

NHANES_FPED_Component_Stats

April 17, 2021

Objectives

Provide statistical distribution plots of FPED components, for comparison on how they are distributed among the seafood vs non-seafood meals.

Applied Data Filters

The dataframe included in this analysis contains the following modifications of the original data set:

1. Meal level aggregation
2. Meals that are only lunch or dinner
3. Meals that have both seafood and meat, where there is ambiguity in the ratio, are dropped
4. Meals that are more than 0 KCAL
5. Meals of participants older than 18 years of age
6. Meals that are consumed at home
7. Meals that are non-vegetarian

Section 1: Fruits

This section provides boxplots and density plots of the Fruit FPED components in the seafood meal and non seafood meal groups. The code for seafood meal is 1 if meal contains seafood, and 0 if meal does not contain seafood.

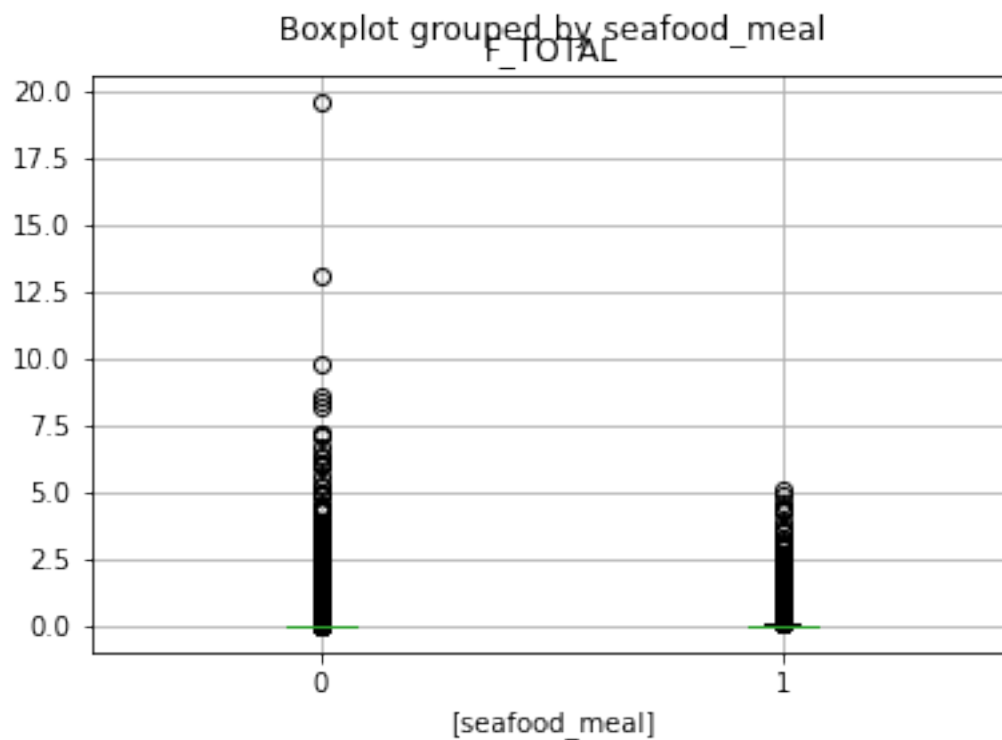
```
[36]: import pandas as pd

#Read data frame and add plant pf total variable
df = pd.read_csv('../Data/nhanes_full_pre_proc.csv')
```

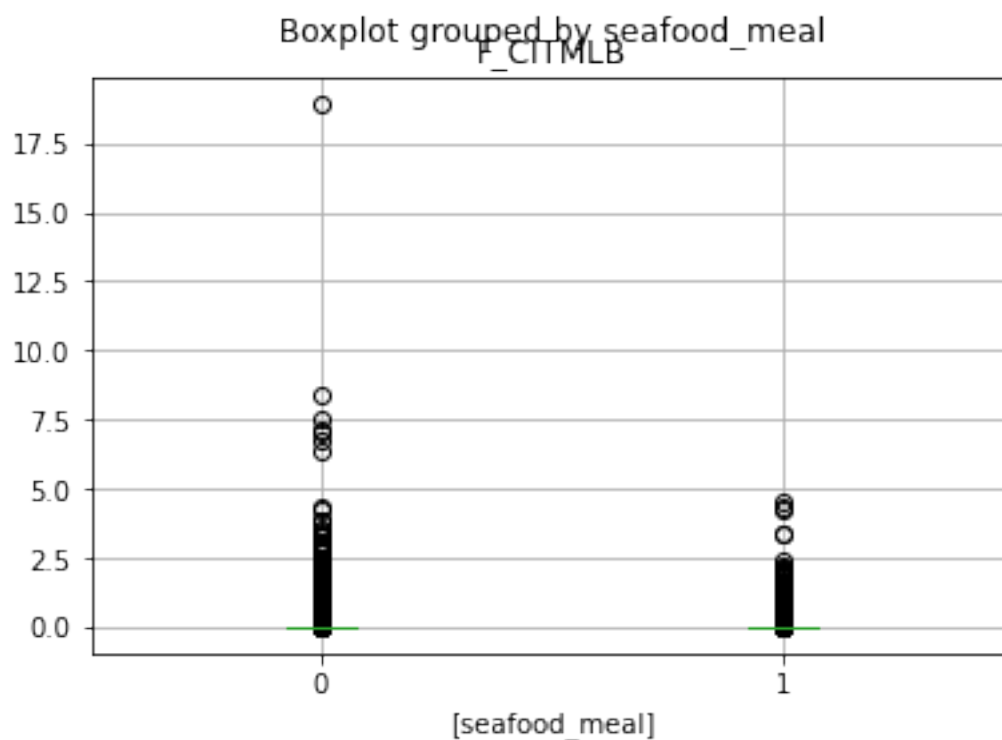
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[37]: import matplotlib.pyplot as plt

fruits = ['F_TOTAL', 'F_CITMLB', 'F_OTHER', 'F_JUICE']

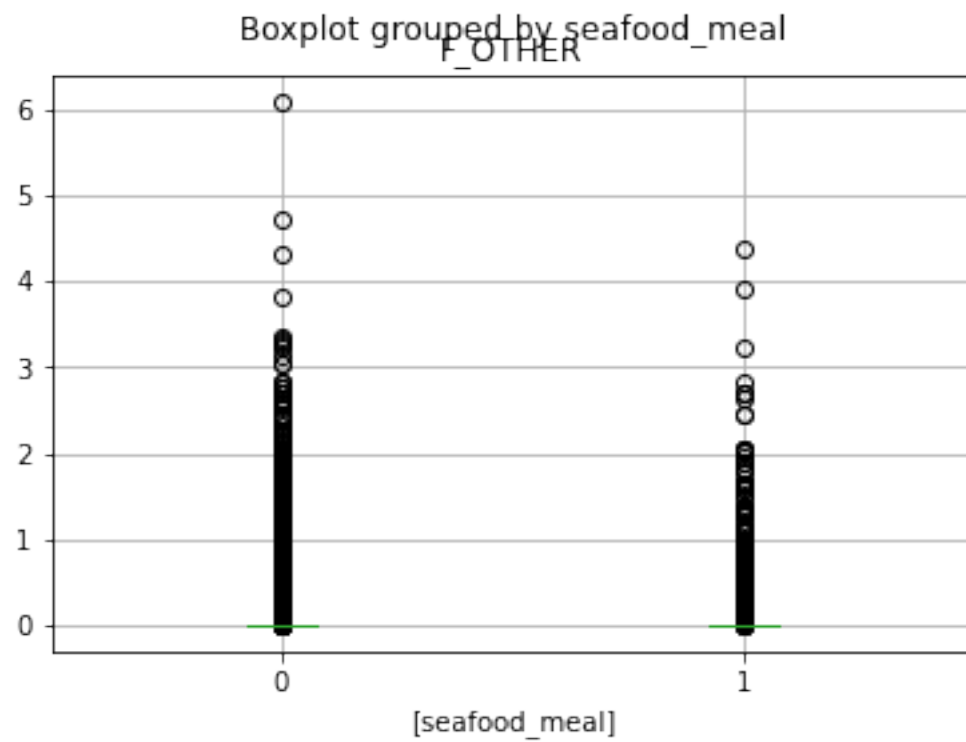
for var in fruits:
    z = df.boxplot(column=var,by=['seafood_meal'])
    plt.show(z)
    plt.clf()
```



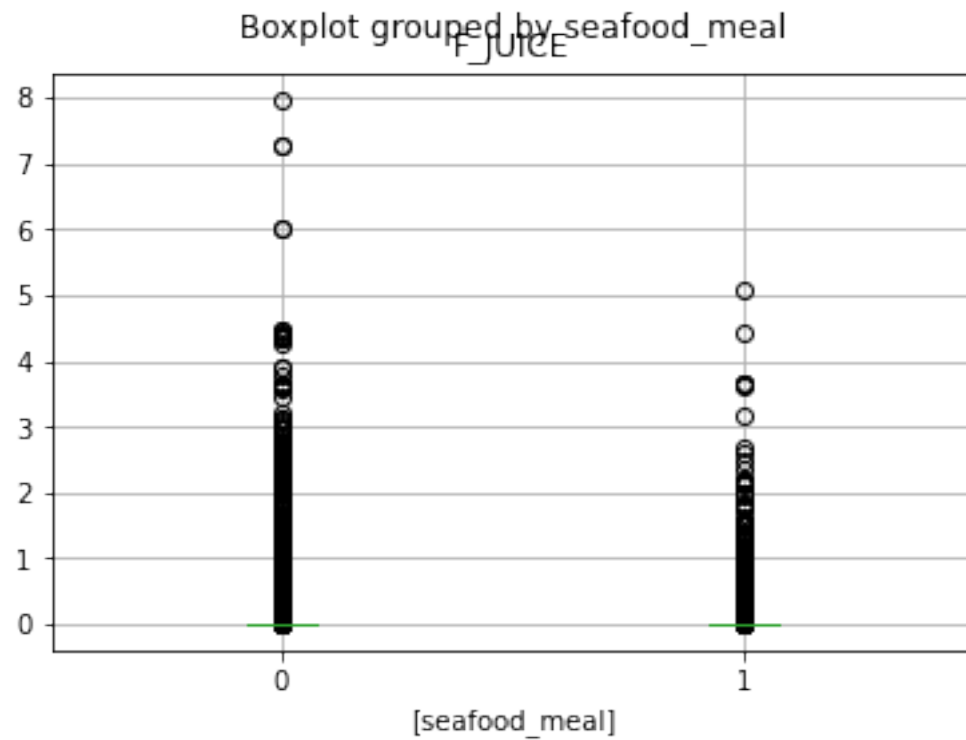
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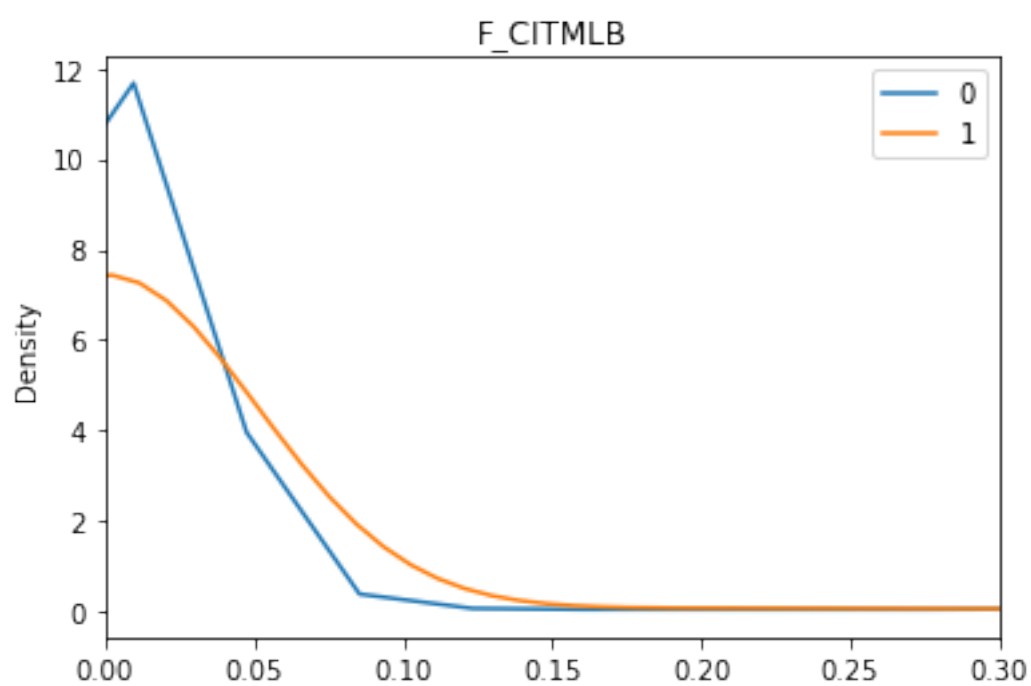
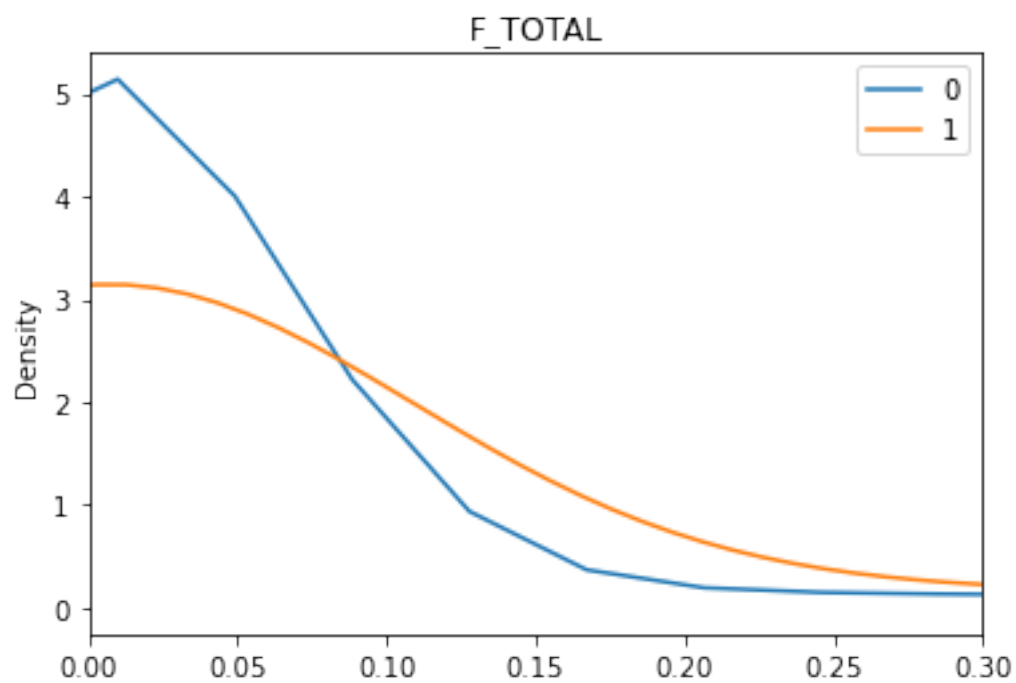


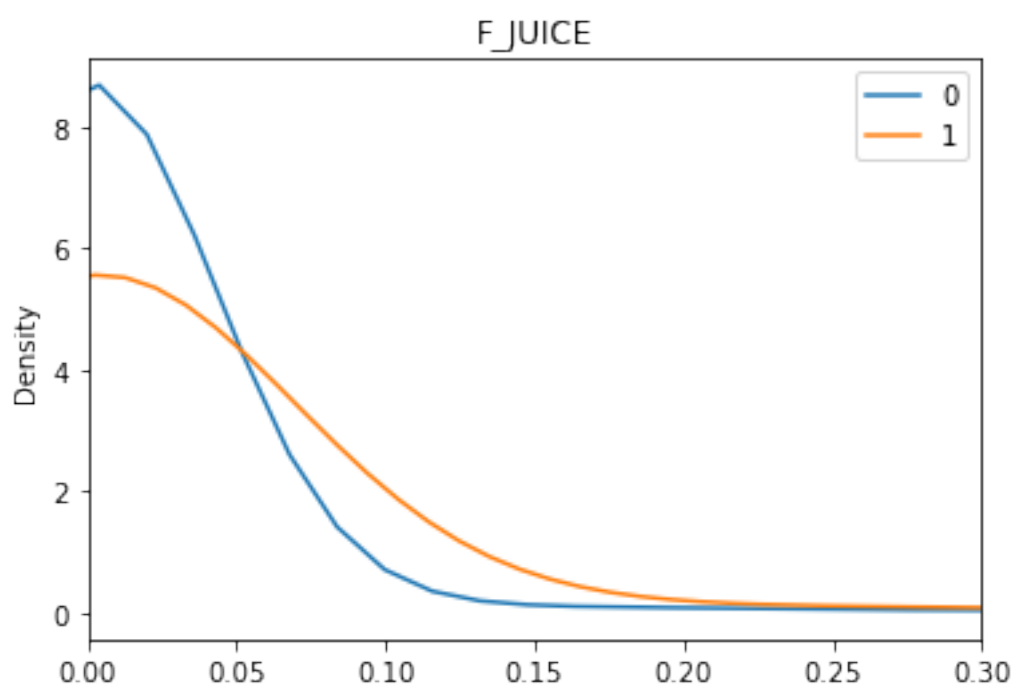
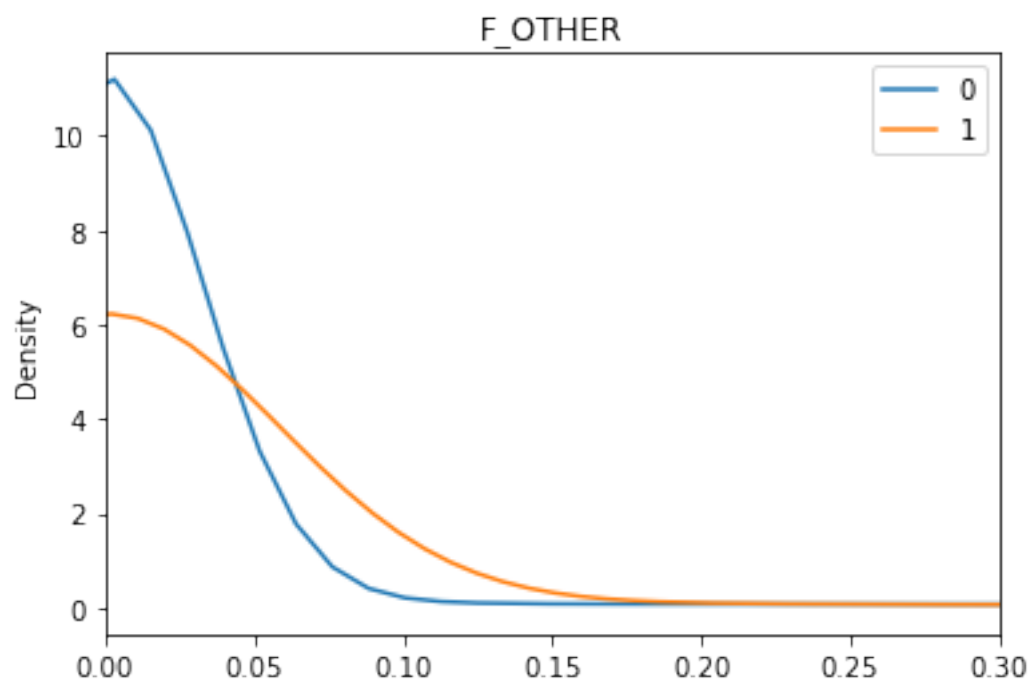
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```
[3]: for var in fruits:
      z = df.groupby('seafood_meal')[var].plot.kde(title = var, legend='x')
      plt.show(z[0].set_xlim(0, 0.3))
      plt.clf()
```





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```
[4]: for var in fruits:
      z = df.groupby('seafood_meal')[var].describe()
      print("Statistics for "+var+'\n')
      print(z)
      print('\n')
```

Statistics for F_TOTAL

	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.148838	0.491428	0.0	0.0	0.0	0.00	19.64
1	3232.0	0.187642	0.513770	0.0	0.0	0.0	0.03	5.08

Statistics for F_CITMLB

	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.029057	0.239037	0.0	0.0	0.0	0.0	18.94
1	3232.0	0.043815	0.255454	0.0	0.0	0.0	0.0	4.55

Statistics for F_OTHER

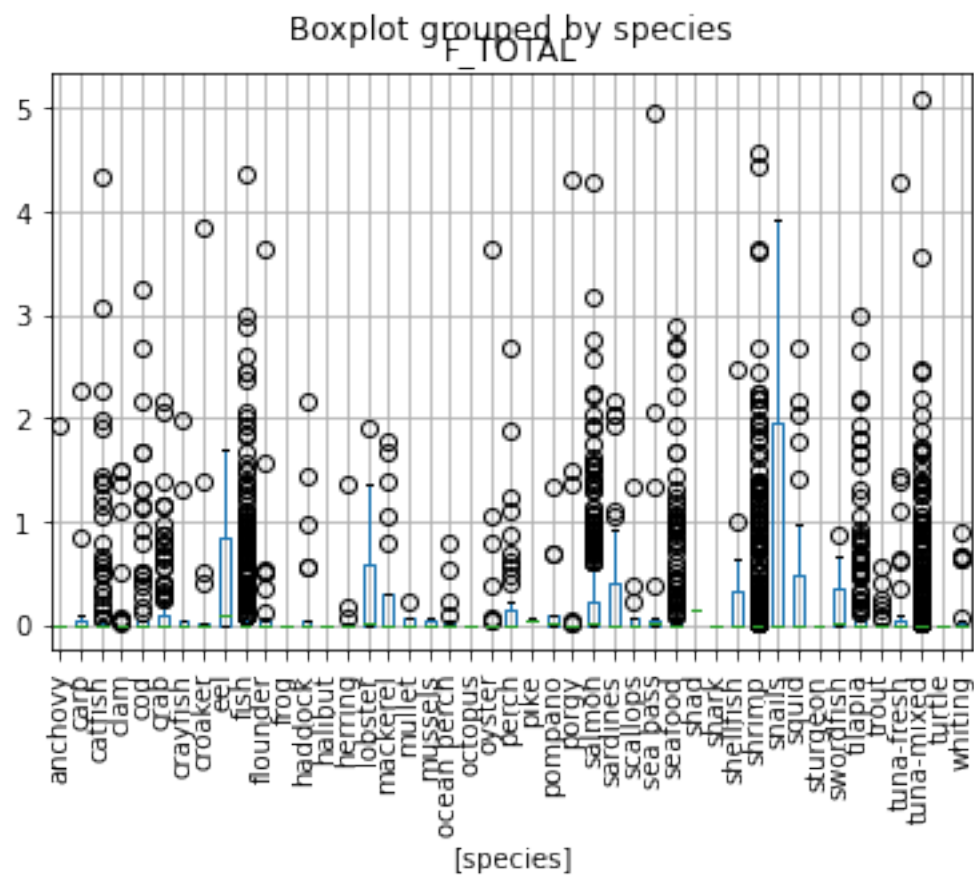
	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.054642	0.249359	0.0	0.0	0.0	0.0	6.09
1	3232.0	0.069378	0.293768	0.0	0.0	0.0	0.0	4.37

Statistics for F_JUICE

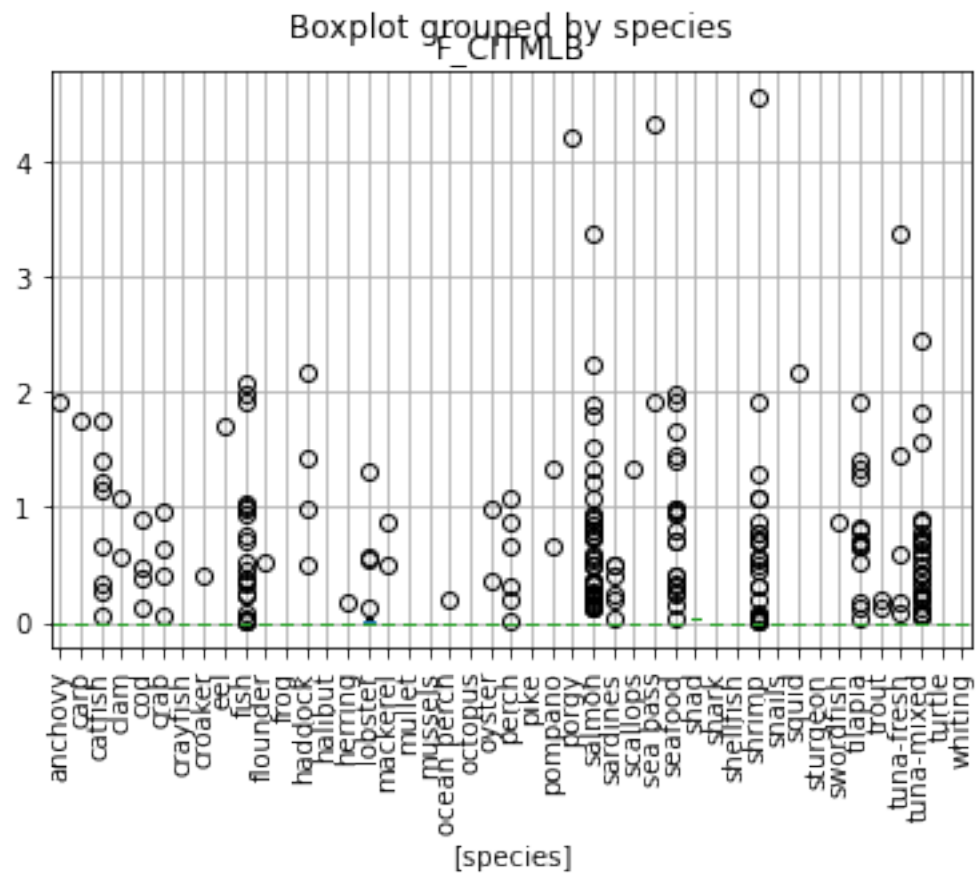
	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.065132	0.322374	0.0	0.0	0.0	0.0	7.97
1	3232.0	0.074459	0.324533	0.0	0.0	0.0	0.0	5.08

Fruits Within Seafood Species

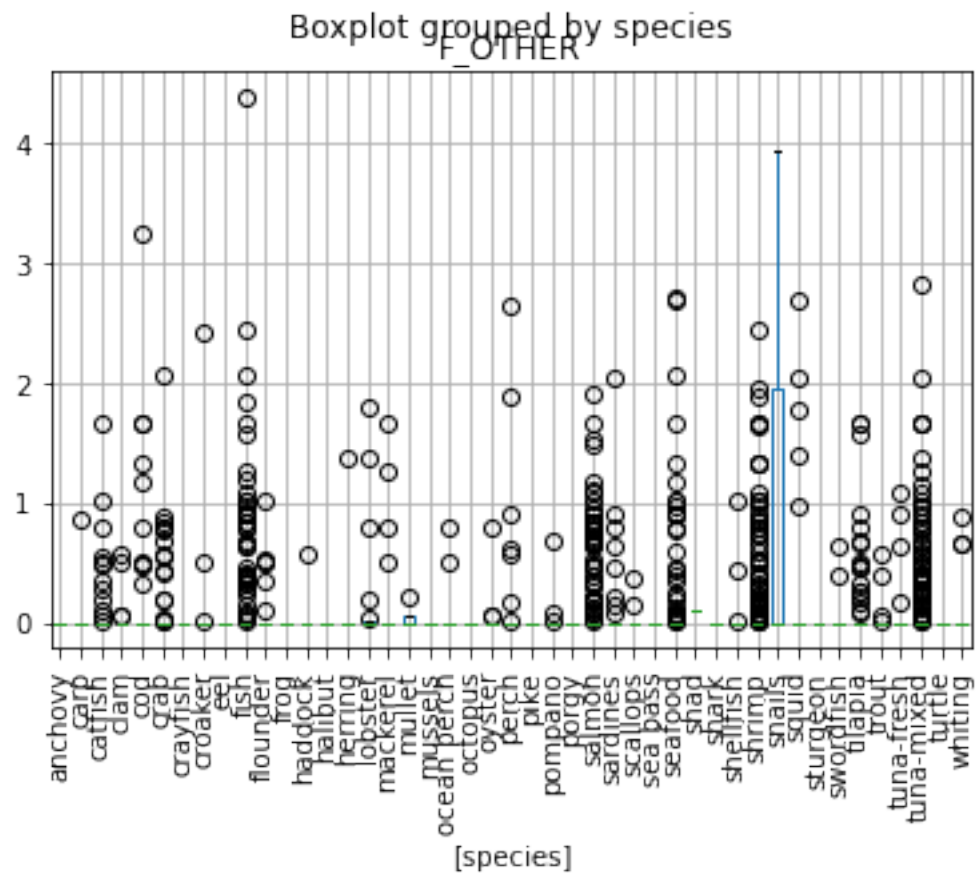
```
[70]: for var in fruits:
      z = df.boxplot(column=var,by=['species'], rot=90)
      plt.show(z)
      plt.clf()
```



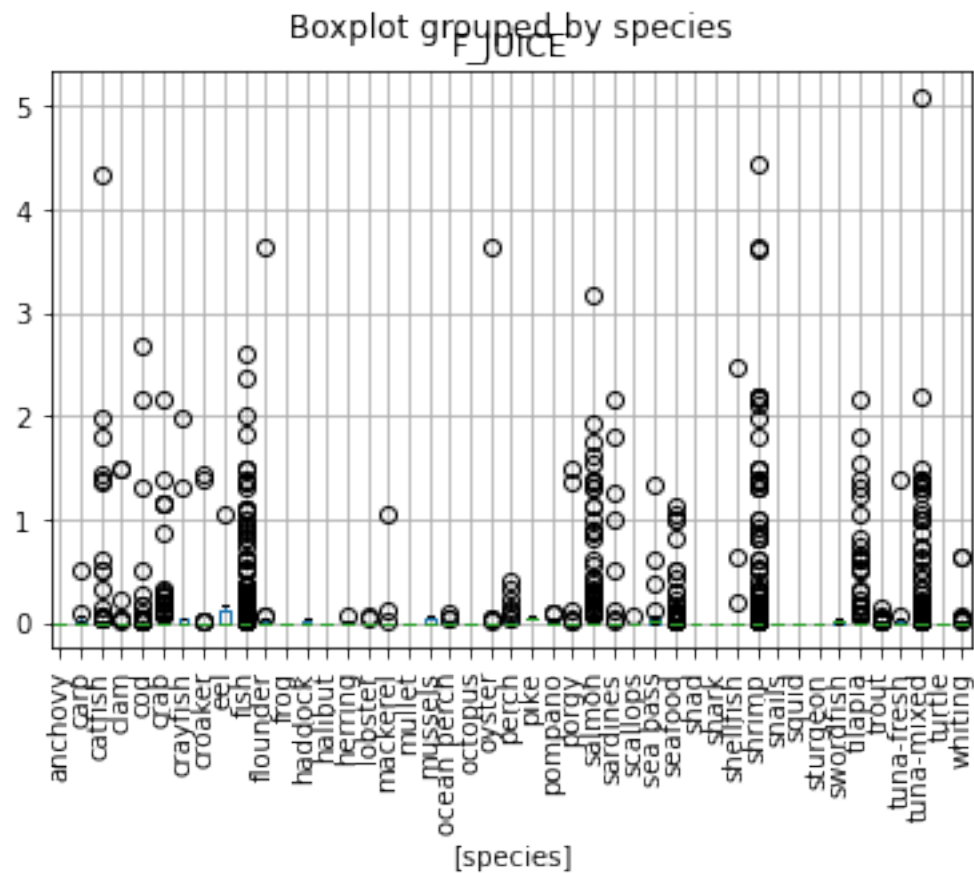
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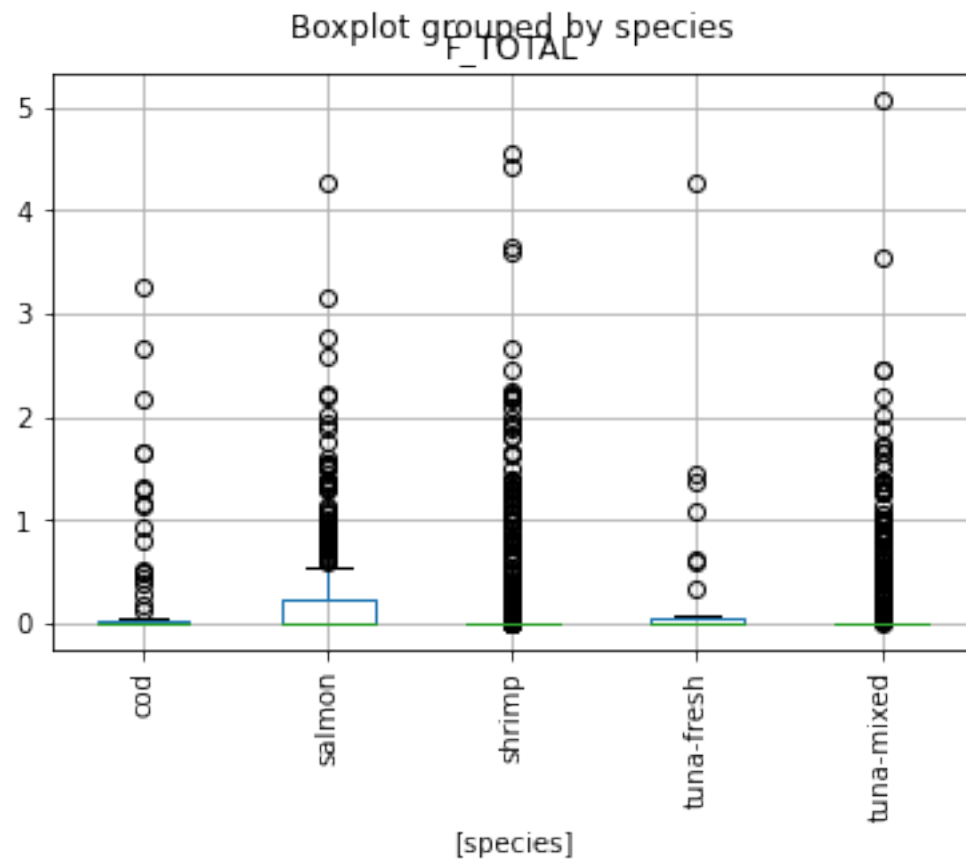


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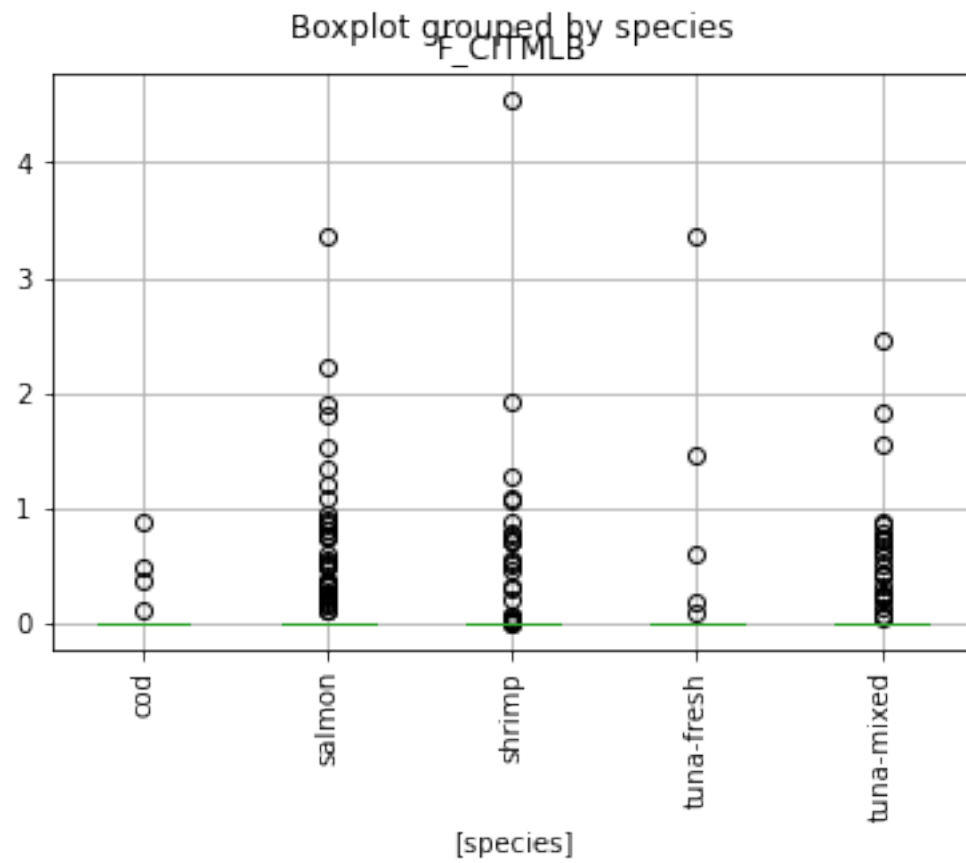
```
[71]: species_filter = ['salmon', 'tuna-mixed', 'tuna-fresh', 'shrimp', 'cod']

df_species = df[df['species'].isin(species_filter)]

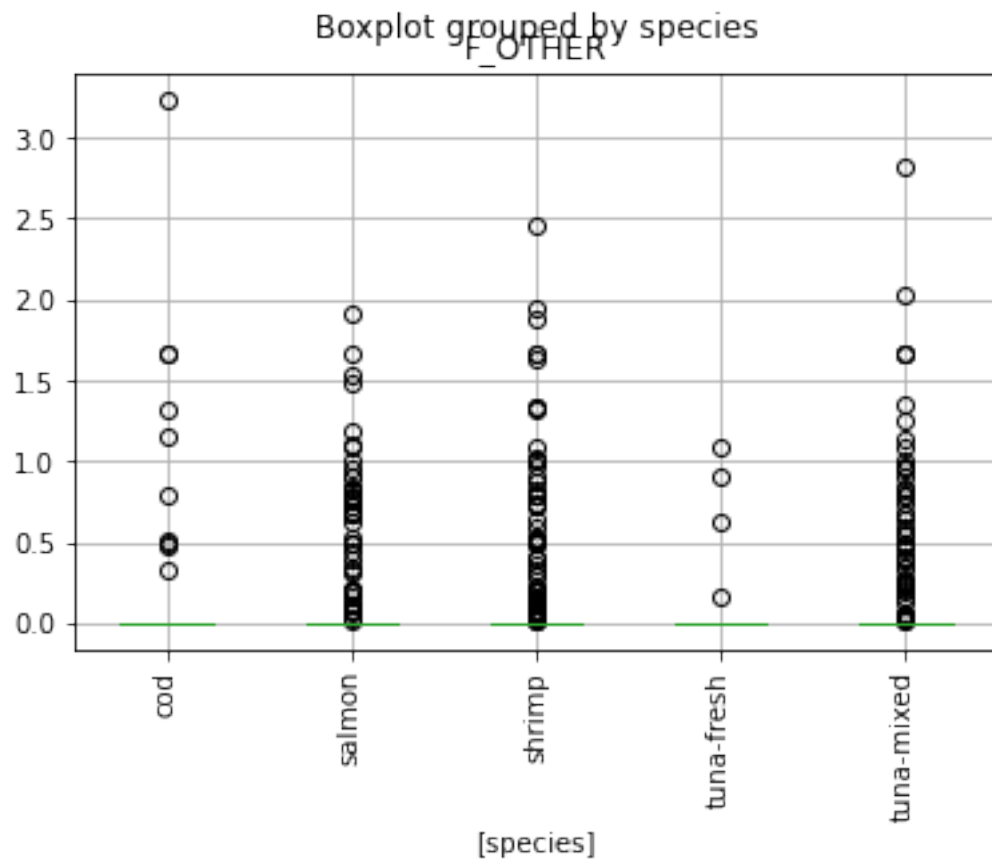
for var in fruits:
    z = df_species.boxplot(column=var,by=['species'], rot=90)
    plt.show(z)
    plt.clf()
```



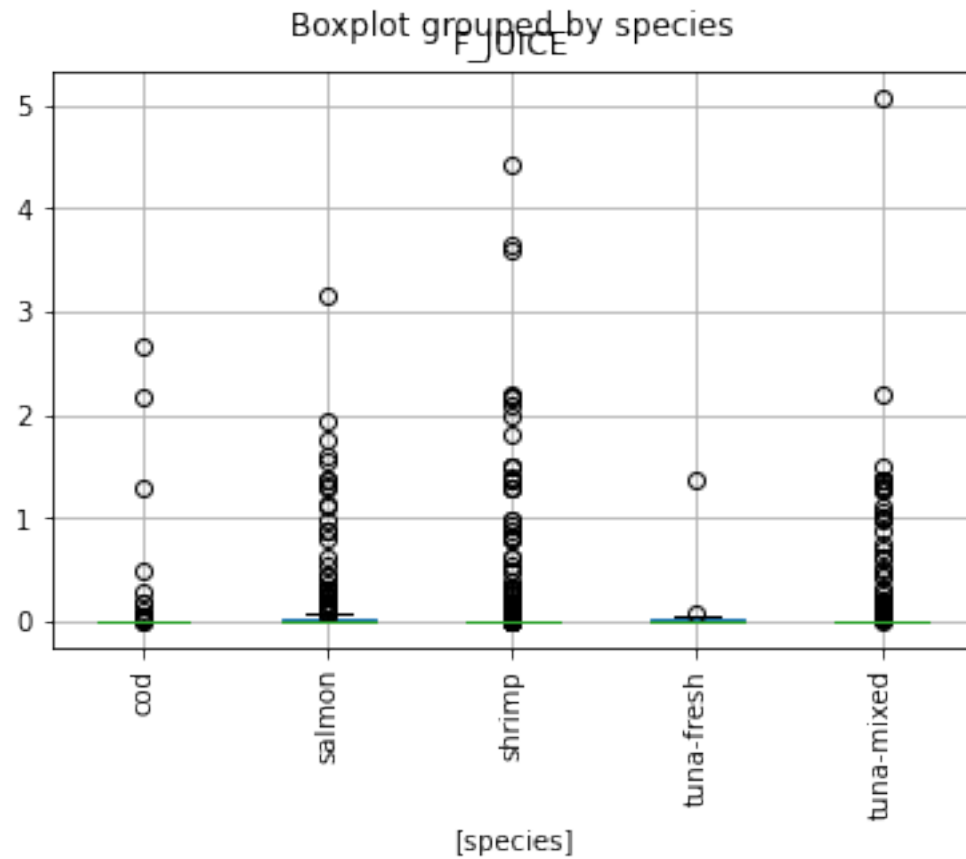
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```
[72]: for var in fruits:
      z = df.groupby('species')[var].describe()
      z = z.sort_values(by='mean', ascending = False)
      print("Statistics for "+var+'\n')
      print(z)
      print('\n')
```

Statistics for F_TOTAL

	count	mean	std	min	25%	50%	75%	max
species								
snails	3.0	1.306667	2.263213	0.00	0.0000	0.000	1.9600	3.92
eel	6.0	0.488333	0.722729	0.00	0.0000	0.085	0.8375	1.70
squid	23.0	0.480000	0.874383	0.00	0.0000	0.000	0.4900	2.69
sea bass	22.0	0.405909	1.133972	0.00	0.0000	0.005	0.0375	4.95
lobster	20.0	0.344500	0.571696	0.00	0.0000	0.010	0.5800	1.91
mackerel	20.0	0.340000	0.617721	0.00	0.0000	0.000	0.2875	1.77

sardines	42.0	0.334048	0.634370	0.00	0.0000	0.000	0.4000	2.17
shellfish	15.0	0.318667	0.678979	0.00	0.0000	0.000	0.3250	2.48
crayfish	11.0	0.305455	0.677294	0.00	0.0000	0.000	0.0400	1.98
porgy	25.0	0.289200	0.927420	0.00	0.0000	0.000	0.0000	4.32
tuna-fresh	37.0	0.274054	0.775061	0.00	0.0000	0.000	0.0500	4.28
croaker	24.0	0.260000	0.822557	0.00	0.0000	0.000	0.0200	3.85
salmon	369.0	0.254228	0.537683	0.00	0.0000	0.010	0.2200	4.28
cod	87.0	0.244023	0.605937	0.00	0.0000	0.000	0.0350	3.26
carp	15.0	0.220667	0.604335	0.00	0.0000	0.000	0.0500	2.26
perch	53.0	0.214528	0.507382	0.00	0.0000	0.000	0.1500	2.68
anchovy	9.0	0.213333	0.640000	0.00	0.0000	0.000	0.0000	1.92
haddock	29.0	0.204828	0.504711	0.00	0.0000	0.000	0.0300	2.17
swordfish	10.0	0.202000	0.324852	0.00	0.0000	0.015	0.3400	0.86
catfish	140.0	0.198786	0.589946	0.00	0.0000	0.000	0.0200	4.34
oyster	32.0	0.187500	0.671464	0.00	0.0000	0.000	0.0000	3.64
fish	497.0	0.186660	0.486761	0.00	0.0000	0.000	0.0300	4.37
seafood	267.0	0.181948	0.474071	0.00	0.0000	0.000	0.0350	2.90
crab	127.0	0.176378	0.387234	0.00	0.0000	0.000	0.0950	2.17
tilapia	239.0	0.174686	0.460958	0.00	0.0000	0.000	0.0400	2.99
tuna-mixed	531.0	0.164350	0.467205	0.00	0.0000	0.000	0.0000	5.08
scallops	12.0	0.161667	0.389845	0.00	0.0000	0.000	0.0575	1.34
shrimp	719.0	0.157010	0.497221	0.00	0.0000	0.000	0.0000	4.56
shad	1.0	0.150000	NaN	0.15	0.1500	0.150	0.1500	0.15
pompano	25.0	0.132400	0.312240	0.00	0.0000	0.020	0.0900	1.34
flounder	61.0	0.128197	0.510691	0.00	0.0000	0.000	0.0400	3.64
herring	13.0	0.126154	0.374089	0.00	0.0000	0.000	0.0200	1.36
clam	59.0	0.104407	0.350666	0.00	0.0000	0.000	0.0000	1.49
whiting	42.0	0.088333	0.229048	0.00	0.0000	0.000	0.0175	0.89
ocean perch	23.0	0.075217	0.195468	0.00	0.0000	0.000	0.0200	0.79
mullet	4.0	0.055000	0.110000	0.00	0.0000	0.000	0.0550	0.22
trout	38.0	0.046579	0.118259	0.00	0.0000	0.000	0.0200	0.56
pike	2.0	0.045000	0.021213	0.03	0.0375	0.045	0.0525	0.06
mussels	7.0	0.021429	0.031848	0.00	0.0000	0.000	0.0350	0.08
shark	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00
frog	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00
sturgeon	2.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
halibut	2.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
octopus	6.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
turtle	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00

Statistics for F_CITMLB

	count	mean	std	min	25%	50%	75%	max
species								
sea bass	22.0	0.284091	0.991865	0.00	0.00	0.00	0.0000	4.33
eel	6.0	0.283333	0.694022	0.00	0.00	0.00	0.0000	1.70
anchovy	9.0	0.213333	0.640000	0.00	0.00	0.00	0.0000	1.92

haddock	29.0	0.175517	0.502882	0.00	0.00	0.00	0.0000	2.17
porgy	25.0	0.168400	0.842000	0.00	0.00	0.00	0.0000	4.21
tuna-fresh	37.0	0.153784	0.600575	0.00	0.00	0.00	0.0000	3.37
lobster	20.0	0.131000	0.328776	0.00	0.00	0.00	0.0225	1.32
carp	15.0	0.116667	0.451848	0.00	0.00	0.00	0.0000	1.75
scallops	12.0	0.111667	0.386825	0.00	0.00	0.00	0.0000	1.34
squid	23.0	0.094348	0.452476	0.00	0.00	0.00	0.0000	2.17
swordfish	10.0	0.086000	0.271956	0.00	0.00	0.00	0.0000	0.86
salmon	369.0	0.080027	0.316030	0.00	0.00	0.00	0.0000	3.37
pompano	25.0	0.080000	0.293769	0.00	0.00	0.00	0.0000	1.34
mackerel	20.0	0.069500	0.222178	0.00	0.00	0.00	0.0000	0.88
seafood	267.0	0.062772	0.271822	0.00	0.00	0.00	0.0000	1.99
perch	53.0	0.059057	0.210597	0.00	0.00	0.00	0.0000	1.08
catfish	140.0	0.049286	0.242697	0.00	0.00	0.00	0.0000	1.75
tilapia	239.0	0.046611	0.225112	0.00	0.00	0.00	0.0000	1.92
sardines	42.0	0.045238	0.129374	0.00	0.00	0.00	0.0000	0.50
oyster	32.0	0.042500	0.184845	0.00	0.00	0.00	0.0000	0.99
shad	1.0	0.040000	NaN	0.04	0.04	0.04	0.0400	0.04
tuna-mixed	531.0	0.030207	0.180979	0.00	0.00	0.00	0.0000	2.45
fish	497.0	0.028974	0.188499	0.00	0.00	0.00	0.0000	2.07
clam	59.0	0.028136	0.159000	0.00	0.00	0.00	0.0000	1.09
shrimp	719.0	0.025522	0.215045	0.00	0.00	0.00	0.0000	4.55
cod	87.0	0.021494	0.115190	0.00	0.00	0.00	0.0000	0.89
croaker	24.0	0.017083	0.083691	0.00	0.00	0.00	0.0000	0.41
crab	127.0	0.016535	0.109170	0.00	0.00	0.00	0.0000	0.97
herring	13.0	0.013846	0.049923	0.00	0.00	0.00	0.0000	0.18
ocean perch	23.0	0.009130	0.043788	0.00	0.00	0.00	0.0000	0.21
trout	38.0	0.008684	0.038777	0.00	0.00	0.00	0.0000	0.21
flounder	61.0	0.008525	0.066579	0.00	0.00	0.00	0.0000	0.52
crayfish	11.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
mullet	4.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
shark	1.0	0.000000	NaN	0.00	0.00	0.00	0.0000	0.00
shellfish	15.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
frog	1.0	0.000000	NaN	0.00	0.00	0.00	0.0000	0.00
snails	3.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
pike	2.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
sturgeon	2.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
halibut	2.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
octopus	6.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
mussels	7.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
turtle	1.0	0.000000	NaN	0.00	0.00	0.00	0.0000	0.00
whiting	42.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00

Statistics for F_OTHER

	count	mean	std	min	25%	50%	75%	max
species								

snails	3.0	1.306667	2.263213	0.00	0.00	0.00	1.960	3.92
squid	23.0	0.385652	0.797427	0.00	0.00	0.00	0.000	2.69
mackerel	20.0	0.211000	0.477768	0.00	0.00	0.00	0.000	1.66
lobster	20.0	0.208500	0.505030	0.00	0.00	0.00	0.010	1.79
cod	87.0	0.133793	0.470070	0.00	0.00	0.00	0.000	3.24
perch	53.0	0.128113	0.463789	0.00	0.00	0.00	0.000	2.64
sardines	42.0	0.125238	0.369239	0.00	0.00	0.00	0.000	2.03
croaker	24.0	0.122917	0.500187	0.00	0.00	0.00	0.000	2.42
shad	1.0	0.110000	NaN	0.11	0.11	0.11	0.110	0.11
herring	13.0	0.104615	0.377196	0.00	0.00	0.00	0.000	1.36
swordfish	10.0	0.103000	0.223808	0.00	0.00	0.00	0.000	0.63
shellfish	15.0	0.098000	0.276462	0.00	0.00	0.00	0.000	1.01
seafood	267.0	0.087004	0.343496	0.00	0.00	0.00	0.000	2.71
salmon	369.0	0.083388	0.266848	0.00	0.00	0.00	0.000	1.91
tuna-fresh	37.0	0.075405	0.248793	0.00	0.00	0.00	0.000	1.09
crab	127.0	0.072520	0.257525	0.00	0.00	0.00	0.000	2.05
fish	497.0	0.070201	0.323443	0.00	0.00	0.00	0.000	4.37
tuna-mixed	531.0	0.066121	0.264971	0.00	0.00	0.00	0.000	2.82
carp	15.0	0.056667	0.219469	0.00	0.00	0.00	0.000	0.85
ocean perch	23.0	0.056087	0.190901	0.00	0.00	0.00	0.000	0.79
mullet	4.0	0.055000	0.110000	0.00	0.00	0.00	0.055	0.22
shrimp	719.0	0.052962	0.235677	0.00	0.00	0.00	0.000	2.45
whiting	42.0	0.052619	0.194260	0.00	0.00	0.00	0.000	0.89
flounder	61.0	0.049344	0.173713	0.00	0.00	0.00	0.000	1.02
tilapia	239.0	0.047071	0.215675	0.00	0.00	0.00	0.000	1.66
scallops	12.0	0.043333	0.111546	0.00	0.00	0.00	0.000	0.37
catfish	140.0	0.042643	0.193054	0.00	0.00	0.00	0.000	1.66
pompano	25.0	0.031600	0.136311	0.00	0.00	0.00	0.000	0.68
oyster	32.0	0.027813	0.139625	0.00	0.00	0.00	0.000	0.79
trout	38.0	0.027105	0.110108	0.00	0.00	0.00	0.000	0.56
clam	59.0	0.020169	0.098882	0.00	0.00	0.00	0.000	0.57
haddock	29.0	0.019655	0.105846	0.00	0.00	0.00	0.000	0.57
pike	2.0	0.000000	0.000000	0.00	0.00	0.00	0.000	0.00
sturgeon	2.0	0.000000	0.000000	0.00	0.00	0.00	0.000	0.00
turtle	1.0	0.000000	NaN	0.00	0.00	0.00	0.000	0.00
crayfish	11.0	0.000000	0.000000	0.00	0.00	0.00	0.000	0.00
frog	1.0	0.000000	NaN	0.00	0.00	0.00	0.000	0.00
eel	6.0	0.000000	0.000000	0.00	0.00	0.00	0.000	0.00
shark	1.0	0.000000	NaN	0.00	0.00	0.00	0.000	0.00
halibut	2.0	0.000000	0.000000	0.00	0.00	0.00	0.000	0.00
mussels	7.0	0.000000	0.000000	0.00	0.00	0.00	0.000	0.00
sea bass	22.0	0.000000	0.000000	0.00	0.00	0.00	0.000	0.00
octopus	6.0	0.000000	0.000000	0.00	0.00	0.00	0.000	0.00
porgy	25.0	0.000000	0.000000	0.00	0.00	0.00	0.000	0.00
anchovy	9.0	0.000000	0.000000	0.00	0.00	0.00	0.000	0.00

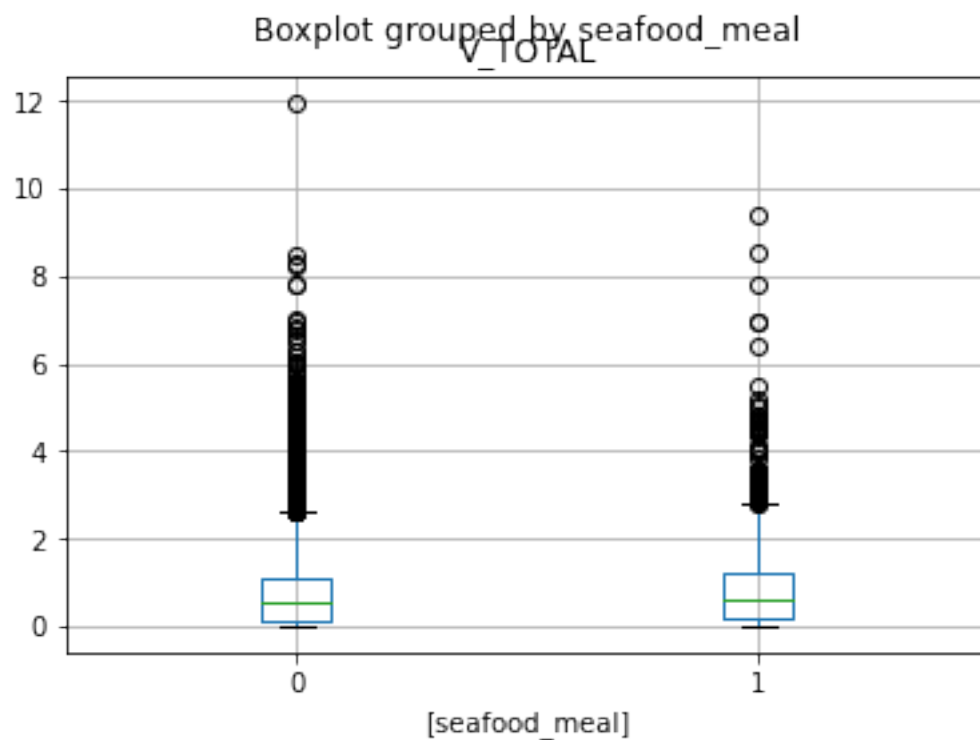
Statistics for F_JUICE

	count	mean	std	min	25%	50%	75%	max
species								
crayfish	11.0	0.305455	0.677294	0.00	0.0000	0.000	0.0400	1.98
shellfish	15.0	0.220667	0.646799	0.00	0.0000	0.000	0.0000	2.48
eel	6.0	0.205000	0.424347	0.00	0.0000	0.000	0.1275	1.06
sardines	42.0	0.163810	0.485100	0.00	0.0000	0.000	0.0000	2.17
sea bass	22.0	0.121818	0.308478	0.00	0.0000	0.005	0.0375	1.33
porgy	25.0	0.120800	0.393615	0.00	0.0000	0.000	0.0000	1.49
croaker	24.0	0.120000	0.397405	0.00	0.0000	0.000	0.0025	1.43
oyster	32.0	0.116875	0.642979	0.00	0.0000	0.000	0.0000	3.64
catfish	140.0	0.106786	0.474301	0.00	0.0000	0.000	0.0100	4.34
salmon	369.0	0.090840	0.316011	0.00	0.0000	0.000	0.0300	3.16
cod	87.0	0.088736	0.392611	0.00	0.0000	0.000	0.0000	2.67
fish	497.0	0.087485	0.302400	0.00	0.0000	0.000	0.0000	2.59
crab	127.0	0.087323	0.295152	0.00	0.0000	0.000	0.0250	2.17
tilapia	239.0	0.081004	0.282521	0.00	0.0000	0.000	0.0200	2.17
shrimp	719.0	0.078554	0.373572	0.00	0.0000	0.000	0.0000	4.43
flounder	61.0	0.070328	0.465066	0.00	0.0000	0.000	0.0200	3.64
tuna-mixed	531.0	0.068060	0.327541	0.00	0.0000	0.000	0.0000	5.08
mackerel	20.0	0.059500	0.234688	0.00	0.0000	0.000	0.0000	1.05
clam	59.0	0.055932	0.272530	0.00	0.0000	0.000	0.0000	1.49
carp	15.0	0.047333	0.130902	0.00	0.0000	0.000	0.0250	0.51
pike	2.0	0.045000	0.021213	0.03	0.0375	0.045	0.0525	0.06
tuna-fresh	37.0	0.044865	0.226122	0.00	0.0000	0.000	0.0200	1.38
whiting	42.0	0.035714	0.136295	0.00	0.0000	0.000	0.0075	0.64
seafood	267.0	0.032210	0.148136	0.00	0.0000	0.000	0.0000	1.14
perch	53.0	0.027358	0.077909	0.00	0.0000	0.000	0.0100	0.40
mussels	7.0	0.021429	0.031848	0.00	0.0000	0.000	0.0350	0.08
pompano	25.0	0.020400	0.032593	0.00	0.0000	0.000	0.0300	0.10
swordfish	10.0	0.013000	0.016364	0.00	0.0000	0.005	0.0200	0.04
trout	38.0	0.010526	0.026401	0.00	0.0000	0.000	0.0075	0.14
ocean perch	23.0	0.010000	0.021532	0.00	0.0000	0.000	0.0100	0.09
haddock	29.0	0.009655	0.015232	0.00	0.0000	0.000	0.0200	0.05
herring	13.0	0.007692	0.016909	0.00	0.0000	0.000	0.0100	0.06
scallops	12.0	0.006667	0.023094	0.00	0.0000	0.000	0.0000	0.08
lobster	20.0	0.005500	0.017006	0.00	0.0000	0.000	0.0000	0.06
turtle	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00
frog	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00
halibut	2.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
snails	3.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
sturgeon	2.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
squid	23.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
octopus	6.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
shark	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00
shad	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00
mullet	4.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
anchovy	9.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00

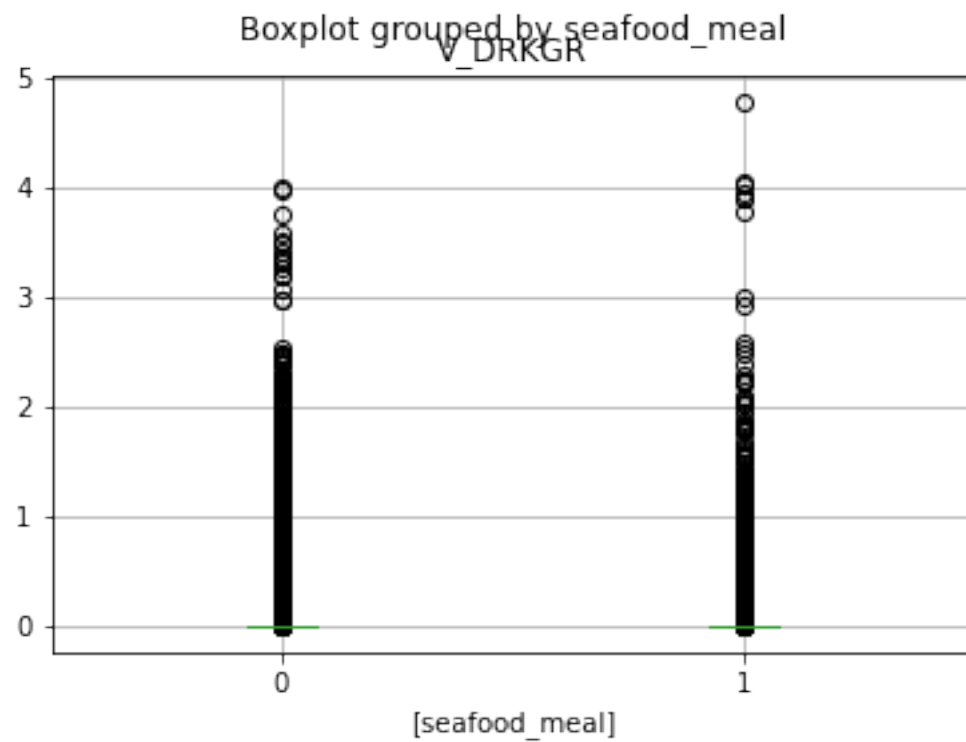
Section 2: Vegetables

This section provides boxplots and density plots of the Vegetable FPED components in the seafood meal and non seafood meal groups. The code for seafood meal is 1 if meal contains seafood, and 0 if meal does not contain seafood.

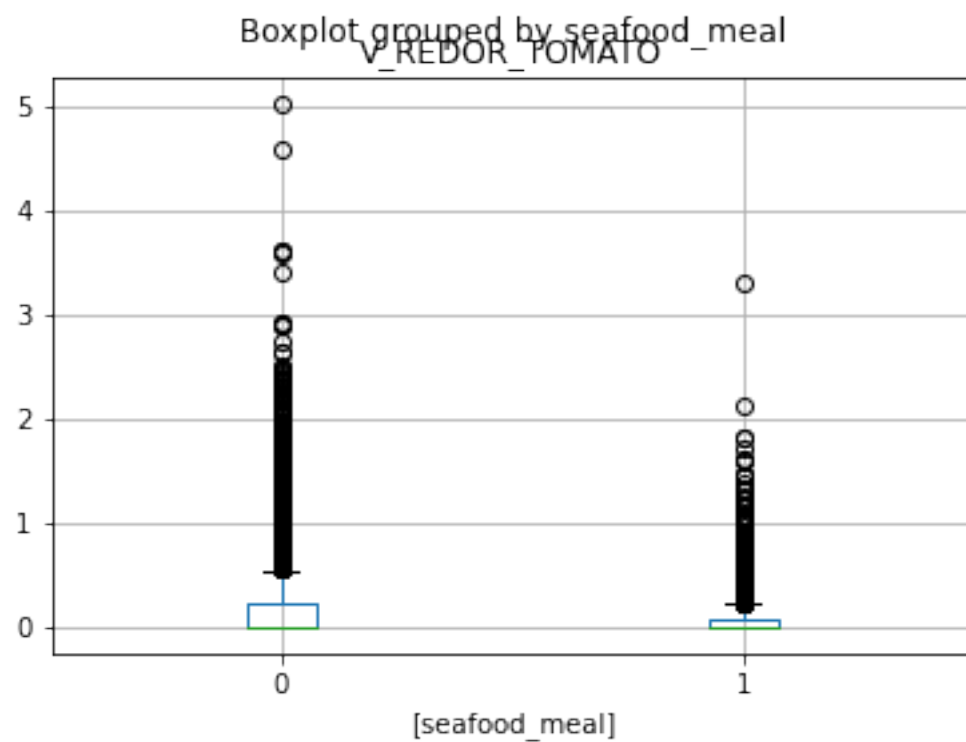
```
[5]: veggie = ['V_TOTAL', 'V_DRKGR', 'V_REDOR_TOMATO', 'V_REDOR_OTHER',  
             'V_STARCHY_POTATO',  
             'V_STARCHY_OTHER', 'V_OTHER', 'V_LEGUMES']  
  
for var in veggie:  
    z = df.boxplot(column=var, by=['seafood_meal'])  
    plt.show(z)  
    plt.clf()
```



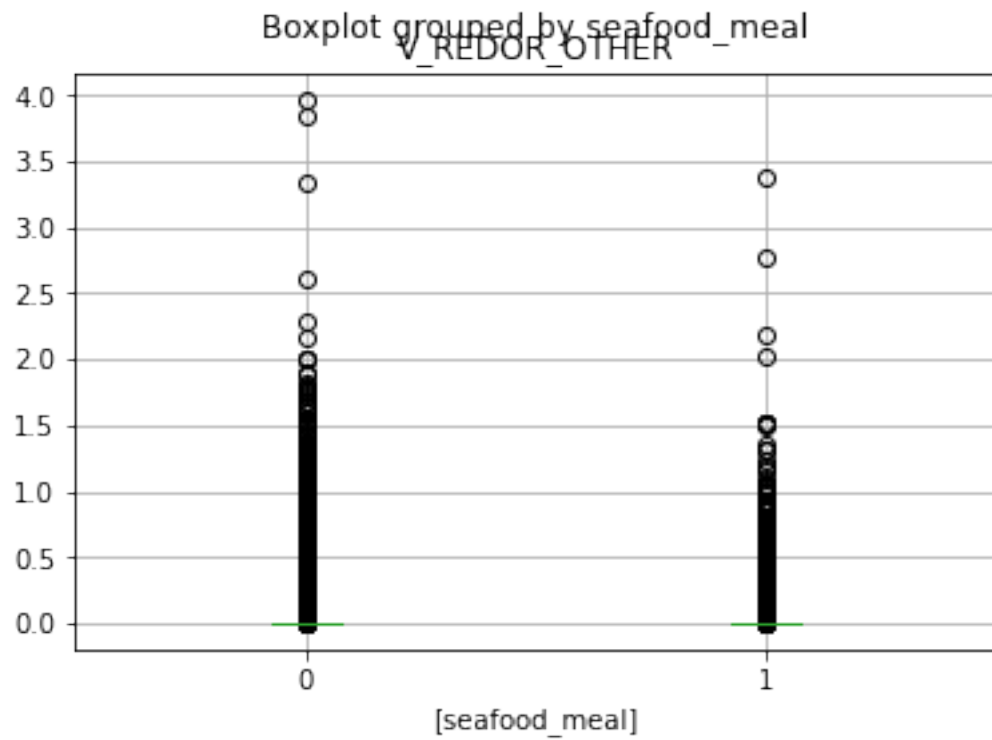
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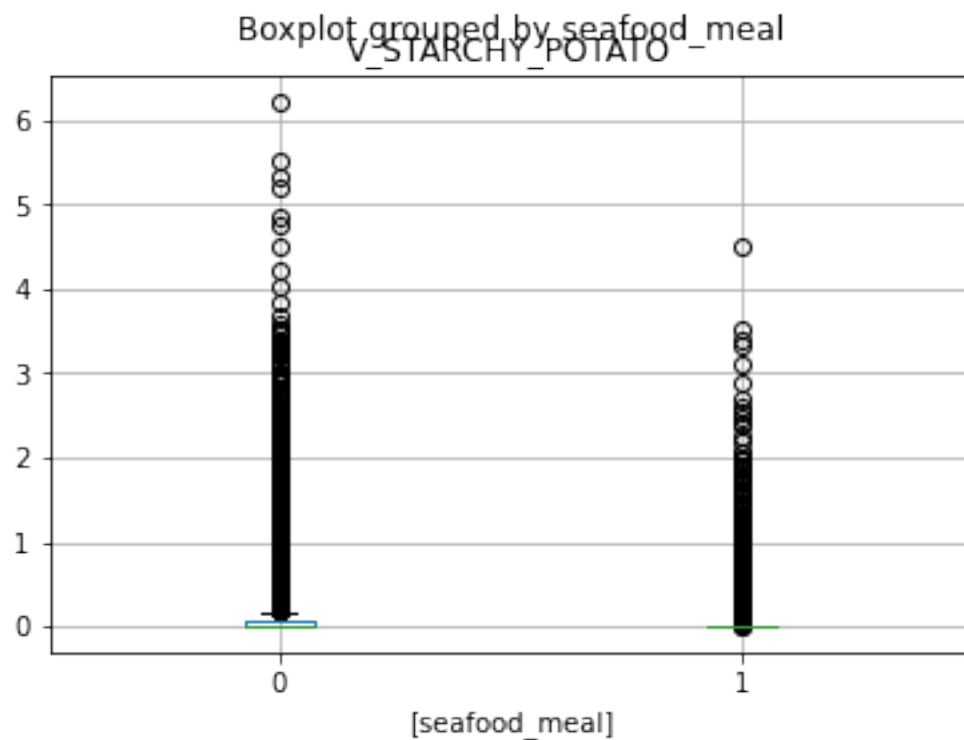
<Figure size 432x288 with 0 Axes>



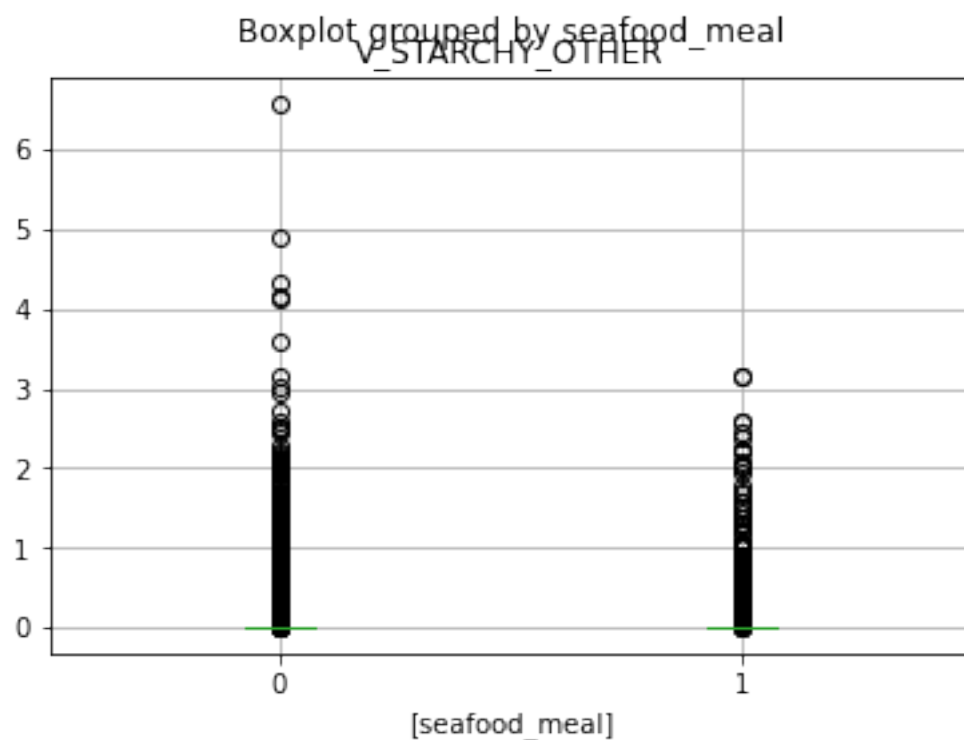
<Figure size 432x288 with 0 Axes>



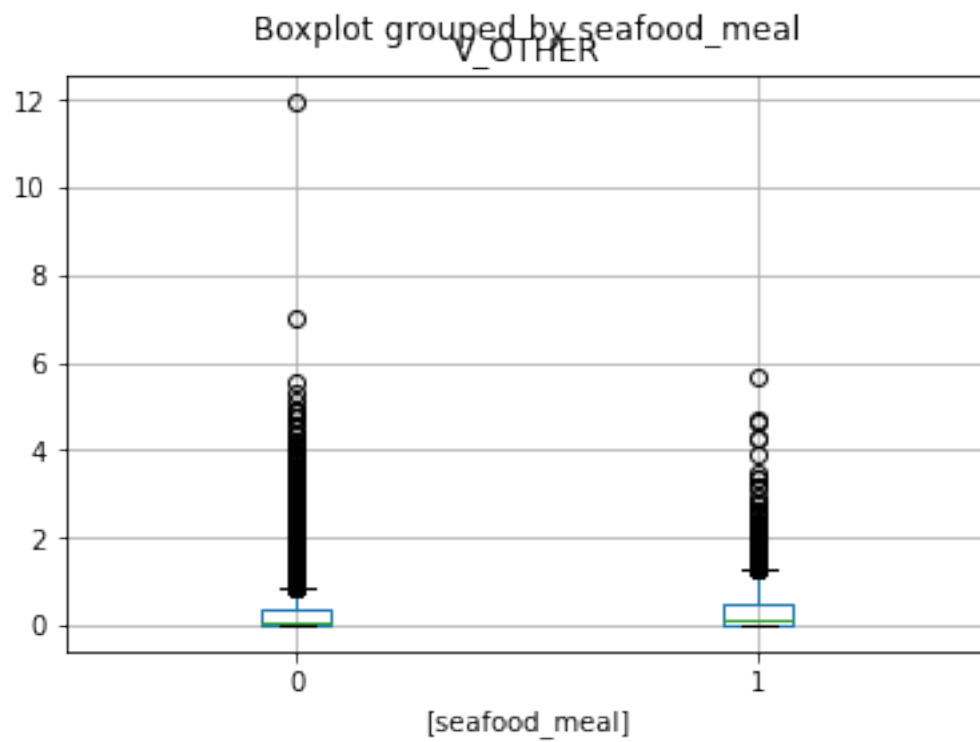
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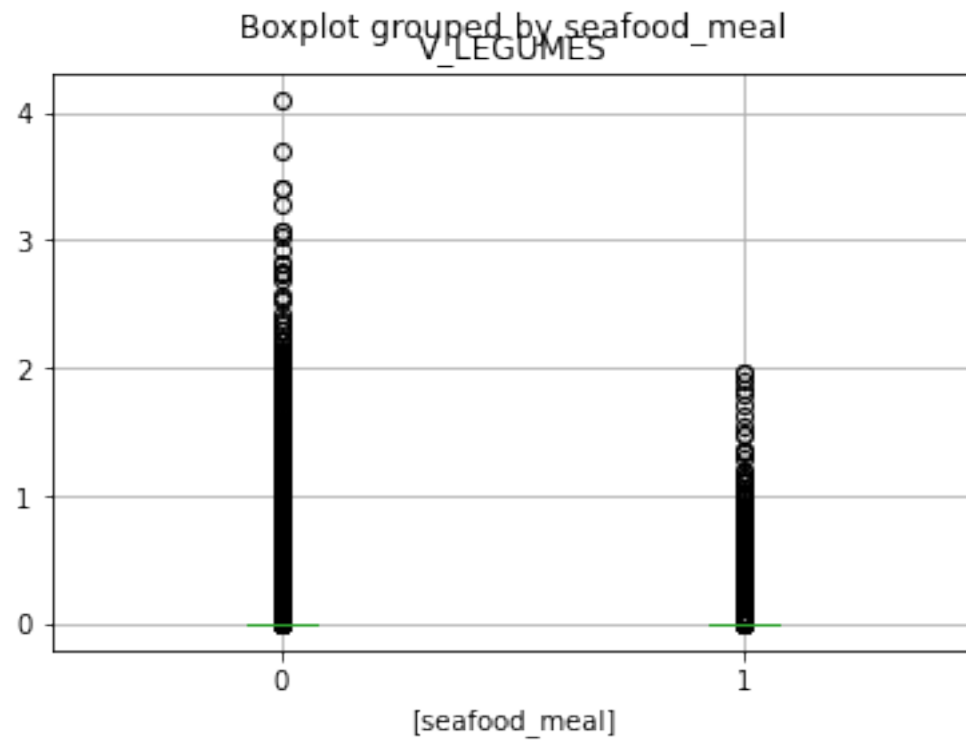
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<Figure size 432x288 with 0 Axes>

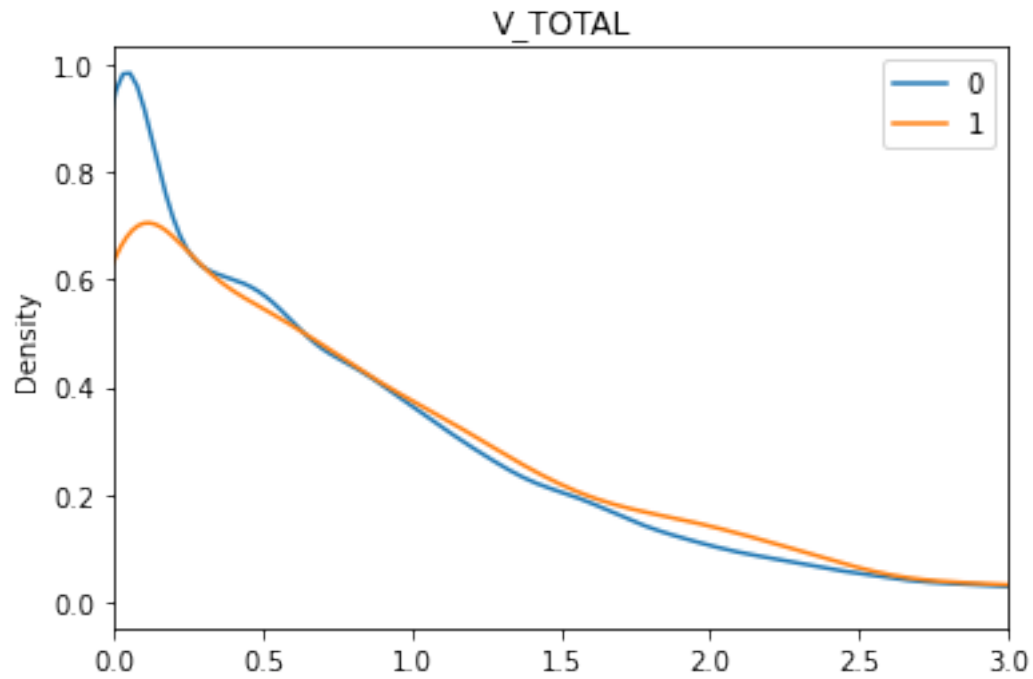


<Figure size 432x288 with 0 Axes>



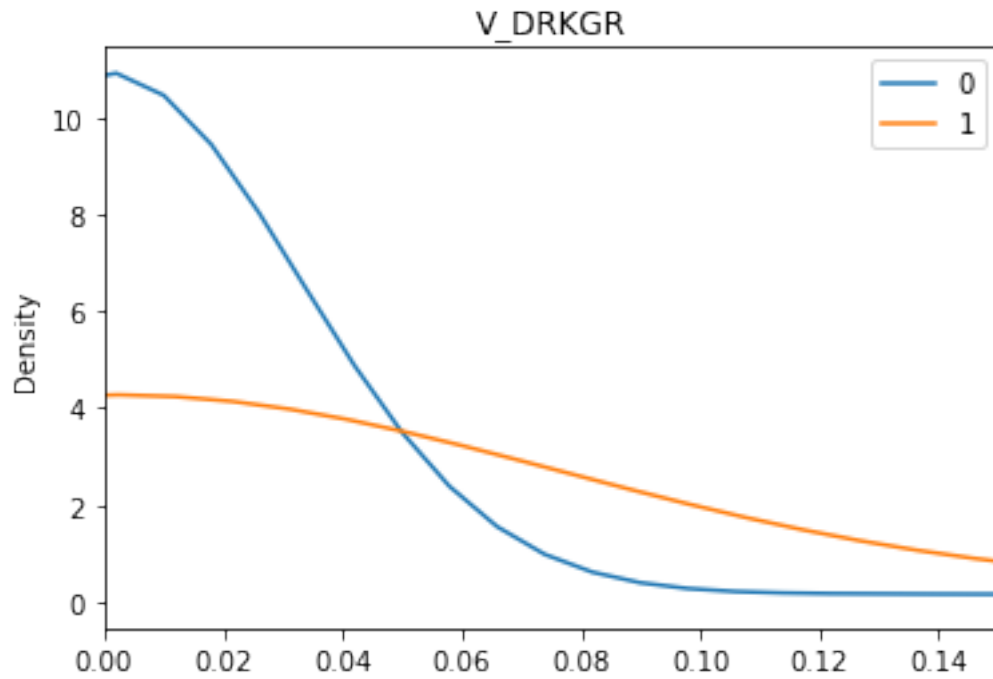
<Figure size 432x288 with 0 Axes>

```
[6]: z = df.groupby('seafood_meal')[veggie[0]].plot.kde(title = veggie[0],
    ↪ legend='x')
plt.show(z[0].set_xlim(0, 3))
plt.clf()
```



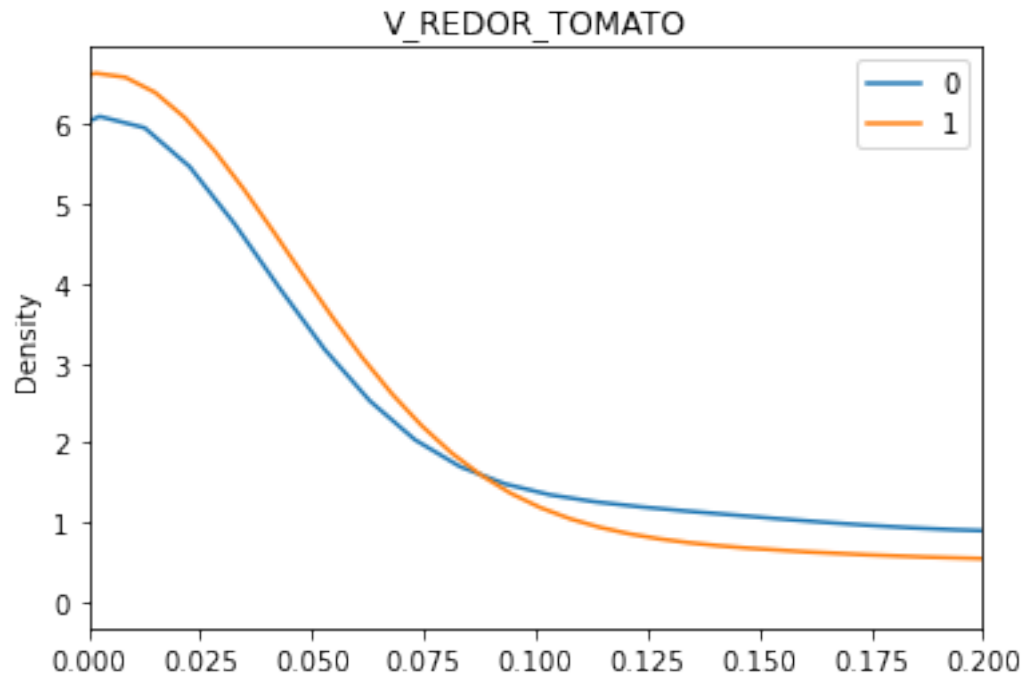
<Figure size 432x288 with 0 Axes>

```
[7]: z = df.groupby('seafood_meal')[veggie[1]].plot.kde(title = veggie[1],  
    ↪ legend='x')  
plt.show(z[0].set_xlim(0, 0.15))  
plt.clf()
```



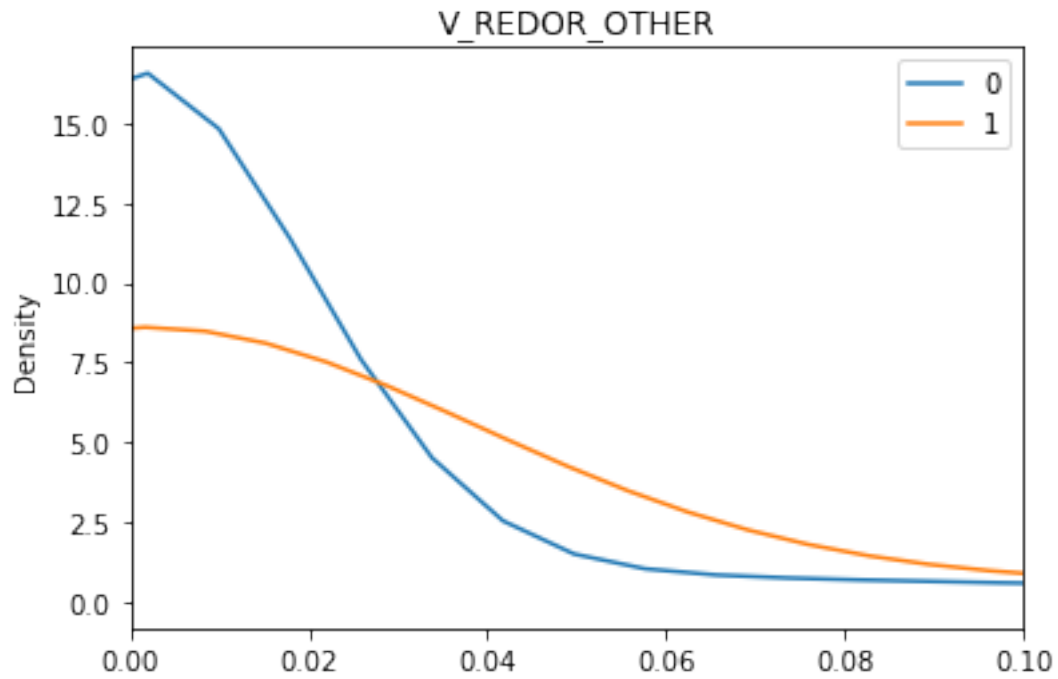
<Figure size 432x288 with 0 Axes>

```
[8]: z = df.groupby('seafood_meal')[veggie[2]].plot.kde(title = veggie[2],  
      ↪ legend='x')  
plt.show(z[0].set_xlim(0, 0.2))  
plt.clf()
```



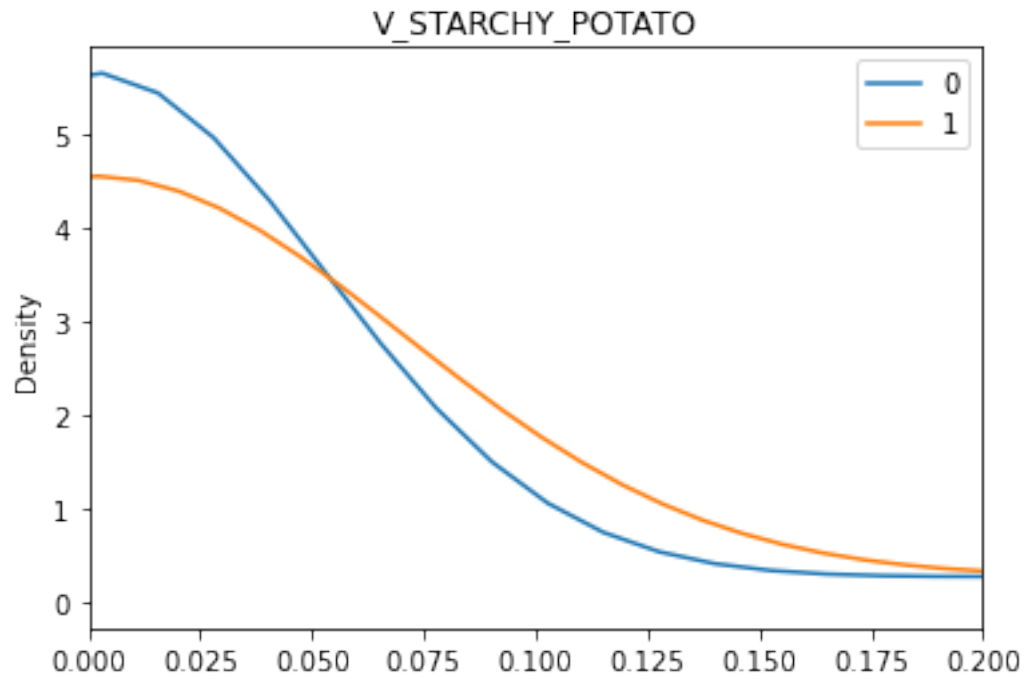
<Figure size 432x288 with 0 Axes>

```
[9]: z = df.groupby('seafood_meal')[veggie[3]].plot.kde(title = veggie[3],
    ↪ legend='x')
plt.show(z[0].set_xlim(0, 0.1))
plt.clf()
```



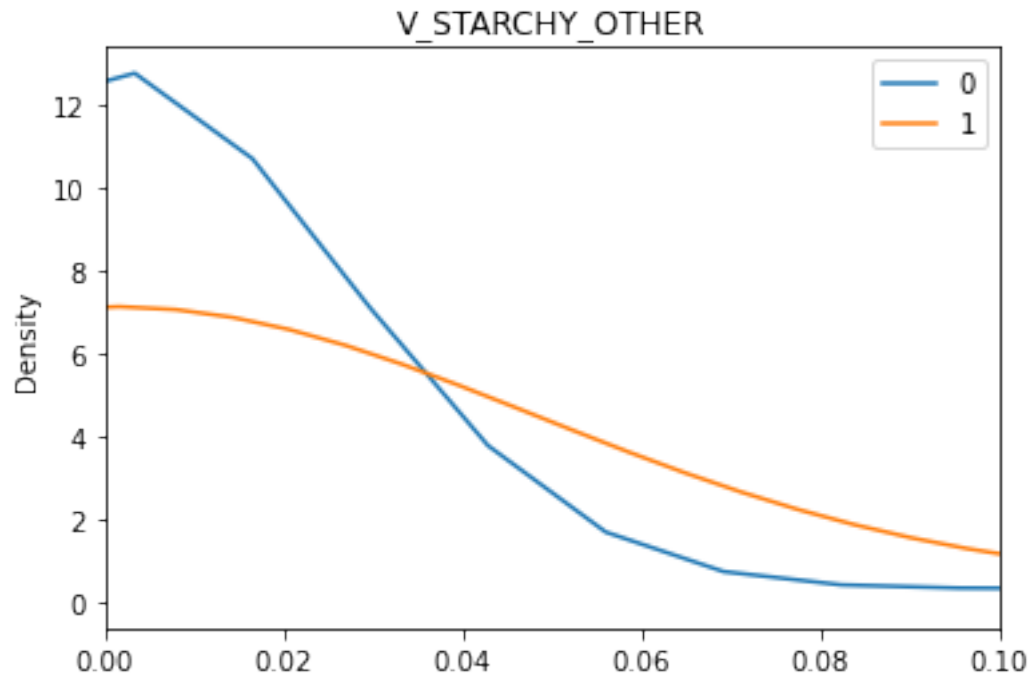
<Figure size 432x288 with 0 Axes>

```
[10]: z = df.groupby('seafood_meal')[veggie[4]].plot.kde(title = veggie[4],  
    ↪ legend='x')  
plt.show(z[0].set_xlim(0, 0.2))  
plt.clf()
```



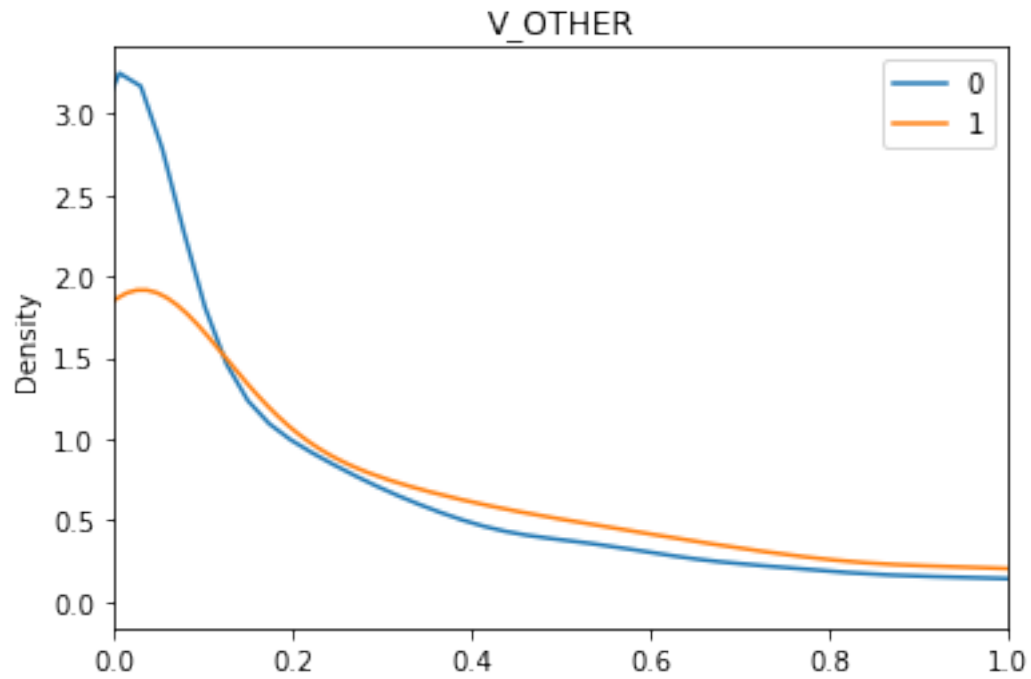
<Figure size 432x288 with 0 Axes>

```
[11]: z = df.groupby('seafood_meal')[veggie[5]].plot.kde(title = veggie[5],  
    ↪ legend='x')  
plt.show(z[0].set_xlim(0, 0.1))  
plt.clf()
```



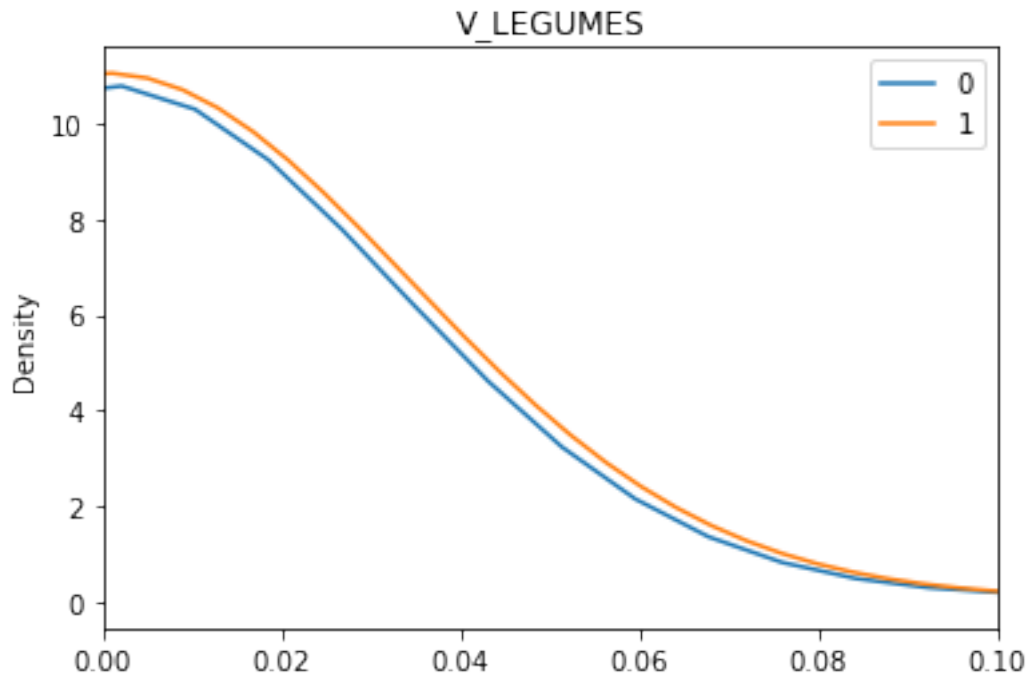
<Figure size 432x288 with 0 Axes>

```
[12]: z = df.groupby('seafood_meal')[veggie[6]].plot.kde(title = veggie[6],
↳ legend='x')
plt.show(z[0].set_xlim(0, 1))
plt.clf()
```



<Figure size 432x288 with 0 Axes>

```
[13]: z = df.groupby('seafood_meal')[veggie[7]].plot.kde(title = veggie[7],  
↳ legend='x')  
plt.show(z[0].set_xlim(0, 0.1))  
plt.clf()
```

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```
[14]: for var in veggie:
      z = df.groupby('seafood_meal')[var].describe()
      print("Statistics for "+var+"\n")
      print(z)
      print('\n')
```

Statistics for V_TOTAL

	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.766811	0.830492	0.0	0.13	0.54	1.12	11.97
1	3232.0	0.839502	0.884815	0.0	0.17	0.61	1.23	9.40

Statistics for V_DRKGR

	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.064261	0.248228	0.0	0.0	0.0	0.0	3.99
1	3232.0	0.133026	0.378411	0.0	0.0	0.0	0.0	4.78

Statistics for V_REDOR_TOMATO

	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.155829	0.280726	0.0	0.0	0.01	0.22	5.03
1	3232.0	0.096572	0.217002	0.0	0.0	0.00	0.09	3.31

Statistics for V_REDOR_OTHER

	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.044952	0.150933	0.0	0.0	0.0	0.0	3.97
1	3232.0	0.061105	0.187205	0.0	0.0	0.0	0.0	3.37

Statistics for V_STARCHY_POTATO

	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.172294	0.404003	0.0	0.0	0.0	0.07	6.22
1	3232.0	0.131043	0.351846	0.0	0.0	0.0	0.00	4.50

Statistics for V_STARCHY_OTHER

	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.055785	0.204900	0.0	0.0	0.0	0.0	6.58
1	3232.0	0.066473	0.240464	0.0	0.0	0.0	0.0	3.16

Statistics for V_OTHER

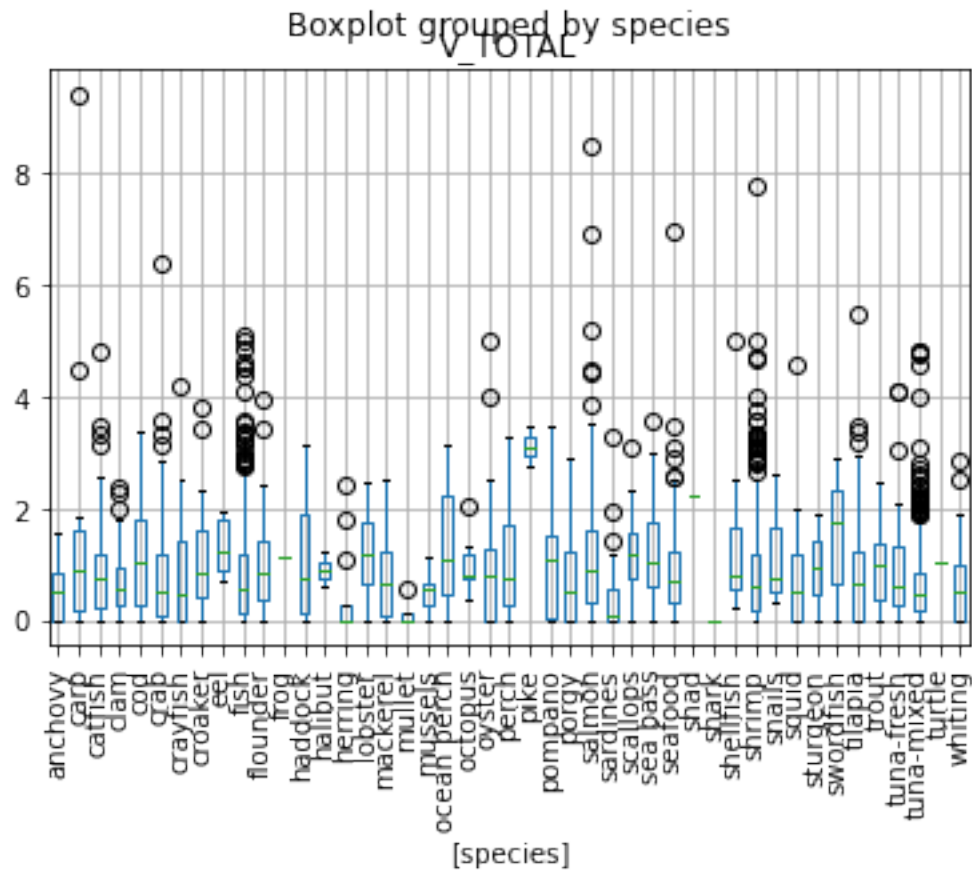
	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.273681	0.465530	0.0	0.0	0.08	0.35	11.97
1	3232.0	0.351272	0.506081	0.0	0.0	0.15	0.51	5.65

Statistics for V_LEGUMES

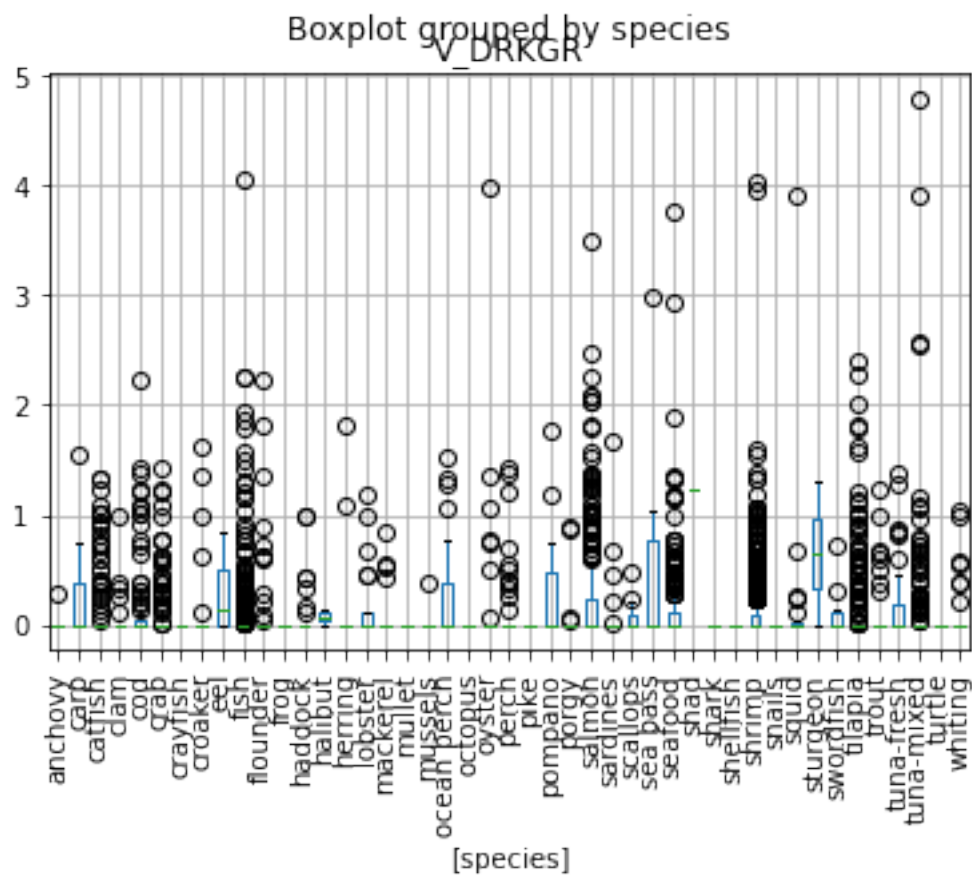
	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.070522	0.249932	0.0	0.0	0.0	0.0	4.10
1	3232.0	0.034558	0.170488	0.0	0.0	0.0	0.0	1.97

Vegetables Within Seafood Species

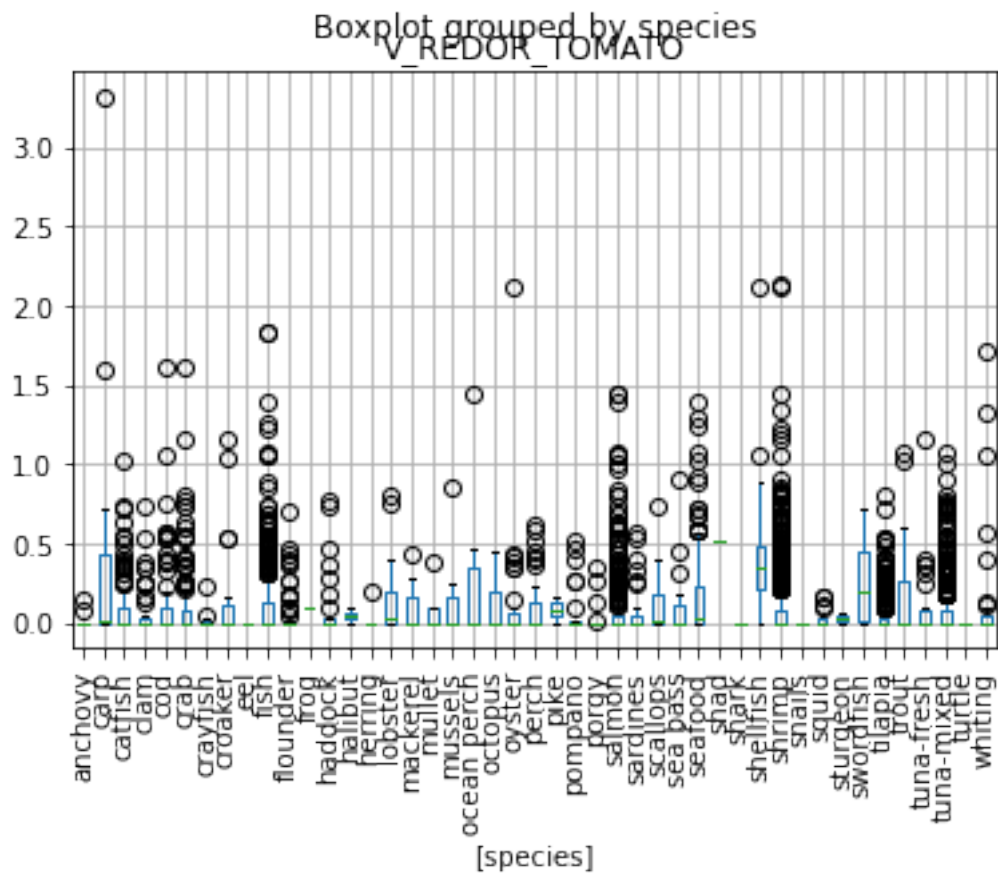
```
[55]: for var in veggie:
      z = df.boxplot(column=var,by=['species'], rot=90)
      plt.show(z)
      plt.clf()
```



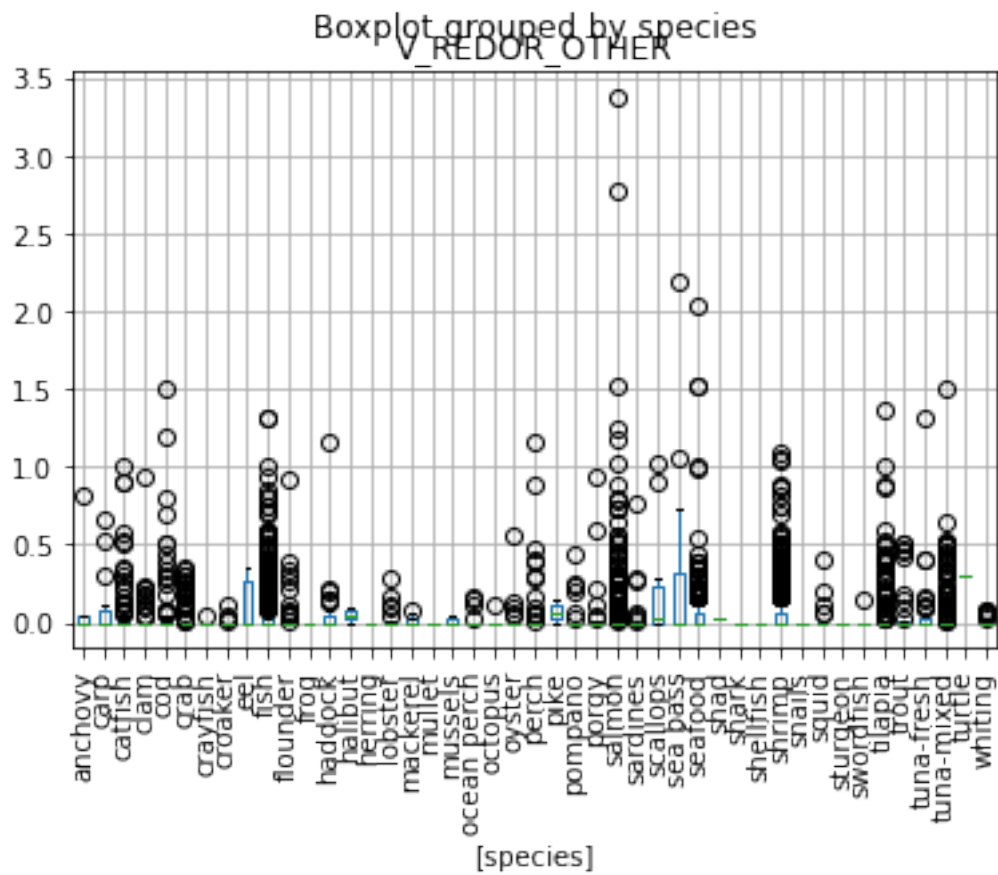
<Figure size 432x288 with 0 Axes>



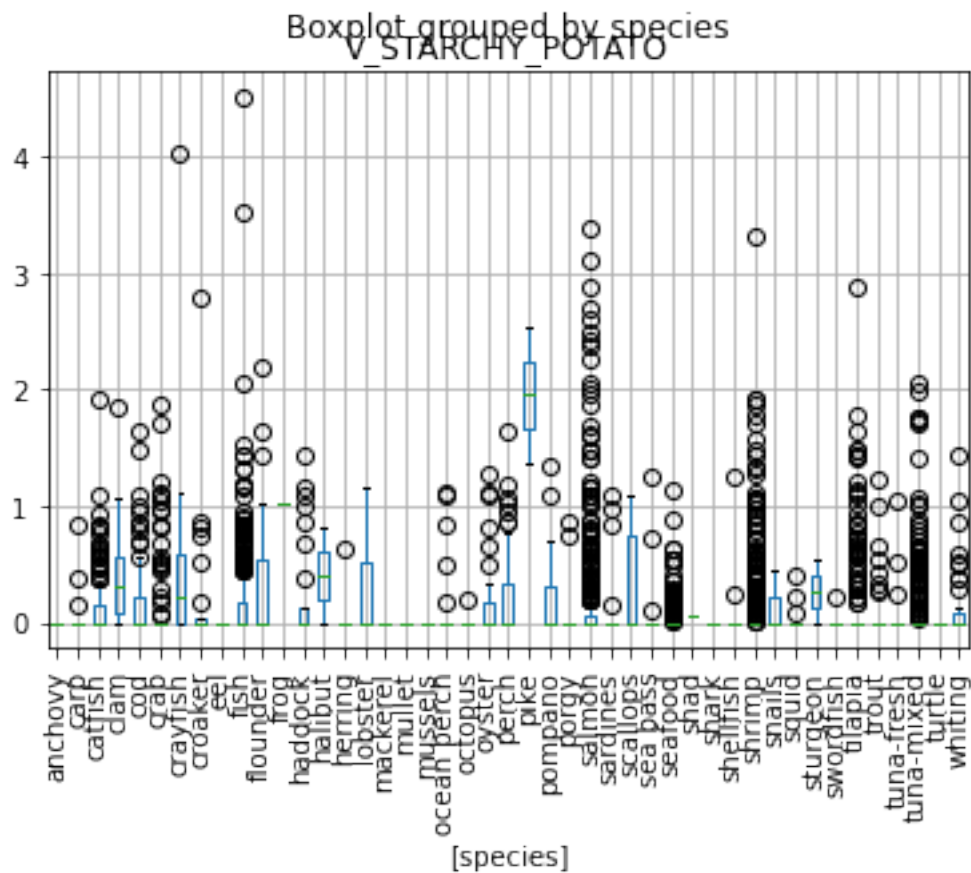
<Figure size 432x288 with 0 Axes>



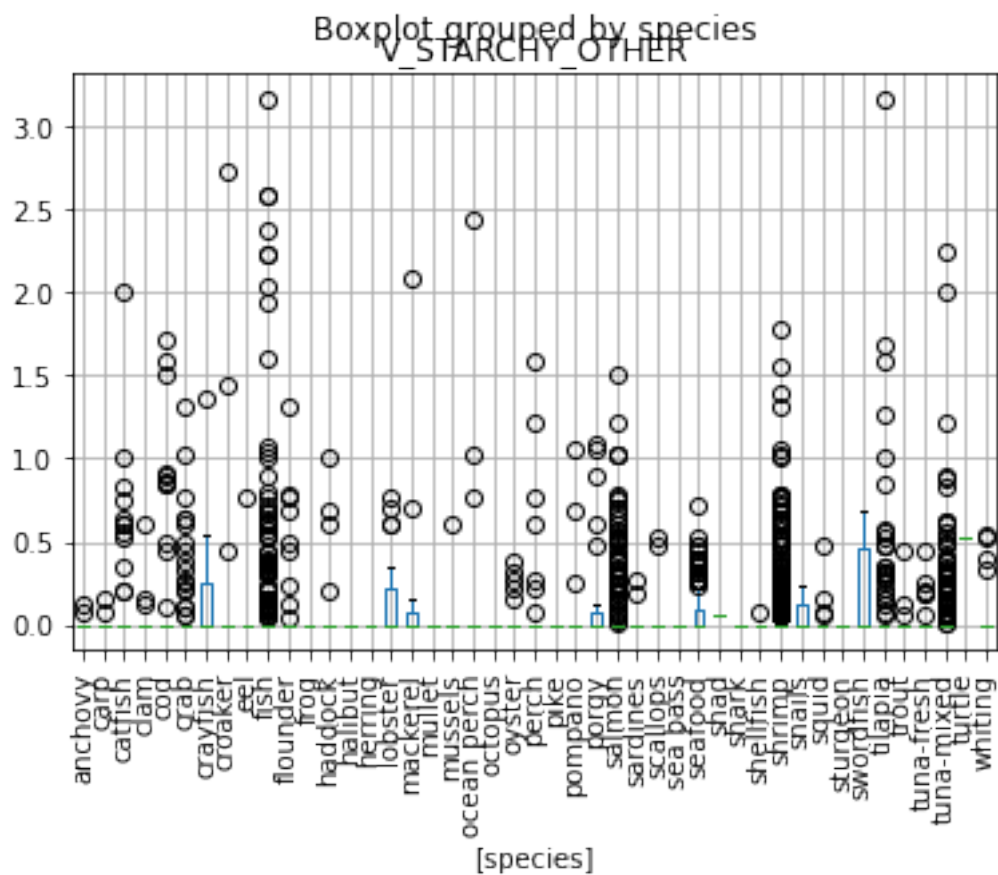
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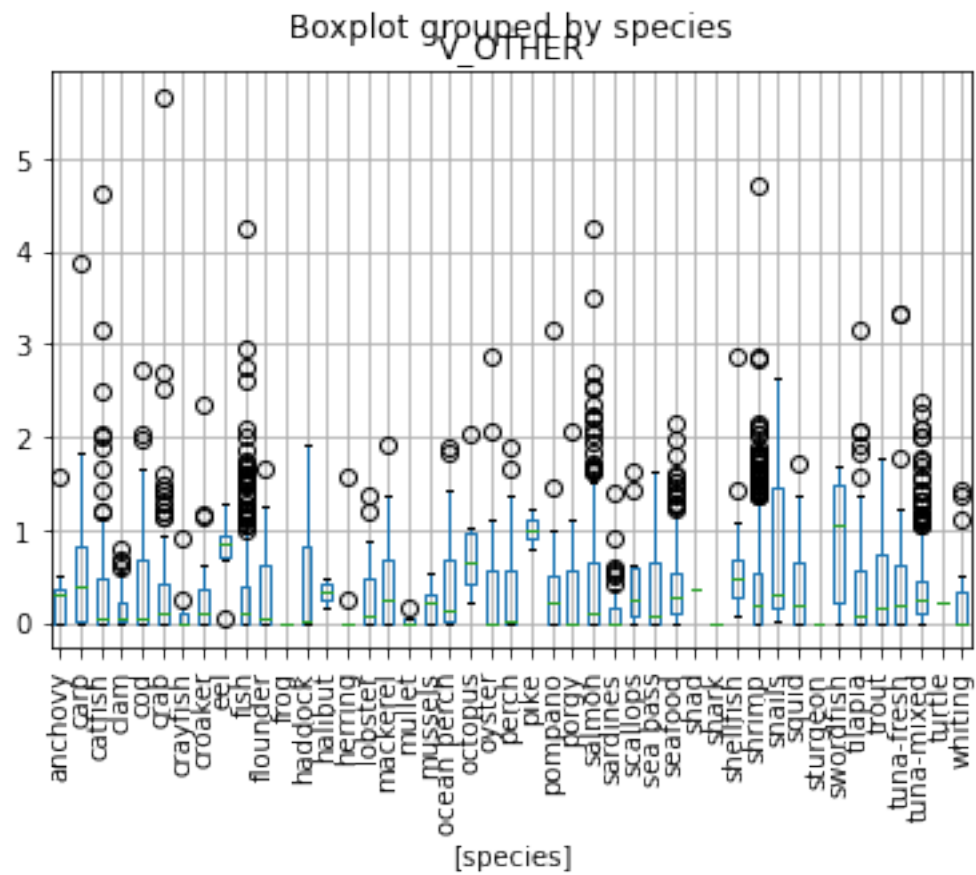
<Figure size 432x288 with 0 Axes>



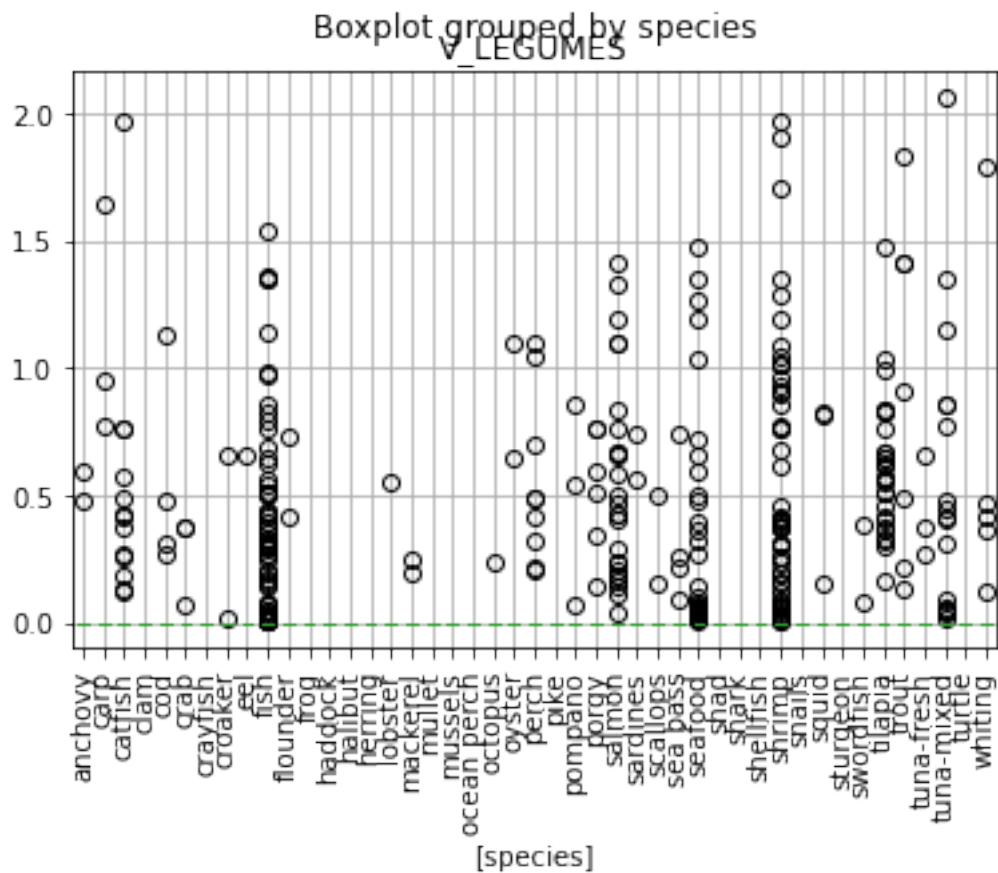
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<Figure size 432x288 with 0 Axes>

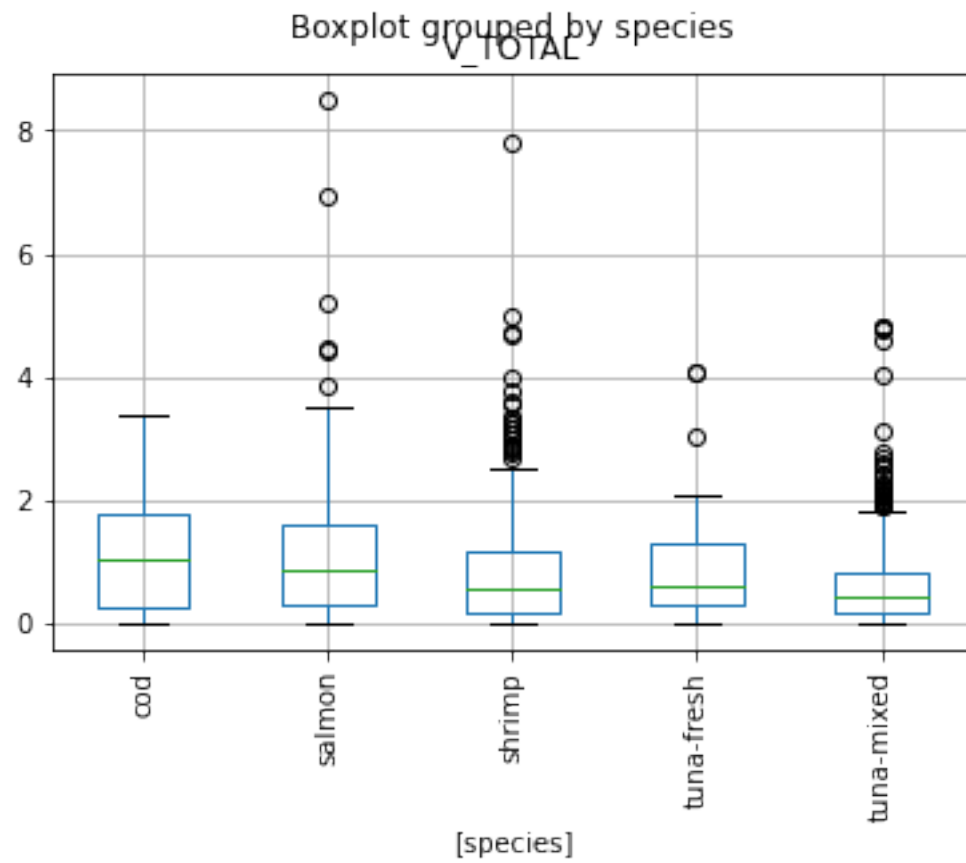


<Figure size 432x288 with 0 Axes>

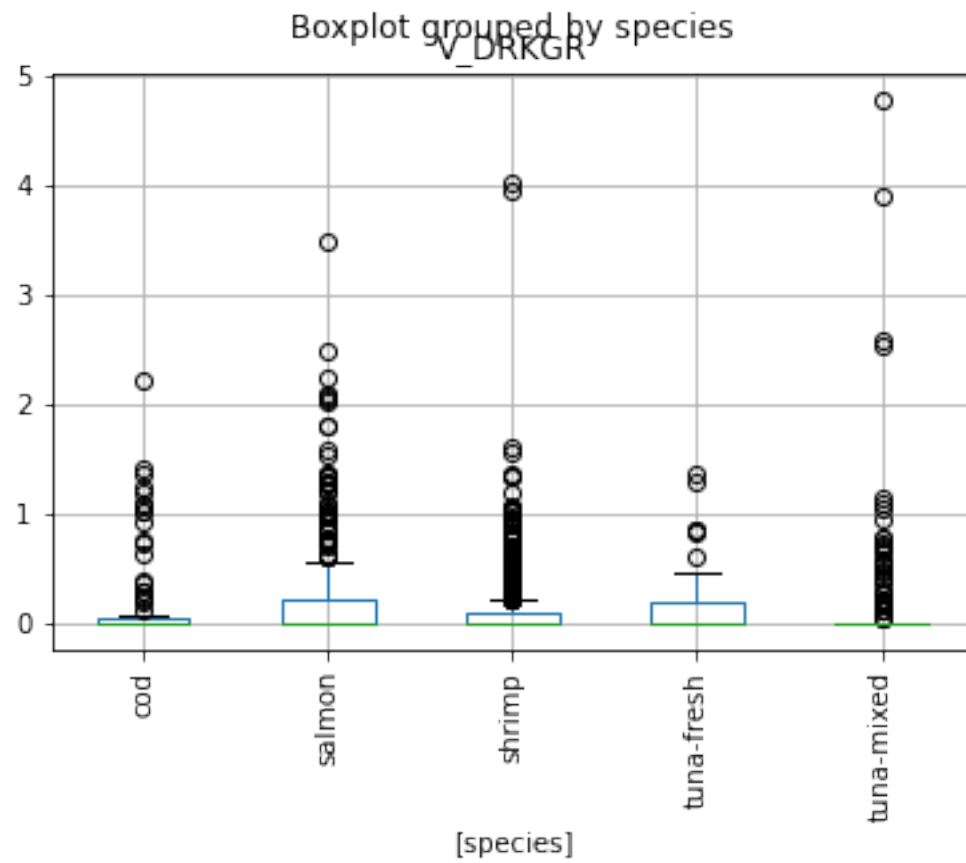


<Figure size 432x288 with 0 Axes>

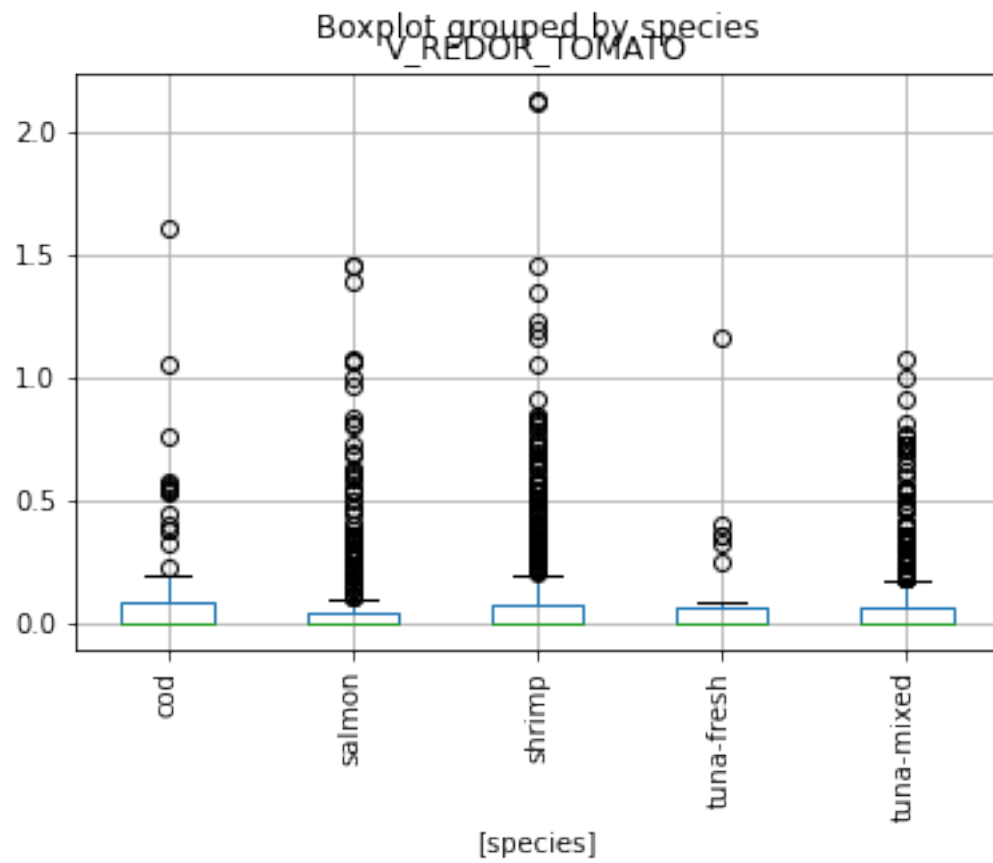
```
[53]: for var in veggie:
      z = df_species.boxplot(column=var,by=['species'], rot=90)
      plt.show(z)
      plt.clf()
```



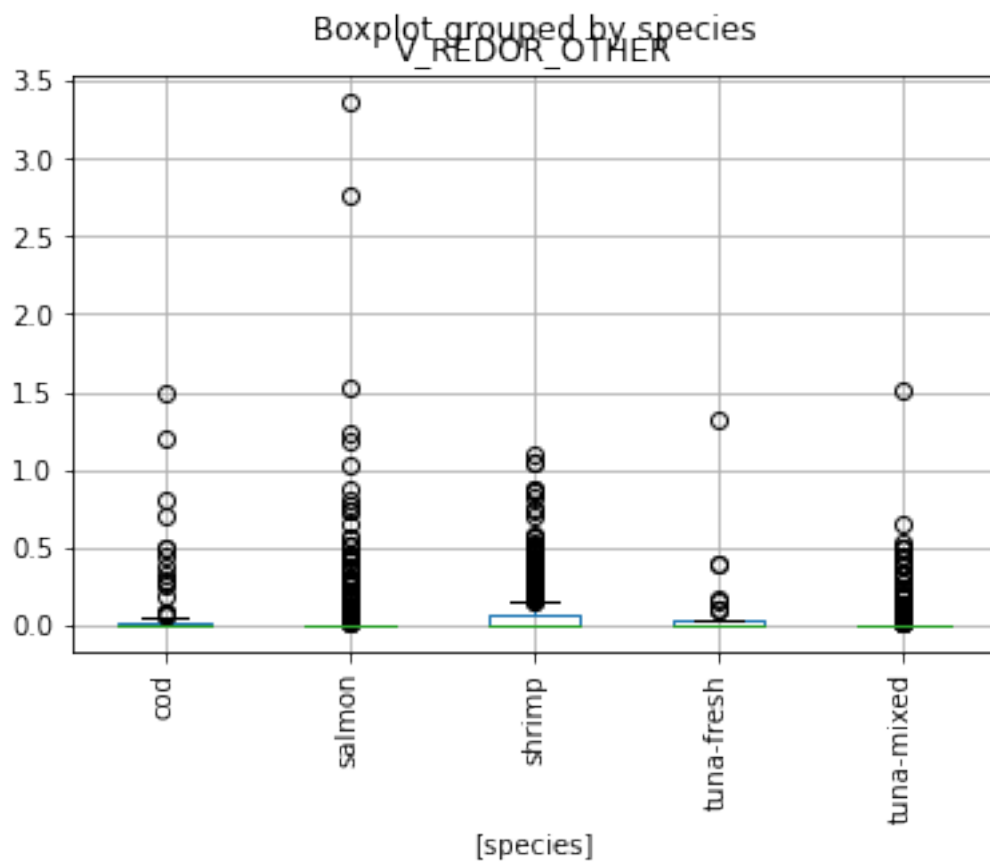
<Figure size 432x288 with 0 Axes>



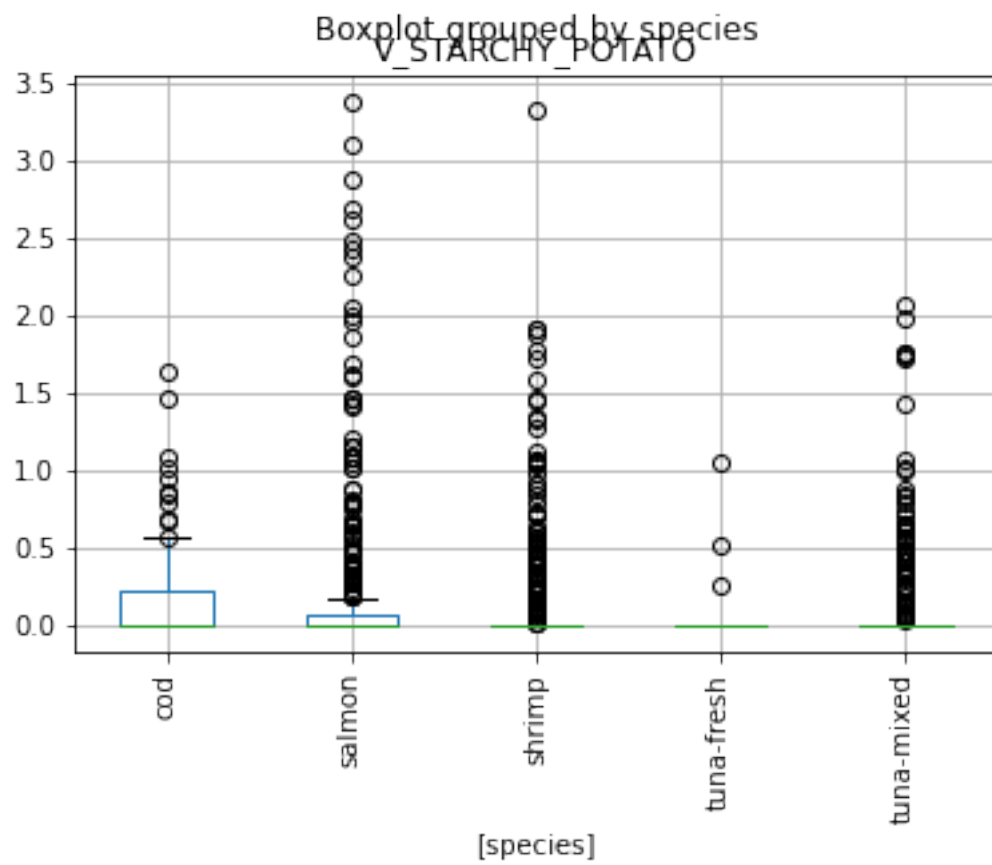
<Figure size 432x288 with 0 Axes>



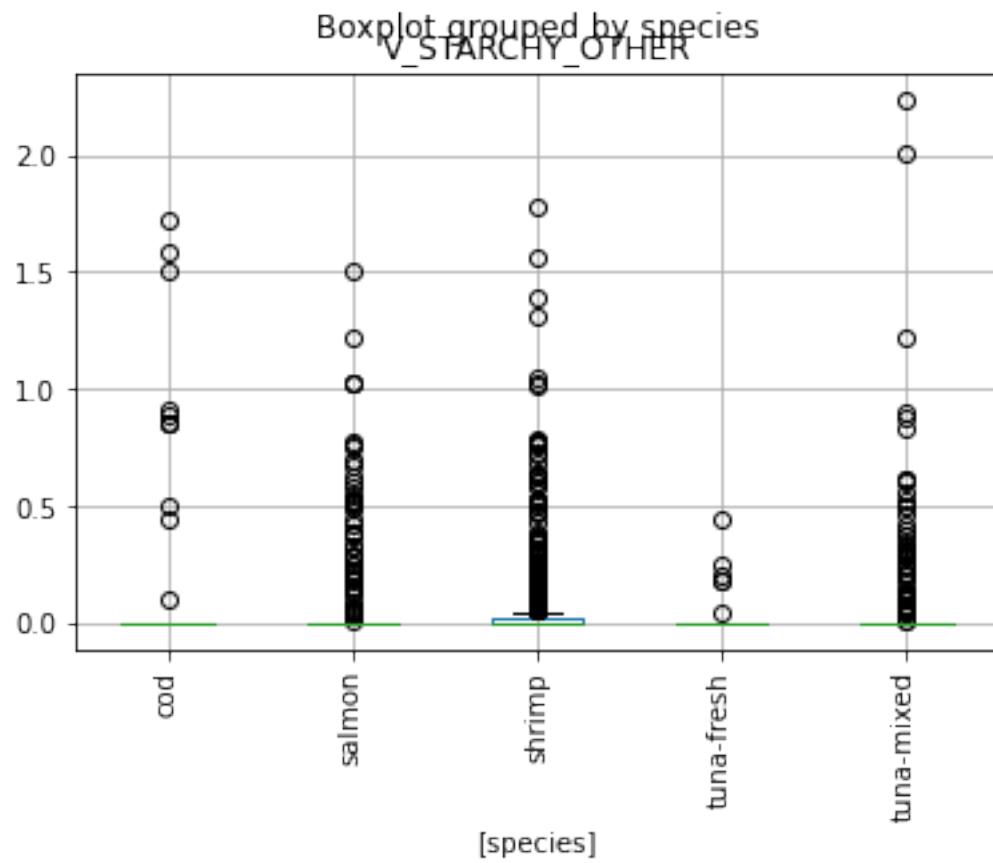
<Figure size 432x288 with 0 Axes>



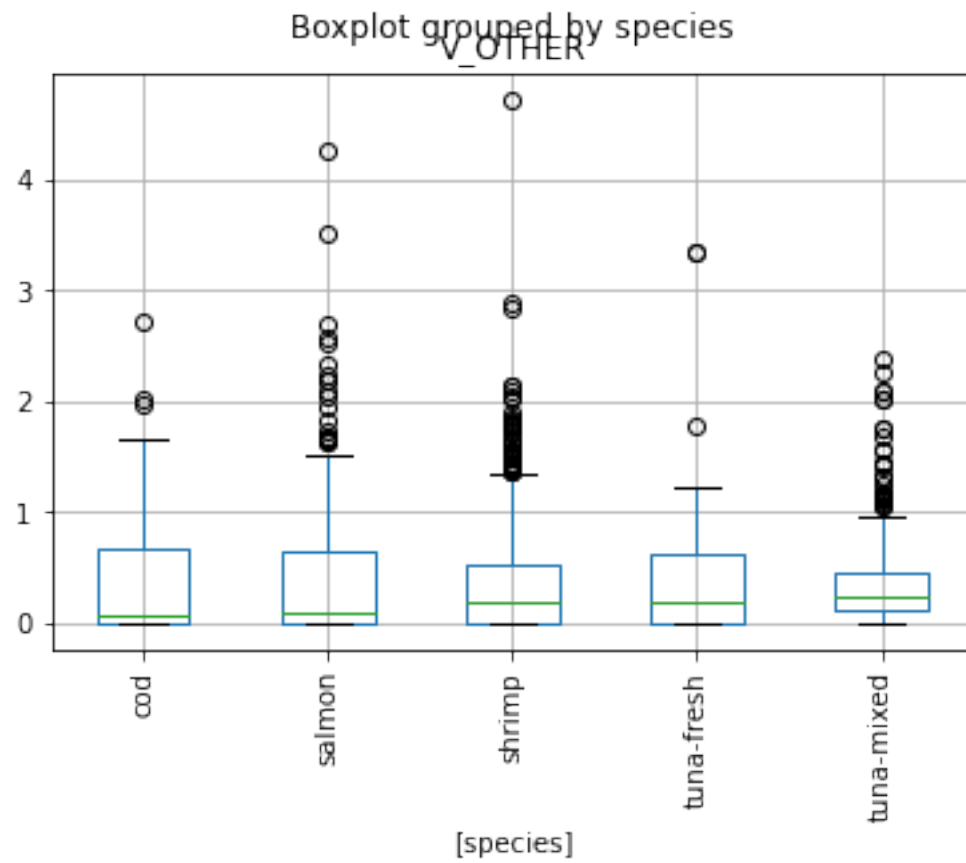
<Figure size 432x288 with 0 Axes>



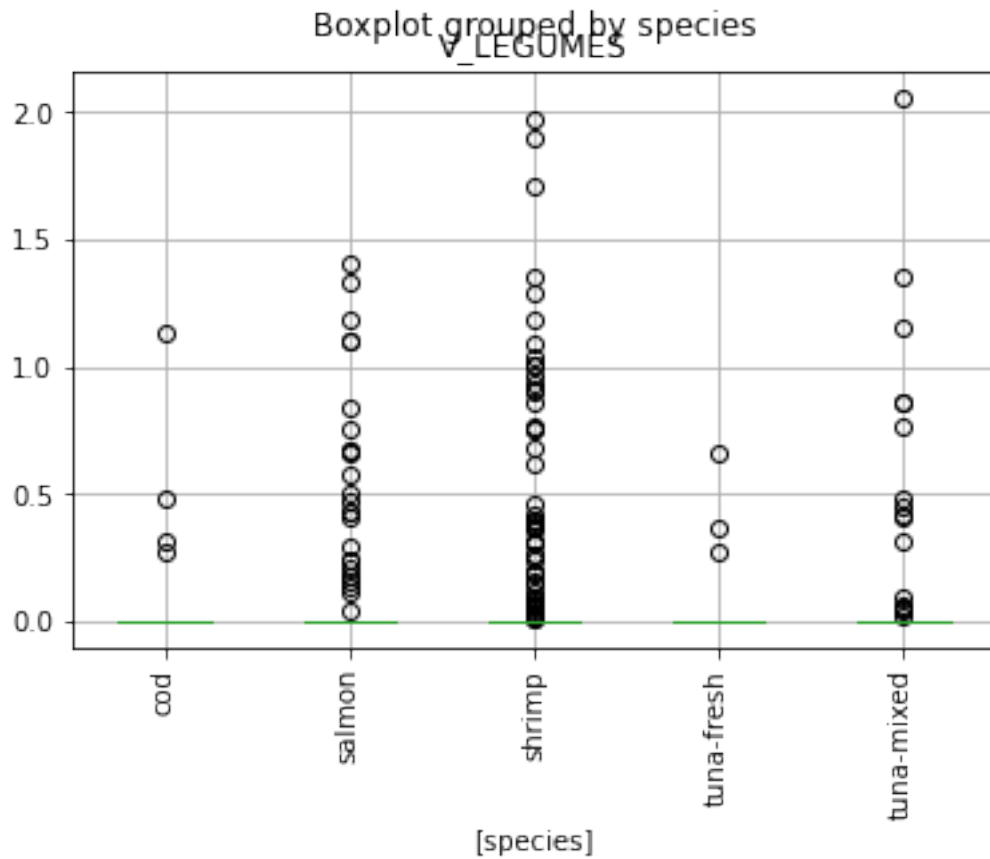
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<Figure size 432x288 with 0 Axes>



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<Figure size 432x288 with 0 Axes>

```
[54]: for var in veggie:
      z = df.groupby('species')[var].describe()
      z = z.sort_values(by='mean', ascending = False)
      print("Statistics for "+var+"\n")
      print(z)
      print('\n')
```

Statistics for V_TOTAL

	count	mean	std	min	25%	50%	75%	max
species								
pike	2.0	3.115000	0.530330	2.74	2.9275	3.115	3.3025	3.49
shad	1.0	2.210000	NaN	2.21	2.2100	2.210	2.2100	2.21
carp	15.0	1.622667	2.435782	0.00	0.1800	0.890	1.6200	9.40
swordfish	10.0	1.537000	1.068239	0.00	0.6375	1.745	2.3450	2.91
eel	6.0	1.301667	0.539385	0.68	0.9050	1.215	1.7800	1.93
ocean perch	23.0	1.292609	1.016313	0.00	0.4400	1.080	2.2550	3.16

scallops	12.0	1.284167	0.835610	0.00	0.7325	1.160	1.5375	3.11
shellfish	15.0	1.269333	1.228661	0.24	0.5500	0.790	1.6350	5.00
sea bass	22.0	1.268182	1.009760	0.00	0.6000	1.035	1.7300	3.56
snails	3.0	1.223333	1.236177	0.31	0.5200	0.730	1.6800	2.63
lobster	20.0	1.129500	0.753794	0.00	0.6575	1.170	1.7550	2.47
frog	1.0	1.120000	NaN	1.12	1.1200	1.120	1.1200	1.12
croaker	24.0	1.115833	1.021814	0.00	0.4225	0.845	1.5875	3.83
cod	87.0	1.097241	0.878847	0.00	0.2800	1.020	1.7950	3.39
salmon	369.0	1.083144	1.054814	0.00	0.3200	0.870	1.6200	8.51
pompano	25.0	1.067200	1.013733	0.00	0.0400	1.060	1.5300	3.48
turtle	1.0	1.050000	NaN	1.05	1.0500	1.050	1.0500	1.05
haddock	29.0	1.028276	0.909411	0.00	0.1300	0.730	1.9000	3.12
oyster	32.0	1.014687	1.154665	0.00	0.0000	0.795	1.2550	5.00
octopus	6.0	1.005000	0.585995	0.38	0.7450	0.790	1.1725	2.04
crayfish	11.0	0.990000	1.340470	0.00	0.0000	0.450	1.3950	4.17
perch	53.0	0.979245	0.883518	0.00	0.2500	0.770	1.7000	3.28
flounder	61.0	0.972459	0.841742	0.00	0.3800	0.850	1.4000	3.96
tuna-fresh	37.0	0.957568	1.043436	0.00	0.2900	0.590	1.3200	4.09
sturgeon	2.0	0.950000	1.343503	0.00	0.4750	0.950	1.4250	1.90
trout	38.0	0.929737	0.737708	0.00	0.3500	0.975	1.3525	2.46
halibut	2.0	0.895000	0.445477	0.58	0.7375	0.895	1.0525	1.21
seafood	267.0	0.887004	0.784787	0.00	0.3300	0.680	1.2150	6.95
catfish	140.0	0.835286	0.823286	0.00	0.2225	0.725	1.2000	4.84
mackerel	20.0	0.834500	0.787277	0.00	0.0975	0.655	1.2100	2.51
tilapia	239.0	0.813389	0.843749	0.00	0.0000	0.650	1.2200	5.51
crab	127.0	0.810236	0.961830	0.00	0.0800	0.510	1.1950	6.39
fish	497.0	0.807847	0.899692	0.00	0.1200	0.550	1.1700	5.08
shrimp	719.0	0.800153	0.826446	0.00	0.1800	0.580	1.1700	7.79
squid	23.0	0.769565	1.017709	0.00	0.0000	0.500	1.1850	4.56
porgy	25.0	0.742800	0.896970	0.00	0.0000	0.490	1.2400	2.92
clam	59.0	0.673220	0.573307	0.00	0.2700	0.570	0.9150	2.36
whiting	42.0	0.641905	0.700036	0.00	0.0000	0.485	0.9900	2.84
tuna-mixed	531.0	0.630264	0.691519	0.00	0.1700	0.440	0.8400	4.83
anchovy	9.0	0.523333	0.515170	0.00	0.0000	0.500	0.8200	1.56
mussels	7.0	0.510000	0.365559	0.00	0.2800	0.570	0.6550	1.13
herring	13.0	0.426923	0.813013	0.00	0.0000	0.000	0.2500	2.40
sardines	42.0	0.406667	0.655981	0.00	0.0000	0.070	0.5500	3.29
mullet	4.0	0.137500	0.275000	0.00	0.0000	0.000	0.1375	0.55
shark	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00

Statistics for V_DRKGR

	count	mean	std	min	25%	50%	75%	max
species								
shad	1.0	1.220000	NaN	1.22	1.220	1.22	1.2200	1.22
sturgeon	2.0	0.650000	0.919239	0.00	0.325	0.65	0.9750	1.30
sea bass	22.0	0.411818	0.694952	0.00	0.000	0.00	0.7575	2.99

ocean perch	23.0	0.292609	0.514094	0.00	0.000	0.00	0.3900	1.53
eel	6.0	0.283333	0.358924	0.00	0.000	0.14	0.4975	0.85
oyster	32.0	0.265000	0.762610	0.00	0.000	0.00	0.0000	3.99
carp	15.0	0.251333	0.463571	0.00	0.000	0.00	0.3700	1.56
pompano	25.0	0.240000	0.452069	0.00	0.000	0.00	0.4700	1.77
squid	23.0	0.226522	0.815306	0.00	0.000	0.00	0.0200	3.90
herring	13.0	0.223077	0.565087	0.00	0.000	0.00	0.0000	1.82
salmon	369.0	0.221301	0.471215	0.00	0.000	0.00	0.2300	3.49
tuna-fresh	37.0	0.200270	0.376050	0.00	0.000	0.00	0.1900	1.37
croaker	24.0	0.194583	0.459811	0.00	0.000	0.00	0.0000	1.61
cod	87.0	0.193908	0.429430	0.00	0.000	0.00	0.0400	2.22
lobster	20.0	0.187500	0.365368	0.00	0.000	0.00	0.1125	1.19
tilapia	239.0	0.162176	0.403805	0.00	0.000	0.00	0.0000	2.39
flounder	61.0	0.155246	0.432009	0.00	0.000	0.00	0.0000	2.22
seafood	267.0	0.151498	0.398960	0.00	0.000	0.00	0.1100	3.77
perch	53.0	0.144340	0.337585	0.00	0.000	0.00	0.0000	1.42
trout	38.0	0.141316	0.308284	0.00	0.000	0.00	0.0000	1.24
catfish	140.0	0.138714	0.316671	0.00	0.000	0.00	0.0000	1.32
swordfish	10.0	0.121000	0.229949	0.00	0.000	0.00	0.1175	0.71
crab	127.0	0.119370	0.283016	0.00	0.000	0.00	0.0000	1.42
haddock	29.0	0.118621	0.271763	0.00	0.000	0.00	0.0000	1.00
mackerel	20.0	0.118000	0.251994	0.00	0.000	0.00	0.0000	0.84
shrimp	719.0	0.116634	0.312196	0.00	0.000	0.00	0.0900	4.02
fish	497.0	0.099517	0.342665	0.00	0.000	0.00	0.0000	4.05
whiting	42.0	0.097381	0.251076	0.00	0.000	0.00	0.0000	1.03
scallops	12.0	0.079167	0.149208	0.00	0.000	0.00	0.0800	0.47
porgy	25.0	0.074800	0.241456	0.00	0.000	0.00	0.0000	0.89
sardines	42.0	0.071905	0.283095	0.00	0.000	0.00	0.0000	1.67
halibut	2.0	0.070000	0.098995	0.00	0.035	0.07	0.1050	0.14
tuna-mixed	531.0	0.055838	0.336239	0.00	0.000	0.00	0.0000	4.78
mussels	7.0	0.052857	0.139847	0.00	0.000	0.00	0.0000	0.37
clam	59.0	0.034915	0.145192	0.00	0.000	0.00	0.0000	0.98
anchovy	9.0	0.032222	0.096667	0.00	0.000	0.00	0.0000	0.29
octopus	6.0	0.000000	0.000000	0.00	0.000	0.00	0.0000	0.00
snails	3.0	0.000000	0.000000	0.00	0.000	0.00	0.0000	0.00
shellfish	15.0	0.000000	0.000000	0.00	0.000	0.00	0.0000	0.00
mullet	4.0	0.000000	0.000000	0.00	0.000	0.00	0.0000	0.00
shark	1.0	0.000000	NaN	0.00	0.000	0.00	0.0000	0.00
frog	1.0	0.000000	NaN	0.00	0.000	0.00	0.0000	0.00
crayfish	11.0	0.000000	0.000000	0.00	0.000	0.00	0.0000	0.00
pike	2.0	0.000000	0.000000	0.00	0.000	0.00	0.0000	0.00
turtle	1.0	0.000000	NaN	0.00	0.000	0.00	0.0000	0.00

Statistics for V_REDOR_TOMATO

	count	mean	std	min	25%	50%	75%	max
species								

shad	1.0	0.510000	NaN	0.51	0.5100	0.510	0.5100	0.51
shellfish	15.0	0.480000	0.537468	0.00	0.2050	0.350	0.4900	2.11
carp	15.0	0.438000	0.908706	0.00	0.0000	0.010	0.4400	3.31
swordfish	10.0	0.264000	0.267549	0.00	0.0150	0.200	0.4450	0.71
ocean perch	23.0	0.191304	0.326055	0.00	0.0000	0.000	0.3450	1.45
mussels	7.0	0.165714	0.315270	0.00	0.0000	0.000	0.1550	0.85
lobster	20.0	0.158000	0.246952	0.00	0.0000	0.035	0.2025	0.81
croaker	24.0	0.157500	0.326367	0.00	0.0000	0.000	0.1075	1.15
trout	38.0	0.157105	0.272445	0.00	0.0000	0.000	0.2700	1.07
seafood	267.0	0.152996	0.236800	0.00	0.0000	0.030	0.2300	1.39
oyster	32.0	0.136250	0.386696	0.00	0.0000	0.000	0.0550	2.11
whiting	42.0	0.135476	0.369464	0.00	0.0000	0.000	0.0400	1.72
scallops	12.0	0.134167	0.224801	0.00	0.0000	0.005	0.1775	0.73
octopus	6.0	0.120000	0.194422	0.00	0.0000	0.000	0.2025	0.45
cod	87.0	0.118851	0.260279	0.00	0.0000	0.000	0.0900	1.61
crab	127.0	0.113937	0.248782	0.00	0.0000	0.000	0.0850	1.61
fish	497.0	0.110724	0.227110	0.00	0.0000	0.000	0.1200	1.83
haddock	29.0	0.102069	0.215181	0.00	0.0000	0.000	0.0300	0.77
salmon	369.0	0.101084	0.231237	0.00	0.0000	0.000	0.0400	1.45
sea bass	22.0	0.098182	0.215000	0.00	0.0000	0.000	0.1075	0.90
shrimp	719.0	0.095661	0.224310	0.00	0.0000	0.000	0.0800	2.13
mullet	4.0	0.095000	0.190000	0.00	0.0000	0.000	0.0950	0.38
mackerel	20.0	0.092500	0.130702	0.00	0.0000	0.000	0.1600	0.44
perch	53.0	0.090189	0.167464	0.00	0.0000	0.000	0.1200	0.62
frog	1.0	0.090000	NaN	0.09	0.0900	0.090	0.0900	0.09
catfish	140.0	0.090000	0.175835	0.00	0.0000	0.000	0.0900	1.02
tuna-fresh	37.0	0.087568	0.215837	0.00	0.0000	0.000	0.0700	1.16
tuna-mixed	531.0	0.087552	0.185322	0.00	0.0000	0.000	0.0700	1.07
pompano	25.0	0.081200	0.161744	0.00	0.0000	0.000	0.0100	0.52
pike	2.0	0.080000	0.113137	0.00	0.0400	0.080	0.1200	0.16
flounder	61.0	0.067705	0.147200	0.00	0.0000	0.000	0.0100	0.70
clam	59.0	0.066441	0.147365	0.00	0.0000	0.000	0.0200	0.73
sardines	42.0	0.065238	0.143871	0.00	0.0000	0.000	0.0475	0.56
tilapia	239.0	0.063431	0.136680	0.00	0.0000	0.000	0.0350	0.80
halibut	2.0	0.045000	0.063640	0.00	0.0225	0.045	0.0675	0.09
porgy	25.0	0.030400	0.088811	0.00	0.0000	0.000	0.0000	0.35
sturgeon	2.0	0.030000	0.042426	0.00	0.0150	0.030	0.0450	0.06
squid	23.0	0.028261	0.053313	0.00	0.0000	0.000	0.0300	0.17
crayfish	11.0	0.027273	0.068715	0.00	0.0000	0.000	0.0150	0.23
anchovy	9.0	0.024444	0.050772	0.00	0.0000	0.000	0.0000	0.14
herring	13.0	0.015385	0.055470	0.00	0.0000	0.000	0.0000	0.20
snails	3.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
eel	6.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
shark	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00
turtle	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00

Statistics for V_REDOR_OTHER

species	count	mean	std	min	25%	50%	75%	max
turtle	1.0	0.310000	NaN	0.31	0.310	0.31	0.3100	0.31
sea bass	22.0	0.271818	0.517481	0.00	0.000	0.00	0.3275	2.19
scallops	12.0	0.218333	0.364962	0.00	0.000	0.03	0.2375	1.03
eel	6.0	0.118333	0.183348	0.00	0.000	0.00	0.2625	0.36
carp	15.0	0.112667	0.213423	0.00	0.000	0.00	0.0800	0.66
anchovy	9.0	0.101111	0.266714	0.00	0.000	0.00	0.0500	0.81
cod	87.0	0.090575	0.249387	0.00	0.000	0.00	0.0200	1.50
perch	53.0	0.082264	0.220712	0.00	0.000	0.00	0.0000	1.16
salmon	369.0	0.079133	0.291683	0.00	0.000	0.00	0.0000	3.37
porgy	25.0	0.078000	0.219013	0.00	0.000	0.00	0.0100	0.94
tuna-fresh	37.0	0.077568	0.231366	0.00	0.000	0.00	0.0300	1.32
seafood	267.0	0.074906	0.213336	0.00	0.000	0.00	0.0600	2.03
haddock	29.0	0.074828	0.219034	0.00	0.000	0.00	0.0500	1.16
trout	38.0	0.074474	0.162259	0.00	0.000	0.00	0.0075	0.51
pike	2.0	0.070000	0.098995	0.00	0.035	0.07	0.1050	0.14
fish	497.0	0.069738	0.174283	0.00	0.000	0.00	0.0300	1.32
shrimp	719.0	0.069722	0.153243	0.00	0.000	0.00	0.0600	1.10
tilapia	239.0	0.057657	0.170704	0.00	0.000	0.00	0.0000	1.36
catfish	140.0	0.053714	0.163119	0.00	0.000	0.00	0.0200	1.00
halibut	2.0	0.050000	0.070711	0.00	0.025	0.05	0.0750	0.10
pompano	25.0	0.048400	0.110856	0.00	0.000	0.00	0.0000	0.44
flounder	61.0	0.047213	0.142187	0.00	0.000	0.00	0.0000	0.92
clam	59.0	0.045085	0.134130	0.00	0.000	0.00	0.0000	0.93
squid	23.0	0.036957	0.092757	0.00	0.000	0.00	0.0050	0.40
sardines	42.0	0.035000	0.129751	0.00	0.000	0.00	0.0000	0.76
lobster	20.0	0.035000	0.076192	0.00	0.000	0.00	0.0100	0.29
crab	127.0	0.032205	0.080779	0.00	0.000	0.00	0.0000	0.36
oyster	32.0	0.027500	0.101537	0.00	0.000	0.00	0.0000	0.56
tuna-mixed	531.0	0.025744	0.106104	0.00	0.000	0.00	0.0000	1.51
shad	1.0	0.020000	NaN	0.02	0.020	0.02	0.0200	0.02
ocean perch	23.0	0.019130	0.048889	0.00	0.000	0.00	0.0000	0.17
octopus	6.0	0.018333	0.044907	0.00	0.000	0.00	0.0000	0.11
mackerel	20.0	0.016500	0.027961	0.00	0.000	0.00	0.0300	0.08
swordfish	10.0	0.014000	0.044272	0.00	0.000	0.00	0.0000	0.14
mussels	7.0	0.012857	0.022147	0.00	0.000	0.00	0.0200	0.05
whiting	42.0	0.009762	0.023216	0.00	0.000	0.00	0.0000	0.08
croaker	24.0	0.008333	0.025820	0.00	0.000	0.00	0.0000	0.12
crayfish	11.0	0.003636	0.012060	0.00	0.000	0.00	0.0000	0.04
snails	3.0	0.000000	0.000000	0.00	0.000	0.00	0.0000	0.00
sturgeon	2.0	0.000000	0.000000	0.00	0.000	0.00	0.0000	0.00
shellfish	15.0	0.000000	0.000000	0.00	0.000	0.00	0.0000	0.00
shark	1.0	0.000000	NaN	0.00	0.000	0.00	0.0000	0.00
mullet	4.0	0.000000	0.000000	0.00	0.000	0.00	0.0000	0.00
herring	13.0	0.000000	0.000000	0.00	0.000	0.00	0.0000	0.00
frog	1.0	0.000000	NaN	0.00	0.000	0.00	0.0000	0.00

Statistics for V_STARCHY_POTATO

	count	mean	std	min	25%	50%	75%	max
species								
pike	2.0	1.955000	0.827315	1.37	1.6625	1.955	2.2475	2.54
frog	1.0	1.030000	NaN	1.03	1.0300	1.030	1.0300	1.03
crayfish	11.0	0.612727	1.189269	0.00	0.0000	0.210	0.5800	4.03
halibut	2.0	0.405000	0.572756	0.00	0.2025	0.405	0.6075	0.81
clam	59.0	0.367458	0.345865	0.00	0.0900	0.310	0.5600	1.85
flounder	61.0	0.301639	0.457803	0.00	0.0000	0.000	0.5400	2.18
scallops	12.0	0.300833	0.436087	0.00	0.0000	0.000	0.7475	1.09
sturgeon	2.0	0.270000	0.381838	0.00	0.1350	0.270	0.4050	0.54
lobster	20.0	0.253000	0.361693	0.00	0.0000	0.000	0.5225	1.15
croaker	24.0	0.245833	0.611014	0.00	0.0000	0.000	0.0450	2.79
perch	53.0	0.240943	0.397610	0.00	0.0000	0.000	0.3300	1.64
haddock	29.0	0.234138	0.437187	0.00	0.0000	0.000	0.1200	1.44
salmon	369.0	0.218862	0.543456	0.00	0.0000	0.000	0.0700	3.38
pompano	25.0	0.200800	0.377822	0.00	0.0000	0.000	0.3200	1.34
oyster	32.0	0.192188	0.377810	0.00	0.0000	0.000	0.1650	1.28
cod	87.0	0.178161	0.348480	0.00	0.0000	0.000	0.2250	1.63
ocean perch	23.0	0.161304	0.357940	0.00	0.0000	0.000	0.0000	1.12
fish	497.0	0.158370	0.381237	0.00	0.0000	0.000	0.1700	4.50
snails	3.0	0.153333	0.265581	0.00	0.0000	0.000	0.2300	0.46
whiting	42.0	0.149048	0.322844	0.00	0.0000	0.000	0.0825	1.44
tilapia	239.0	0.143640	0.384468	0.00	0.0000	0.000	0.0000	2.87
catfish	140.0	0.135929	0.282331	0.00	0.0000	0.000	0.1400	1.91
crab	127.0	0.127480	0.343023	0.00	0.0000	0.000	0.0000	1.88
trout	38.0	0.125000	0.289564	0.00	0.0000	0.000	0.0000	1.23
shellfish	15.0	0.099333	0.324268	0.00	0.0000	0.000	0.0000	1.25
sea bass	22.0	0.094091	0.299661	0.00	0.0000	0.000	0.0000	1.24
carp	15.0	0.092000	0.232692	0.00	0.0000	0.000	0.0000	0.85
shrimp	719.0	0.076857	0.282255	0.00	0.0000	0.000	0.0000	3.32
tuna-mixed	531.0	0.075932	0.258385	0.00	0.0000	0.000	0.0000	2.06
sardines	42.0	0.072857	0.253755	0.00	0.0000	0.000	0.0000	1.09
porgy	25.0	0.064400	0.223683	0.00	0.0000	0.000	0.0000	0.87
seafood	267.0	0.054457	0.142460	0.00	0.0000	0.000	0.0000	1.14
shad	1.0	0.050000	NaN	0.05	0.0500	0.050	0.0500	0.05
herring	13.0	0.049231	0.177504	0.00	0.0000	0.000	0.0000	0.64
tuna-fresh	37.0	0.049189	0.193353	0.00	0.0000	0.000	0.0000	1.05
octopus	6.0	0.033333	0.081650	0.00	0.0000	0.000	0.0000	0.20
squid	23.0	0.031739	0.096750	0.00	0.0000	0.000	0.0000	0.41
swordfish	10.0	0.023000	0.072732	0.00	0.0000	0.000	0.0000	0.23
turtle	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00
shark	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00
mussels	7.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
eel	6.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00

mackerel	20.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
mullet	4.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
anchovy	9.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00

Statistics for V_STARCHY_OTHER

	count	mean	std	min	25%	50%	75%	max
species								
turtle	1.0	0.520000	NaN	0.52	0.52	0.52	0.5200	0.52
crayfish	11.0	0.222727	0.414683	0.00	0.00	0.00	0.2450	1.36
swordfish	10.0	0.195000	0.314440	0.00	0.00	0.00	0.4575	0.68
croaker	24.0	0.192083	0.619768	0.00	0.00	0.00	0.0000	2.73
ocean perch	23.0	0.183913	0.556538	0.00	0.00	0.00	0.0000	2.44
porgy	25.0	0.172800	0.350993	0.00	0.00	0.00	0.0700	1.08
mackerel	20.0	0.162500	0.480733	0.00	0.00	0.00	0.0700	2.09
lobster	20.0	0.160000	0.276043	0.00	0.00	0.00	0.2200	0.76
eel	6.0	0.126667	0.310269	0.00	0.00	0.00	0.0000	0.76
cod	87.0	0.117356	0.354294	0.00	0.00	0.00	0.0000	1.72
perch	53.0	0.089245	0.298991	0.00	0.00	0.00	0.0000	1.58
mussels	7.0	0.087143	0.230558	0.00	0.00	0.00	0.0000	0.61
haddock	29.0	0.086552	0.245055	0.00	0.00	0.00	0.0000	1.01
scallops	12.0	0.083333	0.194811	0.00	0.00	0.00	0.0000	0.52
fish	497.0	0.081288	0.340771	0.00	0.00	0.00	0.0000	3.16
snails	3.0	0.080000	0.138564	0.00	0.00	0.00	0.1200	0.24
flounder	61.0	0.080000	0.241454	0.00	0.00	0.00	0.0000	1.31
pompano	25.0	0.079600	0.249173	0.00	0.00	0.00	0.0000	1.06
tilapia	239.0	0.068661	0.290836	0.00	0.00	0.00	0.0000	3.16
shrimp	719.0	0.066134	0.186553	0.00	0.00	0.00	0.0200	1.78
seafood	267.0	0.063296	0.119156	0.00	0.00	0.00	0.0900	0.72
crab	127.0	0.062126	0.198864	0.00	0.00	0.00	0.0000	1.32
salmon	369.0	0.060596	0.193051	0.00	0.00	0.00	0.0000	1.51
catfish	140.0	0.058929	0.235512	0.00	0.00	0.00	0.0000	2.01
shad	1.0	0.050000	NaN	0.05	0.05	0.05	0.0500	0.05
whiting	42.0	0.042381	0.135030	0.00	0.00	0.00	0.0000	0.54
oyster	32.0	0.041562	0.103179	0.00	0.00	0.00	0.0000	0.38
tuna-mixed	531.0	0.037740	0.176185	0.00	0.00	0.00	0.0000	2.24
tuna-fresh	37.0	0.035405	0.094446	0.00	0.00	0.00	0.0000	0.44
squid	23.0	0.033043	0.103723	0.00	0.00	0.00	0.0000	0.48
anchovy	9.0	0.023333	0.047958	0.00	0.00	0.00	0.0000	0.13
trout	38.0	0.016579	0.074190	0.00	0.00	0.00	0.0000	0.44
carp	15.0	0.015333	0.043894	0.00	0.00	0.00	0.0000	0.16
clam	59.0	0.015085	0.082845	0.00	0.00	0.00	0.0000	0.61
sardines	42.0	0.010714	0.049505	0.00	0.00	0.00	0.0000	0.27
shellfish	15.0	0.004667	0.018074	0.00	0.00	0.00	0.0000	0.07
halibut	2.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
frog	1.0	0.000000	NaN	0.00	0.00	0.00	0.0000	0.00
pike	2.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00

sturgeon	2.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
mullet	4.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
shark	1.0	0.000000	NaN	0.00	0.00	0.00	0.0000	0.00
octopus	6.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
sea bass	22.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
herring	13.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00

Statistics for V_OTHER

	count	mean	std	min	25%	50%	75%	max
species								
pike	2.0	1.010000	0.311127	0.79	0.9000	1.010	1.1200	1.23
snails	3.0	0.986667	1.430536	0.02	0.1650	0.310	1.4700	2.63
swordfish	10.0	0.919000	0.684454	0.00	0.2275	1.045	1.4775	1.70
octopus	6.0	0.831667	0.655177	0.22	0.4325	0.660	0.9550	2.04
eel	6.0	0.773333	0.409374	0.05	0.7025	0.845	0.9350	1.28
carp	15.0	0.716000	1.024073	0.00	0.0050	0.380	0.8150	3.88
shellfish	15.0	0.686000	0.701262	0.07	0.2900	0.480	0.6850	2.88
tuna-fresh	37.0	0.507838	0.819072	0.00	0.0000	0.200	0.6300	3.33
scallops	12.0	0.468333	0.541594	0.00	0.0875	0.240	0.5925	1.62
ocean perch	23.0	0.445217	0.591907	0.00	0.0050	0.130	0.6700	1.88
mackerel	20.0	0.444500	0.542863	0.00	0.0000	0.235	0.6700	1.92
pompano	25.0	0.415600	0.689463	0.00	0.0000	0.230	0.5000	3.15
squid	23.0	0.414783	0.509508	0.00	0.0000	0.180	0.6400	1.72
trout	38.0	0.414474	0.510854	0.00	0.0000	0.160	0.7375	1.76
haddock	29.0	0.412069	0.575471	0.00	0.0000	0.010	0.8100	1.93
salmon	369.0	0.402087	0.598169	0.00	0.0000	0.100	0.6500	4.25
cod	87.0	0.398046	0.577901	0.00	0.0000	0.060	0.6650	2.72
sea bass	22.0	0.390909	0.503662	0.00	0.0000	0.080	0.6600	1.64
seafood	267.0	0.390150	0.392394	0.00	0.1050	0.270	0.5400	2.14
shrimp	719.0	0.375076	0.493838	0.00	0.0000	0.190	0.5400	4.72
catfish	140.0	0.358071	0.648155	0.00	0.0000	0.040	0.4725	4.61
crab	127.0	0.355433	0.673973	0.00	0.0000	0.110	0.4300	5.65
oyster	32.0	0.352187	0.648436	0.00	0.0000	0.000	0.5500	2.88
shad	1.0	0.350000	NaN	0.35	0.3500	0.350	0.3500	0.35
tuna-mixed	531.0	0.347363	0.365642	0.00	0.1100	0.250	0.4550	2.38
anchovy	9.0	0.342222	0.496356	0.00	0.0000	0.310	0.3600	1.56
lobster	20.0	0.336000	0.432318	0.00	0.0000	0.070	0.4825	1.37
perch	53.0	0.332830	0.482615	0.00	0.0000	0.030	0.5600	1.89
halibut	2.0	0.330000	0.226274	0.17	0.2500	0.330	0.4100	0.49
porgy	25.0	0.322400	0.523715	0.00	0.0000	0.000	0.5500	2.05
flounder	61.0	0.320328	0.426145	0.00	0.0000	0.040	0.6100	1.65
croaker	24.0	0.318333	0.548767	0.00	0.0000	0.105	0.3700	2.35
tilapia	239.0	0.317657	0.468624	0.00	0.0000	0.070	0.5550	3.15
fish	497.0	0.288612	0.476104	0.00	0.0000	0.090	0.4000	4.25
turtle	1.0	0.210000	NaN	0.21	0.2100	0.210	0.2100	0.21
whiting	42.0	0.208095	0.362453	0.00	0.0000	0.000	0.3475	1.44

mussels	7.0	0.190000	0.202814	0.00	0.0000	0.210	0.2950	0.53
sardines	42.0	0.150714	0.291049	0.00	0.0000	0.000	0.1500	1.39
clam	59.0	0.143220	0.192331	0.00	0.0150	0.060	0.2250	0.79
herring	13.0	0.139231	0.432444	0.00	0.0000	0.000	0.0000	1.56
crayfish	11.0	0.122727	0.273682	0.00	0.0000	0.000	0.0950	0.91
mullet	4.0	0.042500	0.085000	0.00	0.0000	0.000	0.0425	0.17
frog	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00
sturgeon	2.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
shark	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00

Statistics for V_LEGUMES

	count	mean	std	min	25%	50%	75%	max
species								
carp	15.0	0.224000	0.495145	0.0	0.0	0.0	0.0	1.64
trout	38.0	0.168421	0.446630	0.0	0.0	0.0	0.0	1.83
porgy	25.0	0.124000	0.251181	0.0	0.0	0.0	0.0	0.76
anchovy	9.0	0.118889	0.237510	0.0	0.0	0.0	0.0	0.59
eel	6.0	0.110000	0.269444	0.0	0.0	0.0	0.0	0.66
perch	53.0	0.094151	0.246642	0.0	0.0	0.0	0.0	1.10
squid	23.0	0.077391	0.234835	0.0	0.0	0.0	0.0	0.82
whiting	42.0	0.075238	0.292493	0.0	0.0	0.0	0.0	1.79
tilapia	239.0	0.068912	0.213767	0.0	0.0	0.0	0.0	1.48
sea bass	22.0	0.059545	0.168140	0.0	0.0	0.0	0.0	0.74
pompano	25.0	0.058800	0.198920	0.0	0.0	0.0	0.0	0.86
oyster	32.0	0.054688	0.222652	0.0	0.0	0.0	0.0	1.10
scallops	12.0	0.054167	0.146874	0.0	0.0	0.0	0.0	0.50
fish	497.0	0.050020	0.189796	0.0	0.0	0.0	0.0	1.54
catfish	140.0	0.048071	0.207416	0.0	0.0	0.0	0.0	1.97
swordfish	10.0	0.046000	0.120019	0.0	0.0	0.0	0.0	0.38
seafood	267.0	0.044045	0.192914	0.0	0.0	0.0	0.0	1.48
shrimp	719.0	0.041043	0.198508	0.0	0.0	0.0	0.0	1.97
octopus	6.0	0.040000	0.097980	0.0	0.0	0.0	0.0	0.24
salmon	369.0	0.038862	0.175734	0.0	0.0	0.0	0.0	1.41
tuna-fresh	37.0	0.035135	0.129070	0.0	0.0	0.0	0.0	0.66
sardines	42.0	0.030952	0.141504	0.0	0.0	0.0	0.0	0.74
croaker	24.0	0.028333	0.134606	0.0	0.0	0.0	0.0	0.66
lobster	20.0	0.027500	0.122984	0.0	0.0	0.0	0.0	0.55
cod	87.0	0.025172	0.137298	0.0	0.0	0.0	0.0	1.13
mackerel	20.0	0.022000	0.068411	0.0	0.0	0.0	0.0	0.25
flounder	61.0	0.018852	0.107053	0.0	0.0	0.0	0.0	0.73
tuna-mixed	531.0	0.017759	0.138628	0.0	0.0	0.0	0.0	2.06
crab	127.0	0.006378	0.046593	0.0	0.0	0.0	0.0	0.37
shellfish	15.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
turtle	1.0	0.000000	NaN	0.0	0.0	0.0	0.0	0.00
snails	3.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
sturgeon	2.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00

crayfish	11.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
shark	1.0	0.000000	NaN	0.0	0.0	0.0	0.0	0.00
shad	1.0	0.000000	NaN	0.0	0.0	0.0	0.0	0.00
pike	2.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
ocean perch	23.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
mussels	7.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
mullet	4.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
herring	13.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
halibut	2.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
haddock	29.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
frog	1.0	0.000000	NaN	0.0	0.0	0.0	0.0	0.00
clam	59.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00

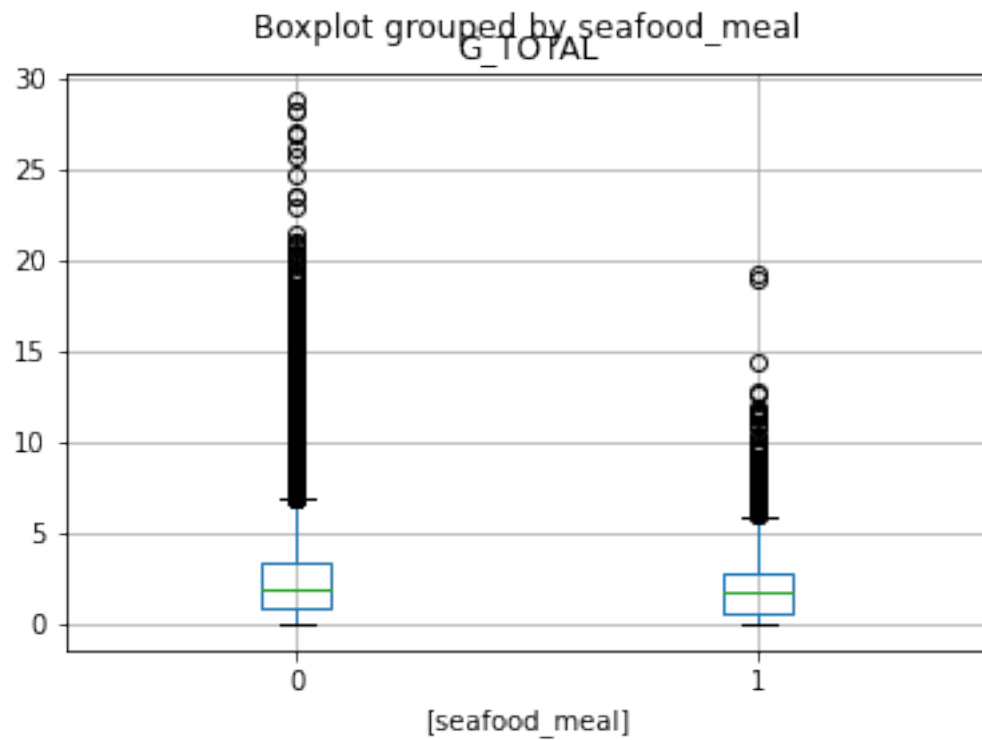
Section 3: Grains

This section provides boxplots and density plots of the Grains FPED components in the seafood meal and non seafood meal groups. The code for seafood meal is 1 if meal contains seafood, and 0 if meal does not contain seafood.

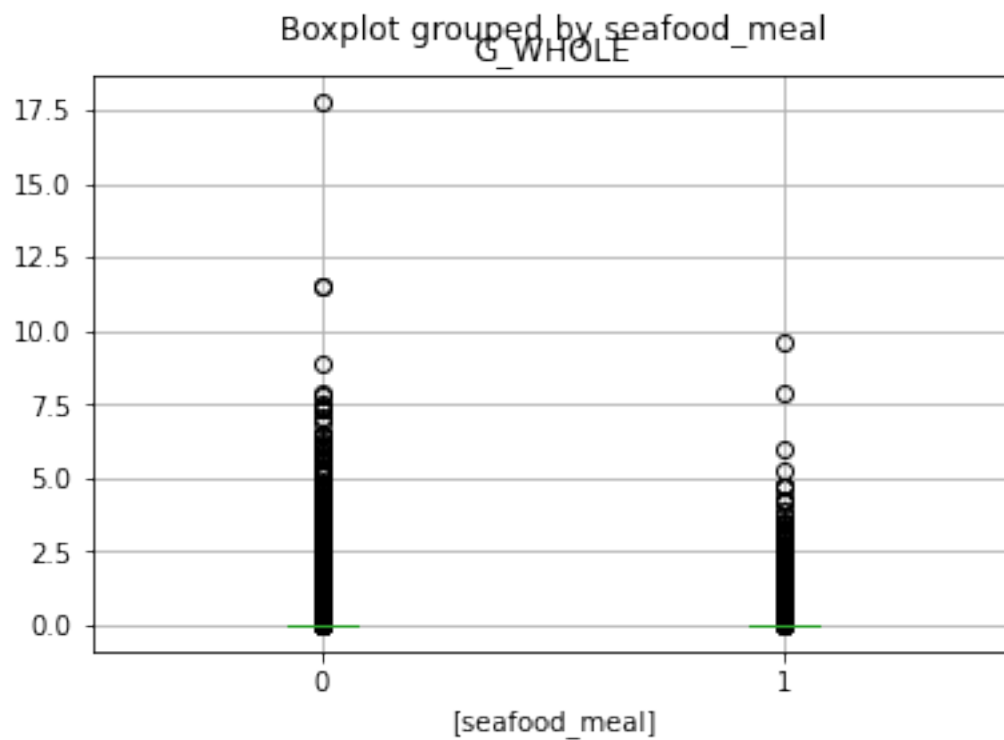
Plot: Meal calories distribution with meals that are 0 KCAL removed, split by 'eathome' groups.

```
[15]: grains = ['G_TOTAL', 'G_WHOLE', 'G_REFINED']

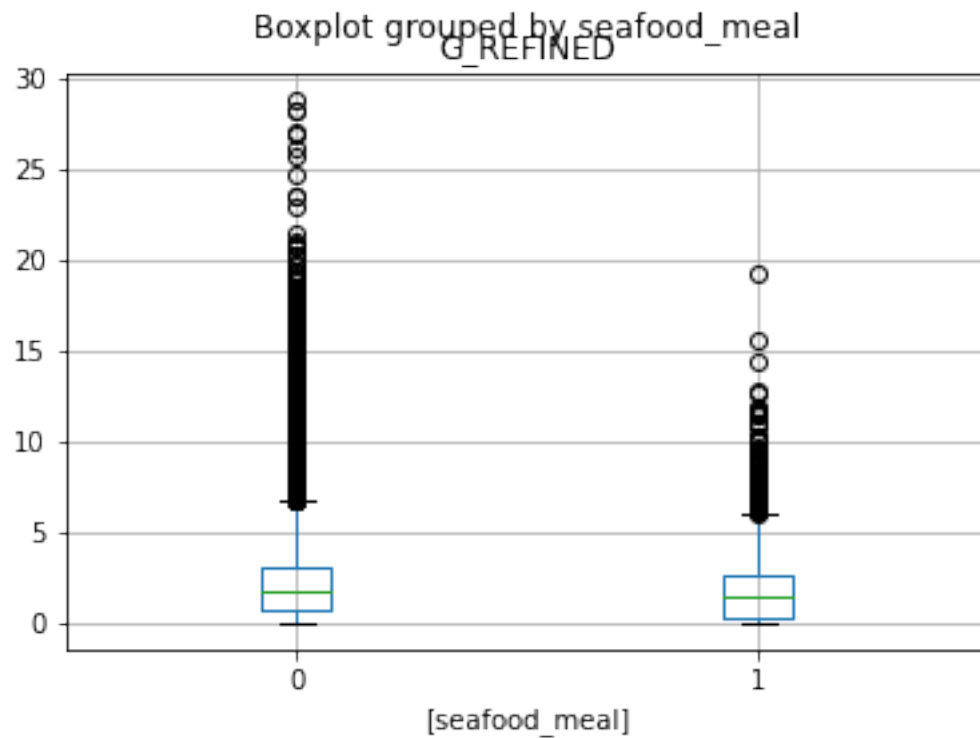
for var in grains:
    z = df.boxplot(column=var, by=['seafood_meal'])
    plt.show(z)
    plt.clf()
```



<Figure size 432x288 with 0 Axes>

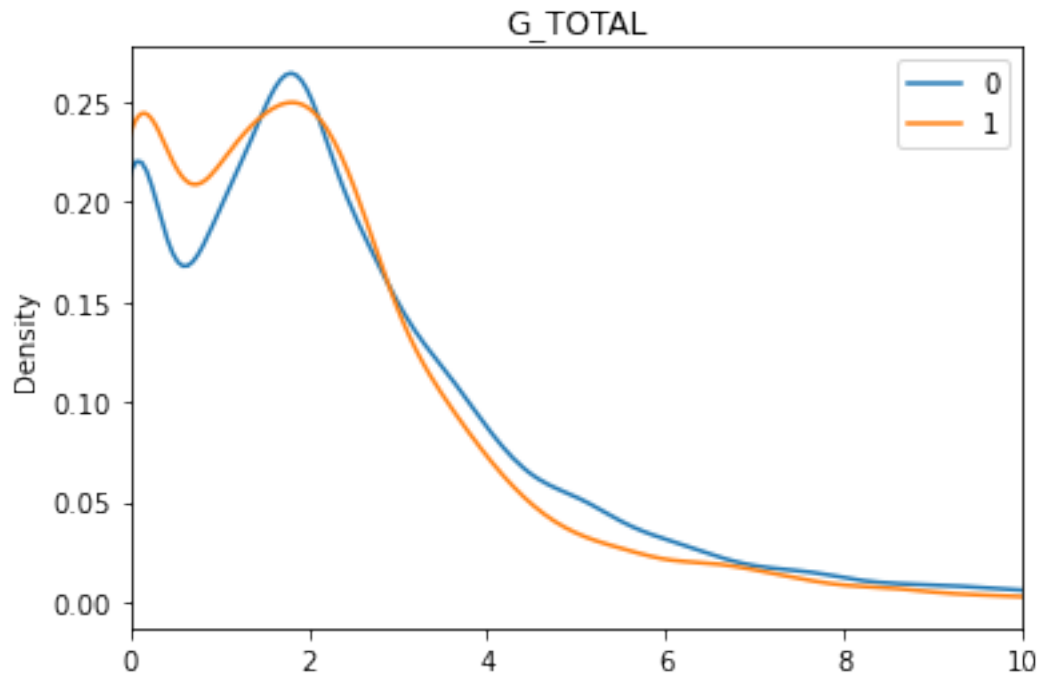


<Figure size 432x288 with 0 Axes>



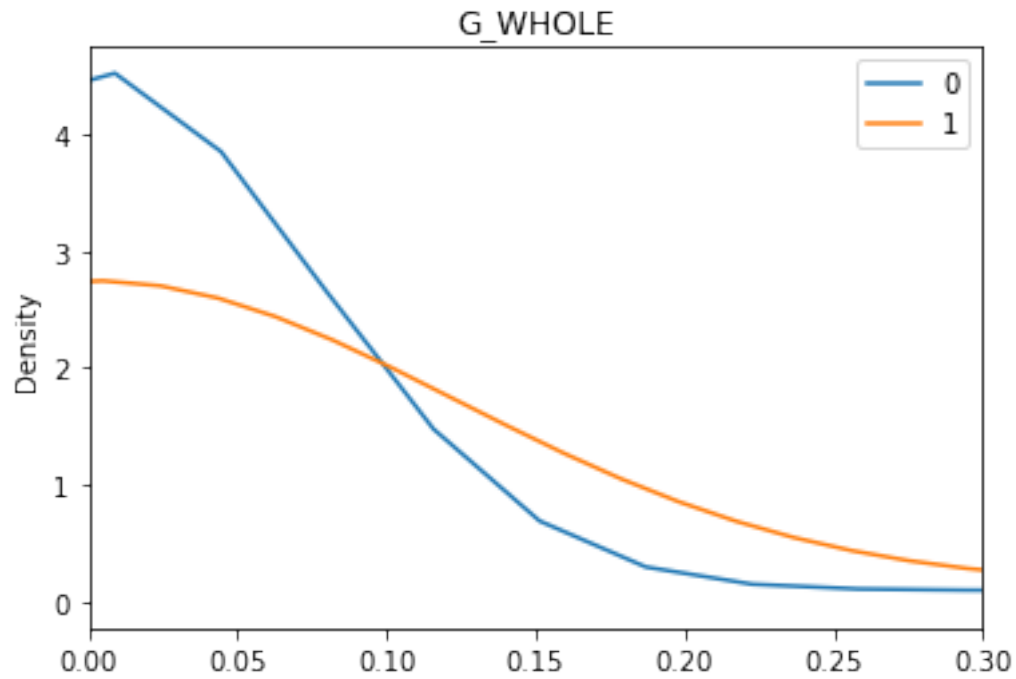
<Figure size 432x288 with 0 Axes>

```
[16]: z = df.groupby('seafood_meal')[grains[0]].plot.kde(title = grains[0],  
↳ legend='x')  
plt.show(z[0].set_xlim(0, 10))  
plt.clf()
```



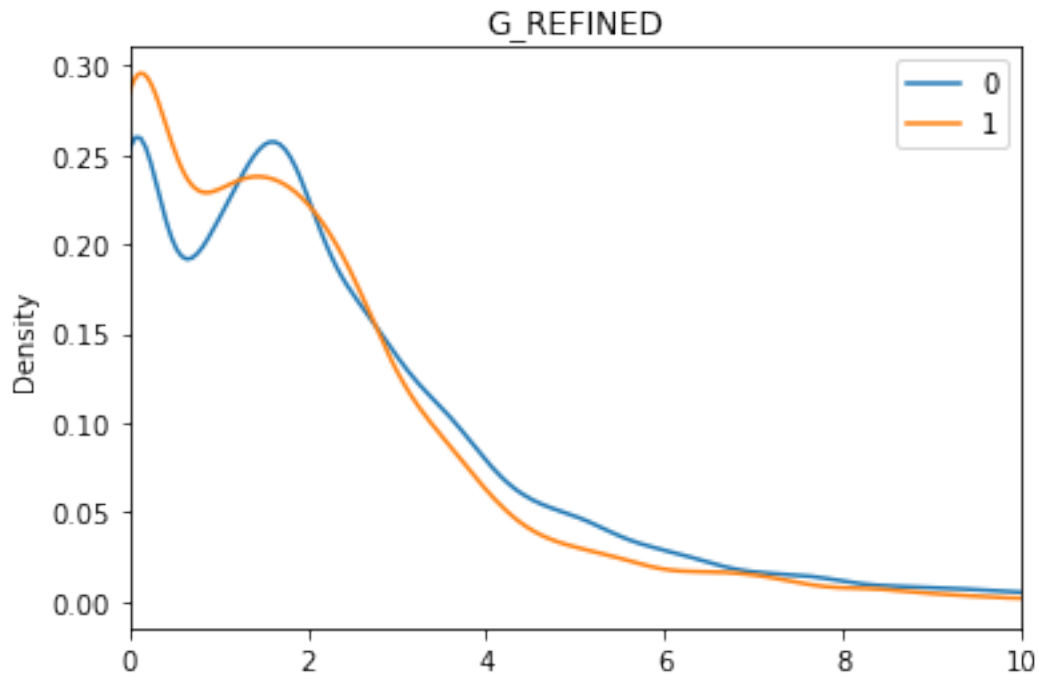
<Figure size 432x288 with 0 Axes>

```
[17]: z = df.groupby('seafood_meal')[grains[1]].plot.kde(title = grains[1],  
↳ legend='x')  
plt.show(z[0].set_xlim(0, 0.3))  
plt.clf()
```



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```
[18]: z = df.groupby('seafood_meal')[grains[2]].plot.kde(title = grains[2],  
↳ legend='x')  
plt.show(z[0].set_xlim(0, 10))  
plt.clf()
```



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```
[19]: for var in grains:
      z = df.groupby('seafood_meal')[var].describe()
      print("Statistics for "+var+"\n")
      print(z)
      print('\n')
```

Statistics for G_TOTAL

	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	2.480072	2.398177	0.0	0.94	1.95	3.3200	28.83
1	3232.0	2.053747	1.958012	0.0	0.67	1.75	2.7825	19.26

Statistics for G_WHOLE

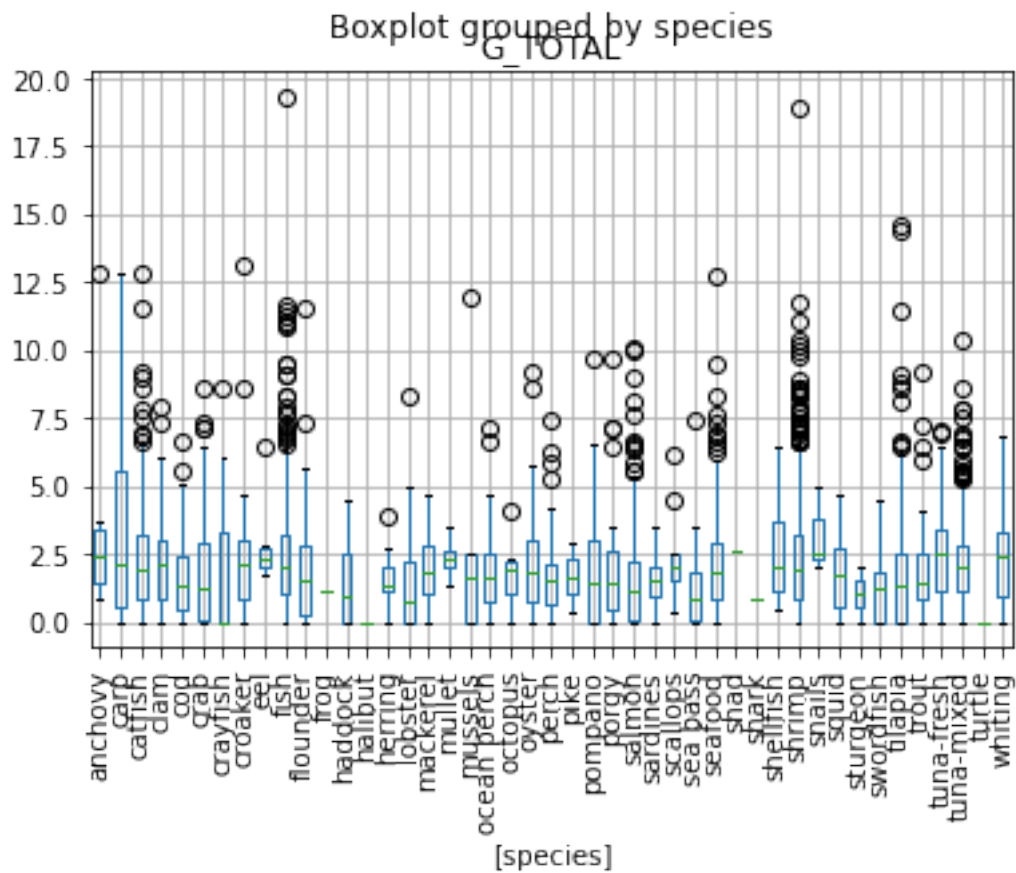
	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.158145	0.580842	0.0	0.0	0.0	0.0	17.79
1	3232.0	0.184836	0.620747	0.0	0.0	0.0	0.0	9.65

Statistics for G_REFINED

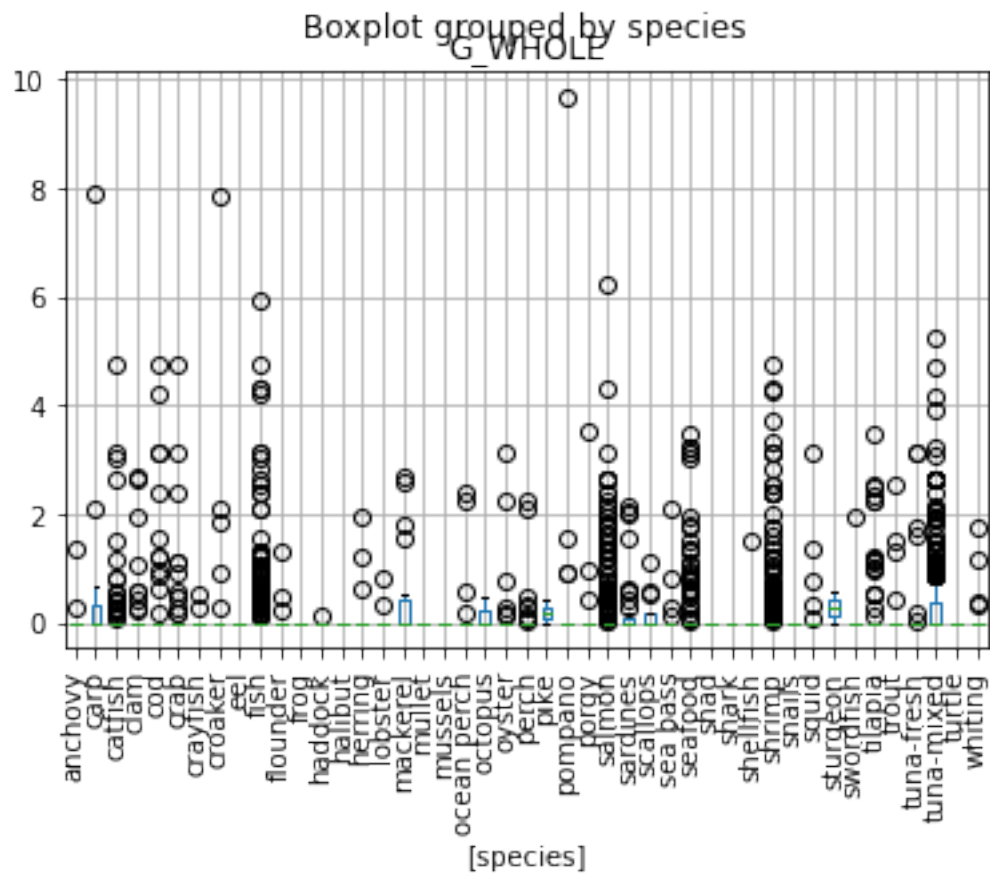
	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	2.321905	2.39243	0.0	0.74	1.76	3.1600	28.83
1	3232.0	1.868917	1.93630	0.0	0.36	1.46	2.6025	19.26

Grains Within Seafood Species

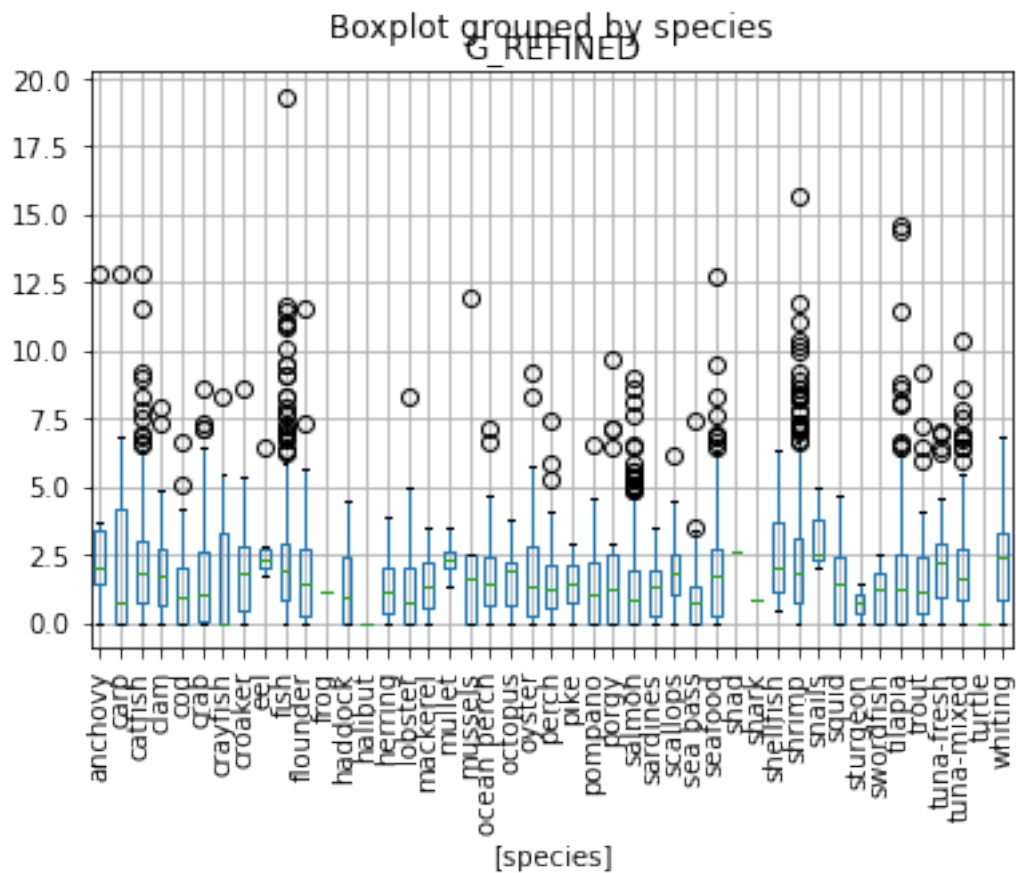
```
[56]: for var in grains:
      z = df.boxplot(column=var,by=['species'], rot=90)
      plt.show(z)
      plt.clf()
```



<Figure size 432x288 with 0 Axes>

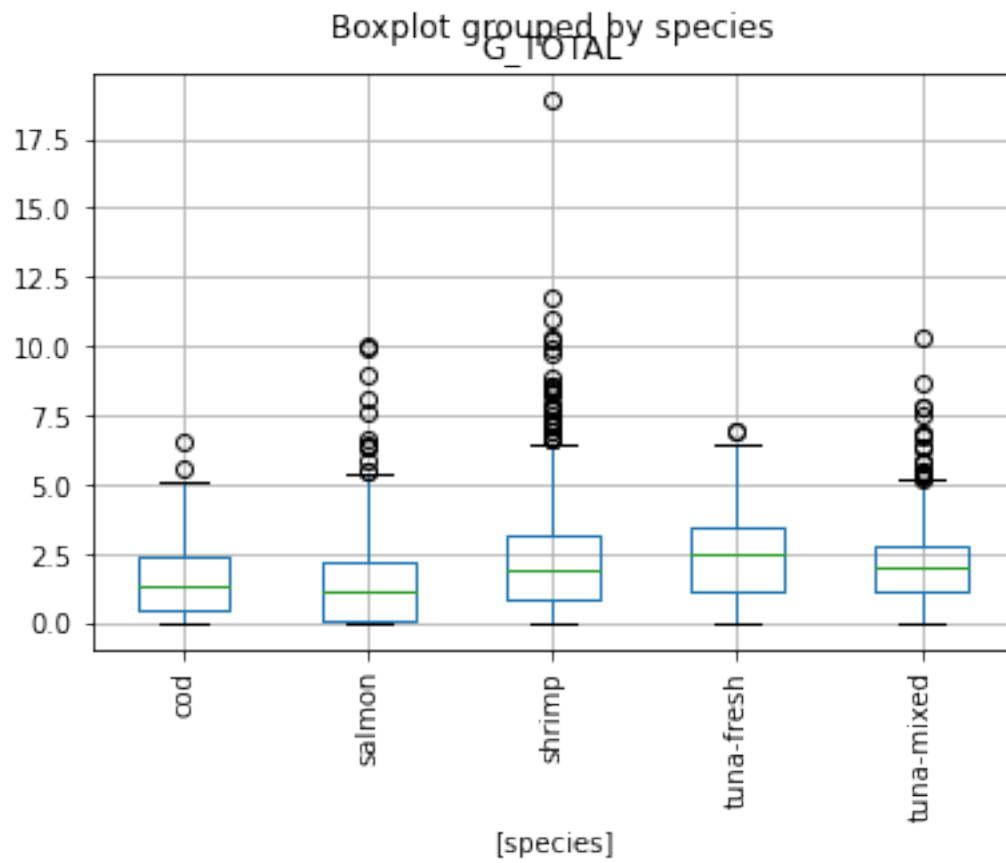


<Figure size 432x288 with 0 Axes>

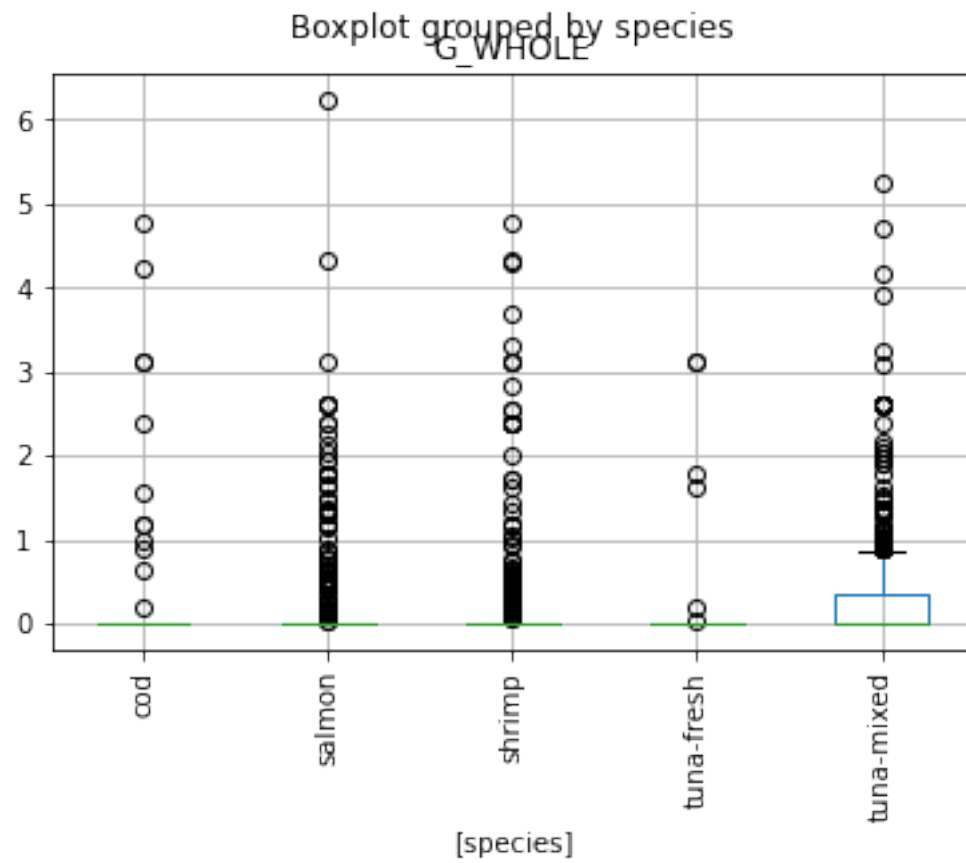


<Figure size 432x288 with 0 Axes>

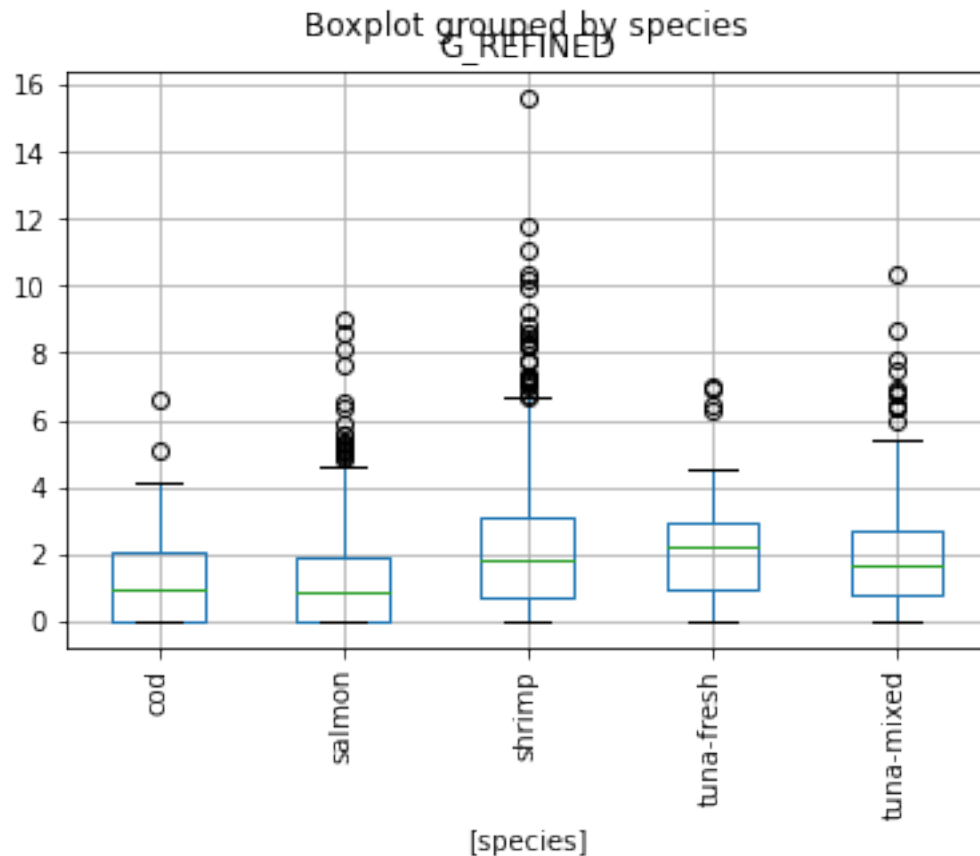
```
[57]: for var in grains:
      z = df_species.boxplot(column=var,by=['species'], rot=90)
      plt.show(z)
      plt.clf()
```



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<Figure size 432x288 with 0 Axes>



<Figure size 432x288 with 0 Axes>

```
[58]: for var in grains:
      z = df.groupby('species')[var].describe()
      z = z.sort_values(by='mean', ascending = False)
      print("Statistics for "+var+"\n")
      print(z)
      print('\n')
```

Statistics for G_TOTAL

	count	mean	std	min	25%	50%	75%	max
species								
anchovy	9.0	3.367778	3.654883	0.81	1.4800	2.370	3.4100	12.79
carp	15.0	3.352667	3.712222	0.00	0.5550	2.080	5.5500	12.84
snails	3.0	3.186667	1.571507	2.05	2.2900	2.530	3.7550	4.98
eel	6.0	2.915000	1.744623	1.70	2.0550	2.275	2.7200	6.39
mussels	7.0	2.662857	4.257592	0.00	0.0000	1.660	2.5100	11.96
croaker	24.0	2.653333	2.936426	0.00	0.8700	2.145	3.0025	13.15

shad	1.0	2.650000	NaN	2.65	2.6500	2.650	2.6500	2.65
tuna-fresh	37.0	2.612432	1.884827	0.00	1.1300	2.490	3.4400	6.99
whiting	42.0	2.519762	2.013474	0.00	0.9400	2.380	3.3250	6.87
shellfish	15.0	2.511333	1.950428	0.47	1.1250	2.000	3.6700	6.42
catfish	140.0	2.444857	2.315237	0.00	0.8700	1.970	3.1825	12.84
fish	497.0	2.405392	2.159185	0.00	1.0500	2.070	3.1800	19.26
mullet	4.0	2.362500	0.891791	1.31	2.0375	2.325	2.6500	3.49
scallops	12.0	2.315000	1.607236	0.36	1.5125	2.020	2.5075	6.15
oyster	32.0	2.304375	2.341946	0.00	0.7325	1.850	3.0325	9.15
shrimp	719.0	2.304228	2.086032	0.00	0.8900	1.930	3.1800	18.94
porgy	25.0	2.285600	2.602300	0.00	0.4300	1.480	2.5700	9.67
tuna-mixed	531.0	2.126460	1.489040	0.00	1.1850	1.990	2.7950	10.34
clam	59.0	2.120508	1.727882	0.00	0.8000	2.130	2.9650	7.88
seafood	267.0	2.117079	1.864771	0.00	0.8350	1.850	2.9100	12.70
pompano	25.0	2.077600	2.327331	0.00	0.0000	1.420	2.9700	9.65
ocean perch	23.0	2.062609	1.960893	0.00	0.7650	1.620	2.4850	7.08
trout	38.0	2.016579	2.104495	0.00	0.8125	1.385	2.5300	9.15
mackerel	20.0	1.956000	1.291374	0.00	1.0775	1.795	2.8450	4.71
flounder	61.0	1.948361	2.093633	0.00	0.2700	1.490	2.7600	11.55
crayfish	11.0	1.948182	3.098538	0.00	0.0000	0.000	3.2750	8.58
tilapia	239.0	1.871339	2.259260	0.00	0.0000	1.380	2.5300	14.56
octopus	6.0	1.833333	1.412865	0.01	0.9950	1.940	2.2325	4.10
crab	127.0	1.819291	1.907190	0.00	0.1050	1.250	2.8800	8.61
squid	23.0	1.741739	1.438372	0.00	0.5100	1.720	2.7350	4.69
perch	53.0	1.721698	1.668787	0.00	0.6000	1.520	2.1400	7.42
pike	2.0	1.645000	1.760696	0.40	1.0225	1.645	2.2675	2.89
cod	87.0	1.622069	1.465793	0.00	0.4700	1.360	2.3850	6.60
herring	13.0	1.593077	1.026104	0.00	1.1500	1.330	2.0100	3.86
salmon	369.0	1.553388	1.696892	0.00	0.0900	1.150	2.2600	10.06
lobster	20.0	1.526500	2.156599	0.00	0.0000	0.770	2.1725	8.28
sardines	42.0	1.493571	0.973865	0.00	0.9025	1.555	2.0275	3.49
sea bass	22.0	1.328182	1.731437	0.00	0.0400	0.840	1.7875	7.37
haddock	29.0	1.286207	1.392283	0.00	0.0000	0.960	2.5100	4.43
swordfish	10.0	1.267000	1.424290	0.00	0.0000	1.255	1.7975	4.45
frog	1.0	1.090000	NaN	1.09	1.0900	1.090	1.0900	1.09
sturgeon	2.0	1.015000	1.435427	0.00	0.5075	1.015	1.5225	2.03
shark	1.0	0.800000	NaN	0.80	0.8000	0.800	0.8000	0.80
halibut	2.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
turtle	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00

Statistics for G_WHOLE

	count	mean	std	min	25%	50%	75%	max
species								
carp	15.0	0.753333	2.046822	0.0	0.0000	0.000	0.3450	7.88
croaker	24.0	0.538750	1.656109	0.0	0.0000	0.000	0.0000	7.84
pompano	25.0	0.522800	1.941358	0.0	0.0000	0.000	0.0000	9.65

mackerel	20.0	0.476000	0.903429	0.0	0.0000	0.000	0.4025	2.68
tuna-mixed	531.0	0.303917	0.681337	0.0	0.0000	0.000	0.3500	5.23
sturgeon	2.0	0.295000	0.417193	0.0	0.1475	0.295	0.4425	0.59
herring	13.0	0.287692	0.608922	0.0	0.0000	0.000	0.0000	1.93
cod	87.0	0.278621	0.878473	0.0	0.0000	0.000	0.0000	4.76
tuna-fresh	37.0	0.265946	0.792568	0.0	0.0000	0.000	0.0000	3.12
sardines	42.0	0.250952	0.584882	0.0	0.0000	0.000	0.0900	2.16
squid	23.0	0.245217	0.702889	0.0	0.0000	0.000	0.0000	3.12
ocean perch	23.0	0.235217	0.667341	0.0	0.0000	0.000	0.0000	2.38
salmon	369.0	0.226802	0.655495	0.0	0.0000	0.000	0.0000	6.24
oyster	32.0	0.210938	0.674491	0.0	0.0000	0.000	0.0000	3.12
pike	2.0	0.200000	0.282843	0.0	0.1000	0.200	0.3000	0.40
porgy	25.0	0.194800	0.717920	0.0	0.0000	0.000	0.0000	3.50
swordfish	10.0	0.193000	0.610320	0.0	0.0000	0.000	0.0000	1.93
scallops	12.0	0.192500	0.363621	0.0	0.0000	0.000	0.1850	1.13
anchovy	9.0	0.182222	0.445359	0.0	0.0000	0.000	0.0000	1.34
clam	59.0	0.176102	0.558474	0.0	0.0000	0.000	0.0000	2.69
fish	497.0	0.168390	0.629097	0.0	0.0000	0.000	0.0000	5.95
catfish	140.0	0.156000	0.608547	0.0	0.0000	0.000	0.0000	4.76
seafood	267.0	0.154644	0.553375	0.0	0.0000	0.000	0.0000	3.48
trout	38.0	0.152368	0.512811	0.0	0.0000	0.000	0.0000	2.53
sea bass	22.0	0.150000	0.466619	0.0	0.0000	0.000	0.0000	2.08
crab	127.0	0.122362	0.566244	0.0	0.0000	0.000	0.0000	4.76
octopus	6.0	0.121667	0.196002	0.0	0.0000	0.000	0.2100	0.45
shrimp	719.0	0.120765	0.508671	0.0	0.0000	0.000	0.0000	4.76
perch	53.0	0.106604	0.420485	0.0	0.0000	0.000	0.0000	2.24
tilapia	239.0	0.104184	0.443011	0.0	0.0000	0.000	0.0000	3.47
shellfish	15.0	0.099333	0.384716	0.0	0.0000	0.000	0.0000	1.49
whiting	42.0	0.087381	0.329405	0.0	0.0000	0.000	0.0000	1.77
crayfish	11.0	0.075455	0.176939	0.0	0.0000	0.000	0.0000	0.54
lobster	20.0	0.057000	0.191946	0.0	0.0000	0.000	0.0000	0.81
flounder	61.0	0.033115	0.179039	0.0	0.0000	0.000	0.0000	1.31
haddock	29.0	0.004483	0.024140	0.0	0.0000	0.000	0.0000	0.13
mussels	7.0	0.000000	0.000000	0.0	0.0000	0.000	0.0000	0.00
mullet	4.0	0.000000	0.000000	0.0	0.0000	0.000	0.0000	0.00
shad	1.0	0.000000	NaN	0.0	0.0000	0.000	0.0000	0.00
shark	1.0	0.000000	NaN	0.0	0.0000	0.000	0.0000	0.00
snails	3.0	0.000000	0.000000	0.0	0.0000	0.000	0.0000	0.00
halibut	2.0	0.000000	0.000000	0.0	0.0000	0.000	0.0000	0.00
frog	1.0	0.000000	NaN	0.0	0.0000	0.000	0.0000	0.00
eel	6.0	0.000000	0.000000	0.0	0.0000	0.000	0.0000	0.00
turtle	1.0	0.000000	NaN	0.0	0.0000	0.000	0.0000	0.00

Statistics for G_REFINED

	count	mean	std	min	25%	50%	75%	max
species								

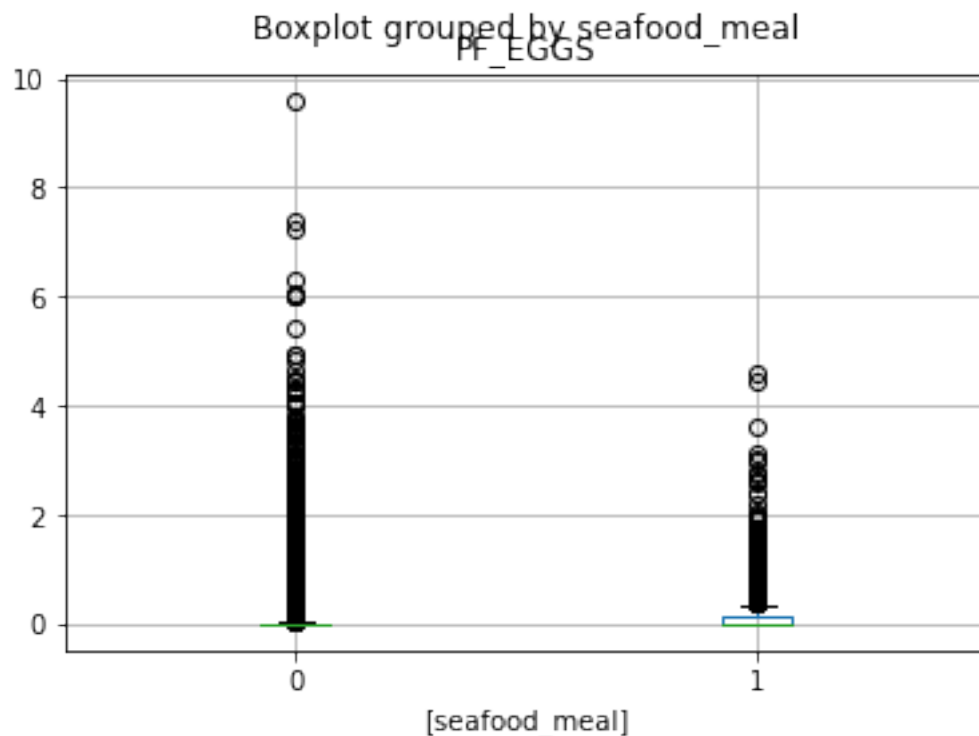
snails	3.0	3.186667	1.571507	2.05	2.2900	2.530	3.7550	4.98
anchovy	9.0	3.185556	3.782942	0.00	1.4800	2.070	3.4100	12.79
eel	6.0	2.915000	1.744623	1.70	2.0550	2.275	2.7200	6.39
mussels	7.0	2.662857	4.257592	0.00	0.0000	1.660	2.5100	11.96
shad	1.0	2.650000	NaN	2.65	2.6500	2.650	2.6500	2.65
carp	15.0	2.598667	3.641550	0.00	0.0000	0.700	4.1450	12.84
whiting	42.0	2.432619	1.964605	0.00	0.8200	2.380	3.3175	6.87
shellfish	15.0	2.412000	1.766406	0.47	1.1250	2.000	3.6700	6.37
mullet	4.0	2.362500	0.891791	1.31	2.0375	2.325	2.6500	3.49
tuna-fresh	37.0	2.346486	1.937499	0.00	0.9200	2.230	2.9400	6.99
catfish	140.0	2.289000	2.337505	0.00	0.7675	1.810	3.0300	12.84
fish	497.0	2.236962	2.154120	0.00	0.8100	1.920	2.9100	19.26
shrimp	719.0	2.183449	2.037051	0.00	0.7350	1.800	3.1050	15.63
scallops	12.0	2.122500	1.734144	0.00	1.0625	1.780	2.4925	6.15
croaker	24.0	2.114583	2.017446	0.00	0.4600	1.870	2.8325	8.61
oyster	32.0	2.093438	2.383907	0.00	0.2225	1.380	2.7725	9.15
porgy	25.0	2.090800	2.665535	0.00	0.0000	1.280	2.5200	9.67
seafood	267.0	1.962397	1.887516	0.00	0.3000	1.690	2.7250	12.70
clam	59.0	1.944407	1.678002	0.00	0.6000	1.750	2.6900	7.88
flounder	61.0	1.915410	2.080610	0.00	0.2700	1.430	2.6800	11.55
crayfish	11.0	1.872727	2.967801	0.00	0.0000	0.000	3.2750	8.29
trout	38.0	1.864211	2.171197	0.00	0.3950	1.155	2.4200	9.15
ocean perch	23.0	1.827826	1.967834	0.00	0.6100	1.460	2.3650	7.08
tuna-mixed	531.0	1.822429	1.484073	0.00	0.8200	1.650	2.6800	10.34
tilapia	239.0	1.767197	2.251759	0.00	0.0000	1.230	2.4900	14.56
octopus	6.0	1.713333	1.411165	0.01	0.6575	1.940	2.2325	3.83
crab	127.0	1.697008	1.872494	0.00	0.0500	1.070	2.6500	8.61
perch	53.0	1.615283	1.576461	0.00	0.5700	1.250	2.1400	7.40
pompano	25.0	1.555600	1.701886	0.00	0.0000	1.080	2.1900	6.49
squid	23.0	1.496087	1.506048	0.00	0.0000	1.450	2.3900	4.69
mackerel	20.0	1.480500	1.204354	0.00	0.5925	1.365	2.2150	3.49
lobster	20.0	1.469500	2.155943	0.00	0.0000	0.770	2.0225	8.28
pike	2.0	1.445000	2.043539	0.00	0.7225	1.445	2.1675	2.89
cod	87.0	1.343333	1.377020	0.00	0.0000	0.980	2.0350	6.60
salmon	369.0	1.326640	1.581405	0.00	0.0000	0.870	1.9300	8.96
herring	13.0	1.305385	1.196548	0.00	0.3600	1.150	2.0100	3.86
haddock	29.0	1.282069	1.388474	0.00	0.0000	0.960	2.4600	4.43
sardines	42.0	1.242857	1.000330	0.00	0.2975	1.355	1.9200	3.49
sea bass	22.0	1.178636	1.747761	0.00	0.0000	0.775	1.3725	7.37
frog	1.0	1.090000	NaN	1.09	1.0900	1.090	1.0900	1.09
swordfish	10.0	1.074000	1.017810	0.00	0.0000	1.255	1.7975	2.52
shark	1.0	0.800000	NaN	0.80	0.8000	0.800	0.8000	0.80
sturgeon	2.0	0.720000	1.018234	0.00	0.3600	0.720	1.0800	1.44
halibut	2.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
turtle	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00

Section 4: Non-Meat Proteins

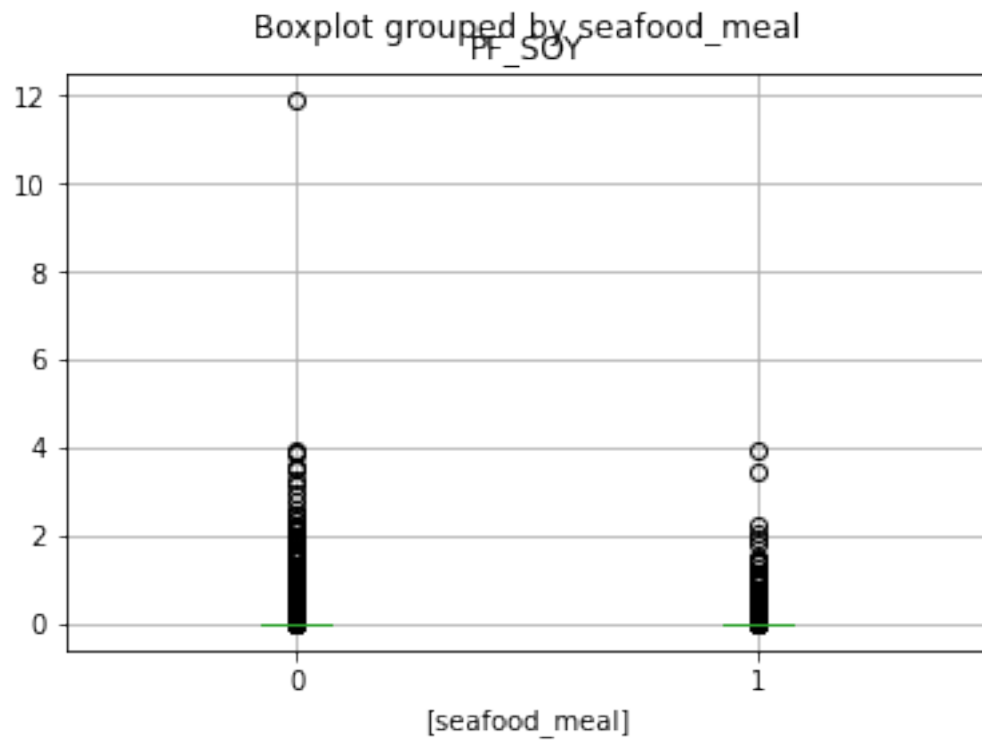
This section provides boxplots and density plots of the non-meat protein FPED components in the seafood meal and non seafood meal groups. The code for seafood meal is 1 if meal contains seafood, and 0 if meal does not contain seafood.

```
[20]: non_meat_protein = ['PF_EGGS', 'PF_SOY', 'PF_NUTSDS', 'PF_LEGUMES']

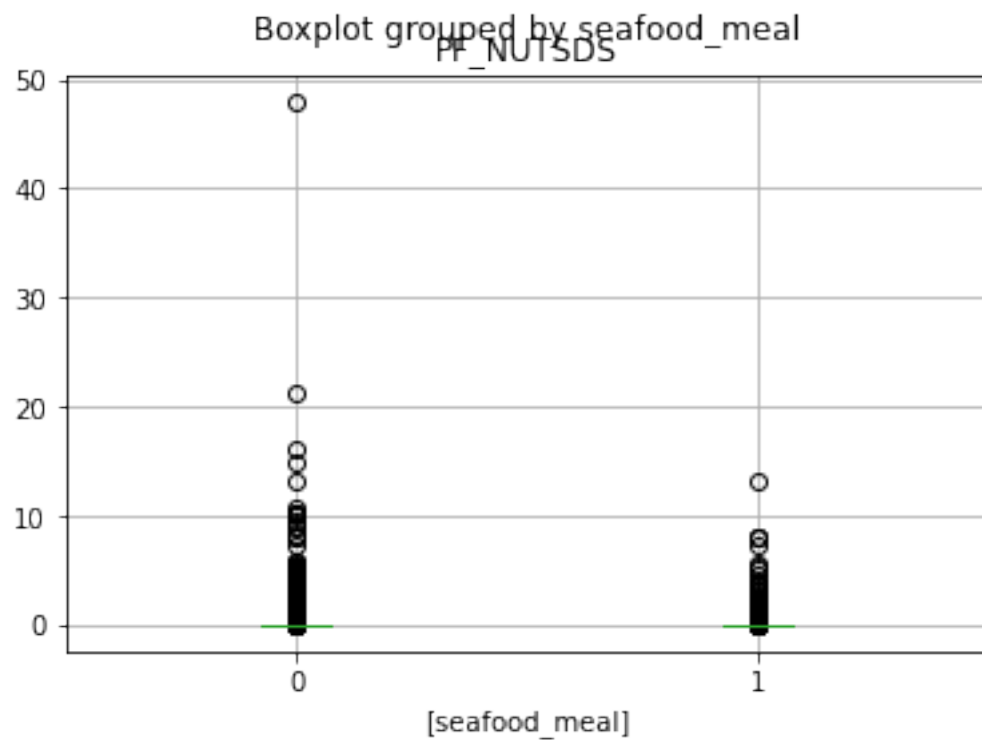
for var in non_meat_protein:
    z = df.boxplot(column=var, by=['seafood_meal'])
    plt.show(z)
    plt.clf()
```



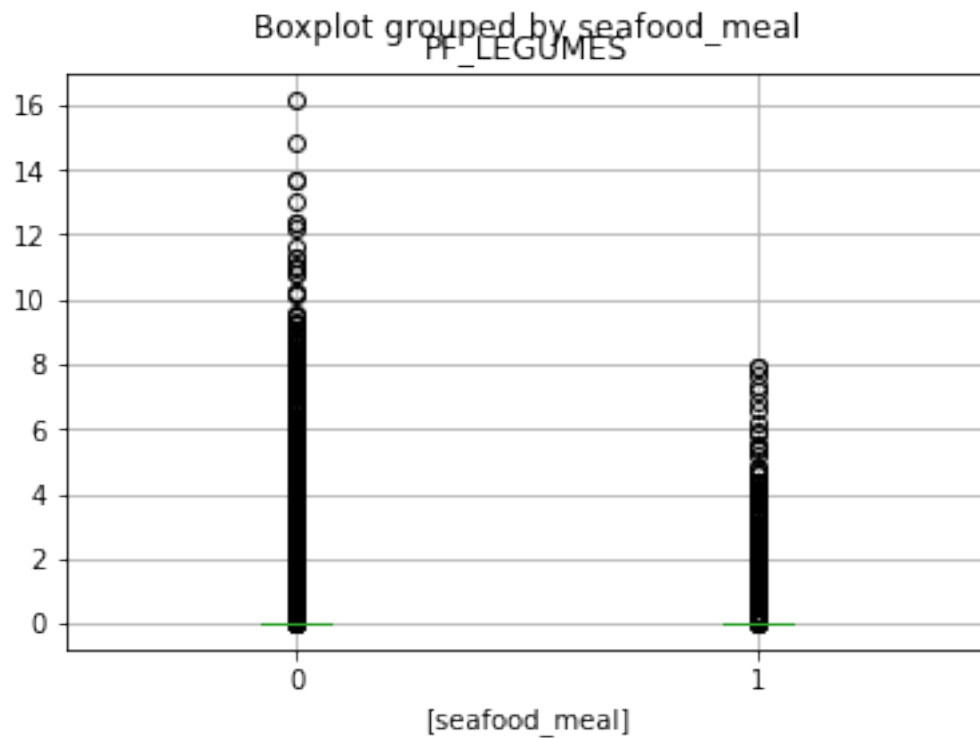
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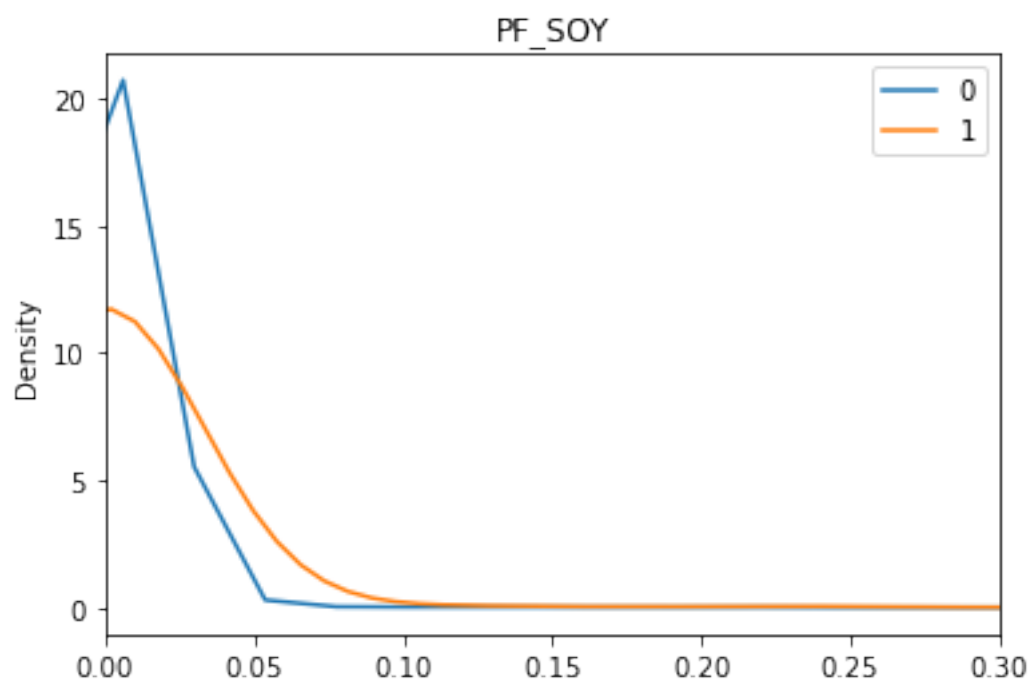
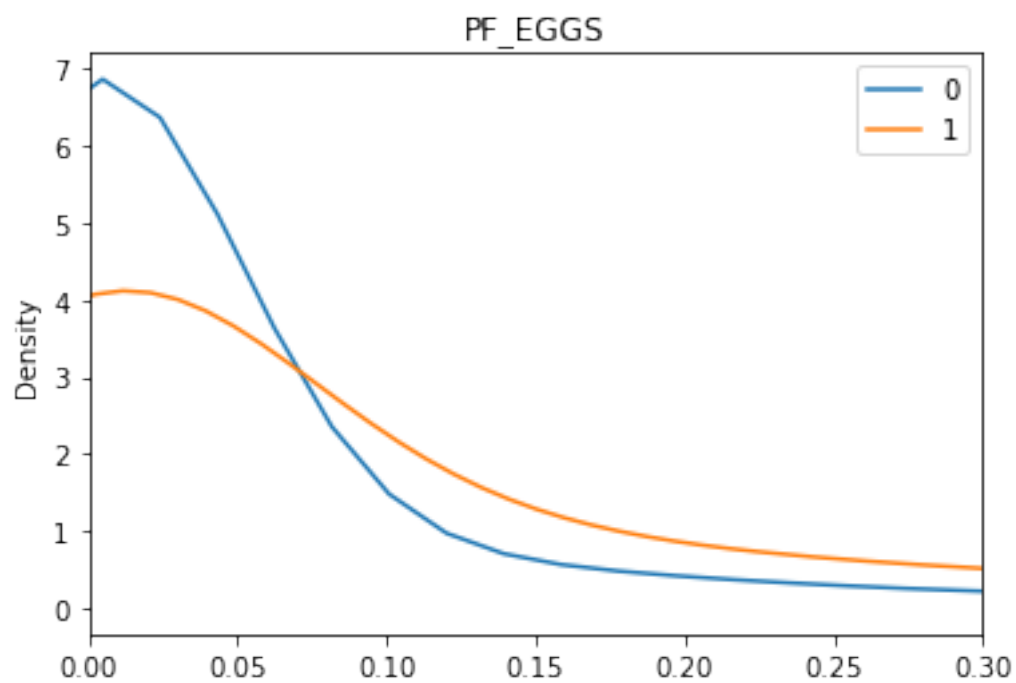


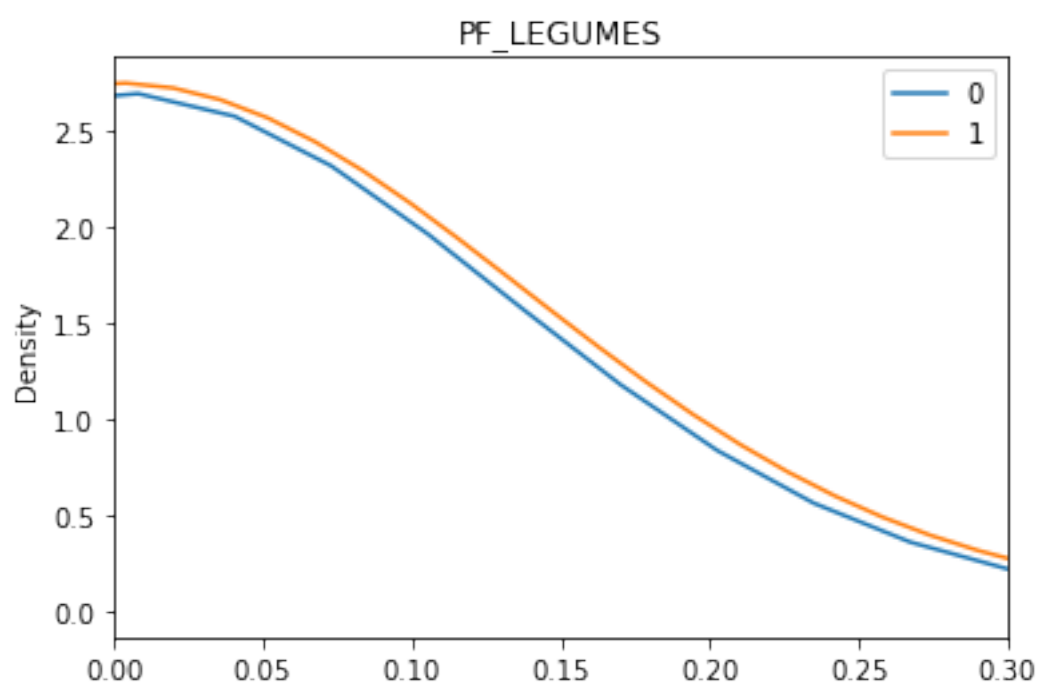
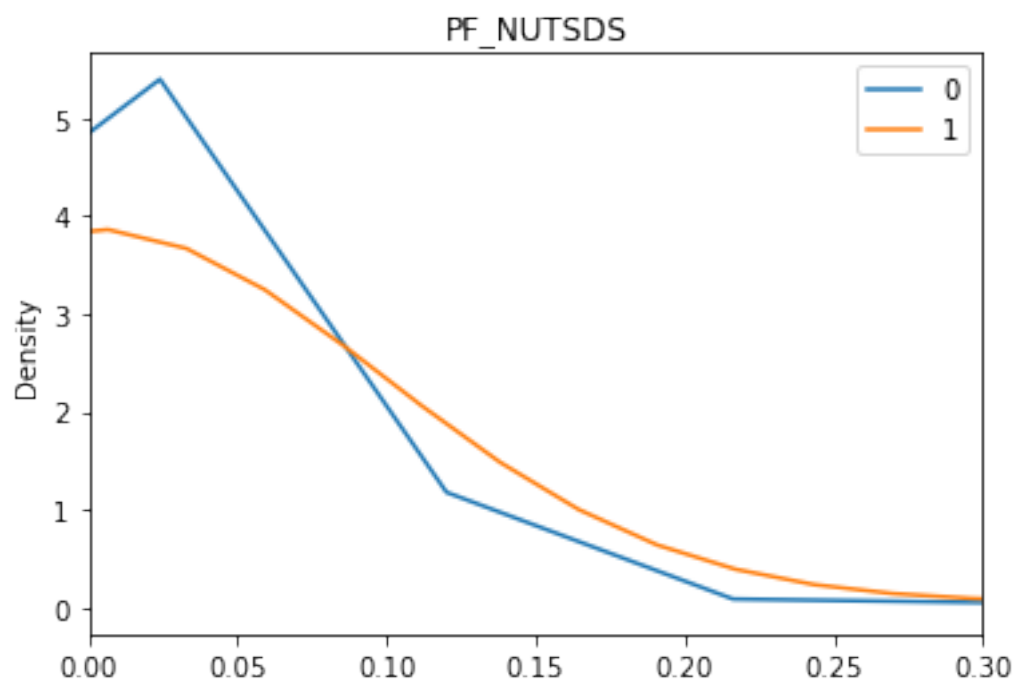
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```
[21]: for var in non_meat_protein:
      z = df.groupby('seafood_meal')[var].plot.kde(title = var, legend='x')
      plt.show(z[0].set_xlim(0, 0.3))
      plt.clf()
```





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```
[22]: for var in non_meat_protein:
      z = df.groupby('seafood_meal')[var].describe()
      print("Statistics for "+var+'\n')
      print(z)
      print('\n')
```

Statistics for PF_EGGS

	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.092293	0.356726	0.0	0.0	0.00	0.02	9.60
1	3232.0	0.143728	0.324184	0.0	0.0	0.01	0.15	4.62

Statistics for PF_SOY

	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.009890	0.136564	0.0	0.0	0.0	0.0	11.91
1	3232.0	0.021417	0.164274	0.0	0.0	0.0	0.0	3.97

Statistics for PF_NUTSDS

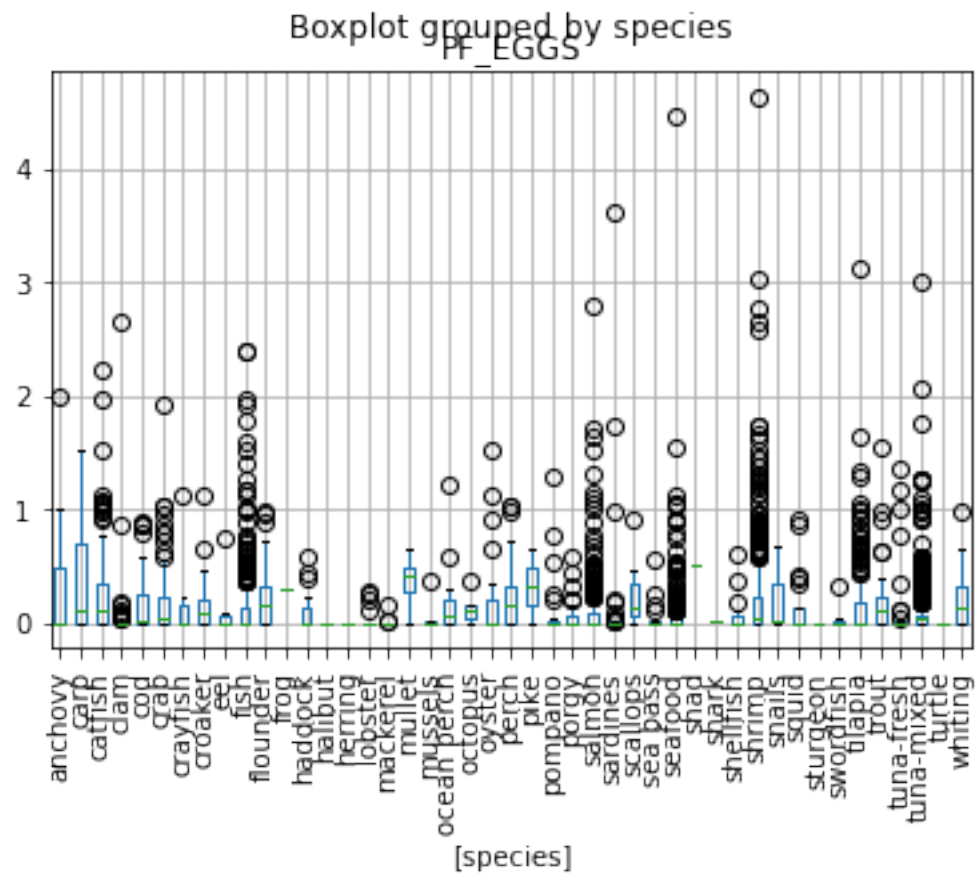
	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.046389	0.508116	0.0	0.0	0.0	0.0	48.00
1	3232.0	0.066460	0.493075	0.0	0.0	0.0	0.0	13.14

Statistics for PF_LEGUMES

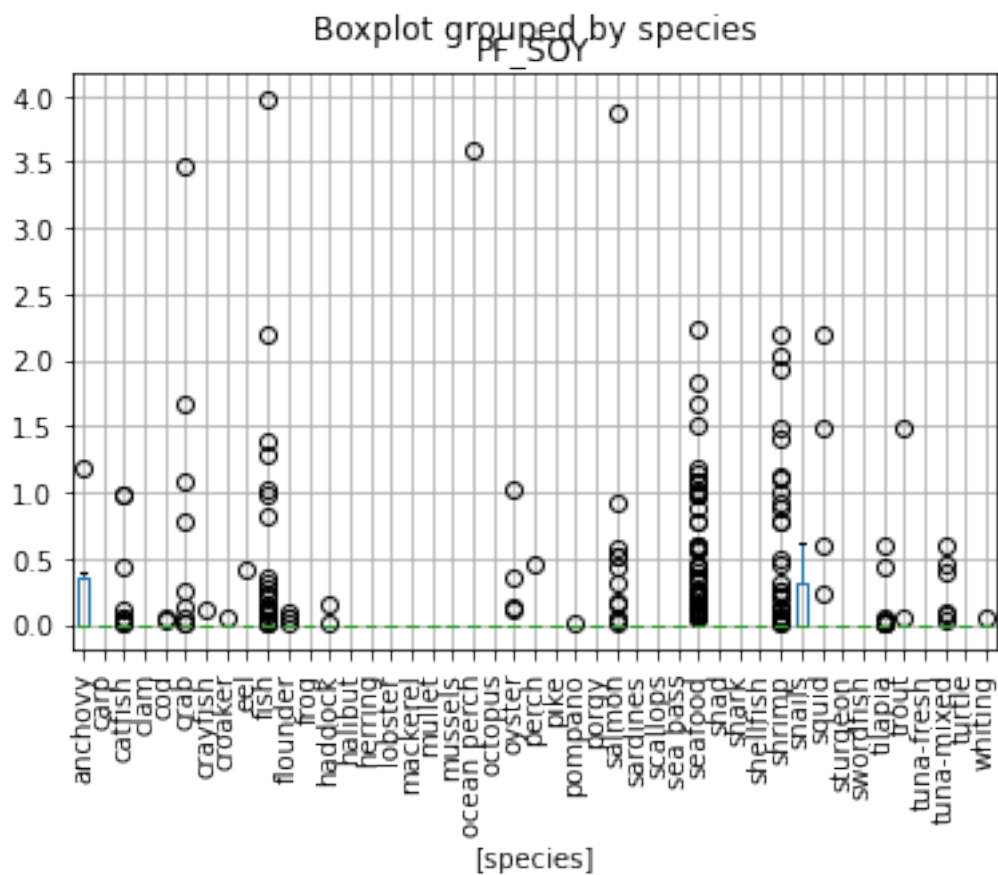
	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.282282	1.000122	0.0	0.0	0.0	0.0	16.18
1	3232.0	0.139044	0.685143	0.0	0.0	0.0	0.0	7.93

Non-Meat Proteins Within Seafood Species

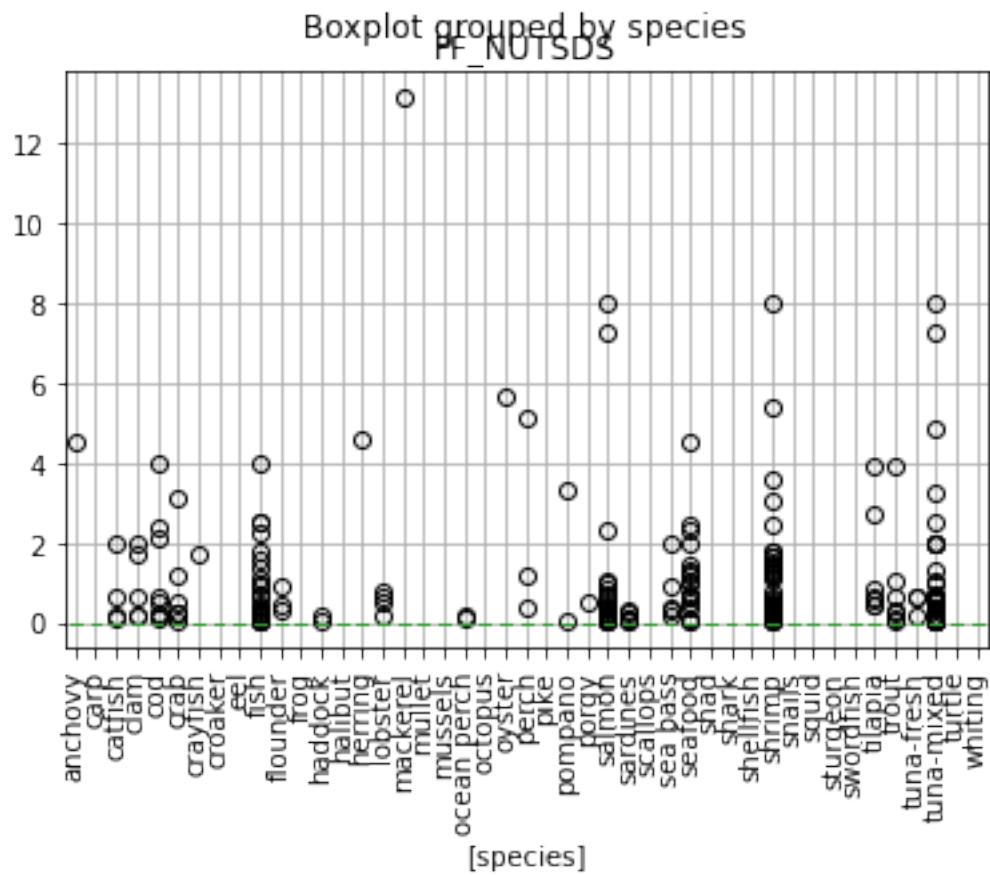
```
[59]: for var in non_meat_protein:
      z = df.boxplot(column=var,by=['species'], rot=90)
      plt.show(z)
      plt.clf()
```



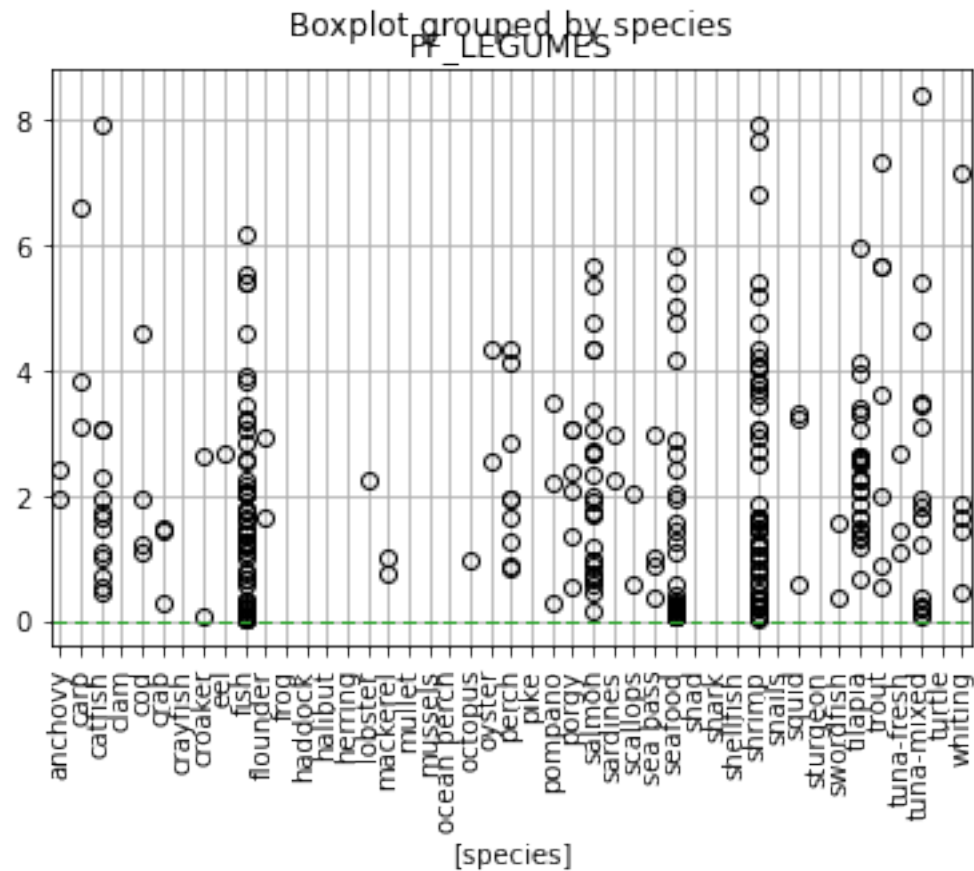
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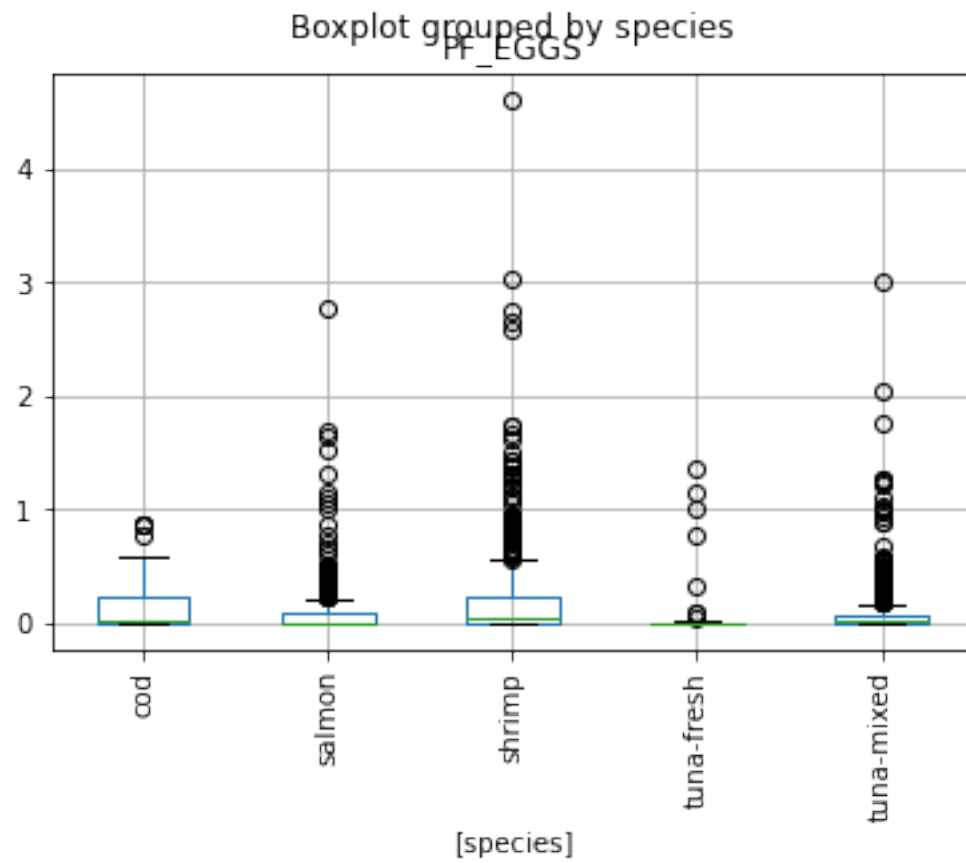


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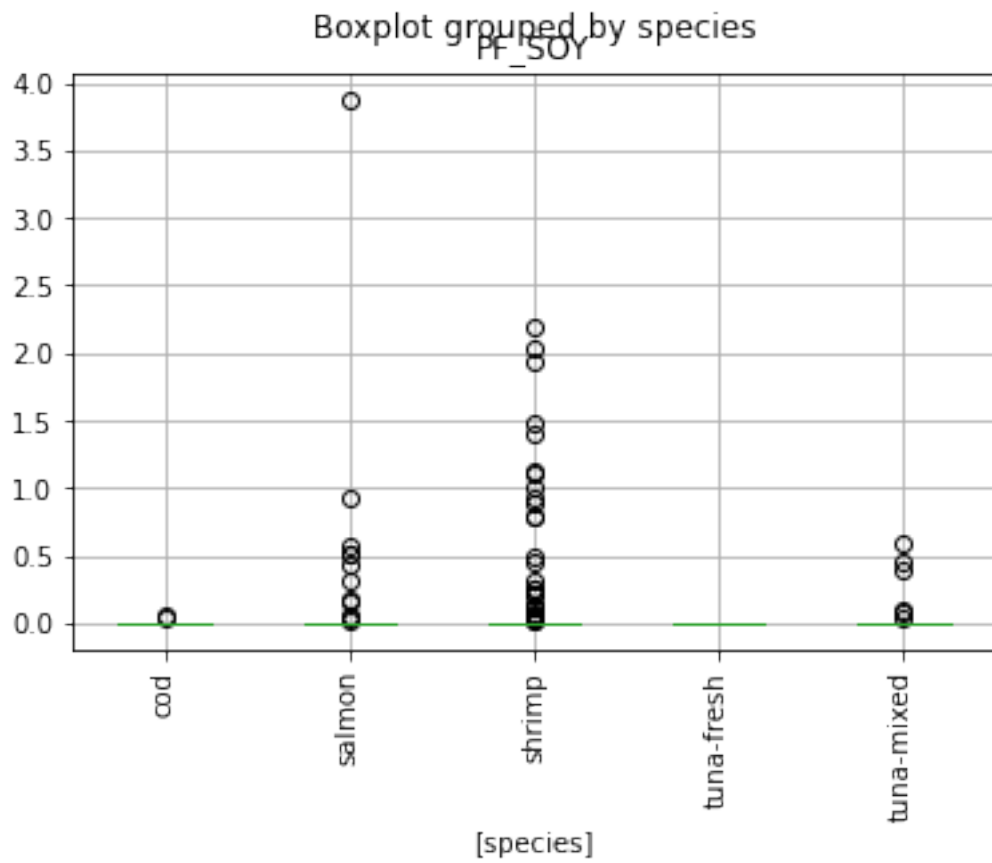


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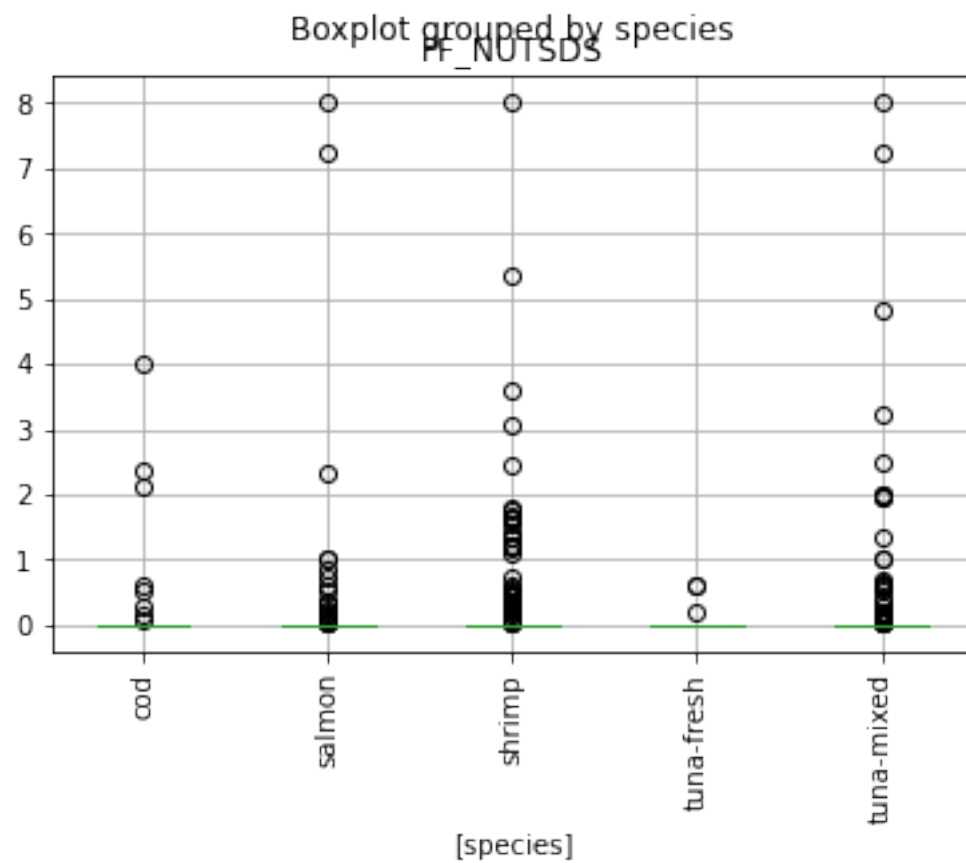
```
[61]: for var in non_meat_protein:
      z = df_species.boxplot(column=var,by=['species'], rot=90)
      plt.show(z)
      plt.clf()
```



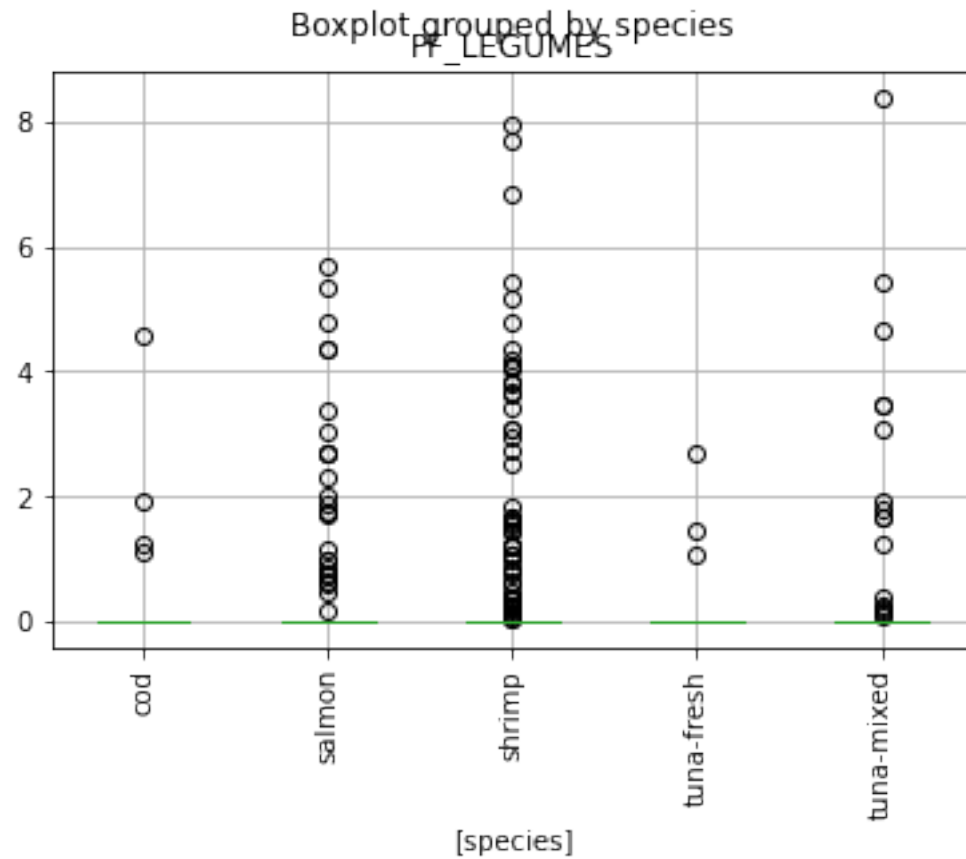
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```
[62]: for var in non_meat_protein:
      z = df.groupby('species')[var].describe()
      z = z.sort_values(by='mean', ascending = False)
      print("Statistics for "+var+'\n')
      print(z)
      print('\n')
```

Statistics for PF_EGGS

	count	mean	std	min	25%	50%	75%	max
species								
shad	1.0	0.510000	NaN	0.51	0.5100	0.510	0.5100	0.51
anchovy	9.0	0.386667	0.696850	0.00	0.0000	0.000	0.4800	2.00
mullet	4.0	0.365000	0.270863	0.00	0.2775	0.405	0.4925	0.65
carp	15.0	0.351333	0.489794	0.00	0.0000	0.110	0.6850	1.51
pike	2.0	0.320000	0.452548	0.00	0.1600	0.320	0.4800	0.64
frog	1.0	0.300000	NaN	0.30	0.3000	0.300	0.3000	0.30

catfish	140.0	0.275000	0.385286	0.00	0.0000	0.120	0.3400	2.22
snails	3.0	0.230000	0.381182	0.00	0.0100	0.020	0.3450	0.67
scallops	12.0	0.226667	0.259452	0.00	0.0550	0.140	0.3325	0.90
perch	53.0	0.221509	0.259425	0.00	0.0000	0.160	0.3200	1.03
flounder	61.0	0.211639	0.258658	0.00	0.0000	0.150	0.3200	0.98
trout	38.0	0.210263	0.329779	0.00	0.0000	0.100	0.2375	1.55
oyster	32.0	0.192500	0.362554	0.00	0.0000	0.000	0.1975	1.52
whiting	42.0	0.191905	0.218791	0.00	0.0000	0.135	0.3200	0.97
shrimp	719.0	0.184826	0.380351	0.00	0.0000	0.040	0.2250	4.62
croaker	24.0	0.171250	0.260907	0.00	0.0000	0.095	0.2000	1.12
crab	127.0	0.165118	0.283350	0.00	0.0000	0.040	0.2200	1.93
sardines	42.0	0.164286	0.624828	0.00	0.0000	0.000	0.0075	3.62
tilapia	239.0	0.155063	0.331994	0.00	0.0000	0.000	0.1700	3.11
ocean perch	23.0	0.153478	0.272724	0.00	0.0000	0.050	0.2100	1.21
crayfish	11.0	0.152727	0.327570	0.00	0.0000	0.000	0.1450	1.11
cod	87.0	0.148276	0.227183	0.00	0.0000	0.020	0.2450	0.88
squid	23.0	0.146957	0.267283	0.00	0.0000	0.000	0.1250	0.91
fish	497.0	0.137404	0.298052	0.00	0.0000	0.000	0.1400	2.40
eel	6.0	0.136667	0.297299	0.00	0.0000	0.000	0.0600	0.74
tuna-fresh	37.0	0.132432	0.344677	0.00	0.0000	0.000	0.0100	1.36
octopus	6.0	0.126667	0.129254	0.00	0.0425	0.110	0.1475	0.36
pompano	25.0	0.124800	0.306406	0.00	0.0000	0.000	0.0200	1.29
salmon	369.0	0.108672	0.272399	0.00	0.0000	0.000	0.0900	2.78
tuna-mixed	531.0	0.107006	0.254972	0.00	0.0000	0.030	0.0700	3.00
seafood	267.0	0.098390	0.344315	0.00	0.0000	0.000	0.0400	4.47
haddock	29.0	0.092759	0.149497	0.00	0.0000	0.000	0.1400	0.57
shellfish	15.0	0.084000	0.174675	0.00	0.0000	0.000	0.0650	0.60
porgy	25.0	0.081200	0.157224	0.00	0.0000	0.000	0.0700	0.59
clam	59.0	0.071864	0.360136	0.00	0.0000	0.000	0.0000	2.65
mussels	7.0	0.054286	0.135013	0.00	0.0000	0.000	0.0100	0.36
sea bass	22.0	0.051818	0.130553	0.00	0.0000	0.000	0.0200	0.56
lobster	20.0	0.041500	0.089928	0.00	0.0000	0.000	0.0000	0.28
swordfish	10.0	0.040000	0.102740	0.00	0.0000	0.000	0.0175	0.33
shark	1.0	0.020000	NaN	0.02	0.0200	0.020	0.0200	0.02
mackerel	20.0	0.009500	0.035759	0.00	0.0000	0.000	0.0000	0.16
sturgeon	2.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
halibut	2.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
turtle	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00
herring	13.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00

Statistics for PF_SOY

	count	mean	std	min	25%	50%	75%	max
species								
anchovy	9.0	0.213333	0.396453	0.0	0.0	0.0	0.35	1.18
snails	3.0	0.206667	0.357957	0.0	0.0	0.0	0.31	0.62
squid	23.0	0.196087	0.546757	0.0	0.0	0.0	0.00	2.20

ocean perch	23.0	0.156522	0.750652	0.0	0.0	0.0	0.00	3.60
seafood	267.0	0.111348	0.312567	0.0	0.0	0.0	0.00	2.23
eel	6.0	0.070000	0.171464	0.0	0.0	0.0	0.00	0.42
crab	127.0	0.058898	0.359321	0.0	0.0	0.0	0.00	3.47
oyster	32.0	0.050937	0.191469	0.0	0.0	0.0	0.00	1.03
trout	38.0	0.040526	0.240022	0.0	0.0	0.0	0.00	1.48
fish	497.0	0.027847	0.233321	0.0	0.0	0.0	0.00	3.97
shrimp	719.0	0.026384	0.181552	0.0	0.0	0.0	0.00	2.20
salmon	369.0	0.020623	0.214813	0.0	0.0	0.0	0.00	3.88
catfish	140.0	0.019357	0.123558	0.0	0.0	0.0	0.00	0.99
crayfish	11.0	0.010000	0.033166	0.0	0.0	0.0	0.00	0.11
perch	53.0	0.008491	0.061812	0.0	0.0	0.0	0.00	0.45
haddock	29.0	0.005862	0.027969	0.0	0.0	0.0	0.00	0.15
tilapia	239.0	0.004979	0.047667	0.0	0.0	0.0	0.00	0.59
flounder	61.0	0.003607	0.015603	0.0	0.0	0.0	0.00	0.09
tuna-mixed	531.0	0.003107	0.037163	0.0	0.0	0.0	0.00	0.60
croaker	24.0	0.002500	0.012247	0.0	0.0	0.0	0.00	0.06
whiting	42.0	0.001190	0.007715	0.0	0.0	0.0	0.00	0.05
cod	87.0	0.001034	0.007158	0.0	0.0	0.0	0.00	0.06
pompano	25.0	0.000800	0.004000	0.0	0.0	0.0	0.00	0.02
shad	1.0	0.000000	NaN	0.0	0.0	0.0	0.00	0.00
turtle	1.0	0.000000	NaN	0.0	0.0	0.0	0.00	0.00
tuna-fresh	37.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
clam	59.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
swordfish	10.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
sturgeon	2.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
shellfish	15.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
shark	1.0	0.000000	NaN	0.0	0.0	0.0	0.00	0.00
lobster	20.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
mackerel	20.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
sea bass	22.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
scallops	12.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
sardines	42.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
porgy	25.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
pike	2.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
carp	15.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
halibut	2.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
octopus	6.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
herring	13.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
mussels	7.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
mullet	4.0	0.000000	0.000000	0.0	0.0	0.0	0.00	0.00
frog	1.0	0.000000	NaN	0.0	0.0	0.0	0.00	0.00

Statistics for PF_NUTSDS

	count	mean	std	min	25%	50%	75%	max
species								

mackerel	20.0	0.657000	2.938193	0.0	0.0	0.0	0.0	13.14
anchovy	9.0	0.504444	1.513333	0.0	0.0	0.0	0.0	4.54
herring	13.0	0.352308	1.270263	0.0	0.0	0.0	0.0	4.58
oyster	32.0	0.175937	0.995253	0.0	0.0	0.0	0.0	5.63
sea bass	22.0	0.170455	0.458096	0.0	0.0	0.0	0.0	2.00
trout	38.0	0.166579	0.654557	0.0	0.0	0.0	0.0	3.90
crayfish	11.0	0.158182	0.524630	0.0	0.0	0.0	0.0	1.74
pompano	25.0	0.135600	0.667658	0.0	0.0	0.0	0.0	3.34
perch	53.0	0.126415	0.723746	0.0	0.0	0.0	0.0	5.15
cod	87.0	0.116667	0.545665	0.0	0.0	0.0	0.0	4.00
lobster	20.0	0.105500	0.242541	0.0	0.0	0.0	0.0	0.80
seafood	267.0	0.085056	0.411164	0.0	0.0	0.0	0.0	4.54
tuna-mixed	531.0	0.081902	0.575516	0.0	0.0	0.0	0.0	8.02
clam	59.0	0.081017	0.351306	0.0	0.0	0.0	0.0	2.00
shrimp	719.0	0.070723	0.456782	0.0	0.0	0.0	0.0	8.00
salmon	369.0	0.067209	0.582970	0.0	0.0	0.0	0.0	8.02
fish	497.0	0.046801	0.301440	0.0	0.0	0.0	0.0	4.00
crab	127.0	0.044252	0.300839	0.0	0.0	0.0	0.0	3.13
tilapia	239.0	0.040042	0.319792	0.0	0.0	0.0	0.0	3.95
tuna-fresh	37.0	0.039189	0.145724	0.0	0.0	0.0	0.0	0.63
flounder	61.0	0.027705	0.136606	0.0	0.0	0.0	0.0	0.93
porgy	25.0	0.021200	0.106000	0.0	0.0	0.0	0.0	0.53
catfish	140.0	0.020857	0.174663	0.0	0.0	0.0	0.0	1.95
sardines	42.0	0.020476	0.064730	0.0	0.0	0.0	0.0	0.31
ocean perch	23.0	0.013043	0.044867	0.0	0.0	0.0	0.0	0.19
haddock	29.0	0.007931	0.035795	0.0	0.0	0.0	0.0	0.19
pike	2.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
snails	3.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
turtle	1.0	0.000000	NaN	0.0	0.0	0.0	0.0	0.00
frog	1.0	0.000000	NaN	0.0	0.0	0.0	0.0	0.00
halibut	2.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
eel	6.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
swordfish	10.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
sturgeon	2.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
squid	23.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
croaker	24.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
carp	15.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
shellfish	15.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
shark	1.0	0.000000	NaN	0.0	0.0	0.0	0.0	0.00
shad	1.0	0.000000	NaN	0.0	0.0	0.0	0.0	0.00
mullet	4.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
mussels	7.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
scallops	12.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
octopus	6.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
whiting	42.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00

Statistics for PF_LEGUMES

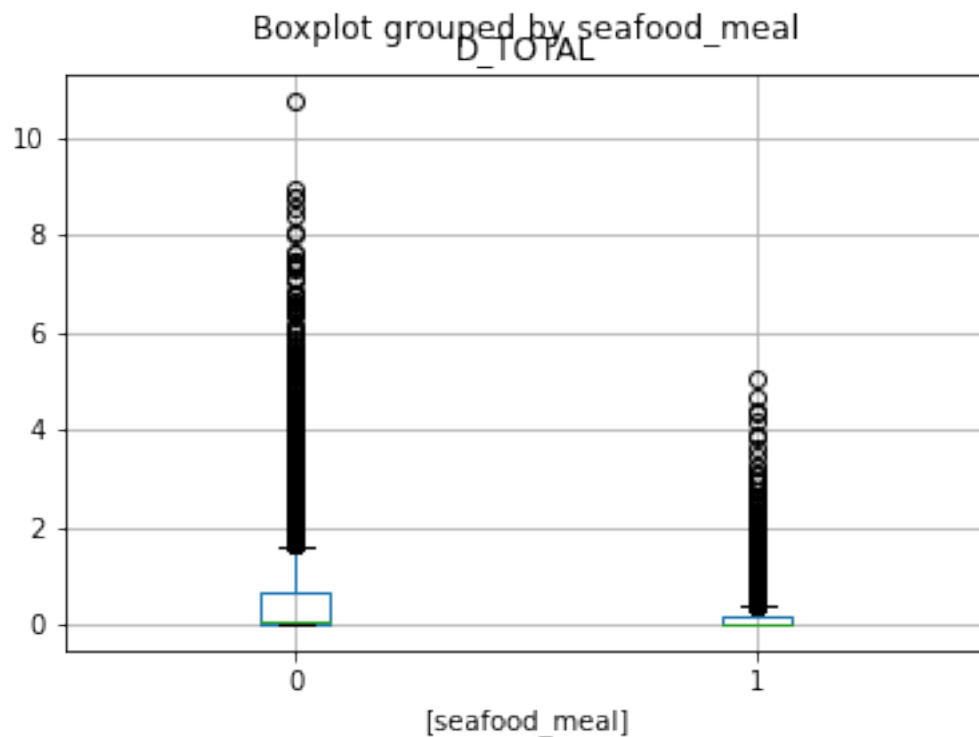
	count	mean	std	min	25%	50%	75%	max
species								
carp	15.0	0.902000	1.993469	0.0	0.0	0.0	0.0	6.60
trout	38.0	0.676053	1.794581	0.0	0.0	0.0	0.0	7.35
porgy	25.0	0.497200	1.007536	0.0	0.0	0.0	0.0	3.04
anchovy	9.0	0.481111	0.961879	0.0	0.0	0.0	0.0	2.40
eel	6.0	0.445000	1.090023	0.0	0.0	0.0	0.0	2.67
perch	53.0	0.374906	0.981748	0.0	0.0	0.0	0.0	4.35
squid	23.0	0.311739	0.947828	0.0	0.0	0.0	0.0	3.33
whiting	42.0	0.300238	1.171575	0.0	0.0	0.0	0.0	7.18
tilapia	239.0	0.276778	0.858187	0.0	0.0	0.0	0.0	5.95
pompano	25.0	0.238800	0.806796	0.0	0.0	0.0	0.0	3.47
sea bass	22.0	0.238182	0.676691	0.0	0.0	0.0	0.0	2.99
scallops	12.0	0.218333	0.595206	0.0	0.0	0.0	0.0	2.03
oyster	32.0	0.215312	0.877213	0.0	0.0	0.0	0.0	4.34
fish	497.0	0.201630	0.762731	0.0	0.0	0.0	0.0	6.18
catfish	140.0	0.192786	0.833583	0.0	0.0	0.0	0.0	7.92
swordfish	10.0	0.192000	0.491117	0.0	0.0	0.0	0.0	1.55
seafood	267.0	0.176816	0.771096	0.0	0.0	0.0	0.0	5.85
shrimp	719.0	0.165216	0.797371	0.0	0.0	0.0	0.0	7.93
octopus	6.0	0.161667	0.396001	0.0	0.0	0.0	0.0	0.97
salmon	369.0	0.156260	0.704646	0.0	0.0	0.0	0.0	5.68
tuna-fresh	37.0	0.140541	0.518196	0.0	0.0	0.0	0.0	2.67
sardines	42.0	0.124524	0.569691	0.0	0.0	0.0	0.0	2.99
croaker	24.0	0.112917	0.534322	0.0	0.0	0.0	0.0	2.62
lobster	20.0	0.111500	0.498643	0.0	0.0	0.0	0.0	2.23
cod	87.0	0.101724	0.556342	0.0	0.0	0.0	0.0	4.59
mackerel	20.0	0.087500	0.272356	0.0	0.0	0.0	0.0	1.00
flounder	61.0	0.075082	0.426968	0.0	0.0	0.0	0.0	2.92
tuna-mixed	531.0	0.071525	0.560603	0.0	0.0	0.0	0.0	8.39
crab	127.0	0.025276	0.184524	0.0	0.0	0.0	0.0	1.48
shellfish	15.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
turtle	1.0	0.000000	NaN	0.0	0.0	0.0	0.0	0.00
snails	3.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
sturgeon	2.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
crayfish	11.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
shark	1.0	0.000000	NaN	0.0	0.0	0.0	0.0	0.00
shad	1.0	0.000000	NaN	0.0	0.0	0.0	0.0	0.00
pike	2.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
ocean perch	23.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
mussels	7.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
mullet	4.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
herring	13.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
halibut	2.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
haddock	29.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00
frog	1.0	0.000000	NaN	0.0	0.0	0.0	0.0	0.00
clam	59.0	0.000000	0.000000	0.0	0.0	0.0	0.0	0.00

Section 5: Dairy

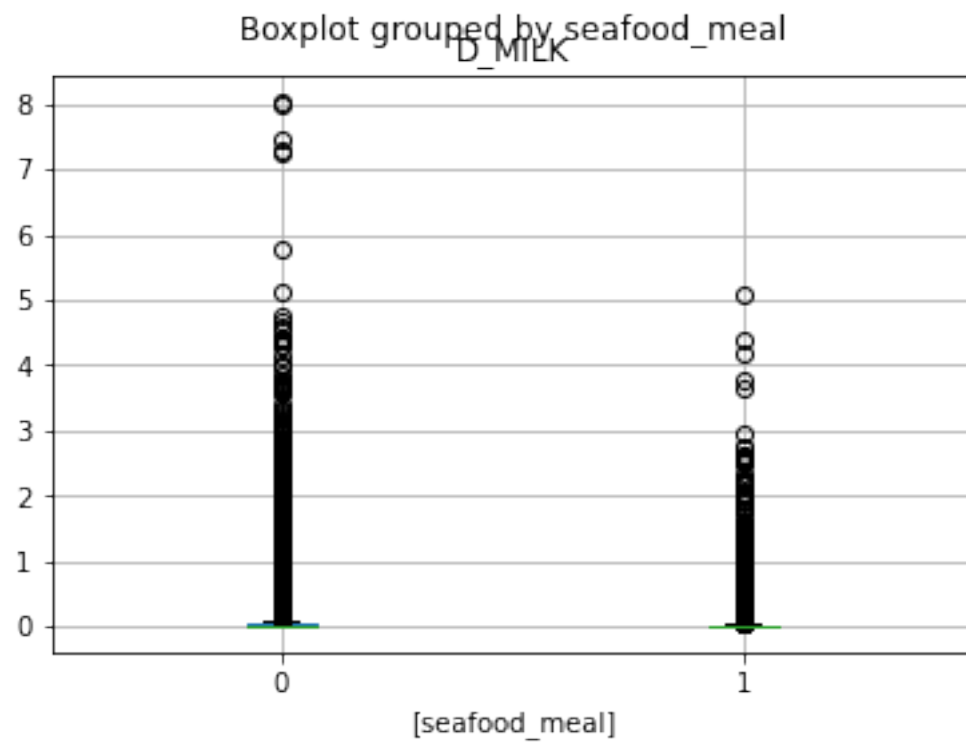
This section provides boxplots and density plots of the dairy FPED components in the seafood meal and non seafood meal groups. The code for seafood meal is 1 if meal contains seafood, and 0 if meal does not contain seafood.

```
[23]: dairy = ['D_TOTAL', 'D_MILK', 'D_YOGURT', 'D_CHEESE']

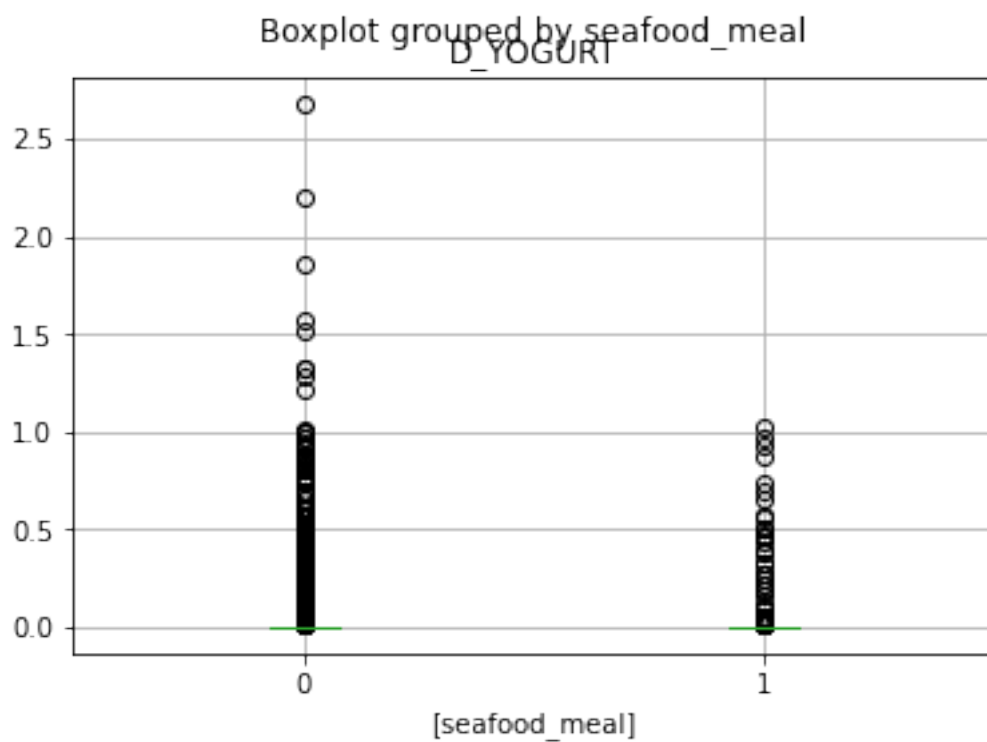
for var in dairy:
    z = df.boxplot(column=var, by=['seafood_meal'])
    plt.show(z)
    plt.clf()
```



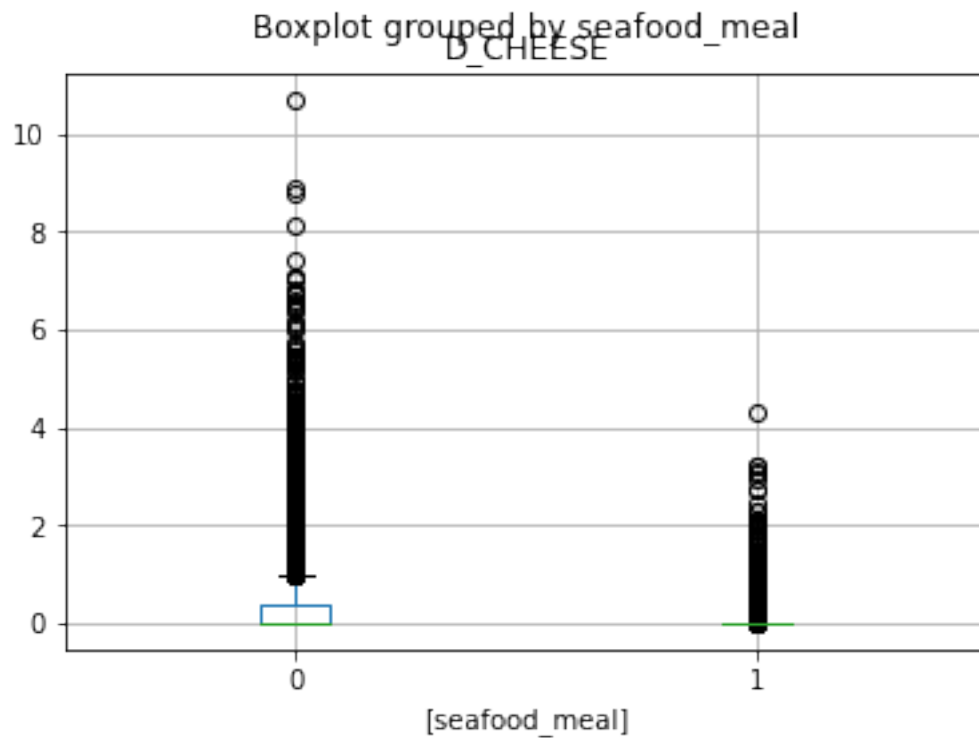
<Figure size 432x288 with 0 Axes>



<Figure size 432x288 with 0 Axes>

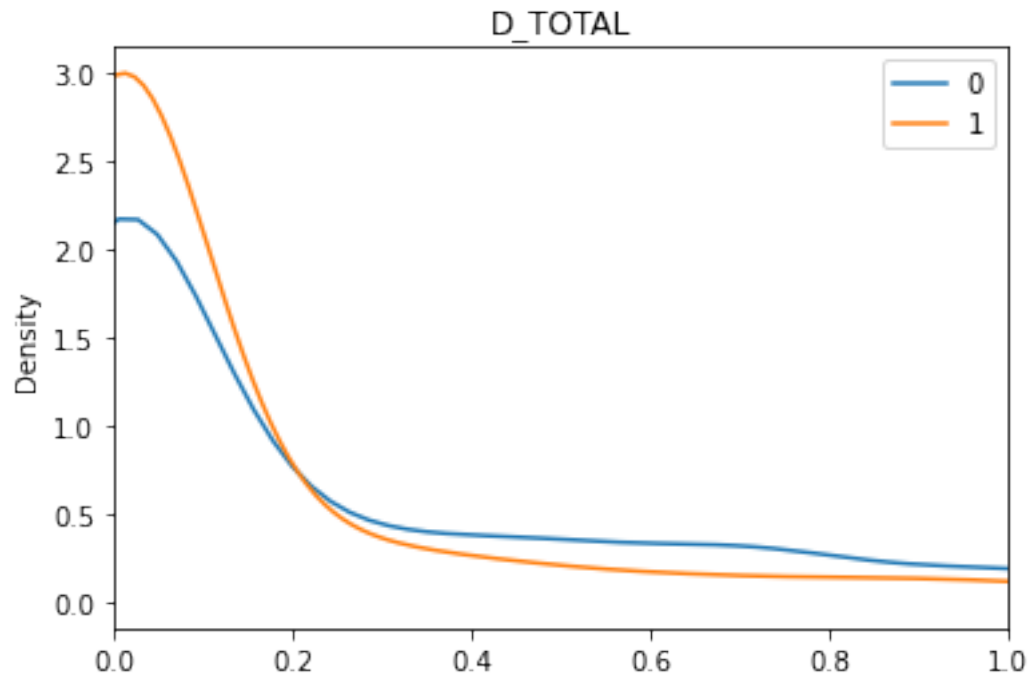


<Figure size 432x288 with 0 Axes>



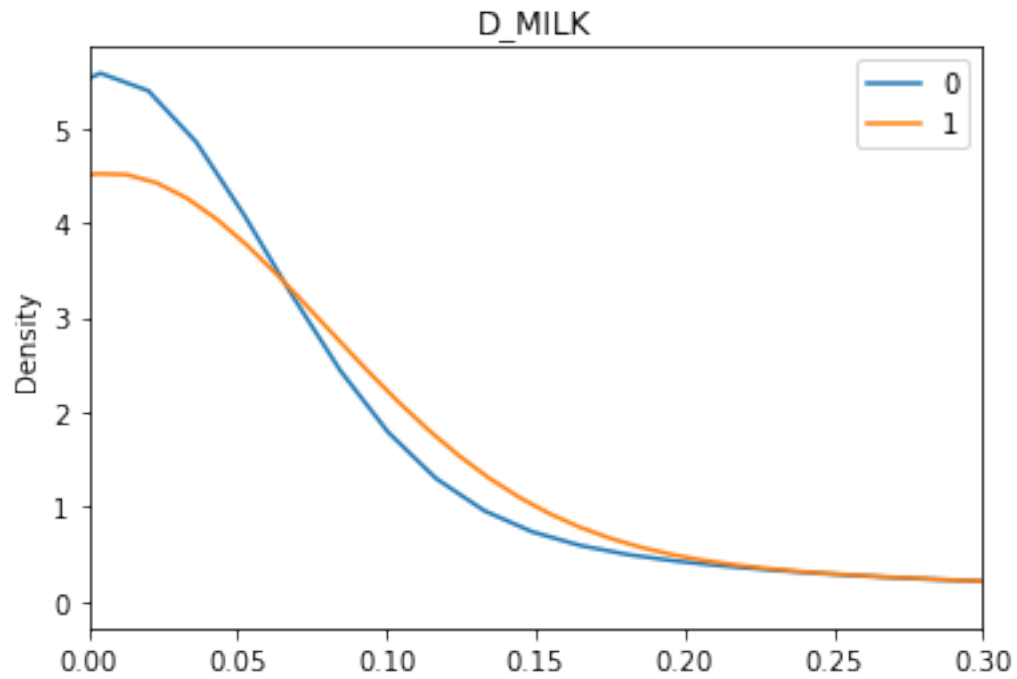
<Figure size 432x288 with 0 Axes>

```
[24]: z = df.groupby('seafood_meal')[dairy[0]].plot.kde(title = dairy[0], legend='x')
plt.show(z[0].set_xlim(0, 1))
plt.clf()
```



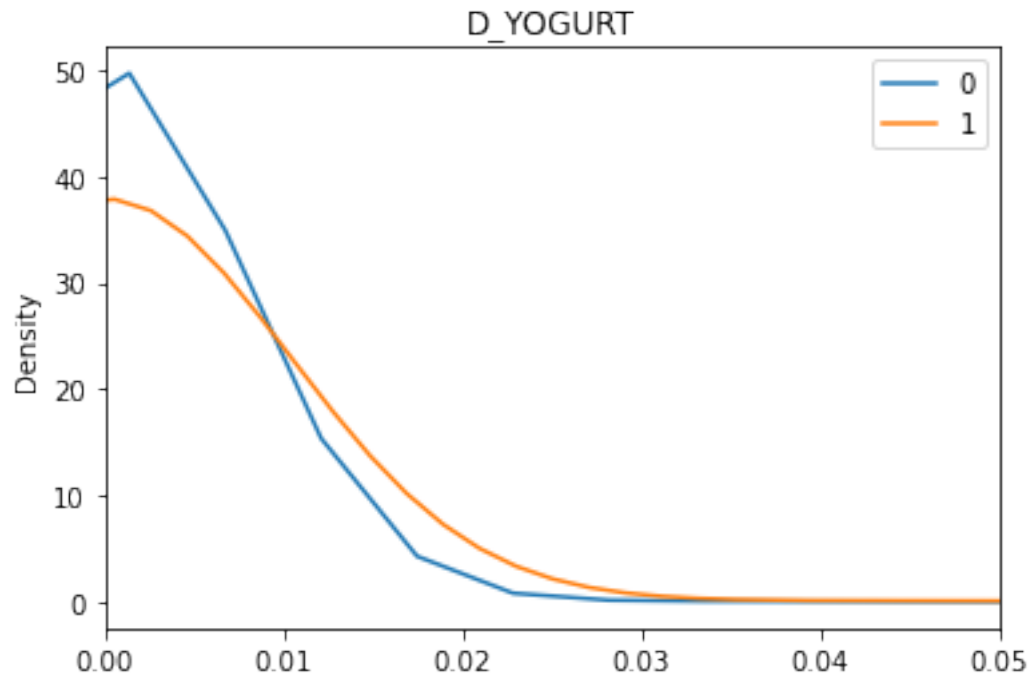
<Figure size 432x288 with 0 Axes>

```
[25]: z = df.groupby('seafood_meal')[dairy[1]].plot.kde(title = dairy[1], legend='x')  
plt.show(z[0].set_xlim(0, 0.3))  
plt.clf()
```



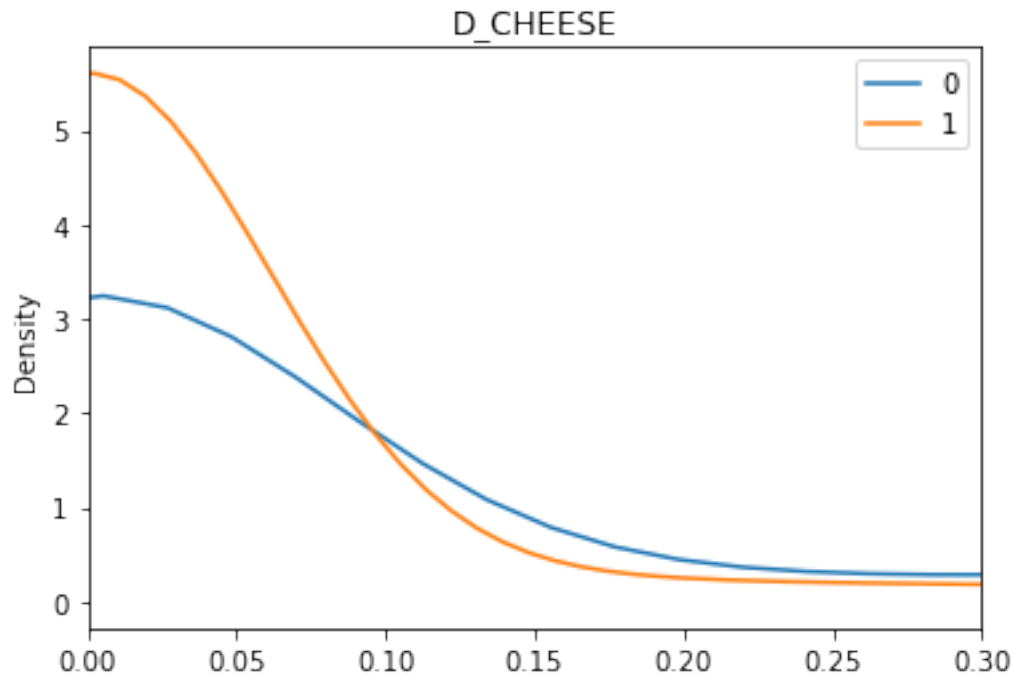
<Figure size 432x288 with 0 Axes>

```
[26]: z = df.groupby('seafood_meal')[dairy[2]].plot.kde(title = dairy[2], legend='x')
plt.show(z[0].set_xlim(0, 0.05))
plt.clf()
```

<Figure size 432x288 with 0 Axes>

```
[27]: z = df.groupby('seafood_meal')[dairy[3]].plot.kde(title = dairy[3], legend='x')
plt.show(z[0].set_xlim(0, 0.3))
plt.clf()
```



<Figure size 432x288 with 0 Axes>

```
[28]: for var in dairy:
      z = df.groupby('seafood_meal')[var].describe()
      print("Statistics for "+var+"\n")
      print(z)
      print('\n')
```

Statistics for D_TOTAL

	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.443461	0.764443	0.0	0.0	0.06	0.65	10.76
1	3232.0	0.209084	0.490321	0.0	0.0	0.00	0.15	5.07

Statistics for D_MILK

	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.136574	0.428739	0.0	0.0	0.0	0.04	8.04
1	3232.0	0.111470	0.365981	0.0	0.0	0.0	0.02	5.07

Statistics for D_YOGURT

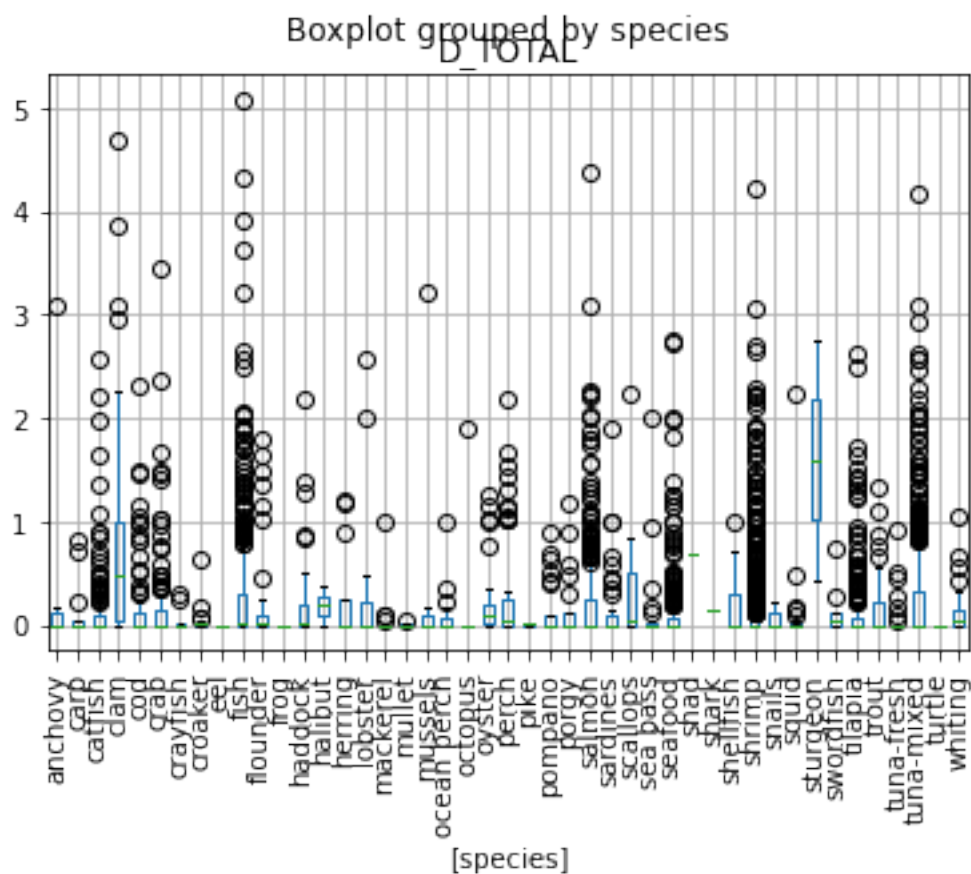
	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.004826	0.059659	0.0	0.0	0.0	0.0	2.68
1	3232.0	0.004947	0.052113	0.0	0.0	0.0	0.0	1.02

Statistics for D_CHEESE

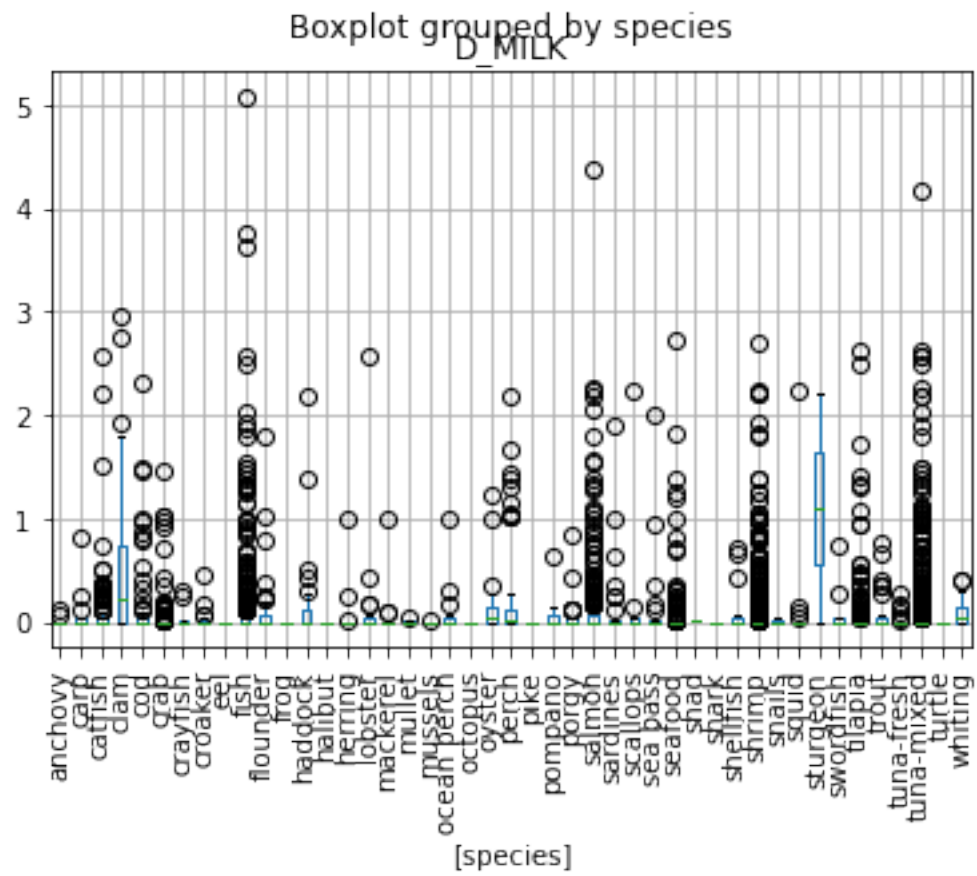
	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.299695	0.623149	0.0	0.0	0.0	0.4	10.71
1	3232.0	0.089947	0.306277	0.0	0.0	0.0	0.0	4.29

Dairy Within Seafood Species

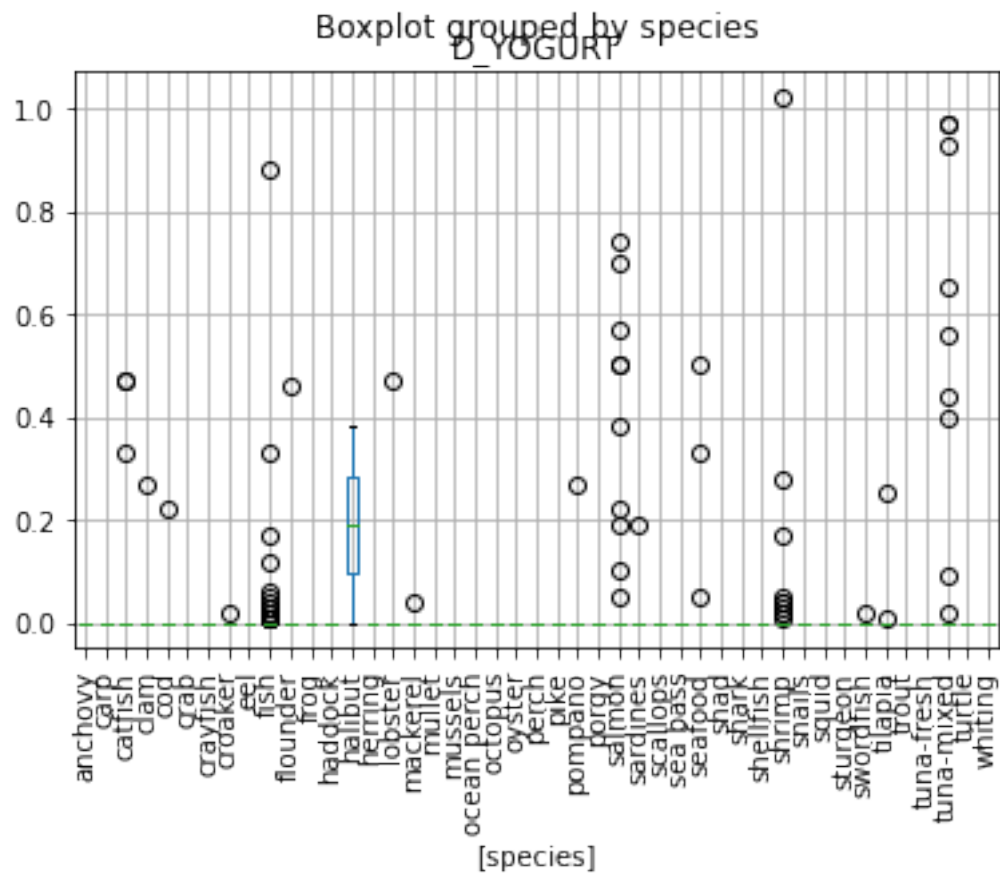
```
[63]: for var in dairy:
      z = df.boxplot(column=var,by=['species'], rot=90)
      plt.show(z)
      plt.clf()
```



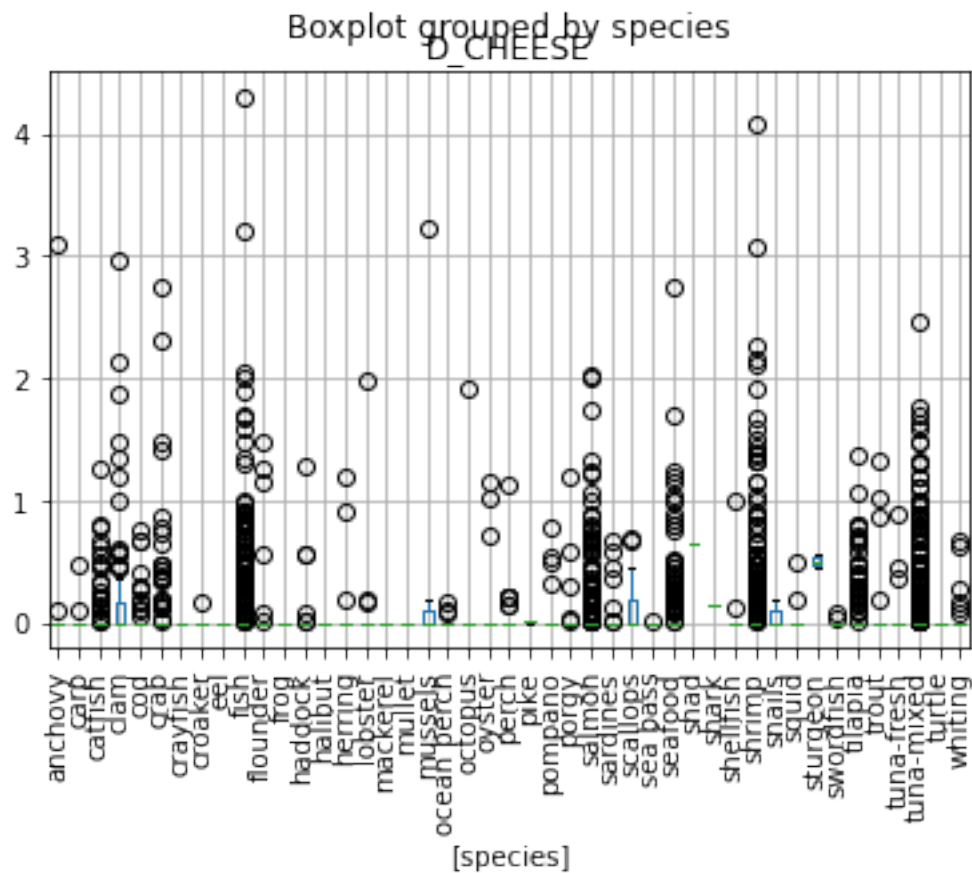
<Figure size 432x288 with 0 Axes>



<Figure size 432x288 with 0 Axes>

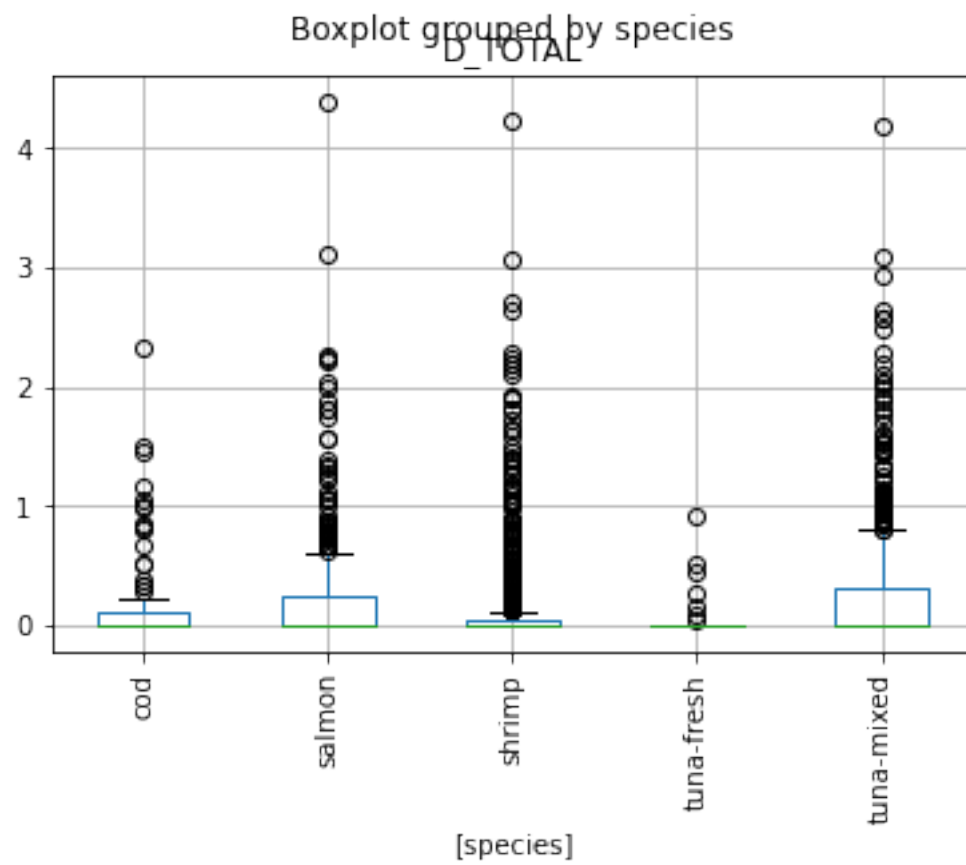


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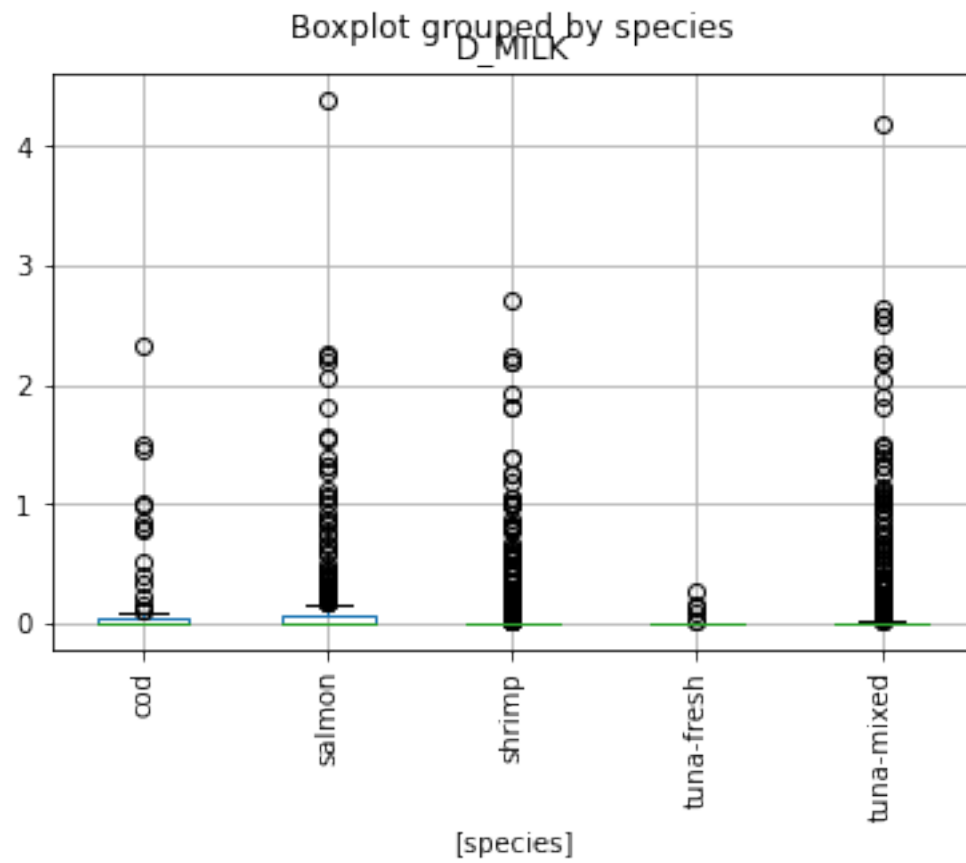


<Figure size 432x288 with 0 Axes>

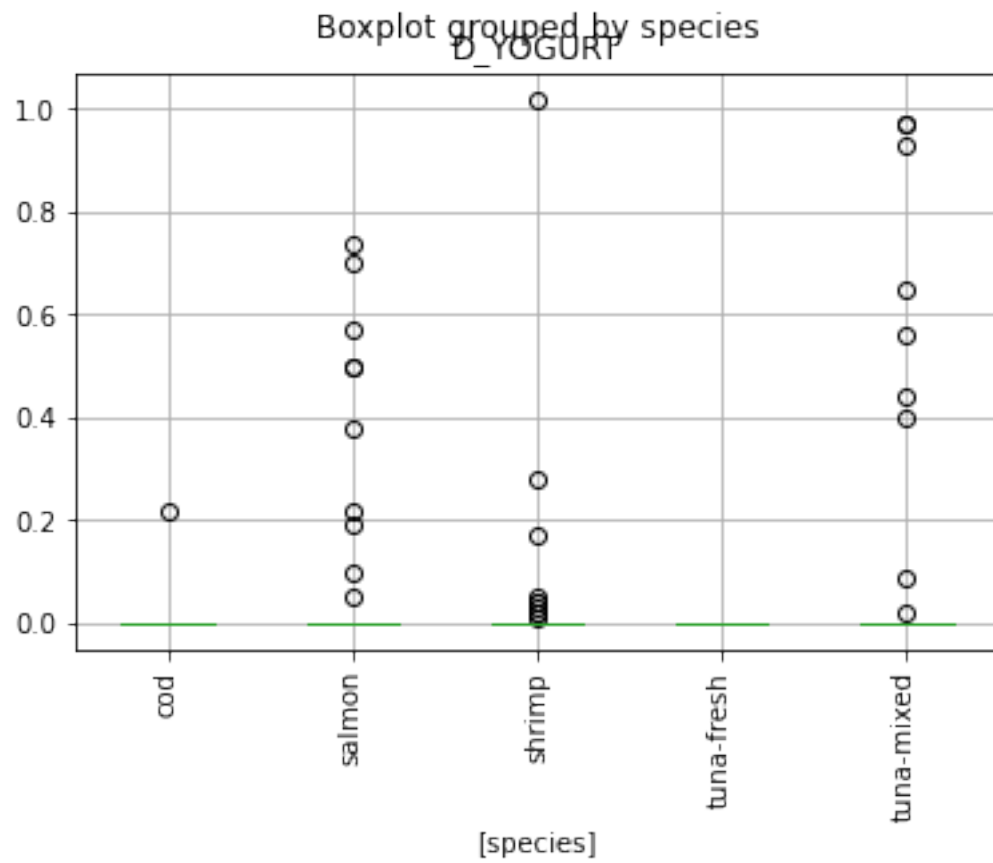
```
[64]: for var in dairy:
        z = df_species.boxplot(column=var,by=['species'], rot=90)
        plt.show(z)
        plt.clf()
```



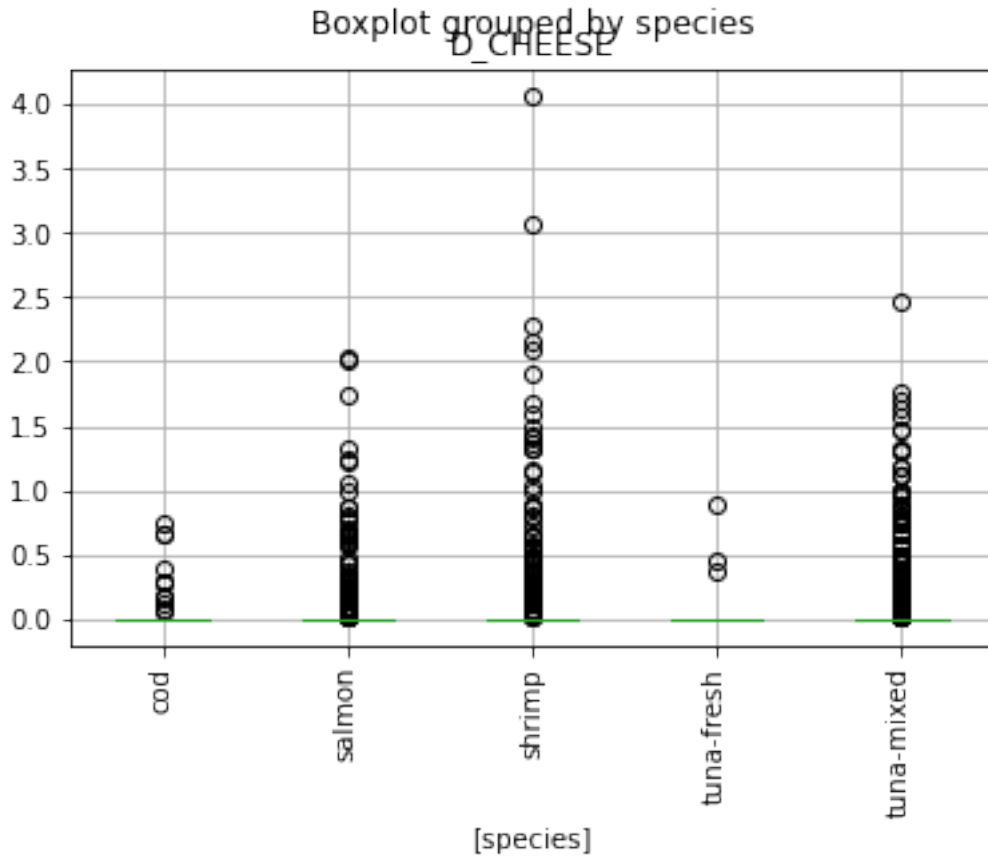
<Figure size 432x288 with 0 Axes>



<Figure size 432x288 with 0 Axes>



<Figure size 432x288 with 0 Axes>



<Figure size 432x288 with 0 Axes>

```
[65]: for var in dairy:
      z = df.groupby('species')[var].describe()
      z = z.sort_values(by='mean', ascending = False)
      print("Statistics for "+var+'\n')
      print(z)
      print('\n')
```

Statistics for D_TOTAL

	count	mean	std	min	25%	50%	75%	max
species								
sturgeon	2.0	1.600000	1.640488	0.44	1.0200	1.600	2.1800	2.76
clam	59.0	0.776441	1.012768	0.00	0.0400	0.470	0.9950	4.68
shad	1.0	0.680000	NaN	0.68	0.6800	0.680	0.6800	0.68
mussels	7.0	0.487143	1.211345	0.00	0.0000	0.000	0.0900	3.23
anchovy	9.0	0.377778	1.023008	0.00	0.0000	0.000	0.1200	3.10
scallops	12.0	0.365000	0.656139	0.00	0.0000	0.040	0.5025	2.23

perch	53.0	0.325094	0.544626	0.00	0.0000	0.050	0.2500	2.19
octopus	6.0	0.318333	0.779754	0.00	0.0000	0.000	0.0000	1.91
lobster	20.0	0.313500	0.695938	0.00	0.0000	0.000	0.2175	2.56
haddock	29.0	0.279655	0.536546	0.00	0.0000	0.010	0.2000	2.19
tuna-mixed	531.0	0.279435	0.544429	0.00	0.0000	0.000	0.3200	4.17
herring	13.0	0.273077	0.477483	0.00	0.0000	0.000	0.2500	1.20
fish	497.0	0.270201	0.588259	0.00	0.0000	0.010	0.3000	5.07
oyster	32.0	0.233750	0.369557	0.00	0.0075	0.100	0.1875	1.26
salmon	369.0	0.228970	0.490965	0.00	0.0000	0.000	0.2400	4.39
shellfish	15.0	0.200000	0.342428	0.00	0.0000	0.000	0.3100	0.99
crab	127.0	0.192047	0.482226	0.00	0.0000	0.000	0.1350	3.44
cod	87.0	0.190345	0.413250	0.00	0.0000	0.000	0.1100	2.32
halibut	2.0	0.190000	0.268701	0.00	0.0950	0.190	0.2850	0.38
flounder	61.0	0.181475	0.425648	0.00	0.0000	0.010	0.1000	1.81
trout	38.0	0.180526	0.340381	0.00	0.0000	0.000	0.2200	1.33
sardines	42.0	0.167381	0.376862	0.00	0.0000	0.000	0.1025	1.89
catfish	140.0	0.165214	0.408604	0.00	0.0000	0.000	0.0850	2.56
sea bass	22.0	0.164545	0.462248	0.00	0.0000	0.000	0.0250	2.01
shrimp	719.0	0.161822	0.441339	0.00	0.0000	0.000	0.0500	4.23
porgy	25.0	0.158000	0.309058	0.00	0.0000	0.000	0.1100	1.19
tilapia	239.0	0.154519	0.386791	0.00	0.0000	0.000	0.0800	2.63
pompano	25.0	0.152000	0.265769	0.00	0.0000	0.000	0.0900	0.89
shark	1.0	0.150000	NaN	0.15	0.1500	0.150	0.1500	0.15
seafood	267.0	0.149176	0.391442	0.00	0.0000	0.000	0.0750	2.74
squid	23.0	0.138696	0.468899	0.00	0.0000	0.000	0.0200	2.23
swordfish	10.0	0.131000	0.234068	0.00	0.0025	0.035	0.1100	0.75
whiting	42.0	0.129762	0.211896	0.00	0.0000	0.045	0.1575	1.04
carp	15.0	0.121333	0.266079	0.00	0.0000	0.000	0.0400	0.81
ocean perch	23.0	0.091304	0.218118	0.00	0.0000	0.000	0.0750	1.00
snails	3.0	0.073333	0.127017	0.00	0.0000	0.000	0.1100	0.22
tuna-fresh	37.0	0.065946	0.185584	0.00	0.0000	0.000	0.0000	0.91
mackerel	20.0	0.062000	0.222985	0.00	0.0000	0.000	0.0000	1.00
crayfish	11.0	0.050000	0.107051	0.00	0.0000	0.000	0.0100	0.29
croaker	24.0	0.044583	0.130116	0.00	0.0000	0.005	0.0200	0.63
mullet	4.0	0.007500	0.015000	0.00	0.0000	0.000	0.0075	0.03
pike	2.0	0.005000	0.007071	0.00	0.0025	0.005	0.0075	0.01
eel	6.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
frog	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00
turtle	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00

Statistics for D_MILK

	count	mean	std	min	25%	50%	75%	max
species								
sturgeon	2.0	1.100000	1.555635	0.00	0.55	1.10	1.6500	2.20
clam	59.0	0.492712	0.674112	0.00	0.00	0.22	0.7500	2.95
perch	53.0	0.281887	0.534254	0.00	0.00	0.02	0.1300	2.19

scallops	12.0	0.205000	0.639012	0.00	0.00	0.00	0.0350	2.23
haddock	29.0	0.191379	0.473978	0.00	0.00	0.00	0.1100	2.19
lobster	20.0	0.172500	0.571746	0.00	0.00	0.00	0.0425	2.56
sea bass	22.0	0.163182	0.462708	0.00	0.00	0.00	0.0075	2.01
tuna-mixed	531.0	0.145405	0.429832	0.00	0.00	0.00	0.0100	4.17
cod	87.0	0.141724	0.383334	0.00	0.00	0.00	0.0400	2.32
oyster	32.0	0.137187	0.274828	0.00	0.00	0.03	0.1325	1.24
fish	497.0	0.136519	0.461216	0.00	0.00	0.00	0.0400	5.07
salmon	369.0	0.134228	0.405792	0.00	0.00	0.00	0.0600	4.39
shellfish	15.0	0.125333	0.252865	0.00	0.00	0.00	0.0400	0.72
swordfish	10.0	0.110000	0.241016	0.00	0.00	0.00	0.0425	0.75
squid	23.0	0.109565	0.463725	0.00	0.00	0.00	0.0000	2.23
sardines	42.0	0.109048	0.339848	0.00	0.00	0.00	0.0100	1.89
flounder	61.0	0.099344	0.282683	0.00	0.00	0.00	0.0800	1.81
herring	13.0	0.097692	0.279707	0.00	0.00	0.00	0.0000	1.00
catfish	140.0	0.097643	0.325401	0.00	0.00	0.00	0.0425	2.56
tilapia	239.0	0.093222	0.323809	0.00	0.00	0.00	0.0150	2.63
trout	38.0	0.090789	0.189600	0.00	0.00	0.00	0.0450	0.76
carp	15.0	0.084000	0.212226	0.00	0.00	0.00	0.0400	0.81
whiting	42.0	0.083095	0.113320	0.00	0.00	0.04	0.1475	0.41
shrimp	719.0	0.081892	0.281780	0.00	0.00	0.00	0.0050	2.70
ocean perch	23.0	0.074348	0.213942	0.00	0.00	0.00	0.0500	1.00
porgy	25.0	0.072000	0.185382	0.00	0.00	0.00	0.0400	0.84
crab	127.0	0.067638	0.226307	0.00	0.00	0.00	0.0000	1.47
mackerel	20.0	0.060000	0.223371	0.00	0.00	0.00	0.0000	1.00
seafood	267.0	0.058652	0.262275	0.00	0.00	0.00	0.0000	2.73
pompano	25.0	0.056400	0.129482	0.00	0.00	0.00	0.0800	0.63
crayfish	11.0	0.050000	0.107051	0.00	0.00	0.00	0.0100	0.29
croaker	24.0	0.036667	0.097609	0.00	0.00	0.00	0.0200	0.46
anchovy	9.0	0.021111	0.043716	0.00	0.00	0.00	0.0000	0.12
shad	1.0	0.020000	NaN	0.02	0.02	0.02	0.0200	0.02
tuna-fresh	37.0	0.019459	0.056615	0.00	0.00	0.00	0.0000	0.27
snails	3.0	0.013333	0.023094	0.00	0.00	0.00	0.0200	0.04
mullet	4.0	0.007500	0.015000	0.00	0.00	0.00	0.0075	0.03
mussels	7.0	0.001429	0.003780	0.00	0.00	0.00	0.0000	0.01
shark	1.0	0.000000	NaN	0.00	0.00	0.00	0.0000	0.00
halibut	2.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
frog	1.0	0.000000	NaN	0.00	0.00	0.00	0.0000	0.00
eel	6.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
octopus	6.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00
turtle	1.0	0.000000	NaN	0.00	0.00	0.00	0.0000	0.00
pike	2.0	0.000000	0.000000	0.00	0.00	0.00	0.0000	0.00

Statistics for D_YOGURT

	count	mean	std	min	25%	50%	75%	max
species								

halibut	2.0	0.190000	0.268701	0.0	0.095	0.19	0.285	0.38
lobster	20.0	0.023500	0.105095	0.0	0.000	0.00	0.000	0.47
pompano	25.0	0.010800	0.054000	0.0	0.000	0.00	0.000	0.27
salmon	369.0	0.010705	0.074848	0.0	0.000	0.00	0.000	0.74
tuna-mixed	531.0	0.009473	0.084644	0.0	0.000	0.00	0.000	0.97
catfish	140.0	0.009071	0.062282	0.0	0.000	0.00	0.000	0.47
flounder	61.0	0.007541	0.058897	0.0	0.000	0.00	0.000	0.46
clam	59.0	0.004576	0.035151	0.0	0.000	0.00	0.000	0.27
sardines	42.0	0.004524	0.029318	0.0	0.000	0.00	0.000	0.19
fish	497.0	0.003722	0.043339	0.0	0.000	0.00	0.000	0.88
seafood	267.0	0.003296	0.036712	0.0	0.000	0.00	0.000	0.50
cod	87.0	0.002529	0.023586	0.0	0.000	0.00	0.000	0.22
shrimp	719.0	0.002337	0.040043	0.0	0.000	0.00	0.000	1.02
mackerel	20.0	0.002000	0.008944	0.0	0.000	0.00	0.000	0.04
swordfish	10.0	0.002000	0.006325	0.0	0.000	0.00	0.000	0.02
tilapia	239.0	0.001088	0.016181	0.0	0.000	0.00	0.000	0.25
croaker	24.0	0.000833	0.004082	0.0	0.000	0.00	0.000	0.02
sea bass	22.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
sturgeon	2.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
squid	23.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
snails	3.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
trout	38.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
shellfish	15.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
shark	1.0	0.000000	NaN	0.0	0.000	0.00	0.000	0.00
shad	1.0	0.000000	NaN	0.0	0.000	0.00	0.000	0.00
tuna-fresh	37.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
turtle	1.0	0.000000	NaN	0.0	0.000	0.00	0.000	0.00
anchovy	9.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
perch	53.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
scallops	12.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
porgy	25.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
pike	2.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
carp	15.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
oyster	32.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
octopus	6.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
ocean perch	23.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
mussels	7.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
mullet	4.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
herring	13.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
haddock	29.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
frog	1.0	0.000000	NaN	0.0	0.000	0.00	0.000	0.00
eel	6.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
crayfish	11.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
crab	127.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00
whiting	42.0	0.000000	0.000000	0.0	0.000	0.00	0.000	0.00

Statistics for D_CHEESE

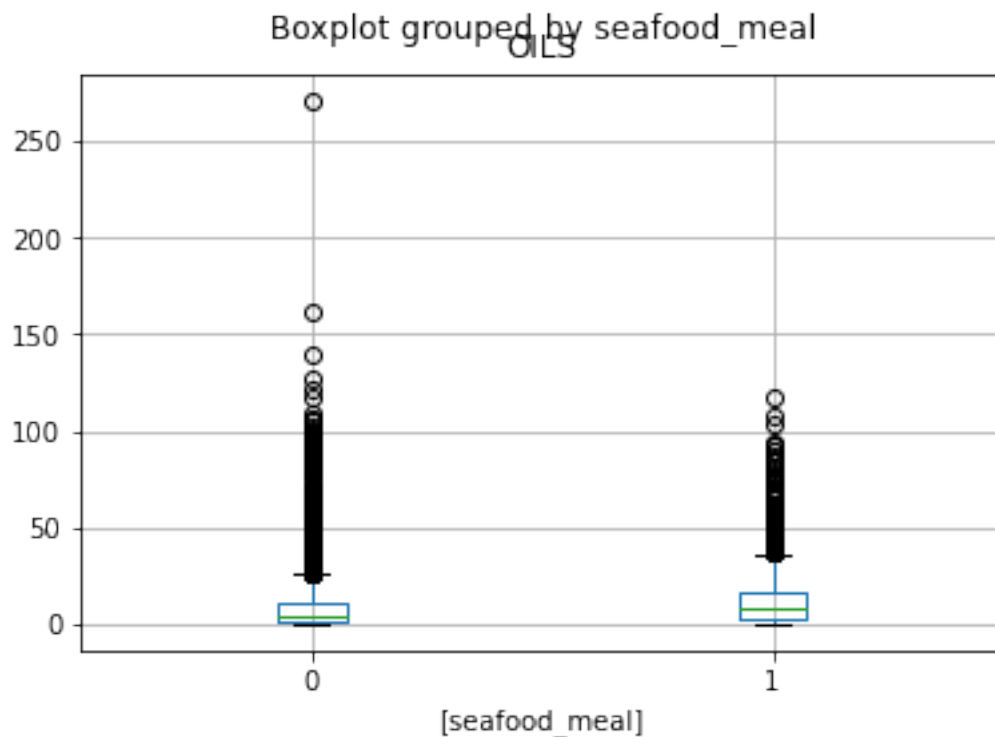
species	count	mean	std	min	25%	50%	75%	max
shad	1.0	0.650000	NaN	0.65	0.6500	0.650	0.6500	0.65
sturgeon	2.0	0.500000	0.084853	0.44	0.4700	0.500	0.5300	0.56
mussels	7.0	0.485714	1.207571	0.00	0.0000	0.000	0.0900	3.22
anchovy	9.0	0.356667	1.029393	0.00	0.0000	0.000	0.0000	3.10
octopus	6.0	0.318333	0.779754	0.00	0.0000	0.000	0.0000	1.91
clam	59.0	0.269831	0.599820	0.00	0.0000	0.000	0.1700	2.97
herring	13.0	0.175385	0.396077	0.00	0.0000	0.000	0.0000	1.20
scallops	12.0	0.158333	0.274121	0.00	0.0000	0.000	0.1775	0.70
shark	1.0	0.150000	NaN	0.15	0.1500	0.150	0.1500	0.15
fish	497.0	0.128913	0.380054	0.00	0.0000	0.000	0.0000	4.29
crab	127.0	0.123780	0.389678	0.00	0.0000	0.000	0.0000	2.74
lobster	20.0	0.116500	0.444063	0.00	0.0000	0.000	0.0000	1.99
tuna-mixed	531.0	0.113823	0.306926	0.00	0.0000	0.000	0.0000	2.47
oyster	32.0	0.090313	0.290888	0.00	0.0000	0.000	0.0000	1.16
trout	38.0	0.089474	0.297639	0.00	0.0000	0.000	0.0000	1.33
seafood	267.0	0.086929	0.286010	0.00	0.0000	0.000	0.0000	2.74
haddock	29.0	0.085862	0.269371	0.00	0.0000	0.000	0.0000	1.27
porgy	25.0	0.084800	0.263773	0.00	0.0000	0.000	0.0000	1.19
pompano	25.0	0.084400	0.207988	0.00	0.0000	0.000	0.0000	0.77
salmon	369.0	0.081409	0.262310	0.00	0.0000	0.000	0.0000	2.03
shrimp	719.0	0.077163	0.320830	0.00	0.0000	0.000	0.0000	4.07
flounder	61.0	0.074426	0.290686	0.00	0.0000	0.000	0.0000	1.48
shellfish	15.0	0.074000	0.255281	0.00	0.0000	0.000	0.0000	0.99
snails	3.0	0.060000	0.103923	0.00	0.0000	0.000	0.0900	0.18
tilapia	239.0	0.058870	0.185522	0.00	0.0000	0.000	0.0000	1.37
catfish	140.0	0.057929	0.181356	0.00	0.0000	0.000	0.0000	1.25
sardines	42.0	0.052857	0.157112	0.00	0.0000	0.000	0.0000	0.66
tuna-fresh	37.0	0.046216	0.170983	0.00	0.0000	0.000	0.0000	0.89
whiting	42.0	0.046190	0.146586	0.00	0.0000	0.000	0.0000	0.67
cod	87.0	0.045517	0.143095	0.00	0.0000	0.000	0.0000	0.75
perch	53.0	0.043208	0.163481	0.00	0.0000	0.000	0.0000	1.12
carp	15.0	0.038000	0.122253	0.00	0.0000	0.000	0.0000	0.47
squid	23.0	0.029130	0.107234	0.00	0.0000	0.000	0.0000	0.49
ocean perch	23.0	0.013913	0.039398	0.00	0.0000	0.000	0.0000	0.16
swordfish	10.0	0.012000	0.026998	0.00	0.0000	0.000	0.0000	0.08
croaker	24.0	0.006667	0.032660	0.00	0.0000	0.000	0.0000	0.16
pike	2.0	0.005000	0.007071	0.00	0.0025	0.005	0.0075	0.01
sea bass	22.0	0.000455	0.002132	0.00	0.0000	0.000	0.0000	0.01
mullet	4.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
mackerel	20.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
halibut	2.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
frog	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00
eel	6.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
crayfish	11.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
turtle	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00

Section 6: Others

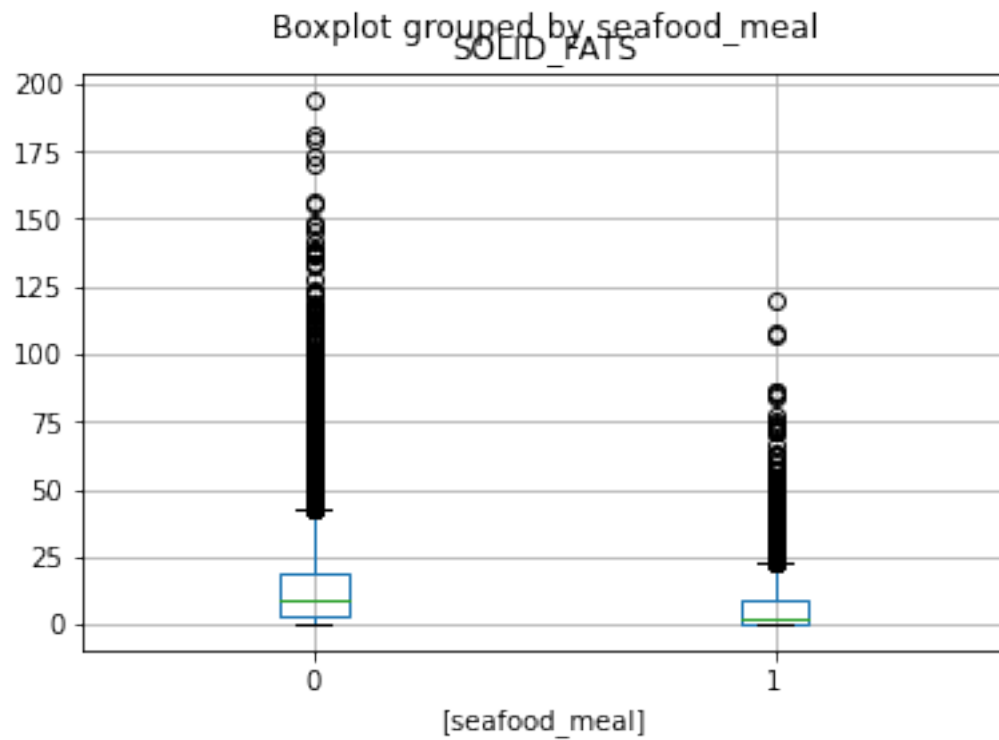
This section provides boxplots and density plots of the other FPED components in the seafood meal and non seafood meal groups. The code for seafood meal is 1 if meal contains seafood, and 0 if meal does not contain seafood.

```
[29]: other = ['OILS', 'SOLID_FATS', 'ADD_SUGARS', 'A_DRINKS']

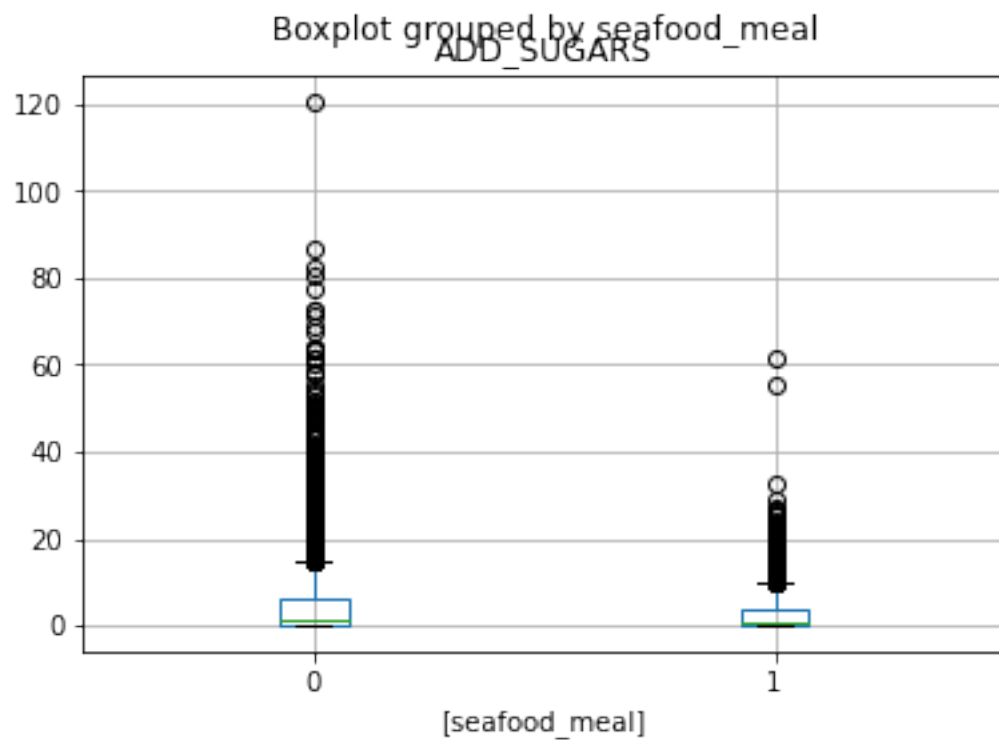
for var in other:
    z = df.boxplot(column=var, by=['seafood_meal'])
    plt.show(z)
    plt.clf()
```



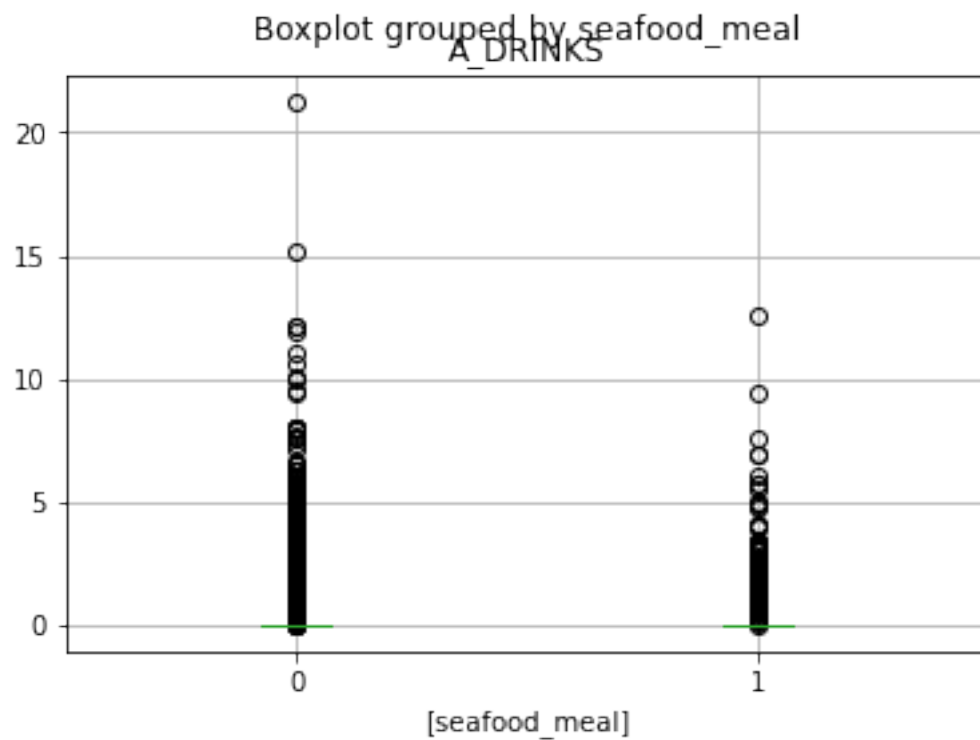
<Figure size 432x288 with 0 Axes>



<Figure size 432x288 with 0 Axes>

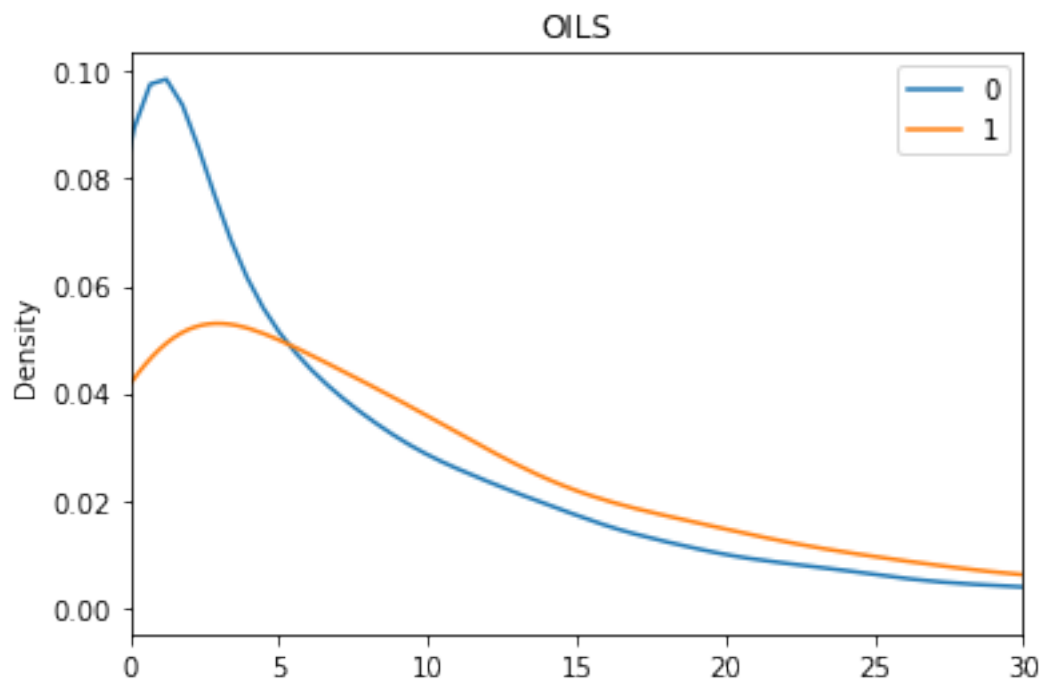


<Figure size 432x288 with 0 Axes>



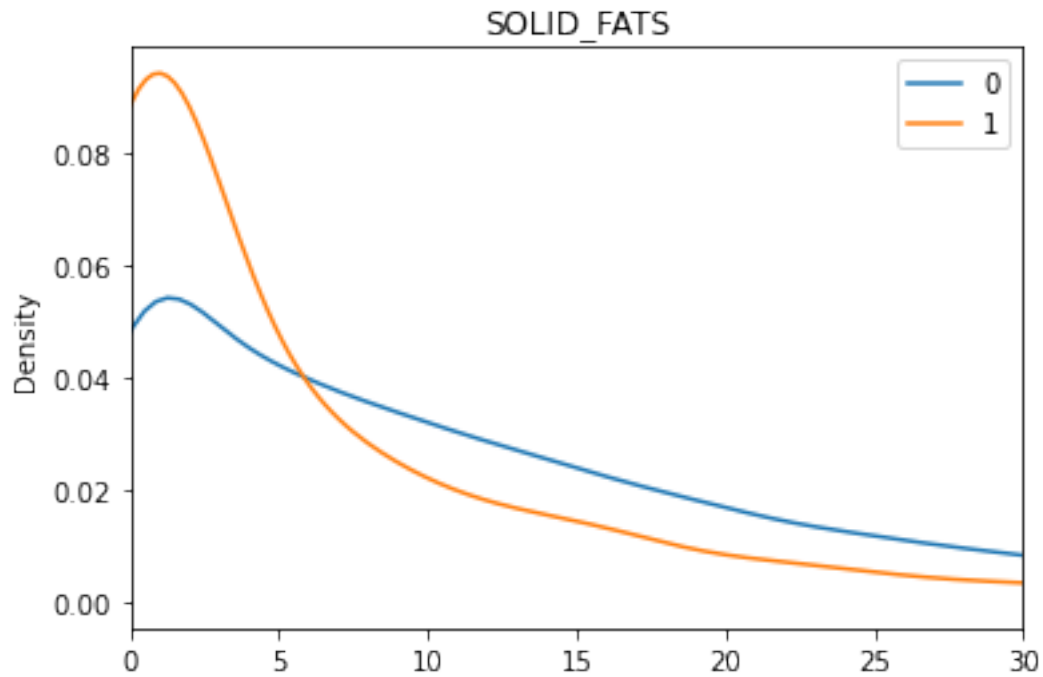
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```
[30]: z = df.groupby('seafood_meal')[other[0]].plot.kde(title = other[0], legend='x')
plt.show(z[0].set_xlim(0, 30))
plt.clf()
```



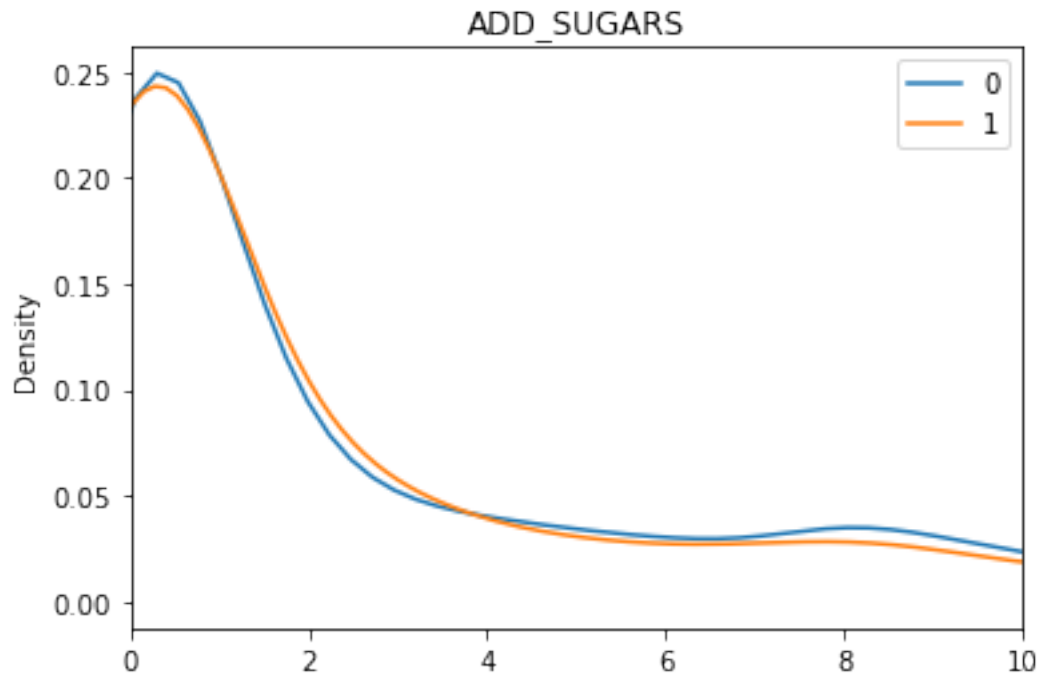
<Figure size 432x288 with 0 Axes>

```
[31]: z = df.groupby('seafood_meal')[other[1]].plot.kde(title = other[1], legend='x')  
plt.show(z[0].set_xlim(0, 30))  
plt.clf()
```



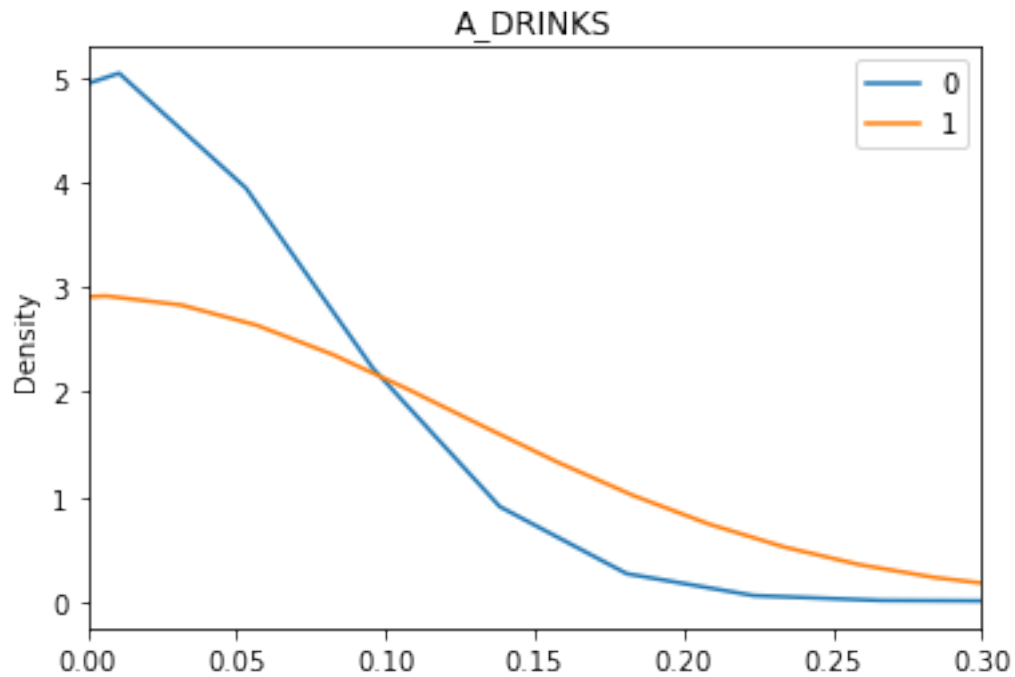
<Figure size 432x288 with 0 Axes>

```
[32]: z = df.groupby('seafood_meal')[other[2]].plot.kde(title = other[2], legend='x')
plt.show(z[0].set_xlim(0, 10))
plt.clf()
```



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```
[33]: z = df.groupby('seafood_meal')[other[3]].plot.kde(title = other[3], legend='x')
plt.show(z[0].set_xlim(0, 0.3))
plt.clf()
```



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```
[34]: for var in other:
      z = df.groupby('seafood_meal')[var].describe()
      print("Statistics for "+var+"\n")
      print(z)
      print('\n')
```

Statistics for OILS

	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	8.186339	10.844504	0.0	1.23	4.51	11.3700	271.03
1	3232.0	11.997413	13.827625	0.0	2.74	7.84	16.3275	117.17

Statistics for SOLID_FATS

	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	13.294004	14.985754	0.0	2.77	9.000	18.83	194.29
1	3232.0	7.082955	11.323490	0.0	0.02	2.535	9.24	119.91

Statistics for ADD_SUGARS

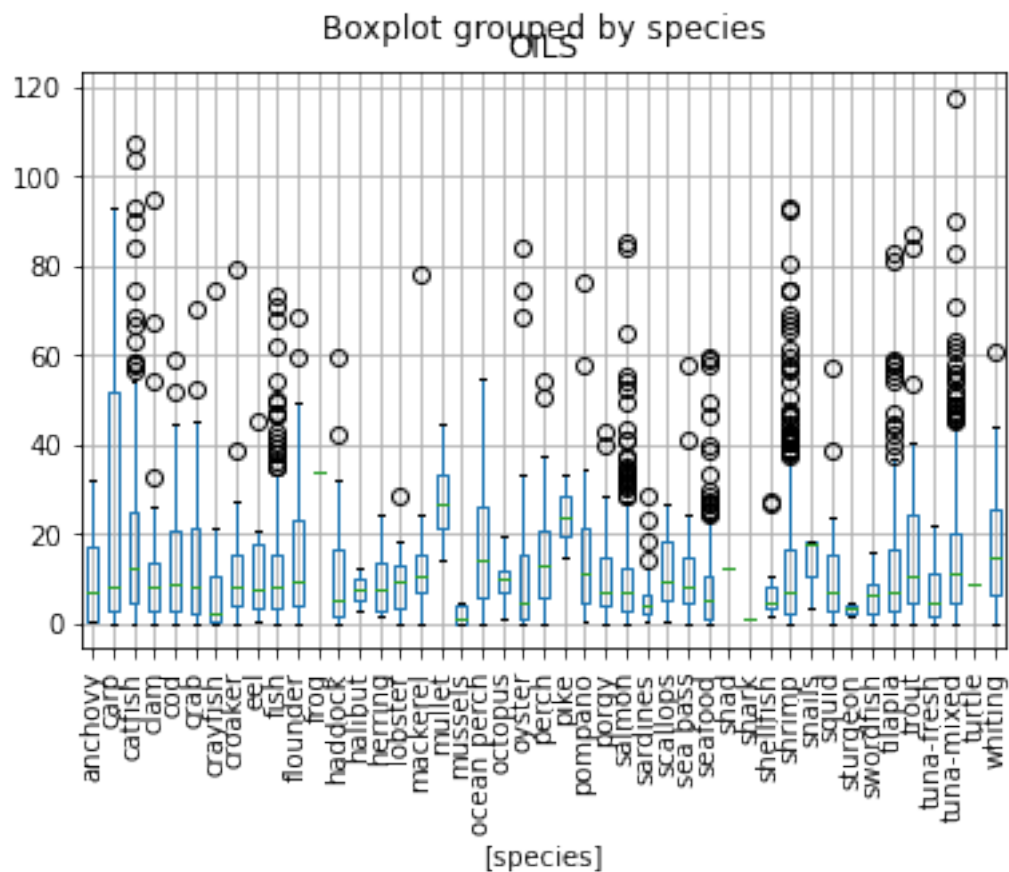
	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	3.867824	5.930227	0.0	0.1	1.12	5.92	120.61
1	3232.0	2.961179	4.698025	0.0	0.0	0.75	4.01	61.64

Statistics for A_DRINKS

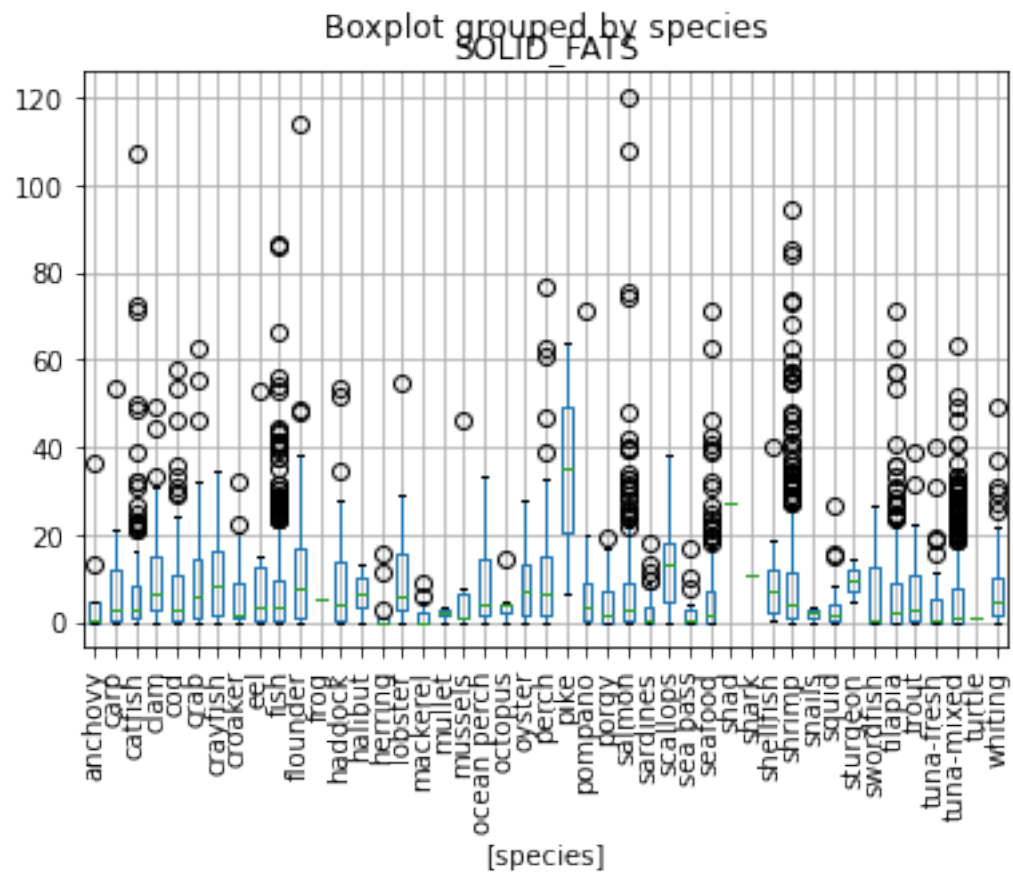
	count	mean	std	min	25%	50%	75%	max
seafood_meal								
0	26011.0	0.098922	0.568399	0.0	0.0	0.0	0.0	21.26
1	3232.0	0.143902	0.632477	0.0	0.0	0.0	0.0	12.62

Others Within Seafood Species

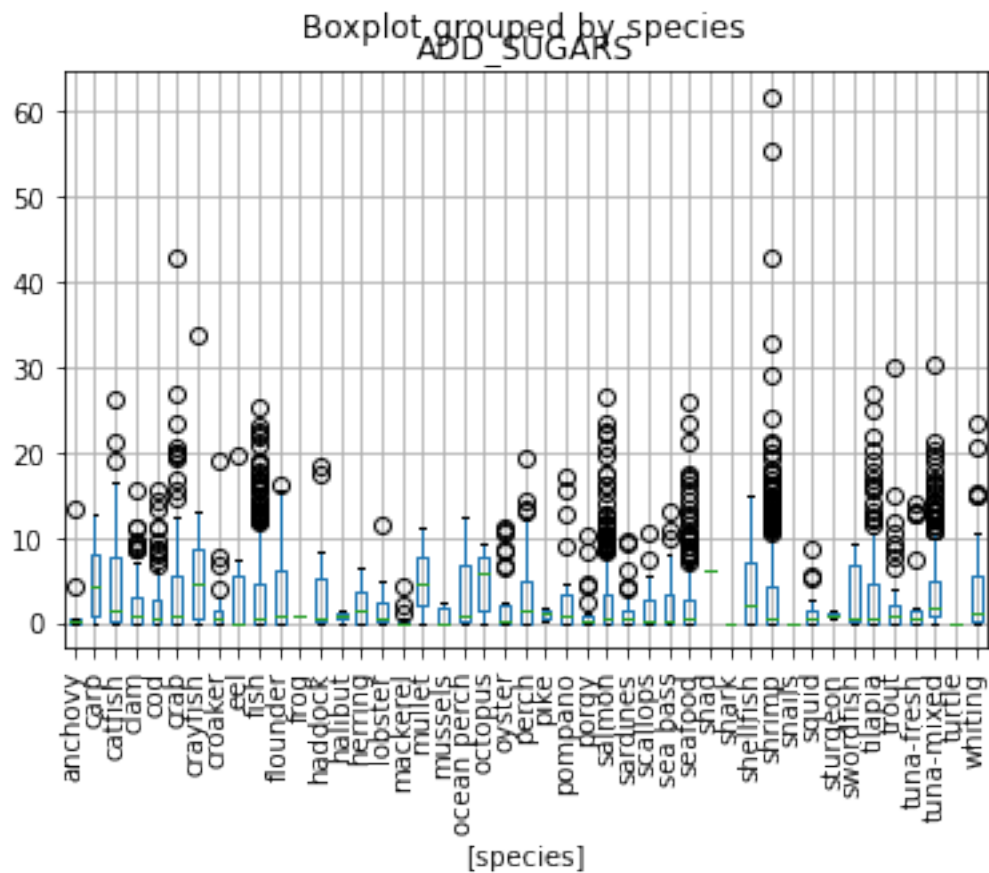
```
[67]: for var in other:
      z = df.boxplot(column=var,by=['species'], rot=90)
      plt.show(z)
      plt.clf()
```



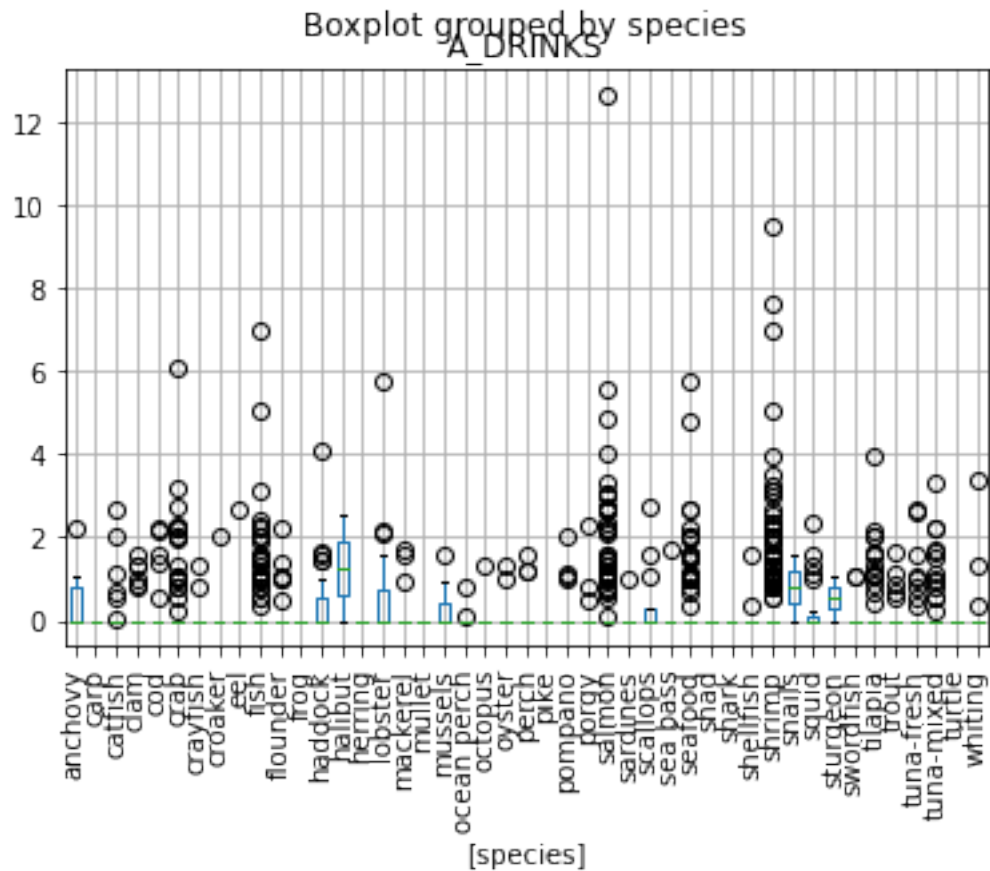
<Figure size 432x288 with 0 Axes>



<Figure size 432x288 with 0 Axes>

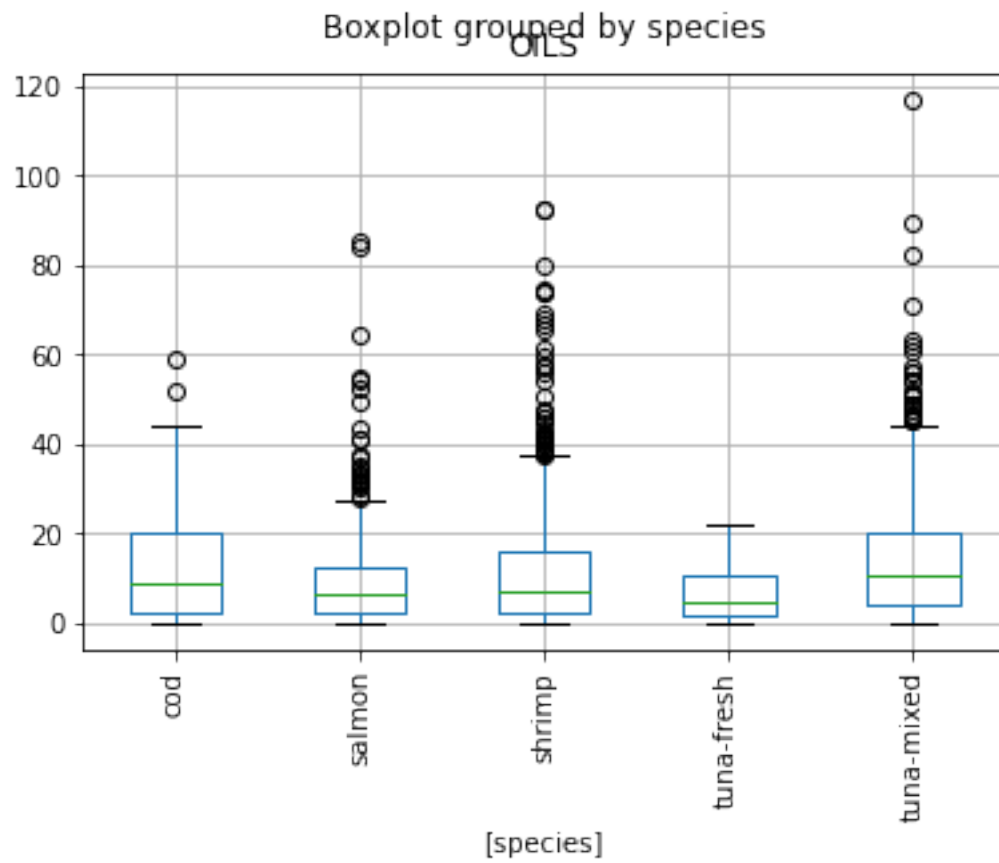


<Figure size 432x288 with 0 Axes>

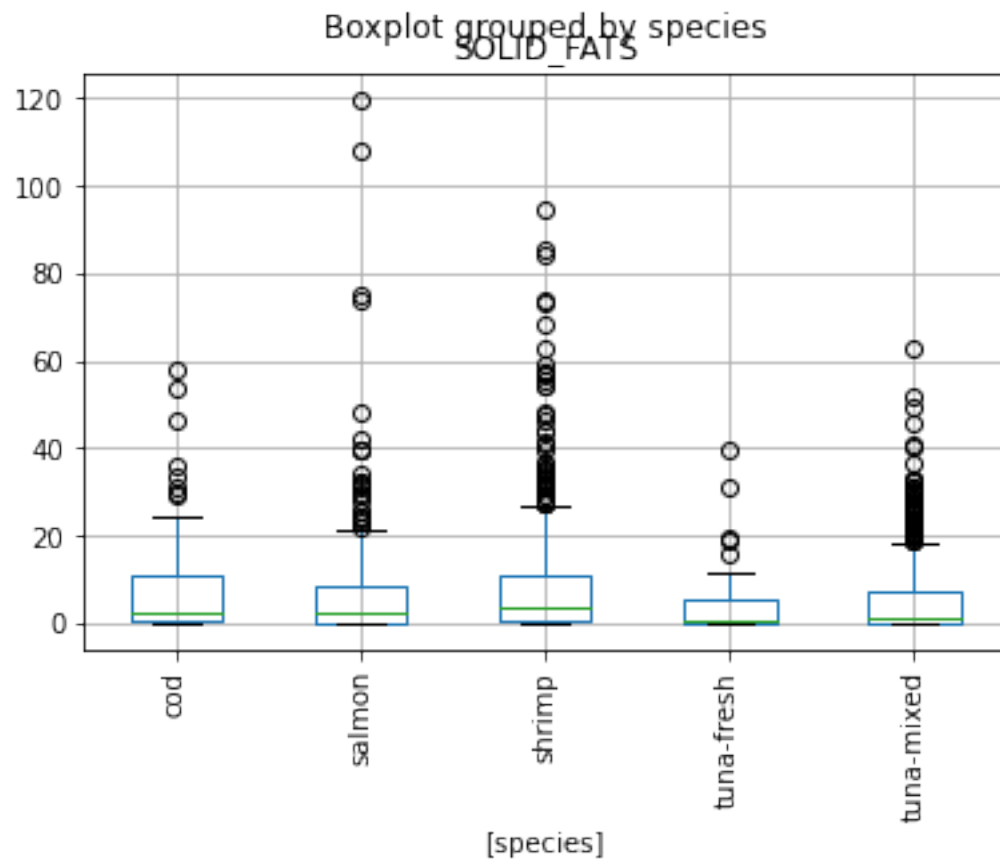


<Figure size 432x288 with 0 Axes>

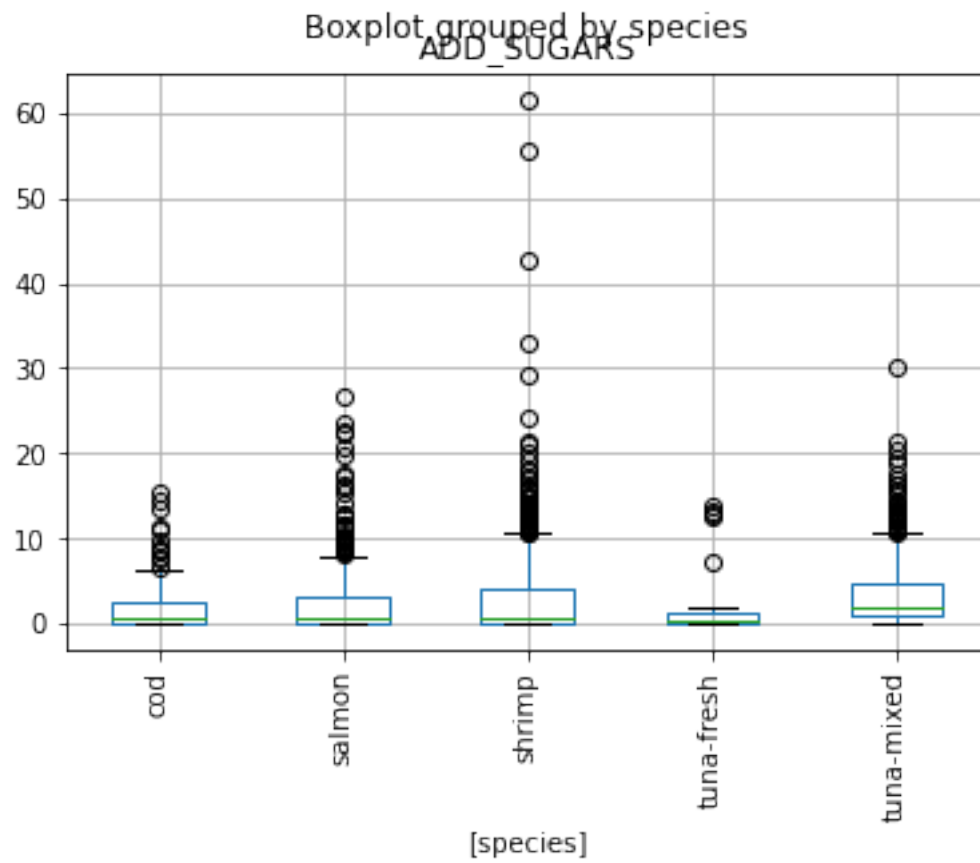
```
[68]: for var in other:
      z = df_species.boxplot(column=var,by=['species'], rot=90)
      plt.show(z)
      plt.clf()
```



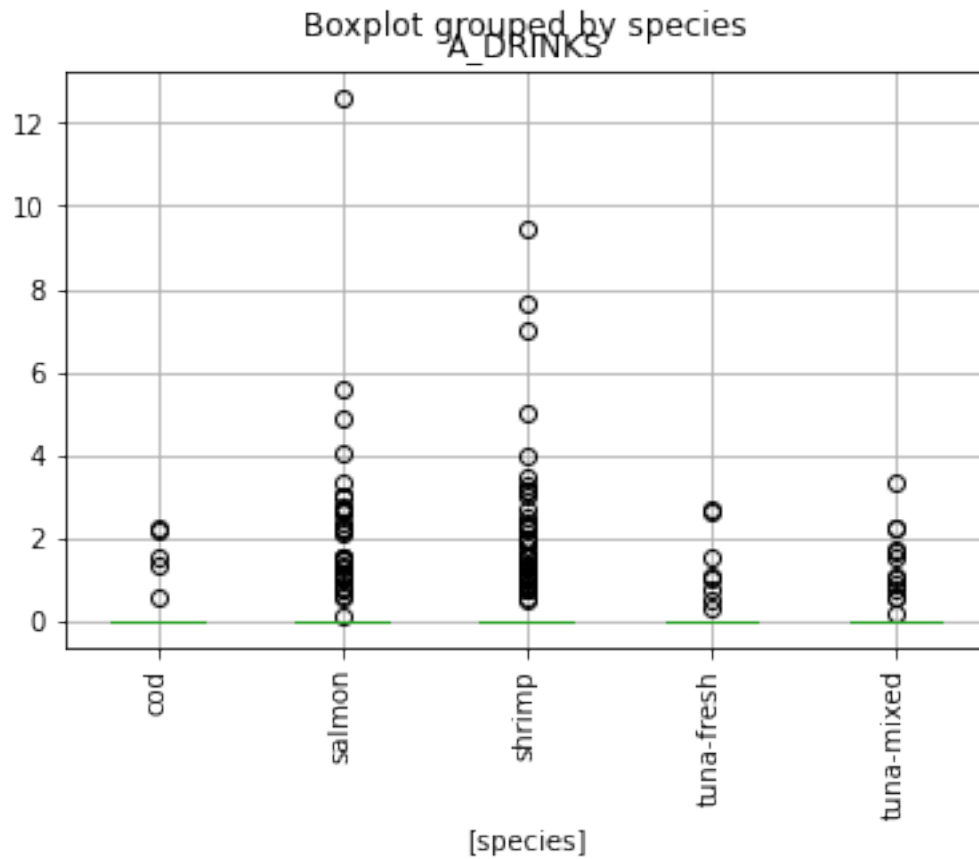
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<Figure size 432x288 with 0 Axes>



<Figure size 432x288 with 0 Axes>



<Figure size 432x288 with 0 Axes>

```
[69]: for var in other:
      z = df.groupby('species')[var].describe()
      z = z.sort_values(by='mean', ascending = False)
      print("Statistics for "+var+"\n")
      print(z)
      print('\n')
```

Statistics for OILS

species	count	mean	std	min	25%	50%	75%	\
frog	1.0	33.960000	NaN	33.96	33.9600	33.960	33.9600	
mullet	4.0	28.000000	12.759668	14.31	21.3450	26.465	33.1200	
carp	15.0	27.330000	31.294143	0.00	2.8250	8.330	51.5150	
pike	2.0	23.800000	13.039049	14.58	19.1900	23.800	28.4100	
catfish	140.0	19.656357	22.252510	0.00	4.3900	12.010	25.0775	
trout	38.0	18.449737	20.773125	0.00	4.8025	10.520	23.9450	

ocean perch	23.0	17.431739	15.073127	0.00	5.6550	14.220	26.0150
whiting	42.0	17.207619	14.118937	0.00	6.1725	14.680	25.6400
pompano	25.0	16.174000	17.618084	0.43	4.4700	10.820	21.0800
flounder	61.0	15.602787	15.641196	0.00	3.7400	9.420	23.1700
tuna-mixed	531.0	14.927552	14.787926	0.00	4.2650	11.010	20.2850
mackerel	20.0	14.411000	16.103360	0.00	6.8200	10.310	15.0775
perch	53.0	14.252453	12.209843	0.00	5.8700	12.730	20.3600
eel	6.0	13.911667	16.832294	0.44	3.2675	7.585	17.7075
oyster	32.0	13.878750	22.134365	0.00	1.2275	4.620	15.0400
croaker	24.0	13.438333	17.162480	0.00	4.0775	8.370	15.1675
snails	3.0	13.026667	8.588413	3.11	10.5100	17.910	17.9850
cod	87.0	12.992759	13.063769	0.00	2.5950	8.780	20.4700
crab	127.0	12.955512	13.710476	0.00	2.1050	8.220	21.1650
sea bass	22.0	12.490909	13.987386	0.00	4.5000	8.115	14.8875
clam	59.0	12.054915	16.498338	0.00	2.6500	7.860	13.7850
shad	1.0	12.020000	NaN	12.02	12.0200	12.020	12.0200
tilapia	239.0	11.993389	13.955190	0.00	2.8250	7.120	16.5850
shrimp	719.0	11.511641	13.639941	0.00	2.1550	7.180	16.3200
porgy	25.0	11.478800	11.940044	0.00	3.8400	6.780	14.6200
haddock	29.0	11.477241	13.833376	0.00	1.3400	5.390	16.1800
crayfish	11.0	11.357273	21.891717	0.00	0.3100	2.150	10.7550
squid	23.0	11.256957	13.611726	0.00	2.4600	6.850	15.1300
fish	497.0	11.149678	11.108146	0.00	3.1200	8.140	15.2900
scallops	12.0	10.941667	8.597138	0.30	4.9950	9.345	18.3300
anchovy	9.0	10.781111	12.121940	0.08	0.1300	6.680	17.1400
salmon	369.0	9.852602	11.551735	0.00	2.4800	6.650	12.5000
octopus	6.0	9.736667	6.106808	1.03	6.7825	10.055	11.8200
lobster	20.0	9.440500	7.408494	0.00	3.2300	9.565	12.9125
herring	13.0	8.870769	7.643847	1.73	2.6000	7.460	13.6600
turtle	1.0	8.760000	NaN	8.76	8.7600	8.760	8.7600
shellfish	15.0	7.856000	8.138181	1.68	3.0950	4.550	8.4000
seafood	267.0	7.771199	9.876049	0.00	1.2450	4.910	10.2800
halibut	2.0	7.505000	6.597306	2.84	5.1725	7.505	9.8375
tuna-fresh	37.0	6.572703	5.670728	0.00	1.6500	4.680	10.9100
swordfish	10.0	6.369000	5.247629	0.00	2.1725	6.085	8.8675
sardines	42.0	5.558095	5.911161	0.41	1.8750	3.800	6.2550
sturgeon	2.0	3.195000	2.298097	1.57	2.3825	3.195	4.0075
mussels	7.0	1.967143	2.187134	0.00	0.0000	1.100	3.9950
shark	1.0	0.970000	NaN	0.97	0.9700	0.970	0.9700

max

species	
frog	33.96
mullet	44.76
carp	92.57
pike	33.02
catfish	107.26
trout	87.09

ocean perch	54.40
whiting	60.62
pompano	76.40
flounder	68.59
tuna-mixed	117.17
mackerel	77.74
perch	53.81
eel	44.95
oyster	84.17
croaker	79.37
snails	18.06
cod	59.09
crab	70.26
sea bass	57.92
clam	94.44
shad	12.02
tilapia	82.54
shrimp	92.67
porgy	42.81
haddock	59.26
crayfish	74.07
squid	57.00
fish	73.03
scallops	26.91
anchovy	31.77
salmon	85.39
octopus	19.18
lobster	28.59
herring	24.21
turtle	8.76
shellfish	27.13
seafood	59.35
halibut	12.17
tuna-fresh	21.85
swordfish	16.05
sardines	28.61
sturgeon	4.82
mussels	4.68
shark	0.97

Statistics for SOLID_FATS

	count	mean	std	min	25%	50%	75%	\
species								
pike	2.0	34.965000	40.467721	6.35	20.6575	34.965	49.2725	
shad	1.0	27.200000	NaN	27.20	27.2000	27.200	27.2000	
scallops	12.0	14.042500	12.517566	0.00	4.4975	13.210	18.2600	

perch	53.0	13.067358	17.278393	0.00	1.6900	6.290	15.3300
eel	6.0	12.463333	20.504625	0.00	0.4225	3.620	12.4875
flounder	61.0	12.176393	17.947047	0.00	1.2100	7.460	16.8700
lobster	20.0	11.091000	13.284798	0.00	2.9025	5.685	15.5775
crayfish	11.0	10.978182	10.624235	0.00	1.4750	8.360	16.4100
clam	59.0	10.553390	10.910439	0.00	2.9450	6.210	14.8450
shark	1.0	10.500000	NaN	10.50	10.5000	10.500	10.5000
haddock	29.0	10.210690	14.638291	0.00	0.2500	3.970	13.8100
sturgeon	2.0	9.530000	7.028641	4.56	7.0450	9.530	12.0150
crab	127.0	9.502362	11.189808	0.00	0.6850	6.130	14.6200
shellfish	15.0	9.392667	10.371616	0.57	2.0050	7.220	11.6850
whiting	42.0	9.231429	11.518154	0.00	1.8125	4.435	10.1125
carp	15.0	9.091333	14.336918	0.00	0.4950	2.930	12.1650
mussels	7.0	8.847143	16.751831	0.00	1.0350	1.170	6.1750
oyster	32.0	8.716875	7.776648	0.00	1.6650	7.200	13.3275
ocean perch	23.0	8.638696	10.254026	0.00	1.5000	3.730	14.3100
shrimp	719.0	8.299583	12.225637	0.00	0.7600	3.730	11.2700
cod	87.0	8.254253	12.208110	0.00	0.2950	2.550	10.7100
catfish	140.0	8.174214	14.828085	0.00	1.0500	2.525	8.3925
pompano	25.0	7.731600	14.460980	0.00	0.1200	3.620	8.8100
fish	497.0	7.492998	11.112291	0.00	0.3600	3.440	9.4700
trout	38.0	7.099737	9.524831	0.00	0.0750	2.585	10.9775
salmon	369.0	7.065068	12.477866	0.00	0.2400	2.630	8.7800
tilapia	239.0	7.036946	11.361870	0.00	0.0000	2.350	9.0350
swordfish	10.0	6.687000	9.804989	0.00	0.0300	0.570	12.4150
halibut	2.0	6.635000	9.383307	0.00	3.3175	6.635	9.9525
croaker	24.0	6.310833	8.938233	0.00	0.7100	1.775	8.7025
anchovy	9.0	6.237778	12.133300	0.00	0.0000	0.300	4.6500
seafood	267.0	5.435019	9.562759	0.00	0.0000	1.550	6.9550
tuna-mixed	531.0	5.389341	8.806778	0.00	0.0000	1.060	7.4500
frog	1.0	5.030000	NaN	5.03	5.0300	5.030	5.0300
tuna-fresh	37.0	4.842973	9.140575	0.00	0.0000	0.660	5.1800
porgy	25.0	4.839600	5.867025	0.00	0.0000	1.870	7.2600
octopus	6.0	4.738333	4.923045	0.02	2.5025	3.810	4.3150
squid	23.0	4.091304	6.612567	0.00	0.1750	1.290	3.7600
sardines	42.0	2.822381	4.509479	0.00	0.0000	0.370	3.7200
herring	13.0	2.429231	5.012249	0.00	0.0000	0.000	1.0000
sea bass	22.0	2.345909	4.160516	0.00	0.0000	0.375	2.7950
snails	3.0	2.063333	1.893049	0.00	1.2350	2.470	3.0950
mullet	4.0	1.990000	1.456182	0.00	1.3575	2.400	3.0325
mackerel	20.0	1.447500	2.470078	0.00	0.0000	0.065	2.0475
turtle	1.0	1.240000	NaN	1.24	1.2400	1.240	1.2400

max

species	
pike	63.58
shad	27.20
scallops	38.48

perch	76.90
eel	52.74
flounder	114.19
lobster	54.63
crayfish	34.31
clam	49.37
shark	10.50
haddock	53.48
sturgeon	14.50
crab	62.56
shellfish	40.16
whiting	49.02
carp	53.58
mussels	46.34
oyster	27.73
ocean perch	33.13
shrimp	94.57
cod	57.87
catfish	107.08
pompano	71.48
fish	86.20
trout	38.54
salmon	119.91
tilapia	71.48
swordfish	26.44
halibut	13.27
croaker	32.23
anchovy	36.40
seafood	71.13
tuna-mixed	63.14
frog	5.03
tuna-fresh	39.83
porgy	19.05
octopus	14.24
squid	26.70
sardines	18.22
herring	15.53
sea bass	16.69
snails	3.72
mullet	3.16
mackerel	9.11
turtle	1.24

Statistics for ADD_SUGARS

	count	mean	std	min	25%	50%	75%	max
species								

crayfish	11.0	7.138182	9.879746	0.00	0.6050	4.460	8.7250	33.83
shad	1.0	6.180000	NaN	6.18	6.1800	6.180	6.1800	6.18
carp	15.0	5.124000	4.624826	0.00	0.8650	4.340	8.0950	12.70
mullet	4.0	5.085000	4.852480	0.00	1.9575	4.615	7.7425	11.11
octopus	6.0	4.880000	3.972838	0.00	1.4825	5.790	7.6750	9.35
eel	6.0	4.483333	7.969795	0.00	0.0000	0.000	5.4525	19.63
catfish	140.0	4.374071	5.355447	0.00	0.1750	1.530	7.6725	26.28
crab	127.0	4.077087	6.714667	0.00	0.0300	0.930	5.5350	42.78
whiting	42.0	4.075238	5.881155	0.00	0.1425	1.105	5.3900	23.42
shellfish	15.0	3.972667	4.639593	0.00	0.0000	2.080	7.1250	14.81
ocean perch	23.0	3.550870	4.442167	0.00	0.1600	0.700	6.8800	12.48
tuna-mixed	531.0	3.452166	4.126271	0.00	0.7850	1.850	4.7700	30.21
flounder	61.0	3.446230	4.610533	0.00	0.0000	0.840	6.2800	16.12
perch	53.0	3.435094	4.577243	0.00	0.0100	1.550	5.0300	19.41
trout	38.0	3.133684	5.904874	0.00	0.0000	0.705	2.1900	29.92
pompano	25.0	3.111600	5.042805	0.00	0.0000	0.710	3.2400	16.99
fish	497.0	3.087143	4.843778	0.00	0.0000	0.580	4.6300	25.31
swordfish	10.0	3.078000	4.024002	0.00	0.0925	0.550	6.7500	9.26
shrimp	719.0	3.059263	5.555434	0.00	0.0000	0.600	4.2250	61.64
tilapia	239.0	3.019958	4.848413	0.00	0.0000	0.480	4.5100	26.96
haddock	29.0	2.961034	4.920219	0.00	0.0800	0.380	5.1700	18.55
sea bass	22.0	2.614545	4.231345	0.00	0.0000	0.235	3.3825	13.07
clam	59.0	2.557119	3.742224	0.00	0.0000	0.820	3.1350	15.53
salmon	369.0	2.536992	4.290811	0.00	0.0000	0.530	3.2000	26.57
seafood	267.0	2.345805	4.222997	0.00	0.0000	0.440	2.7700	25.90
cod	87.0	2.302874	3.674514	0.00	0.0000	0.490	2.6600	15.43
oyster	32.0	2.214063	3.779891	0.00	0.0000	0.065	1.9500	11.25
scallops	12.0	2.163333	3.676217	0.00	0.0000	0.110	2.5950	10.67
anchovy	9.0	2.062222	4.423417	0.00	0.0000	0.040	0.5000	13.27
croaker	24.0	2.056250	4.171973	0.00	0.0000	0.645	1.3150	18.98
tuna-fresh	37.0	2.001892	4.109365	0.00	0.0000	0.380	1.3800	13.88
herring	13.0	2.000000	2.157920	0.00	0.0000	1.330	3.7100	6.55
lobster	20.0	1.643500	2.654885	0.00	0.2725	0.660	2.2375	11.50
porgy	25.0	1.348000	2.701336	0.00	0.0000	0.130	0.8200	10.11
sardines	42.0	1.329286	2.306806	0.00	0.0000	0.395	1.5250	9.49
squid	23.0	1.320000	2.221251	0.00	0.0000	0.350	1.4100	8.60
pike	2.0	0.990000	1.202082	0.14	0.5650	0.990	1.4150	1.84
frog	1.0	0.970000	NaN	0.97	0.9700	0.970	0.9700	0.97
sturgeon	2.0	0.950000	0.707107	0.45	0.7000	0.950	1.2000	1.45
mussels	7.0	0.817143	1.057619	0.00	0.0000	0.000	1.6300	2.46
halibut	2.0	0.740000	1.046518	0.00	0.3700	0.740	1.1100	1.48
mackerel	20.0	0.436000	1.059530	0.00	0.0000	0.000	0.2225	4.34
shark	1.0	0.020000	NaN	0.02	0.0200	0.020	0.0200	0.02
snails	3.0	0.000000	0.000000	0.00	0.0000	0.000	0.0000	0.00
turtle	1.0	0.000000	NaN	0.00	0.0000	0.000	0.0000	0.00

Statistics for A_DRINKS

	count	mean	std	min	25%	50%	75%	max
species								
halibut	2.0	1.285000	1.817264	0.0	0.6425	1.285	1.9275	2.57
snails	3.0	0.796667	0.800021	0.0	0.3950	0.790	1.1950	1.60
lobster	20.0	0.669000	1.405699	0.0	0.0000	0.000	0.7750	5.76
sturgeon	2.0	0.545000	0.770746	0.0	0.2725	0.545	0.8175	1.09
anchovy	9.0	0.456667	0.783278	0.0	0.0000	0.000	0.7900	2.23
eel	6.0	0.450000	1.102270	0.0	0.0000	0.000	0.0000	2.70
scallops	12.0	0.448333	0.888623	0.0	0.0000	0.000	0.2725	2.74
haddock	29.0	0.437586	0.904021	0.0	0.0000	0.000	0.5700	4.12
mussels	7.0	0.355714	0.637544	0.0	0.0000	0.000	0.4550	1.58
squid	23.0	0.329130	0.655840	0.0	0.0000	0.000	0.1100	2.33
crab	127.0	0.288898	0.824995	0.0	0.0000	0.000	0.0000	6.09
tuna-fresh	37.0	0.287027	0.681187	0.0	0.0000	0.000	0.0000	2.70
salmon	369.0	0.242114	0.964446	0.0	0.0000	0.000	0.0000	12.62
octopus	6.0	0.223333	0.547053	0.0	0.0000	0.000	0.0000	1.34
swordfish	10.0	0.218000	0.459584	0.0	0.0000	0.000	0.0000	1.09
mackerel	20.0	0.210500	0.533267	0.0	0.0000	0.000	0.0000	1.74
pompano	25.0	0.209200	0.517590	0.0	0.0000	0.000	0.0000	2.02
crayfish	11.0	0.193636	0.448024	0.0	0.0000	0.000	0.0000	1.34
seafood	267.0	0.179213	0.643089	0.0	0.0000	0.000	0.0000	5.77
shrimp	719.0	0.164784	0.735495	0.0	0.0000	0.000	0.0000	9.46
porgy	25.0	0.143200	0.483285	0.0	0.0000	0.000	0.0000	2.29
trout	38.0	0.129211	0.366262	0.0	0.0000	0.000	0.0000	1.67
shellfish	15.0	0.127333	0.410757	0.0	0.0000	0.000	0.0000	1.58
whiting	42.0	0.119762	0.554179	0.0	0.0000	0.000	0.0000	3.36
flounder	61.0	0.118197	0.397561	0.0	0.0000	0.000	0.0000	2.23
clam	59.0	0.117458	0.363107	0.0	0.0000	0.000	0.0000	1.56
fish	497.0	0.105030	0.524115	0.0	0.0000	0.000	0.0000	6.99
tilapia	239.0	0.099582	0.426007	0.0	0.0000	0.000	0.0000	3.96
cod	87.0	0.090575	0.396629	0.0	0.0000	0.000	0.0000	2.23
croaker	24.0	0.084167	0.412331	0.0	0.0000	0.000	0.0000	2.02
sea bass	22.0	0.079091	0.370969	0.0	0.0000	0.000	0.0000	1.74
perch	53.0	0.074717	0.311100	0.0	0.0000	0.000	0.0000	1.58
oyster	32.0	0.073438	0.291997	0.0	0.0000	0.000	0.0000	1.34
catfish	140.0	0.050286	0.303431	0.0	0.0000	0.000	0.0000	2.66
ocean perch	23.0	0.040000	0.165722	0.0	0.0000	0.000	0.0000	0.79
tuna-mixed	531.0	0.033616	0.248728	0.0	0.0000	0.000	0.0000	3.31
sardines	42.0	0.024048	0.155846	0.0	0.0000	0.000	0.0000	1.01
turtle	1.0	0.000000	NaN	0.0	0.0000	0.000	0.0000	0.00
pike	2.0	0.000000	0.000000	0.0	0.0000	0.000	0.0000	0.00
carp	15.0	0.000000	0.000000	0.0	0.0000	0.000	0.0000	0.00
herring	13.0	0.000000	0.000000	0.0	0.0000	0.000	0.0000	0.00
shark	1.0	0.000000	NaN	0.0	0.0000	0.000	0.0000	0.00
shad	1.0	0.000000	NaN	0.0	0.0000	0.000	0.0000	0.00
mullet	4.0	0.000000	0.000000	0.0	0.0000	0.000	0.0000	0.00
frog	1.0	0.000000	NaN	0.0	0.0000	0.000	0.0000	0.00

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