

Data Analysis Poultry Exportation



Data Analyst Course - Project 5
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Mission

A company in the food industry specialized in Chicken Meat is looking at expanding worldwide. All countries are considered.

Their production is based in France.

The mission is to provide the company with data ensuring it will collaborate with the most promising export market countries.





Data preparation

Data Exploration

Clustering and Principal Component Analysis

Cluster Analysis and Recommendations

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3

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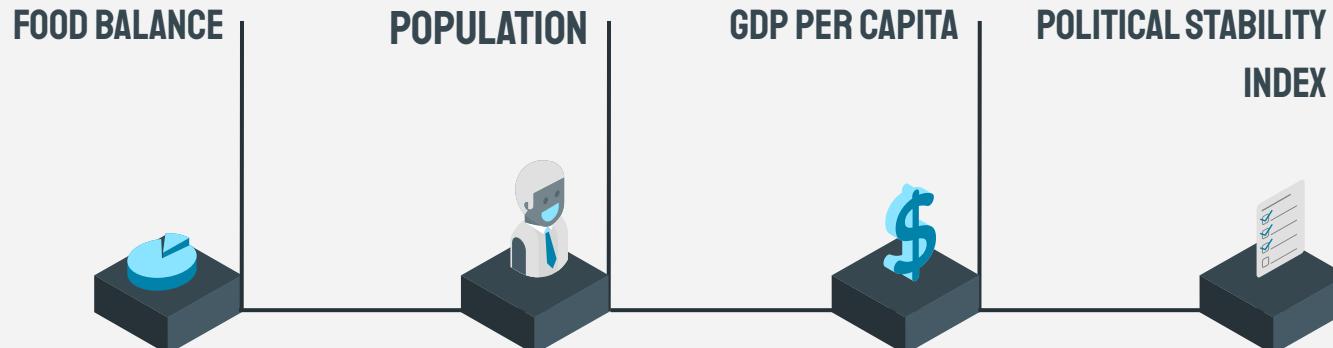


Data Preparation

Source datasets

Data are collected from The Food and Agriculture Organization Corporate Statistical Database (FAOSTAT). The FAOSTAT website disseminates statistical data collected and maintained by the Food and Agriculture Organization (FAO).

Analysis is based on data from 2017 (most recent complete dataset in 2020). Data from 2013 are used to measure a 4 years evolution.



Indicators

 variables for PCA
 additional variables

'country'

country'food_supply_kcalcapitaday'
'protein_supply_gcapitaday'*Calories per capita per day*
Proteins per capita per day

'protein_animal_over_protein'

% of Proteins Animals'pop_thousand'
'pop_growth'*Population (in thousand)*
Population growth'gdp_percapita_usd'
'gdp_growth'*GDP per capita (USD)*
GDP per capita growth

'euro_union'

Belonging to EU

'political_stability_index'

Political Stability Index'dom_supply_poultry_tons'
'export_poultry_tons'
'import_poultry_tons'
'prod_poultry_tons'

'net_import_poultry_tons'

'net_import_poultry_over_domsupply'
'import_poultry_over_domsupply'
'prod_poultry_over_domsupply''growth_domsupply_poultry'
'growth_import_poultry'

'protein_poultry_gcapitaday'

Domestic Supply Poultry (tons)
Export Poultry (tons)
Import Poultry (tons)
*Production Poultry (tons)**Net importations Poultry*
*(Importations - Exportations)**Net importations / Dom Supply*
Importations / Dom Supply
Productions / Dom Supply
*(Poultry)**Growth Dom Supply Poultry*
*Growth Imports Poultry**Protein Poultry per capita g per day*

Imputations

Taiwan **GDP per capita** is missing in the FAOSTAT dataset. Imputation with data collected from the International Monetary Fund (IMF).

Political Stability Index data are missing in the FAOSTAT dataset for 'French Polynesia', 'Namibia' and 'New Caledonia'.

- Imputation for the 2 French territories (French Polynesia and New Caledonia) with France's index.
- Imputation for Namibia with United Arab Emirates' index - the political stability index of the UAE is the closest of Namibia in 2017 (source: World Bank)

Poultry definition

Poultry are domesticated avian species that can be raised for eggs, meat and/or feathers.

The term "poultry" covers a wide range of birds, from indigenous and commercial breeds of chickens to Muscovy ducks, mallard ducks, turkeys, guinea fowl, geese, quail, pigeons, ostriches and pheasants.

In 2017, chickens accounted for 92 percent of the world's poultry population, followed by ducks (5 percent), and turkeys (2 percent).

- Chickens = 89 percent of world poultry meat production. Rest comes from turkeys(5%), ducks (4%), geese and guinea (2%) and others.
- Chickens provide 92 percent of world egg production.

There is no granular data about chicken meat exclusively in our dataset but the data for the category 'Poultry' gives a fair indicator of the chicken market in each country.

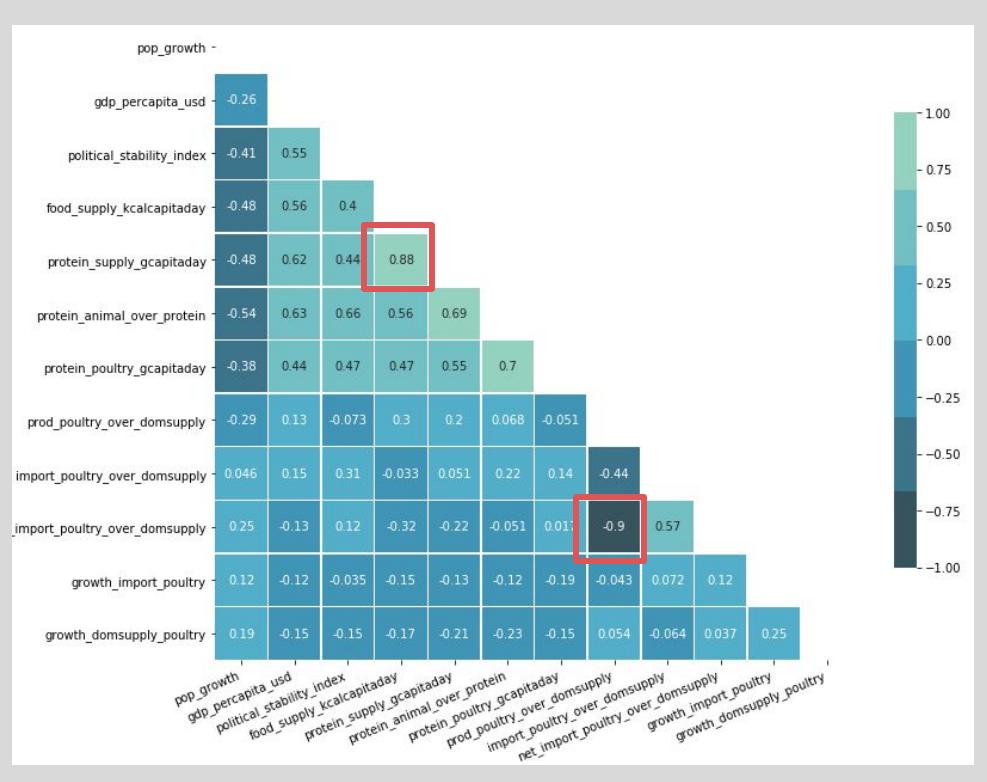


Data Exploration

Pair Plot

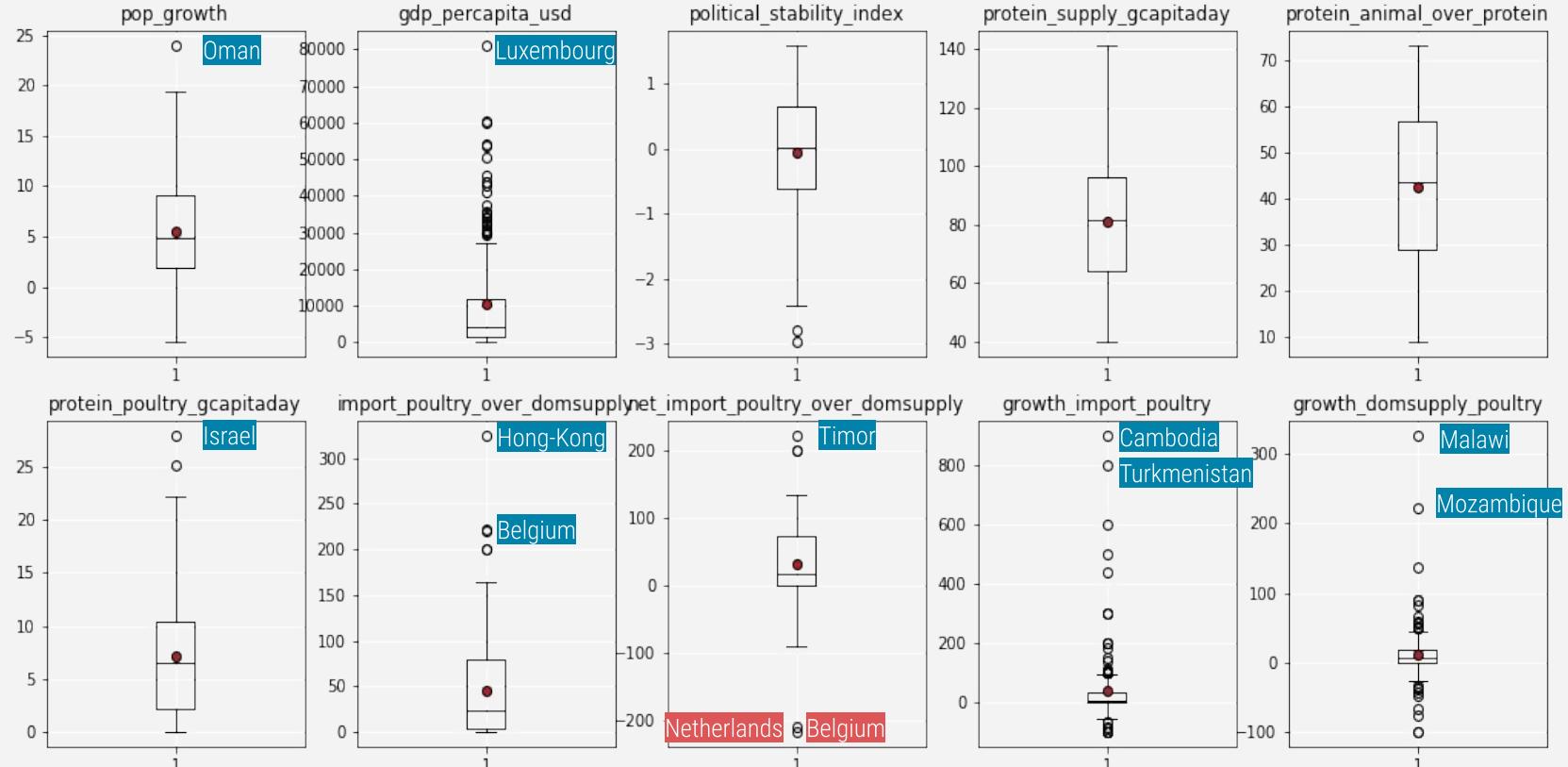


Correlation Matrix



- Strong positive correlation (0.88) between 'protein supply (g per capita)' and 'food supply (kcal per capita)': **'food supply' removed from PCA variables.** Higher is the average quantity of Proteins per capita in a country, higher is the average quantity of calories per capita.
- Strong negative correlation (-0.9) between 'production poultry over domestic supply' and 'net imporations poultry over domestic supply': **'production poultry over domestic supply' removed from PCA variables.** Higher is the Poultry local production, lower are the Poultry net imports.

Outliers





Clustering and Principal Component Analysis

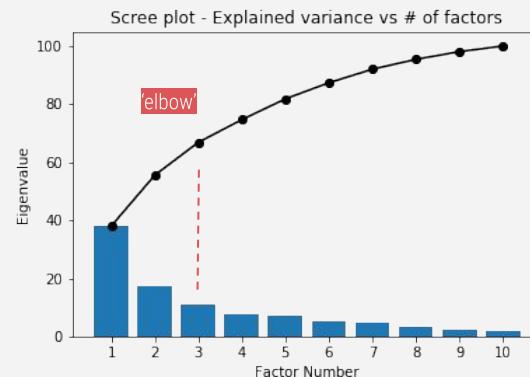
Preparation for PCA

Normalization

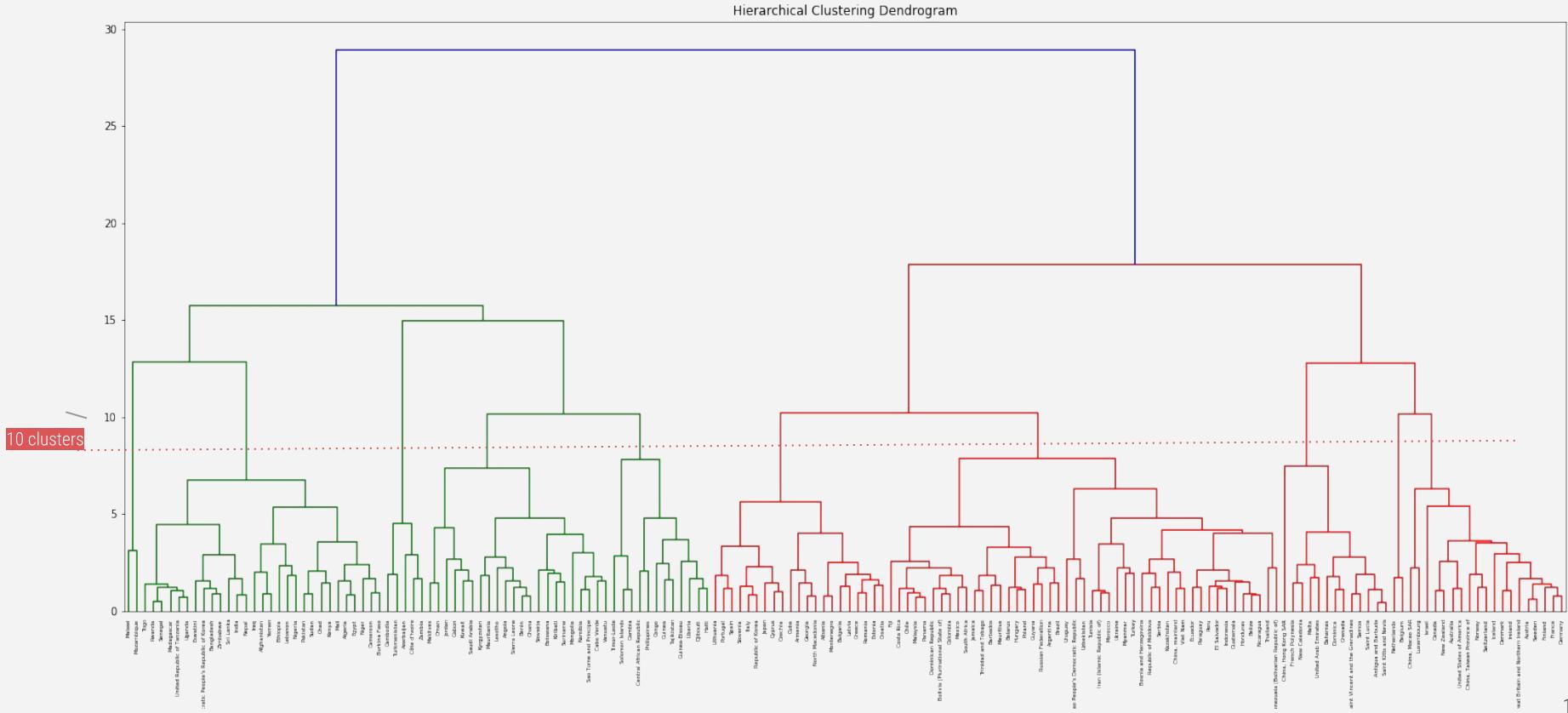
Mean centering - subtracting variable measured mean from each data value so that its empirical mean (average) is zero

Variance standardization to 1 - after the mean centering, dividing 'centered' data by standard deviation.

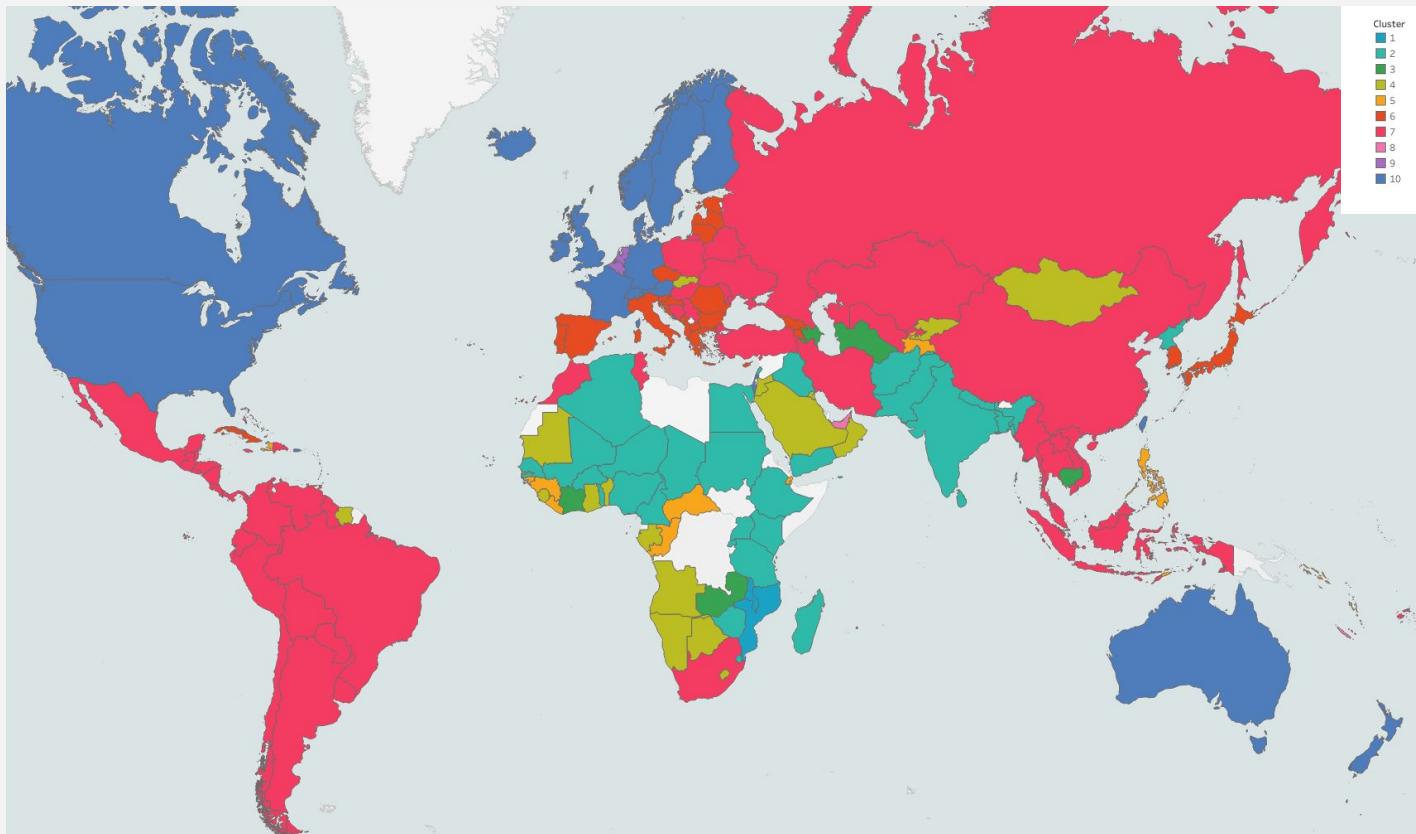
3 components are selected
(capturing approx. 70% of the variance)



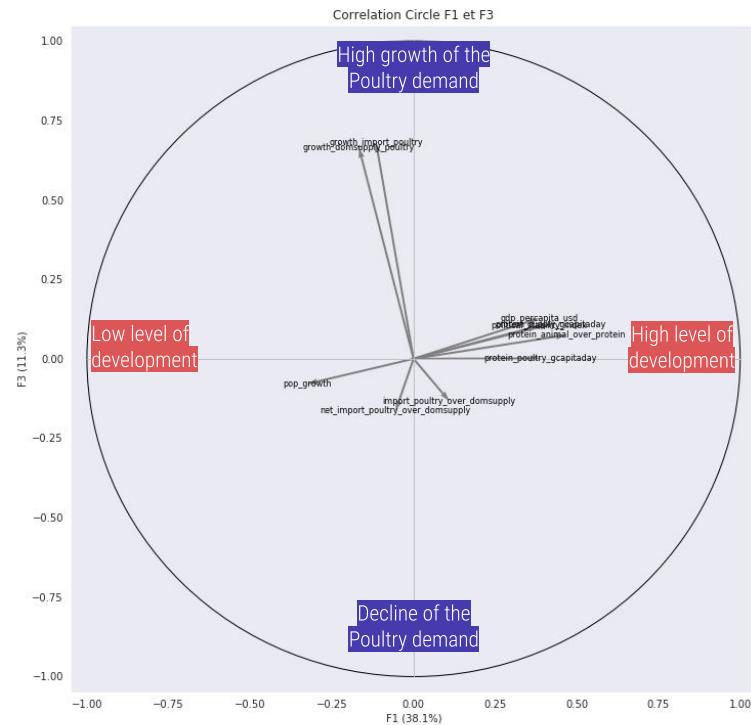
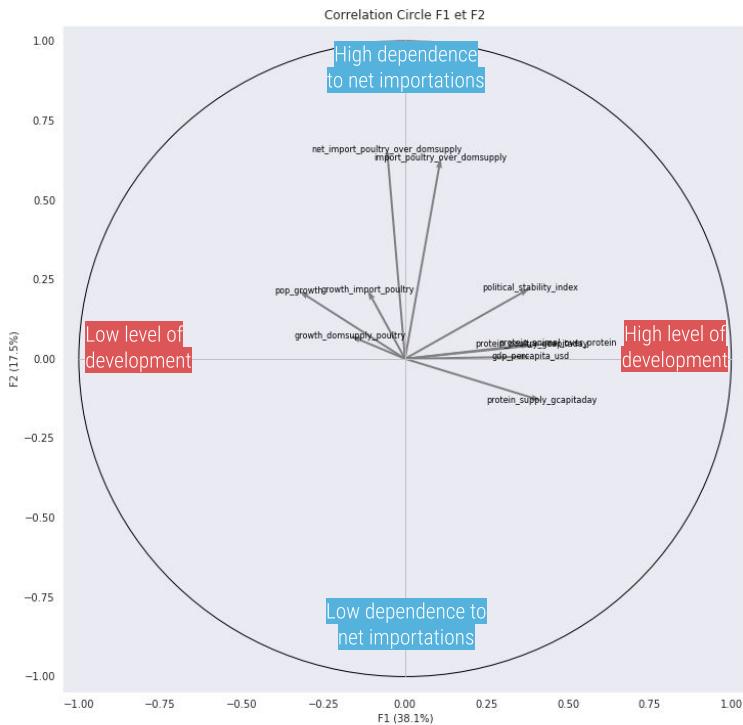
Dendrogram



Clusters



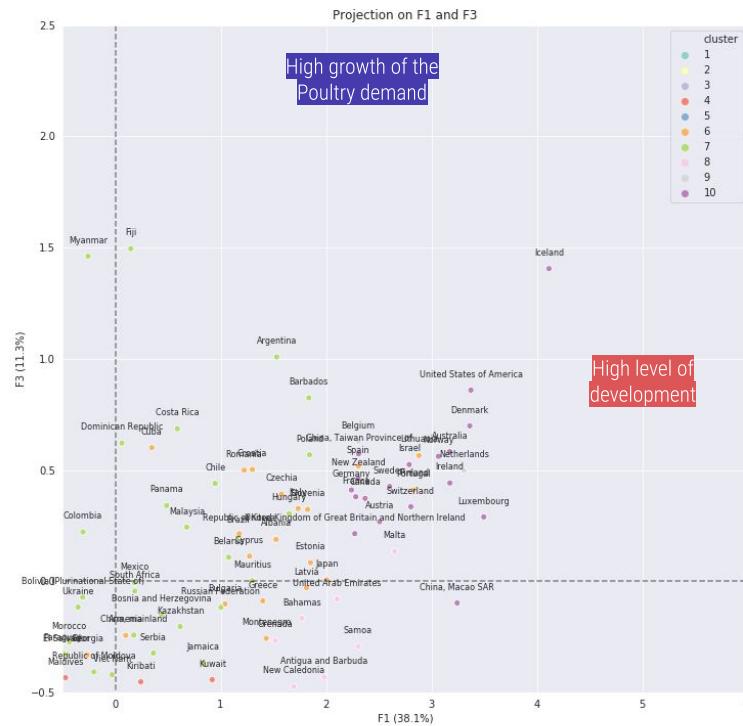
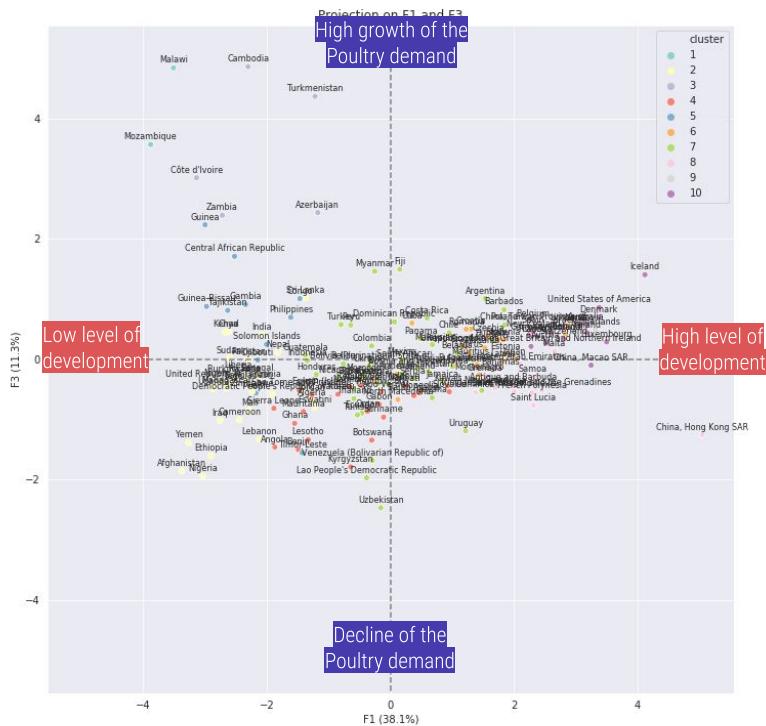
Correlation Circles



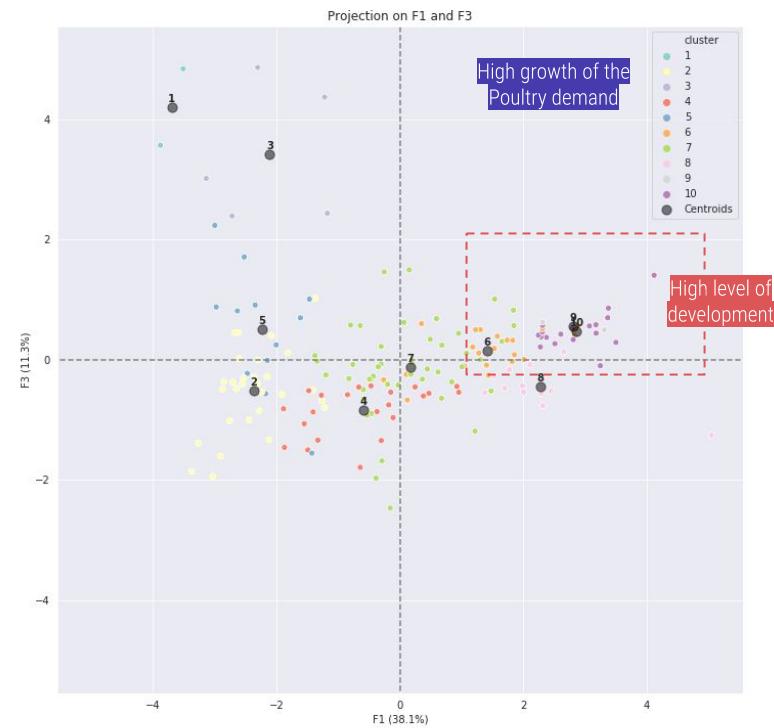
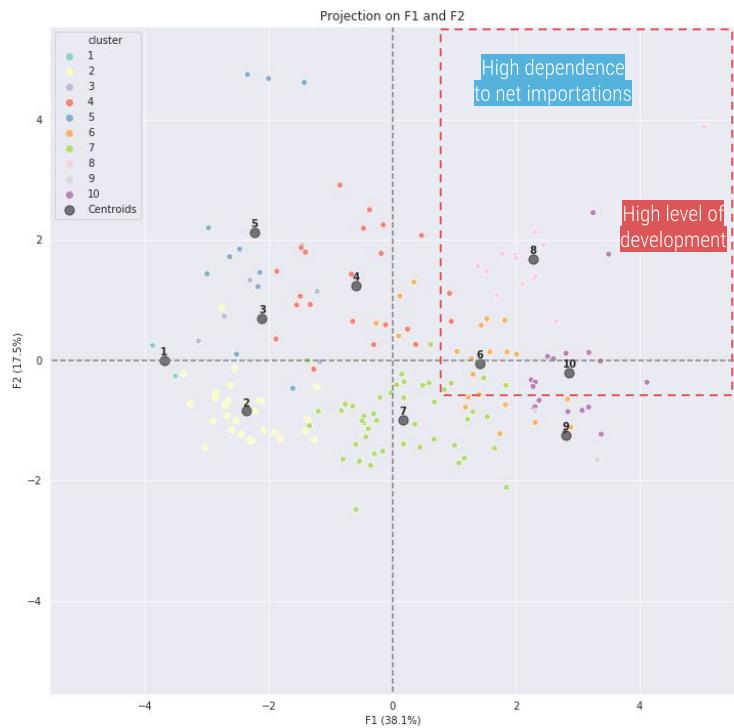
Projection on F1 and F2



Projection on F1 and F3



Cluster 10 is the preferred cluster





Recommendations

Analysis of the clusters

Market observations

The Poultry market is a strong competitive market.

The international Poultry market, whose growth is being powered by emerging countries, is focusing on cost rather than quality.

Cost is the strategic variable for success on the international poultry markets.



In poultry production, **French farms** are more numerous and also smaller than the ones from the main producers in Europe and outside (Brazil, USA, Thailand, China).

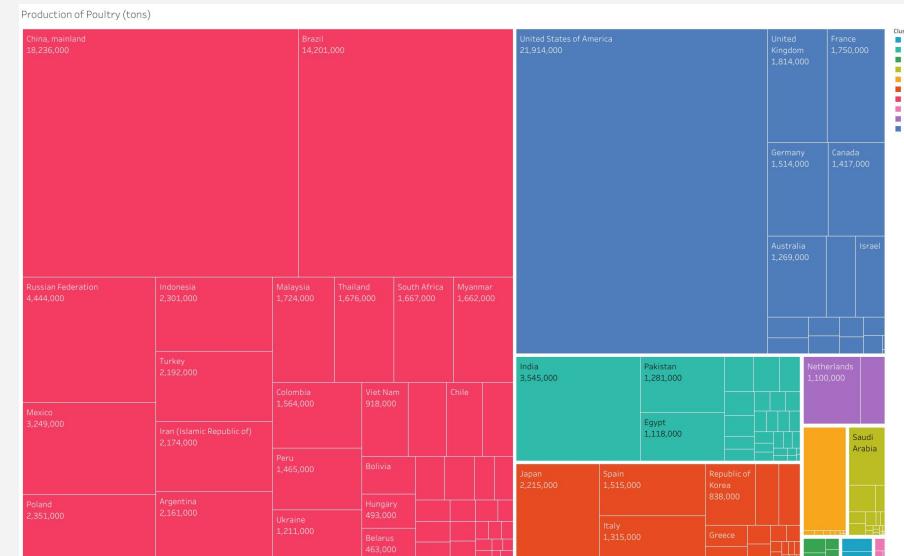
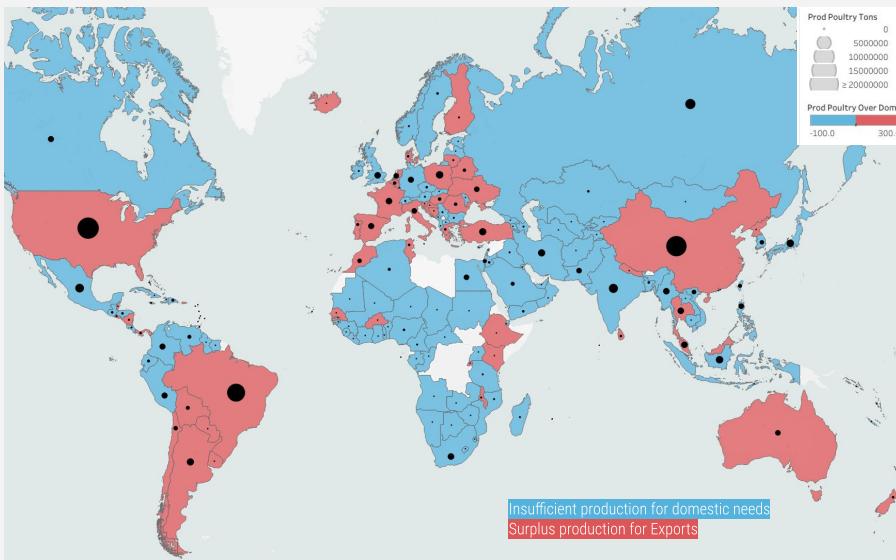
In France, poultry farms have a smaller capacity because of the importance of quality and origin labels (Red Label, organic, Appellation d'Origine Contrôlée). With farm sizes which don't allow for large economies of scale, and with labour costs above some of its competitors, the French Poultry sector is facing challenges on exports.

With a "gourmet" image and high quality products, it is recommended for a French Poultry producer **to explore export markets with a clientele ready to pay for premium products.** Countries with a higher level of development are preferred.

Production is based in France and **part of the European Union (UE).** Exportation to another EU members is facilitated in terms of regulations, standards and import tariffs.

3 giant producers

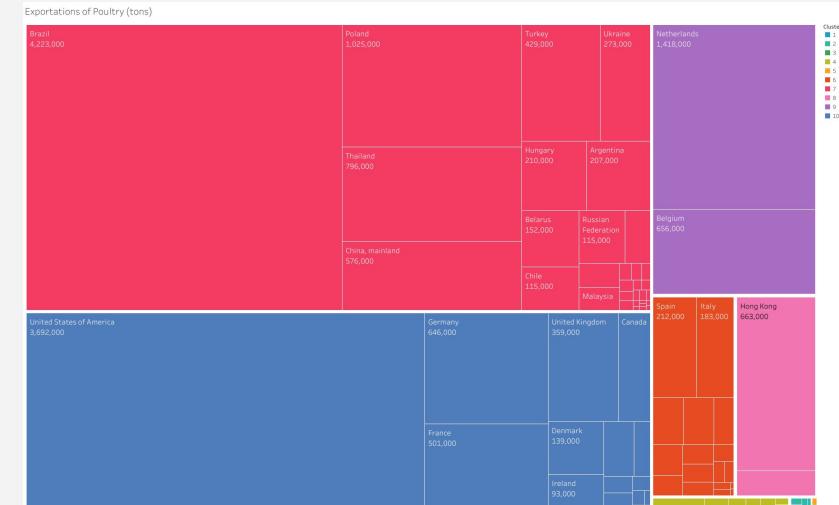
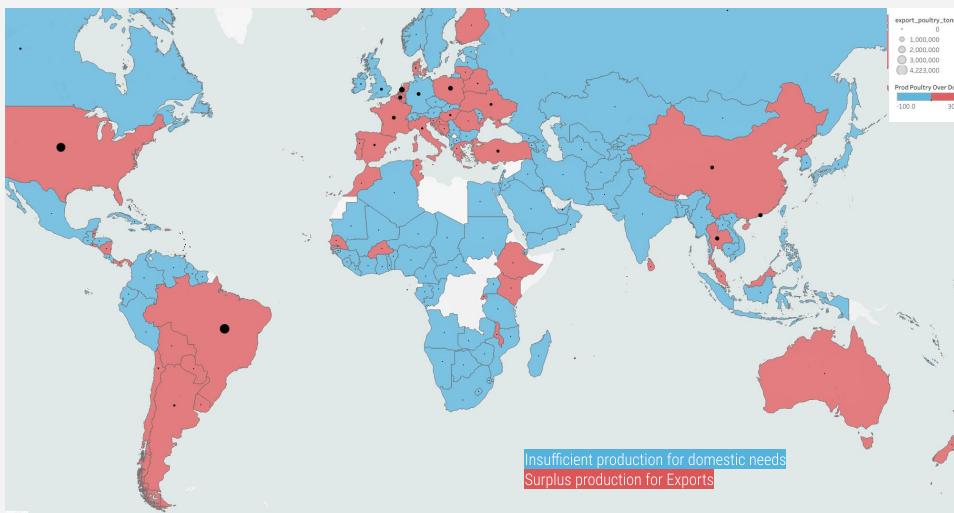
Almost half of the Poultry are produced in 3 countries: USA (18%), China (15%) and Brazil (12%).



45% of exports from the USA and Brazil

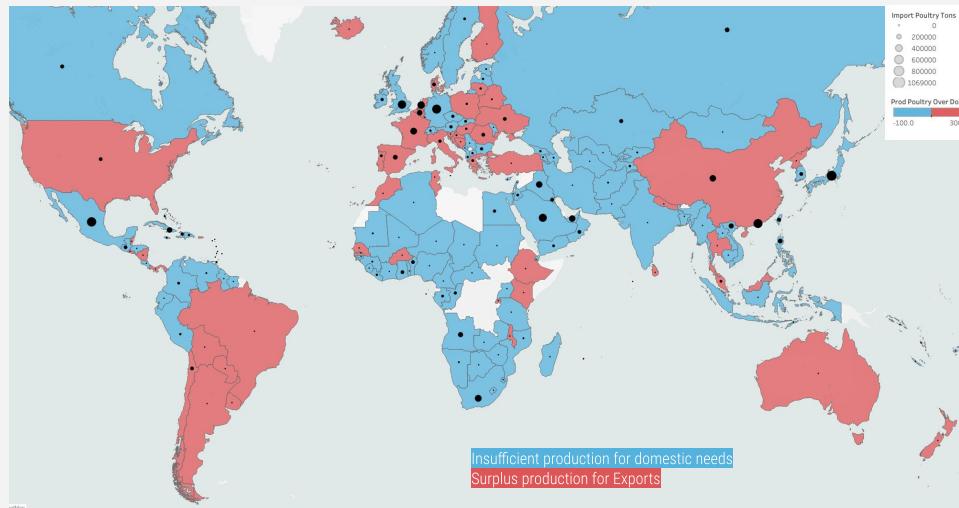
2 countries are exporting almost half of the Poultry: USA (24%) and Brazil (21%).

Netherlands and Belgium are relying on large poultry raw imports in order to re-export semi-processed poultry meat.
China (along with Hong-Kong), Poland and Thailand are key exporters.



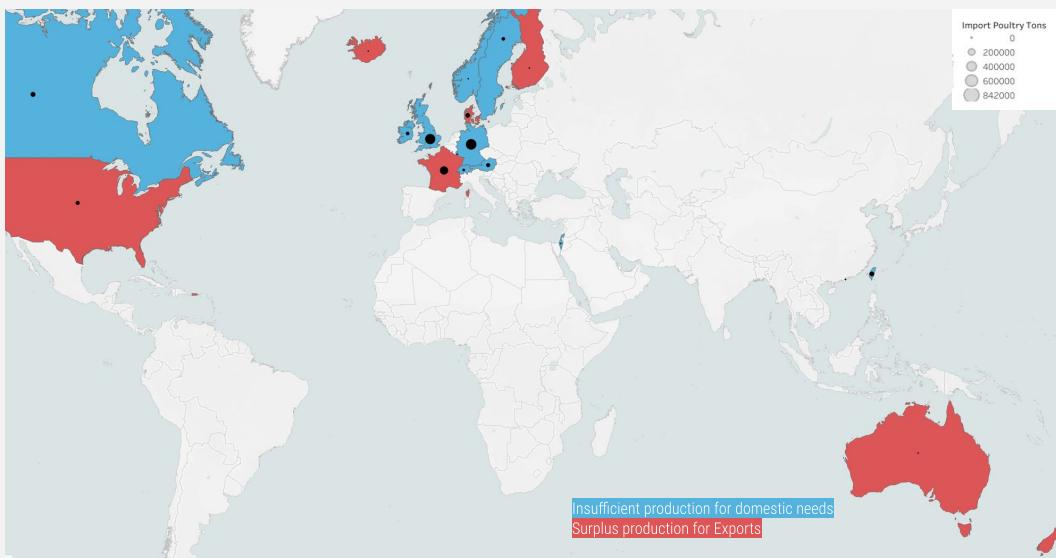
3 countries out of 4 rely on importations

With a local production not meeting the domestic needs, **127 countries are importing Poultry** (net importations). Japan, Mexico and Saudi Arabia are the countries the most dependent on Poultry importations for their domestic market.



Export to high-income developed countries

Recommendation Cluster 10 is the recommended cluster with the best country attributes regarding the level of development, net importations and growth of the local demand for Poultry products.



Selection within Cluster 10

Borders with France:

Requirements: Poultry net import > 10 000 tons, poultry domestic supply stable or in growth, poultry production capacity < 90%.

Selection: **United Kingdom, Luxembourg, Switzerland, Germany**

Within EU:

Requirements: Poultry net import > 30 000 tons, poultry importation growth > 2%, poultry production capacity < 90%.

Selection: **Sweden, Austria**

Outside EU:

Requirements: Poultry net import > 150 000 tons, poultry importation growth > 15%, poultry production capacity < 90%.

Selection: **Taiwan**

Export to high-income developed countries

Luxembourg

While their importations are relatively small (10 000 tons), Luxembourg is selected due to the very close distance from France, their belonging to EU, their very high GDP per capita and their strong dependance to Poultry importations (0 local production).

United Kingdom

While there is a decrease of their importations (due to an increase of their production), United Kingdom is selected due to the very close distance from France, their belonging to EU and the important size of their Poultry net importations (first Poultry Market in EU).

Germany Austria Sweden

All indicators are positive. Significant volume of poultry importations, significant growth, production rate not able to meet the needs, high GDP per capita, population growth, part of EU, etc.

Switzerland

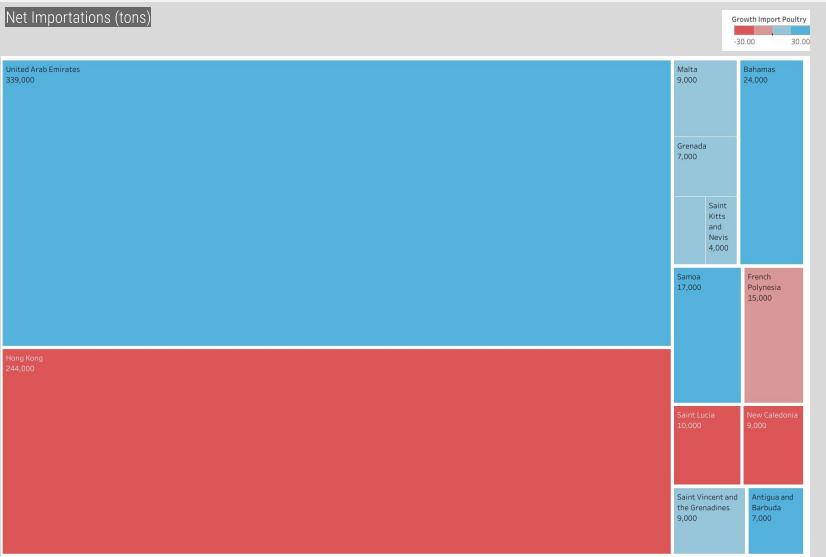
Switzerland is not part of the EU and there is small decline of importations. However Switzerland remains an attractive export opportunity for a french producer due to the close distance (by road) from France, their high GDP per capita, the significant size of their Poultry importations due to an insufficient production and bilateral trade agreements between France and Switzerland.

Taiwan

Far from France, Taiwan is in the selection due to a high level of development, a significant volume of Poultry importations combined with a strong growth of the importations (38%). With a complex political relationship with China, EU countries are significant trade partners.

Export to isolated countries

Recommendation Cluster 8 is made of small countries, islands or city-states with a very low Poultry production (if any) and a relative high level of development. Selection within cluster 8 is an option for a country with good characteristics.



Selection within Cluster 8

Requirements: poultry domestic supply growth > 5%, poultry importation growth > 10%, poultry production capacity < 90%

Within EU:

Additional Requirements: Poultry net import > 30 000 tons
Selection: **None**

Outside EU:

Additional Requirements: Poultry net import > 150 000 tons
Selection: **United Arab Emirates**

United Arab Emirates presents an interesting business opportunity with a significant volume of importations (433,000 tons), a significant growth of both importations and domestic supply and a high GDP per capita. In addition, the UAE are highly dependant on importations due to a very low production inferior to 15% (with limited possibilities for a change due to an extremely hot weather).

Why not the top importers

Japan

First market worldwide in terms of importations, Japan is not included in the selection due to a decline of their internal domestic supply (faster than their population decline) combined with a very strong increase of their Poultry production (+51%). While their demand is decreasing, their production capacity is increasing (now exceeding 90%). Their production could meet in the future their internal demand.

Saudi Arabia

While they have a low production and a high volume of importations, Saudi Arabia's poultry imports declined severely (-18%) and their gdp per capita is not at the level of developed countries.

Mexico

With 972 000 tons of importations and 14% increase of their imports, Mexico is a great export market for Poultry. However due to a low GDP per capita and proximity (geographically, economically and politically) to the 2 giant producers (USA and Brazil), Mexico is not an ideal option for a French producer.

Hong Kong

There is a strong decline of poultry importations (-24%) and market supply (-38%). However these numbers could be biased. Hong-Kong is the main road for imports/exports to/from China. Specialists have difficulties to differentiate data (Hong Kong vs China).

Conclusion

European Union



Germany, United Kingdom, Luxembourg, Sweden, Austria

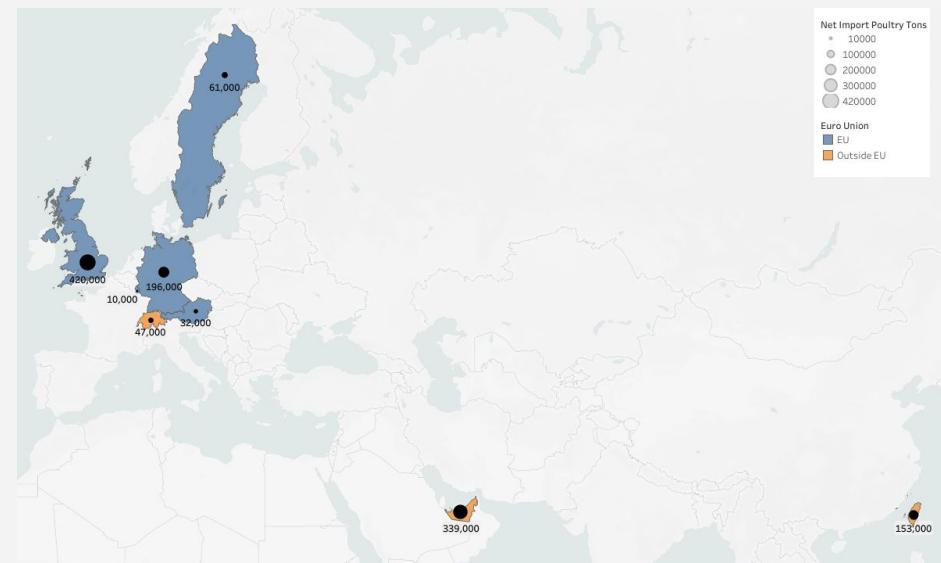
- total Population : 168,702,577 inhabitants
- total Poultry market size : 4,344,000 tons (domestic supply)
- total Poultry importations : 1,826,000 tons
- a high GDP per capita of 44,815 USD (average).

A large poultry export market, with a rich population, highly developed infrastructure, close or relatively close from France and procedures facilitated by their belonging to the European Union.

International

Switzerland, Taiwan, United Arab Emirates

- total Population : 41,617,553 inhabitants
- total Poultry market size : 1,330,000 tons (domestic supply)
- total Poultry importations : 645,000 tons
- a high GDP per capita of 46,976 USD (average).





THANK YOU!

Do you have any questions?

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