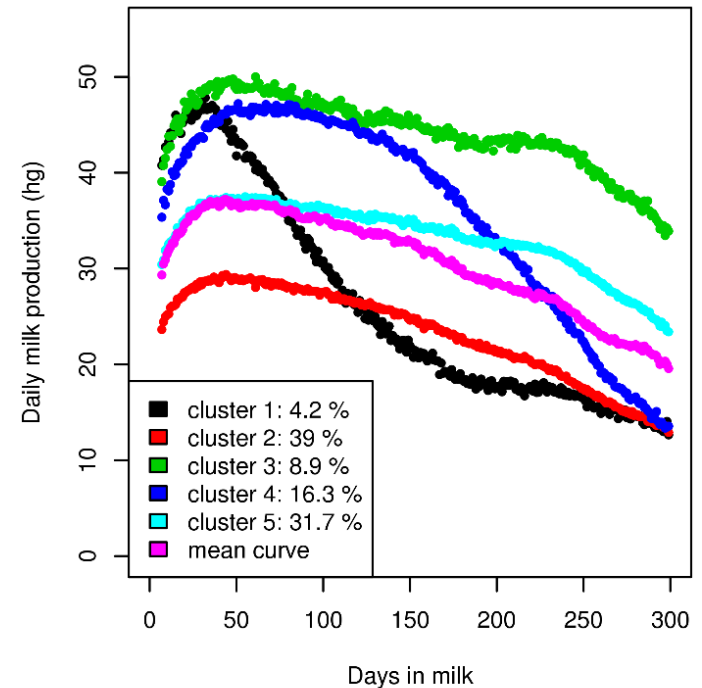


The breed is one of the factors most related to the persistency :



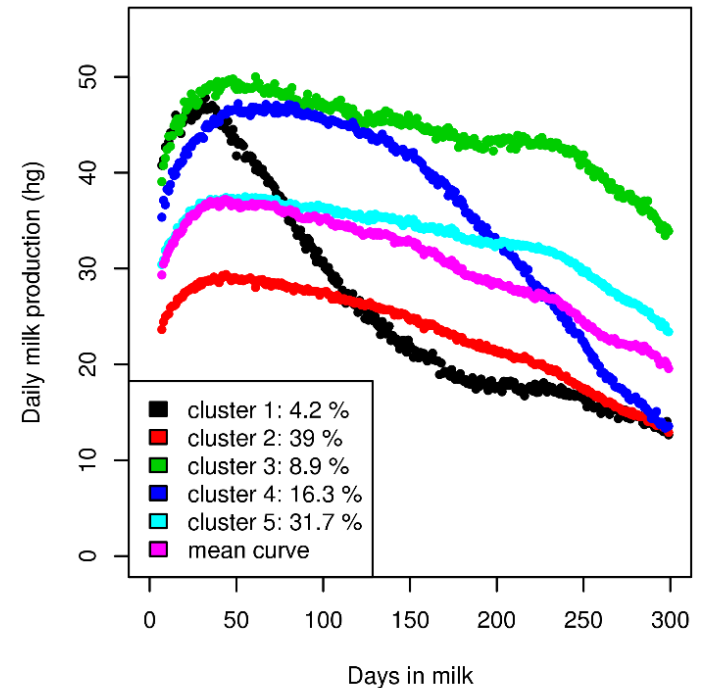
It was possible to summarize curves with a PCA, to do a classification and to study impacts of environmental factors

- **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

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Questions ?