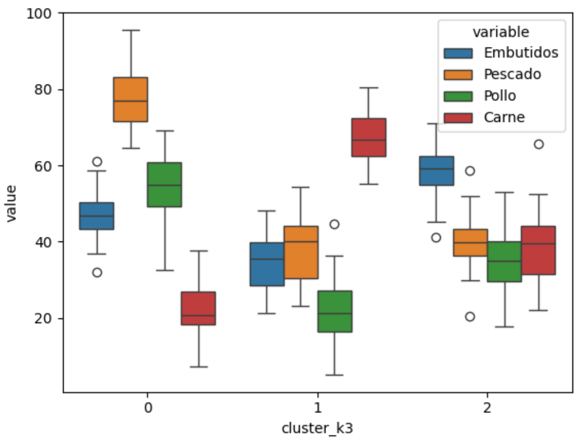
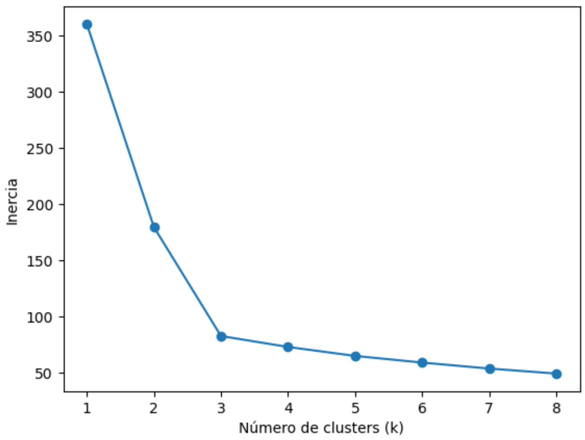
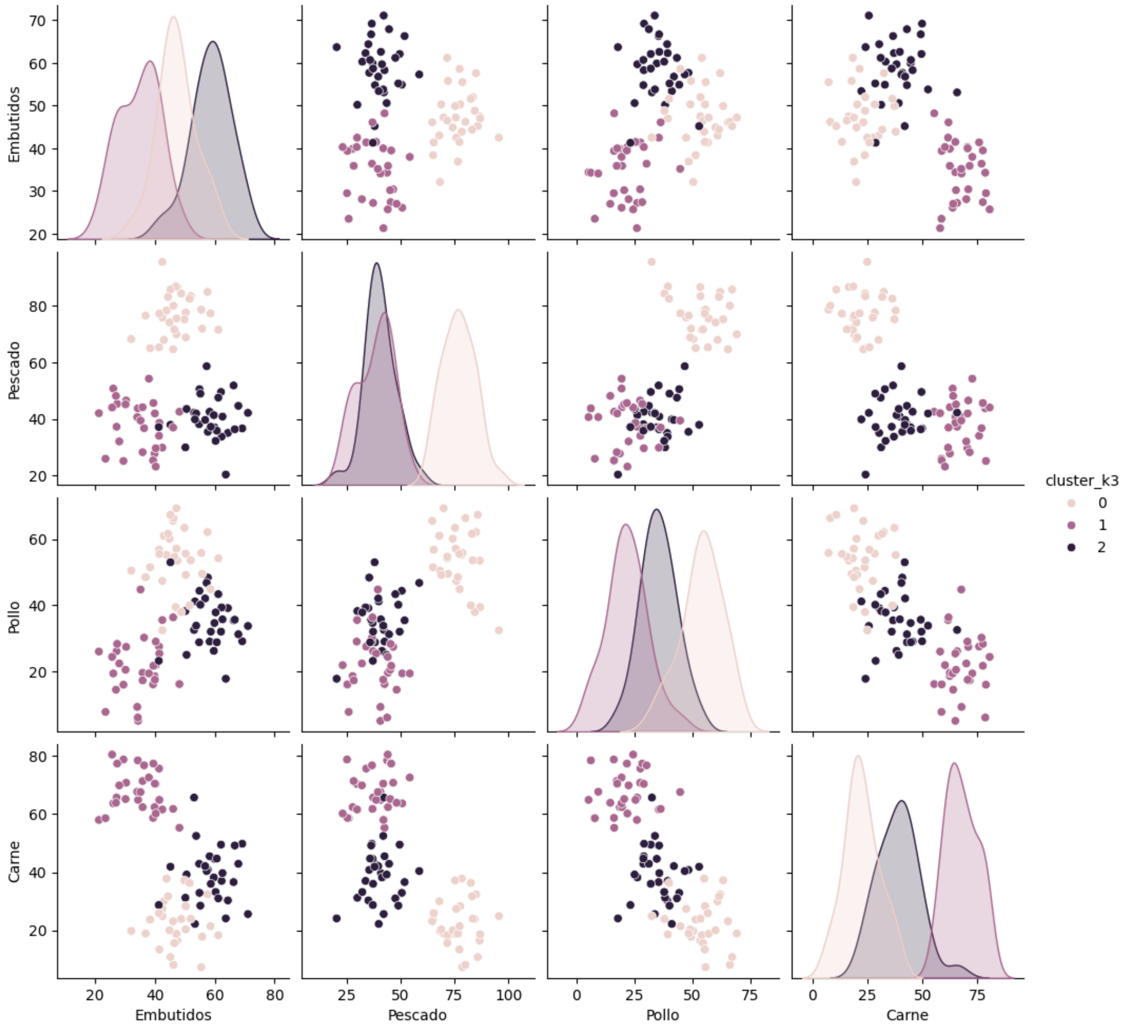
Analisis de clusters con Seaborn, Sklearn y Python







Taller: Segmentación de clientes con Python

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Pizarra: miro

Paquetes

In [ ]:

```
import seaborn as sns
```

In [ ]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

Data

In [ ]:

```
market = pd.read_csv("https://docs.google.com/spreadsheets/d/e/2PACX-1vTdEvsHWHrGSD
```

In [ ]:

```
market.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 90 entries, 0 to 89
Data columns (total 4 columns):
 #   Column     Non-Null Count  Dtype  
---  ------     --------------  -----  
 0   Embutidos  90 non-null     float64
 1   Pescado    90 non-null     float64
 2   Pollo      90 non-null     float64
 3   Carne      90 non-null     float64
dtypes: float64(4)
memory usage: 2.9 KB
```

EDA

Estadistica descriptivas

In [ ]:

```
market.describe()
```

Out[ ]:

	Embutidos	Pescado	Pollo	Carne
count	90.000000	90.000000	90.000000	90.000000
mean	46.834444	51.828889	37.042222	43.014444
std	11.888103	19.426770	15.769491	20.537872
min	21.300000	20.400000	5.200000	7.300000
25%	39.425000	37.225000	25.650000	25.075000
50%	46.350000	44.150000	35.650000	39.450000
75%	56.550000	71.200000	49.425000	62.400000
max	71.100000	95.600000	69.300000	80.500000

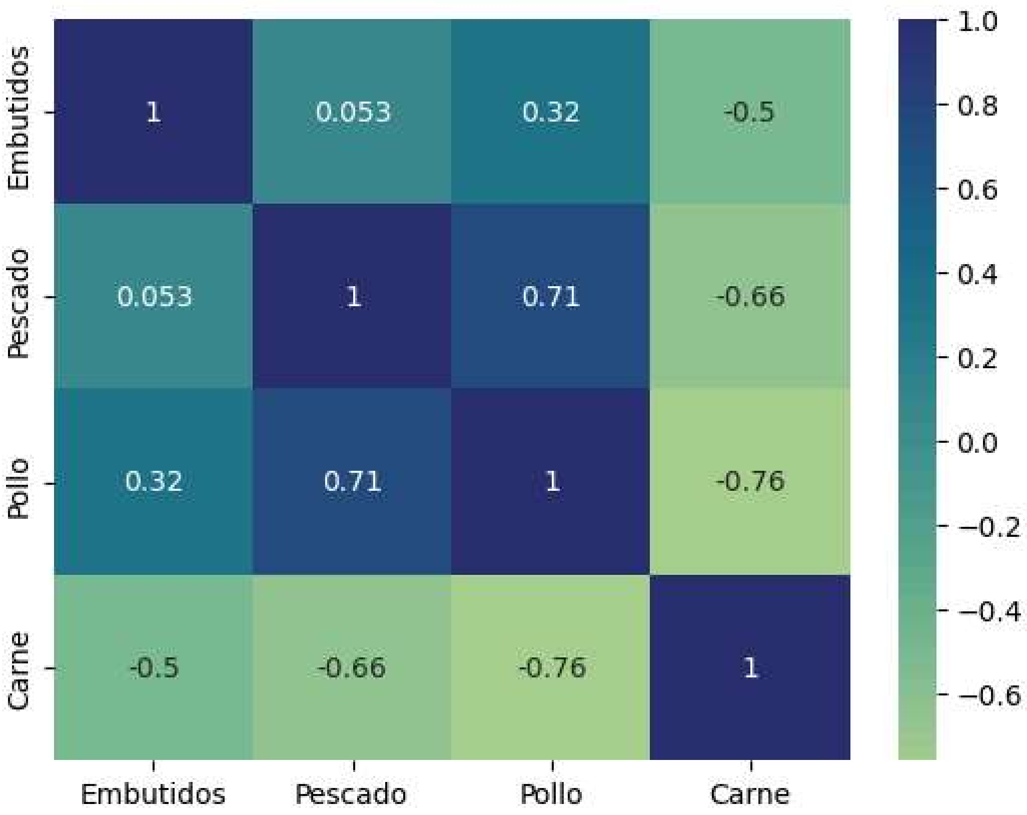
```
In [ ]: market.corr()
```

Out[ ]:

	Embutidos	Pescado	Pollo	Carne
Embutidos	1.000000	0.053112	0.317349	-0.501445
Pescado	0.053112	1.000000	0.708391	-0.660753
Pollo	0.317349	0.708391	1.000000	-0.759839
Carne	-0.501445	-0.660753	-0.759839	1.000000

```
In [ ]: sns.heatmap(market.corr(), cmap="crest", annot=True)
```

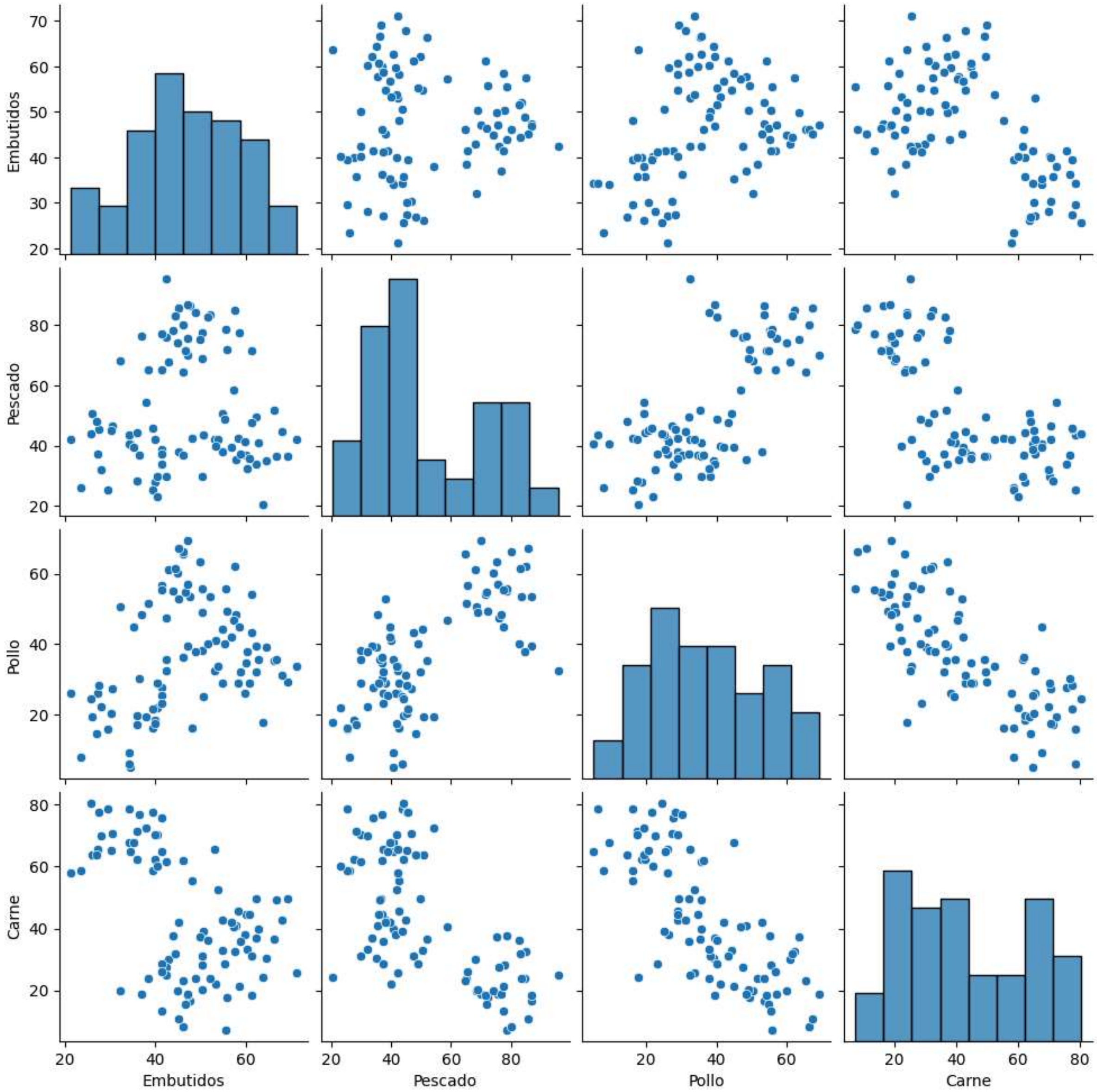
```
Out[ ]: <Axes: >
```



Visualización de datos

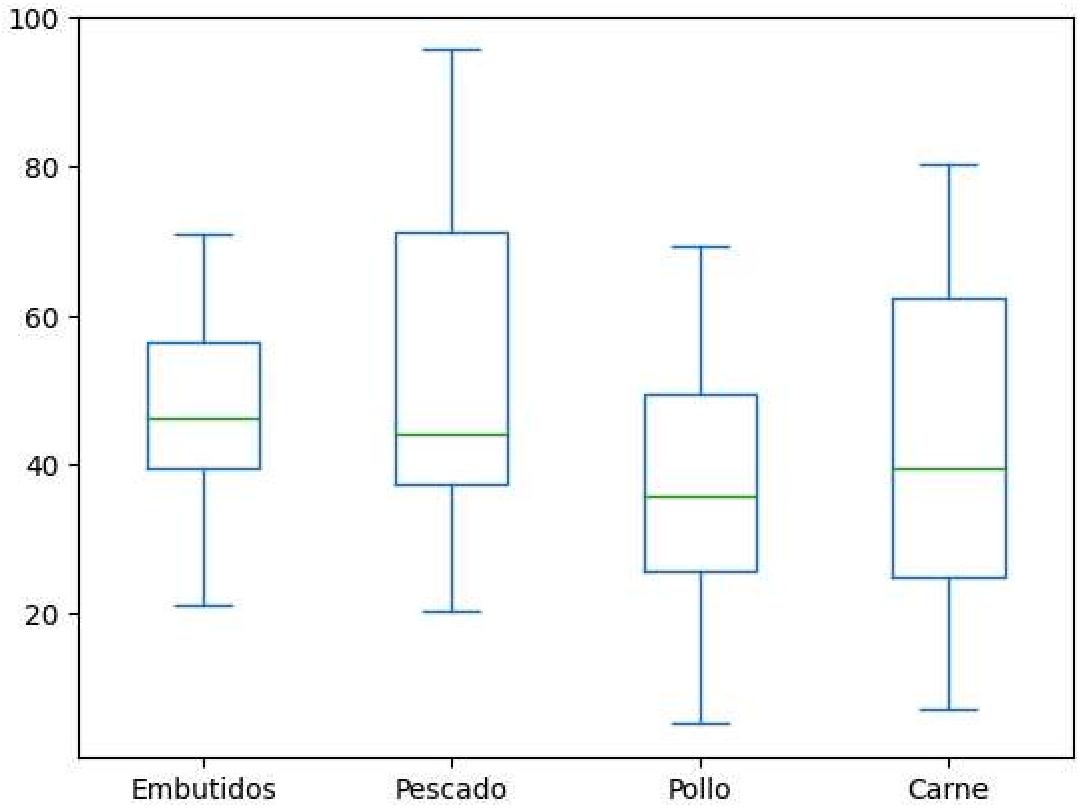
In [ ]:
```
sns.pairplot(market)
```

Out[ ]:
```
<seaborn.axisgrid.PairGrid at 0x790c7d4a07f0>
```



In [ ]:
```
market.plot.box()
```

Out[ ]:
```
<Axes: >
```



In [ ]:

```
market.mean()
```

Out[ ]:

	0
Embutidos	46.834444
Pescado	51.828889
Pollo	37.042222
Carne	43.014444

dtype: float64

Pre Procesamiento

Estandarización

In [ ]:

```
from sklearn.preprocessing import StandardScaler
```

In [ ]:

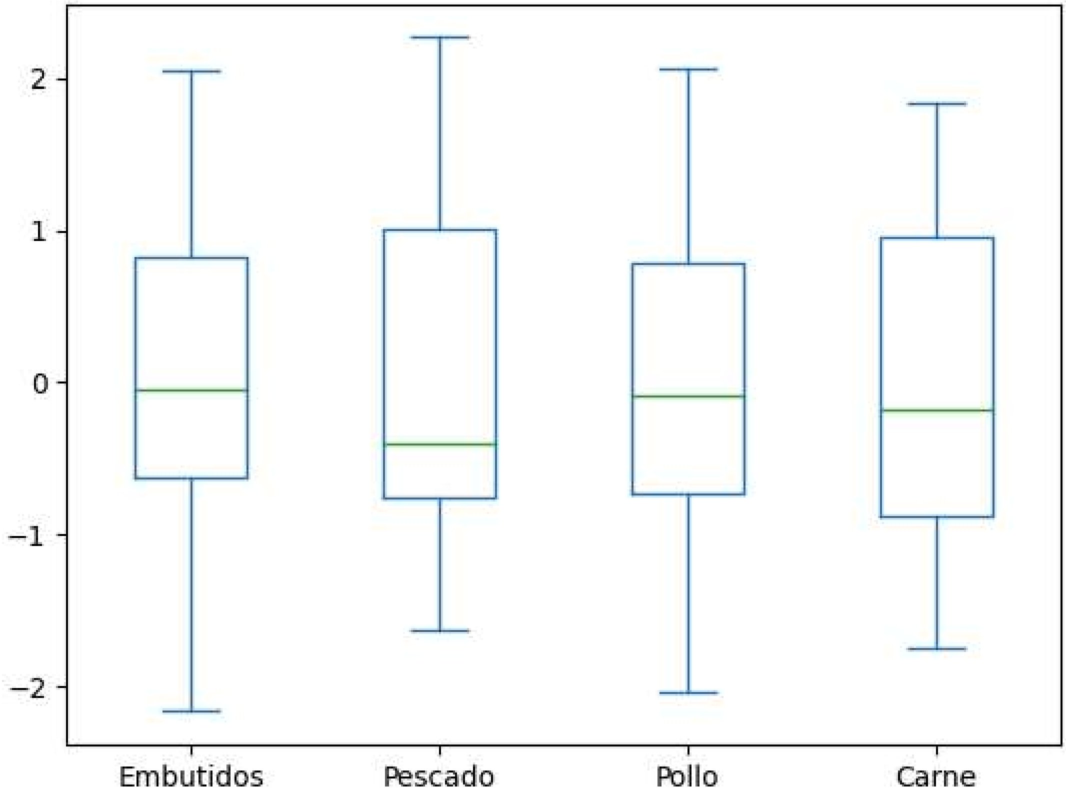
```
scaler = StandardScaler()
scaled_data = scaler.fit_transform(market)
```

In [ ]:

```
pd.DataFrame(scaled_data,columns=market.columns).plot.box()
```

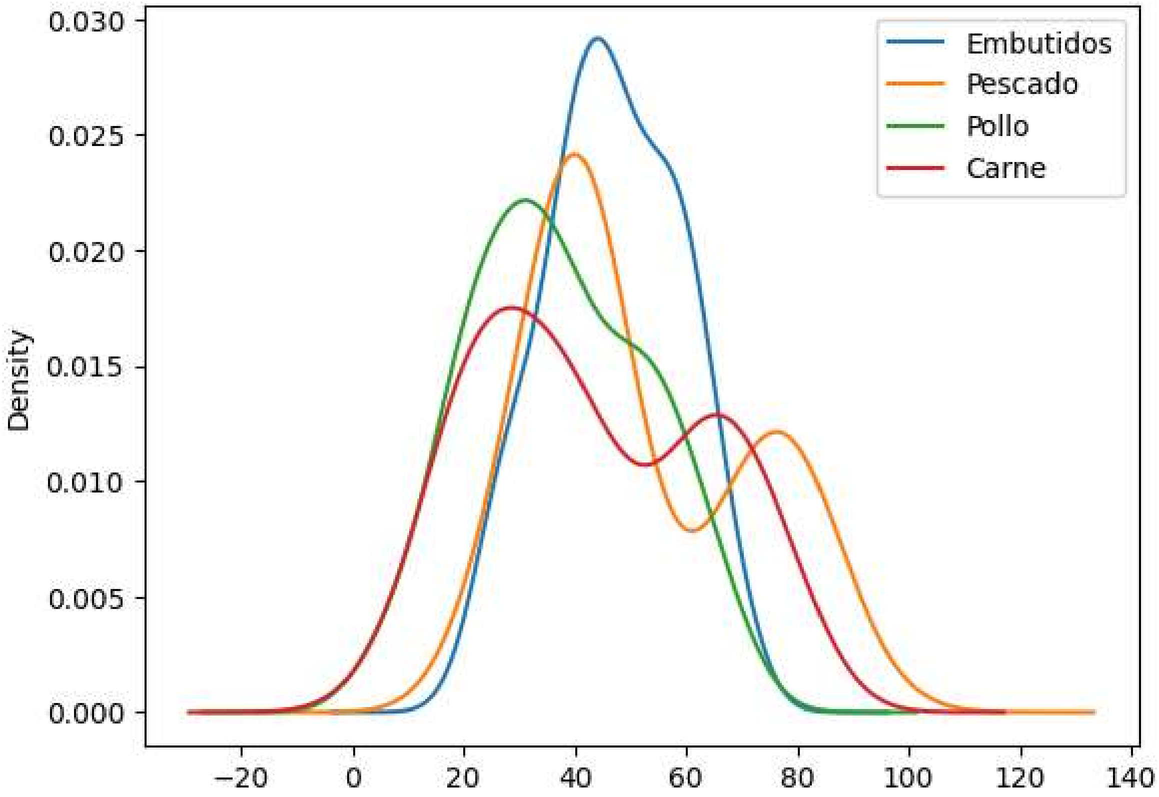
Out[ ]:

```
<Axes: >
```



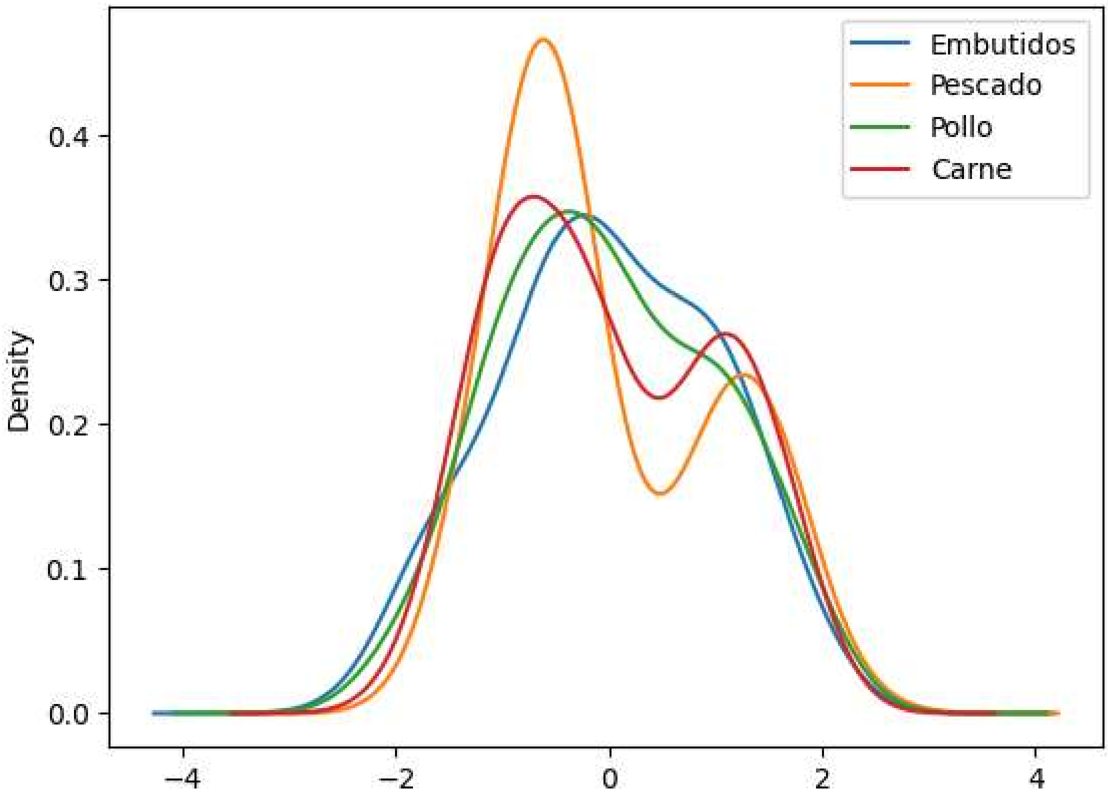
In [ ]:
```
market.plot.kde()
```

Out[ ]:
```
<Axes: ylabel='Density'>
```



In [ ]:
```
pd.DataFrame(scaled_data,columns=market.columns).plot.kde()
```

Out[ ]:
```
<Axes: ylabel='Density'>
```



In [ ]:

```
pd.DataFrame(scaled_data,columns=market.columns).describe()
```

Out[ ]:

	Embutidos	Pescado	Pollo	Carne
count	9.000000e+01	9.000000e+01	9.000000e+01	9.000000e+01
mean	-5.094690e-16	-7.894919e-17	3.207311e-17	1.085551e-16
std	1.005602e+00	1.005602e+00	1.005602e+00	1.005602e+00
min	-2.159932e+00	-1.626877e+00	-2.030542e+00	-1.748698e+00
25%	-6.267572e-01	-7.559519e-01	-7.264689e-01	-8.783747e-01
50%	-4.097865e-02	-3.974880e-01	-8.878041e-02	-1.745270e-01
75%	8.218287e-01	1.002721e+00	7.896355e-01	9.491811e-01
max	2.052598e+00	2.265756e+00	2.057041e+00	1.835417e+00

Modelo de cluster

Algoritmo k means

In [ ]:

```
from sklearn.cluster import KMeans
```

In [ ]:

```
k = 3
kmeans = KMeans(n_clusters=k)
```

Entrenamiento del modelo

In [ ]:

```
kmeans.fit(scaled_data)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:1416: FutureWar
ning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the
value of `n_init` explicitly to suppress the warning
  super()._check_params_vs_input(X, default_n_init=10)
```

Out[ ]:

```
▾      KMeans
KMeans(n_clusters=3)
```

Resultados

In [ ]:

```
kmeans.labels_
```

Out[ ]:

```
array([2, 1, 2, 2, 2, 2, 0, 1, 2, 1, 0, 2, 2, 1, 1, 0, 0, 0, 2, 2, 1, 1,
       0, 2, 1, 0, 0, 1, 0, 2, 1, 1, 0, 2, 2, 1, 1, 1, 0, 1, 0, 2, 0, 2,
       0, 2, 0, 0, 2, 2, 0, 1, 1, 2, 1, 2, 2, 0, 1, 1, 0, 2, 2, 1, 0, 1,
       1, 0, 1, 0, 1, 1, 1, 1, 2, 0, 0, 1, 2, 2, 2, 2, 0, 0, 0, 2, 0, 0,
       1, 0], dtype=int32)
```

In [ ]:

```
kmeans.cluster_centers_
```

Out[ ]:

```
array([[ 0.03092196,  1.29708433,  1.08159052, -1.01082044],
       [-1.03010554, -0.70306664, -0.97367946,  1.21244049],
       [ 0.99918357, -0.59401769, -0.10791106, -0.20162005]])
```

In [ ]:

```
pd.DataFrame(kmeans.cluster_centers_,columns=market.columns)
```

Out[ ]:

	Embutidos	Pescado	Pollo	Carne
0	0.030922	1.297084	1.081591	-1.01082
1	-1.030106	-0.703067	-0.973679	1.21244
2	0.999184	-0.594018	-0.107911	-0.20162

In [ ]:

```
market['cluster_k3'] = kmeans.labels_
```

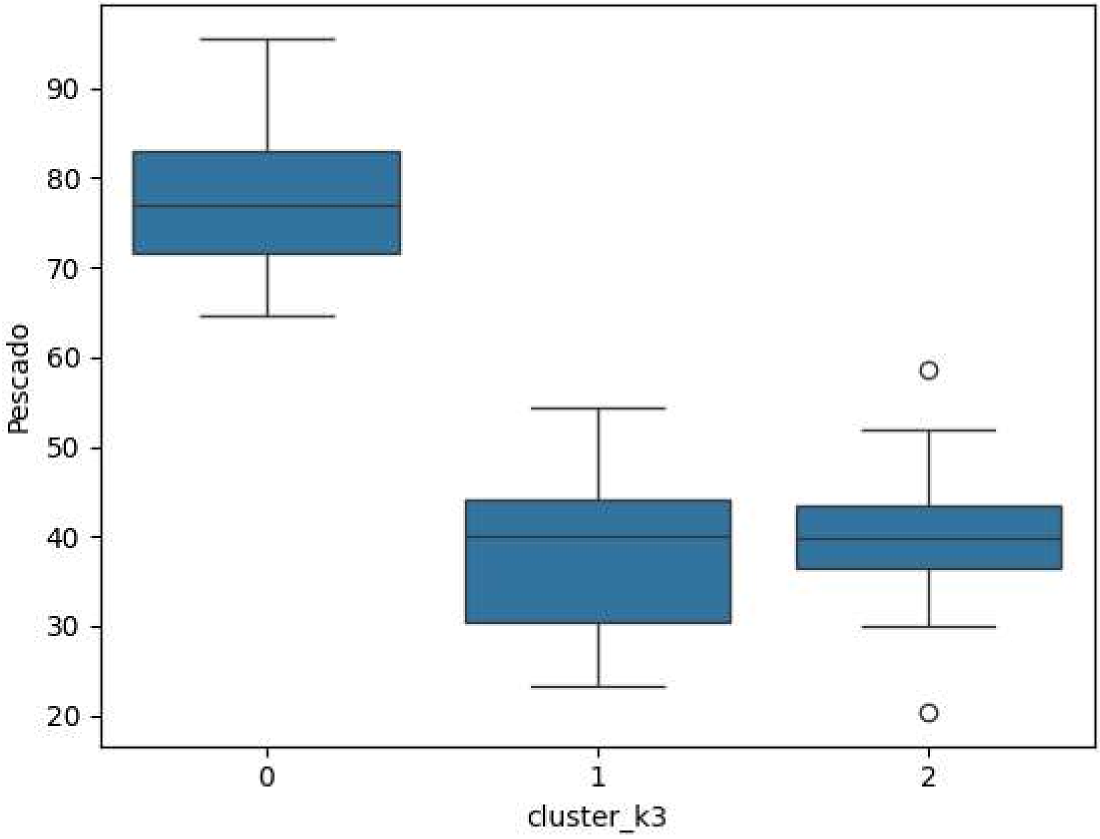
Visualizando resultados

In [ ]:

```
sns.boxplot(market,x='cluster_k3',y='Pescado')
```

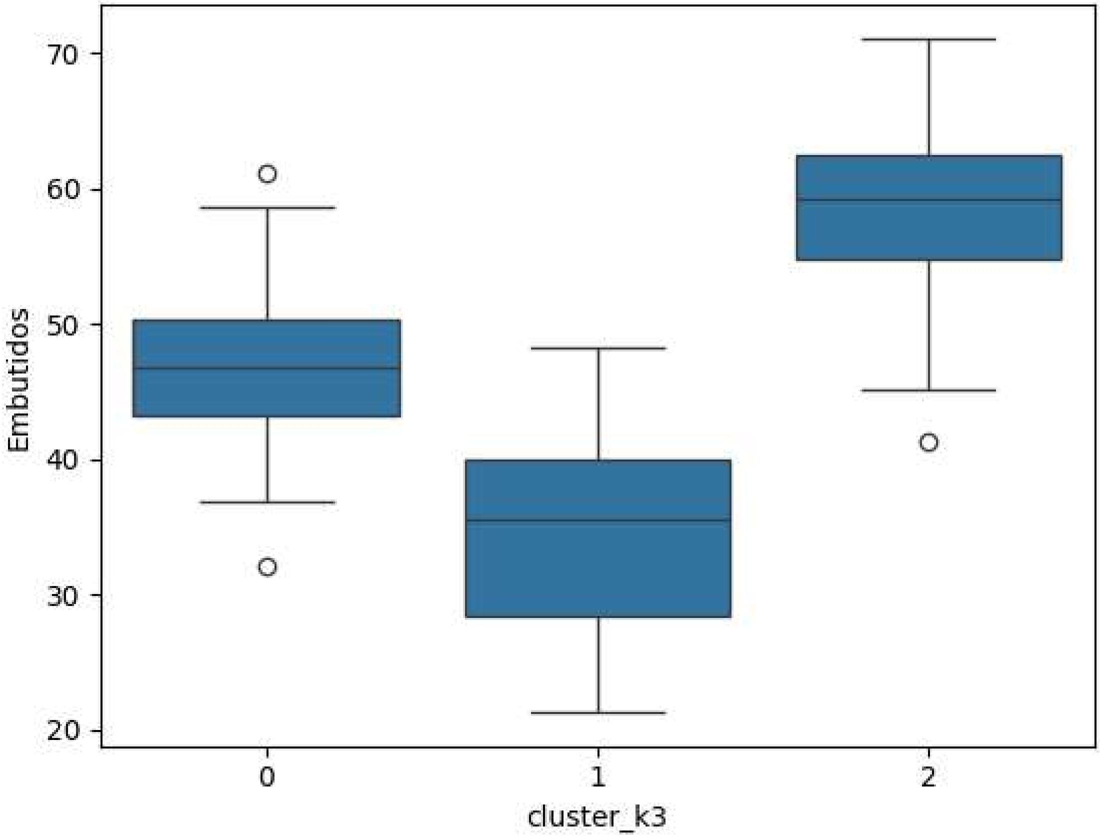
Out[ ]:

```
<Axes: xlabel='cluster_k3', ylabel='Pescado'>
```



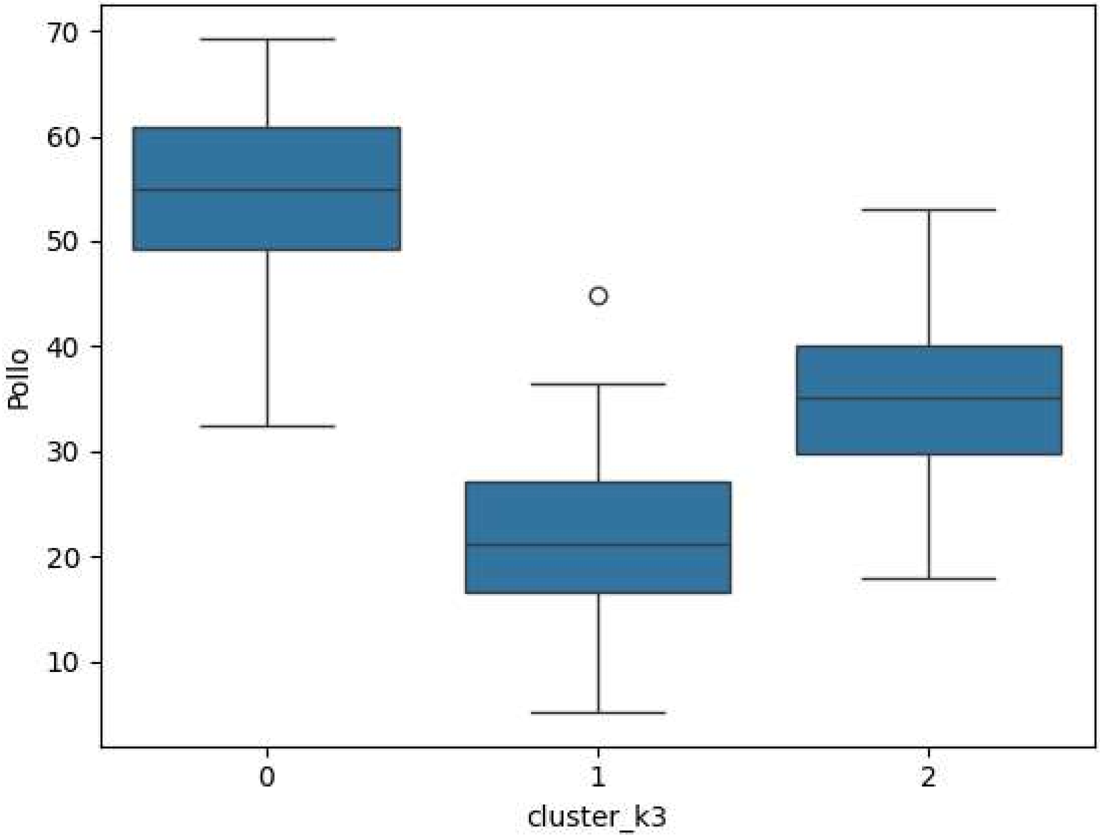
```
In [ ]: sns.boxplot(market,x='cluster_k3',y='Embutidos')
```

```
Out[ ]: <Axes: xlabel='cluster_k3', ylabel='Embutidos'>
```



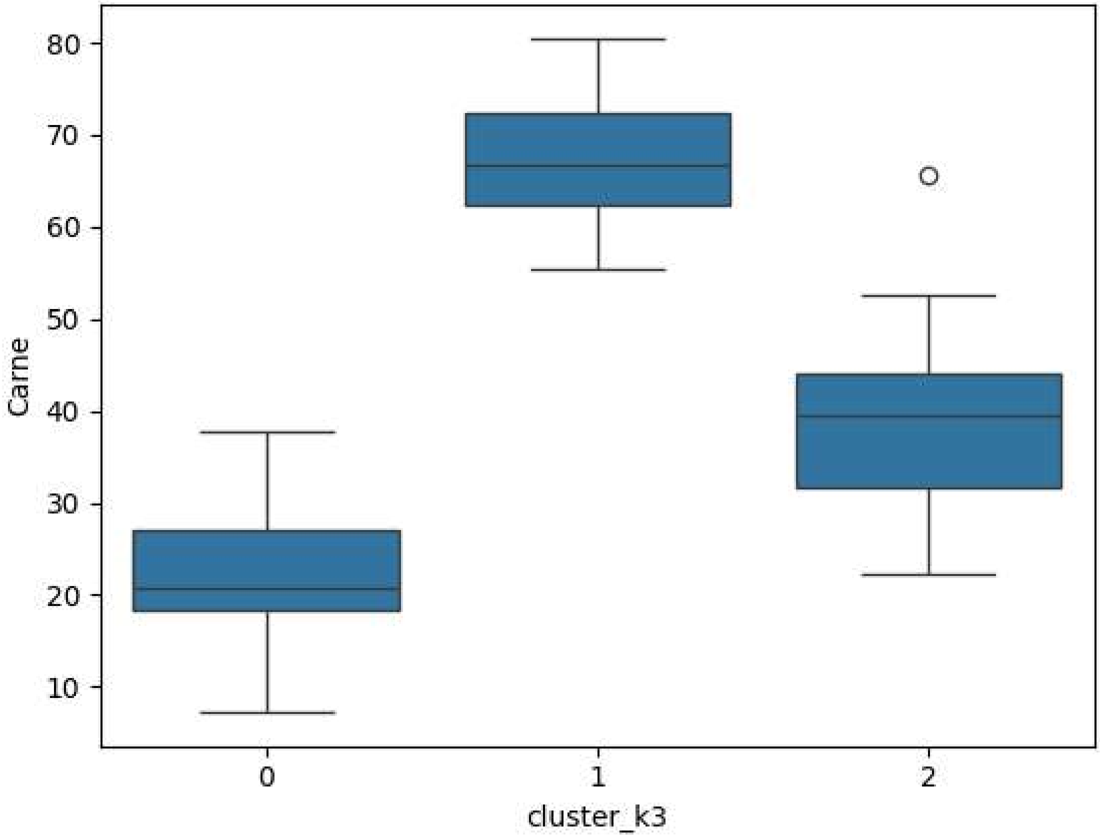
```
In [ ]: sns.boxplot(market,x='cluster_k3',y='Pollo')
```

```
Out[ ]: <Axes: xlabel='cluster_k3', ylabel='Pollo'>
```



```
In [ ]: sns.boxplot(market,x='cluster_k3',y='Carne')
```

```
Out[ ]: <Axes: xlabel='cluster_k3', ylabel='Carne'>
```



Preferencia por clusters

```
In [ ]: market2 = pd.melt(market,id_vars=['cluster_k3'])
```

In [ ]:

```
market2
```

Out[ ]:

	cluster_k3	variable	value
0	2	Embutidos	66.3
1	1	Embutidos	48.2
2	2	Embutidos	62.1
3	2	Embutidos	57.7
4	2	Embutidos	54.8
...	...	...	...
355	2	Carne	36.0
356	0	Carne	21.4
357	0	Carne	25.9
358	1	Carne	61.8
359	0	Carne	13.4

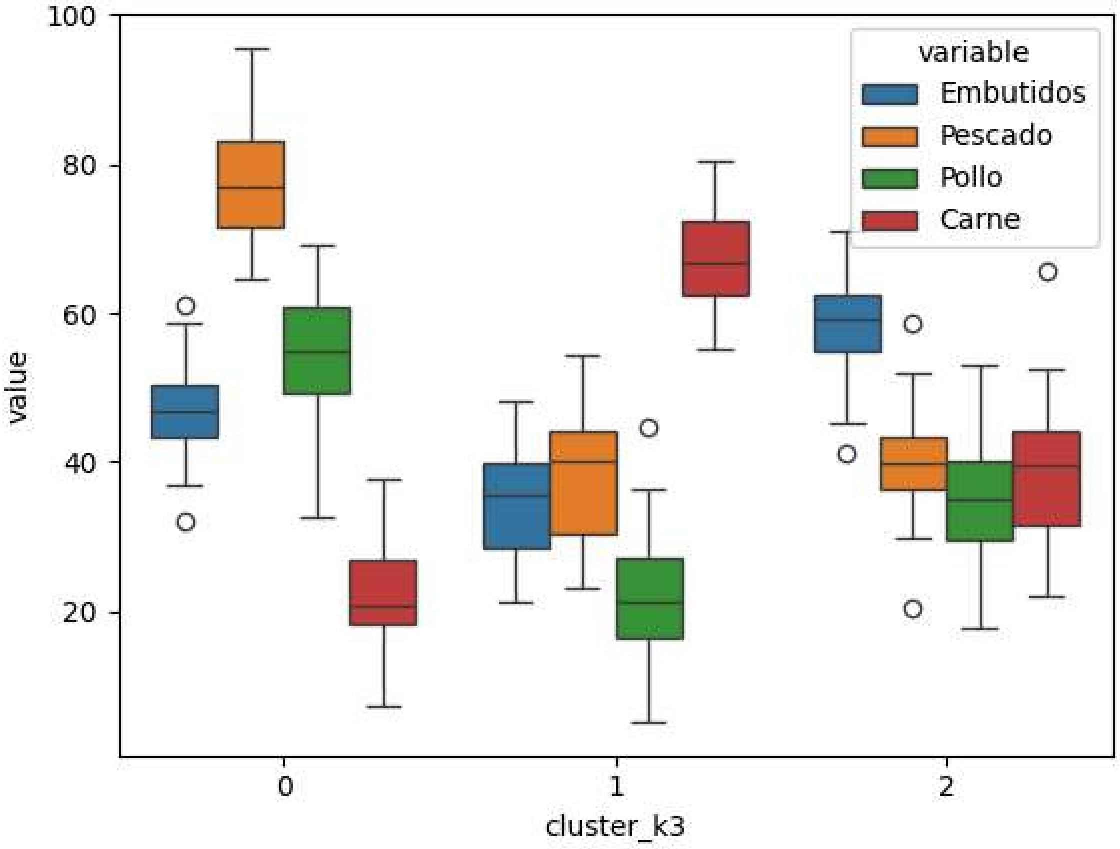
360 rows × 3 columns

In [ ]:

```
sns.boxplot(market2,x='cluster_k3',y='value',hue='variable')
```

Out[ ]:

```
<Axes: xlabel='cluster_k3', ylabel='value'>
```

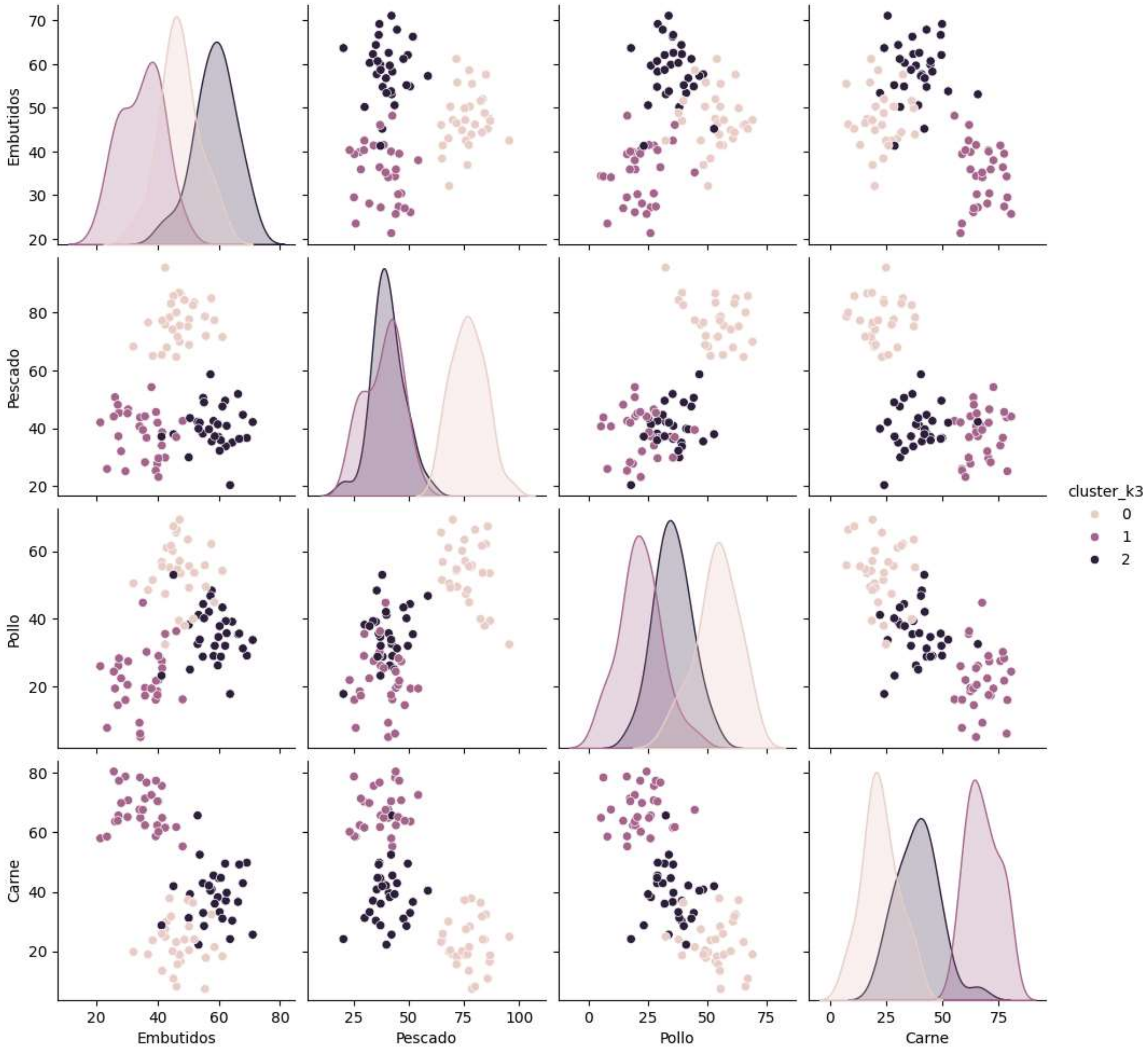


In [ ]:

```
sns.pairplot(market,hue='cluster_k3')
```

Out[ ]:

```
<seaborn.axisgrid.PairGrid at 0x790c7c186bf0>
```



Identificando numero optimo de cluster

In [ ]:

```
kmeans.inertia_
```

Out[ ]:

```
82.44048010009016
```

In [ ]:

```
inertia = []
max_k = 8
for k in range(1,max_k+1):
    kmeans = KMeans(n_clusters=k)
    kmeans.fit(scaled_data)
    inertia.append(kmeans.inertia_)

plt.plot(range(1,max_k+1), inertia, marker='o')
plt.xlabel('Número de clusters (k)')
plt.ylabel('Inercia')
plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:1416: FutureWar
ning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the
value of `n_init` explicitly to suppress the warning
  super()._check_params_vs_input(X, default_n_init=10)
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:1416: FutureWar
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value of `n_init` explicitly to suppress the warning
  super()._check_params_vs_input(X, default_n_init=10)
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:1416: FutureWar
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/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:1416: FutureWar
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value of `n_init` explicitly to suppress the warning
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/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:1416: FutureWar
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value of `n_init` explicitly to suppress the warning
  super()._check_params_vs_input(X, default_n_init=10)
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:1416: FutureWar
ning: The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the
value of `n_init` explicitly to suppress the warning
  super()._check_params_vs_input(X, default_n_init=10)
```

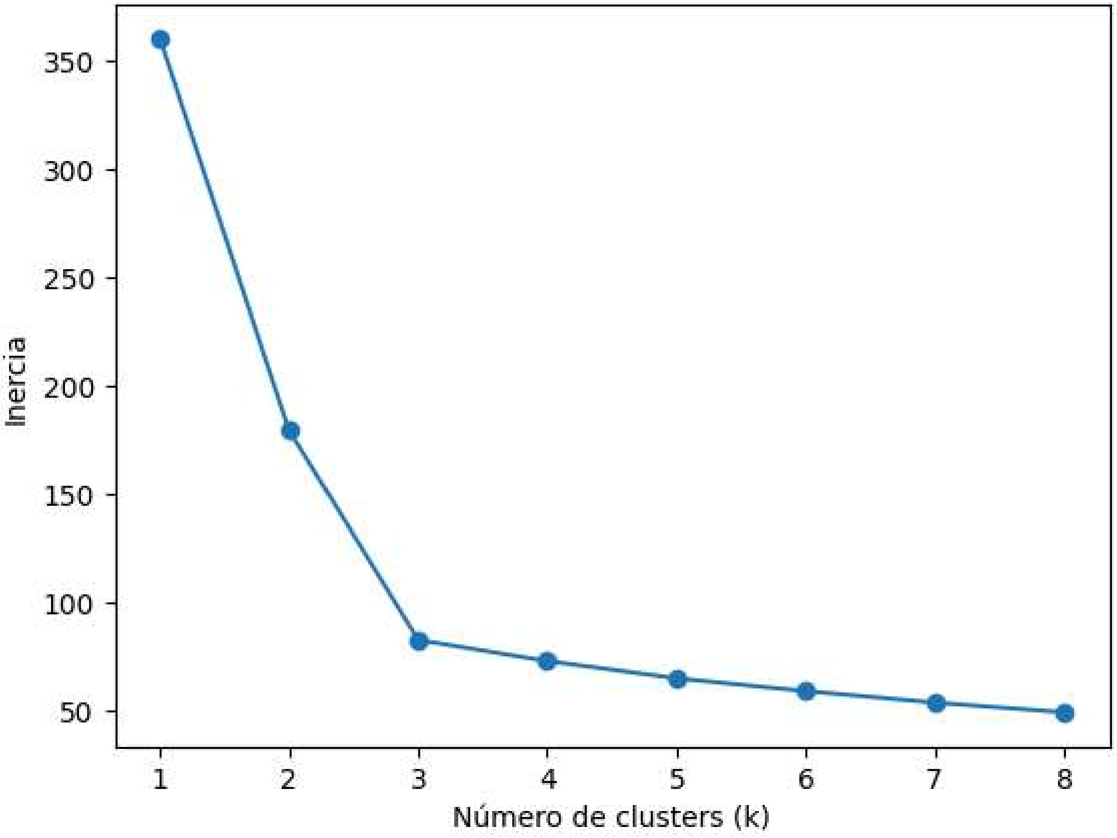
Inercia
Número de clusters (k)