Trade Commodity Analysis

ANIMAL TRADE ANALYSIS 2006-2016

VISUALIZATIONS CREATED IN TABLEAU

Kevin Rius, Kyle Jensen, Trevor Willemarck, Dakota Gannon | OMIS 473 | Fall 2018
Z1764614@students.niu.edu, z1837361@students.niu.edu, z1763779@students.niu.edu, z1739488@students.niu.edu

Purpose:

Our purpose of the project is to elaborate and visualize different variables of the commodity animal trade statistics. Deeply explore the attributes/variables within our dataset to make clear conclusions on the relationships between these attributes/variables. Additionally, we have selected 6 countries within the dataset (at random) for our analysis. We will view trade flow (imports & exports), trade value (USD), each trade's weight, quantity of each trade, and the commodity being traded of each of the 6 countries selected from 2006-2016. This will provide us with 10 years of valuable trade statistics for which we can analyze both contextually and visually.

The 6 countries we have selected for analysis are: Australia (Australia), Brazil (South America), Canada (North America), China (Asia), Denmark(Europe) & Egypt (Africa). We selected these countries because we intended to select a country from each of the 7 continents. However, our dataset does not have trade information for the entire continent of Antarctica since there are no trade normality's. Our analysis will be demonstrated with the utilization of Tableau using the many visualization tools available, such as: bar charts, line charts, pie charts, a table, geographic map, and a heat map. After our visual analysis has been completed for each of the 6 countries selected a conclusion will be made on the rankings of the 6 countries based on their trade (live animals) habits from 2006-2016.

Background Information:

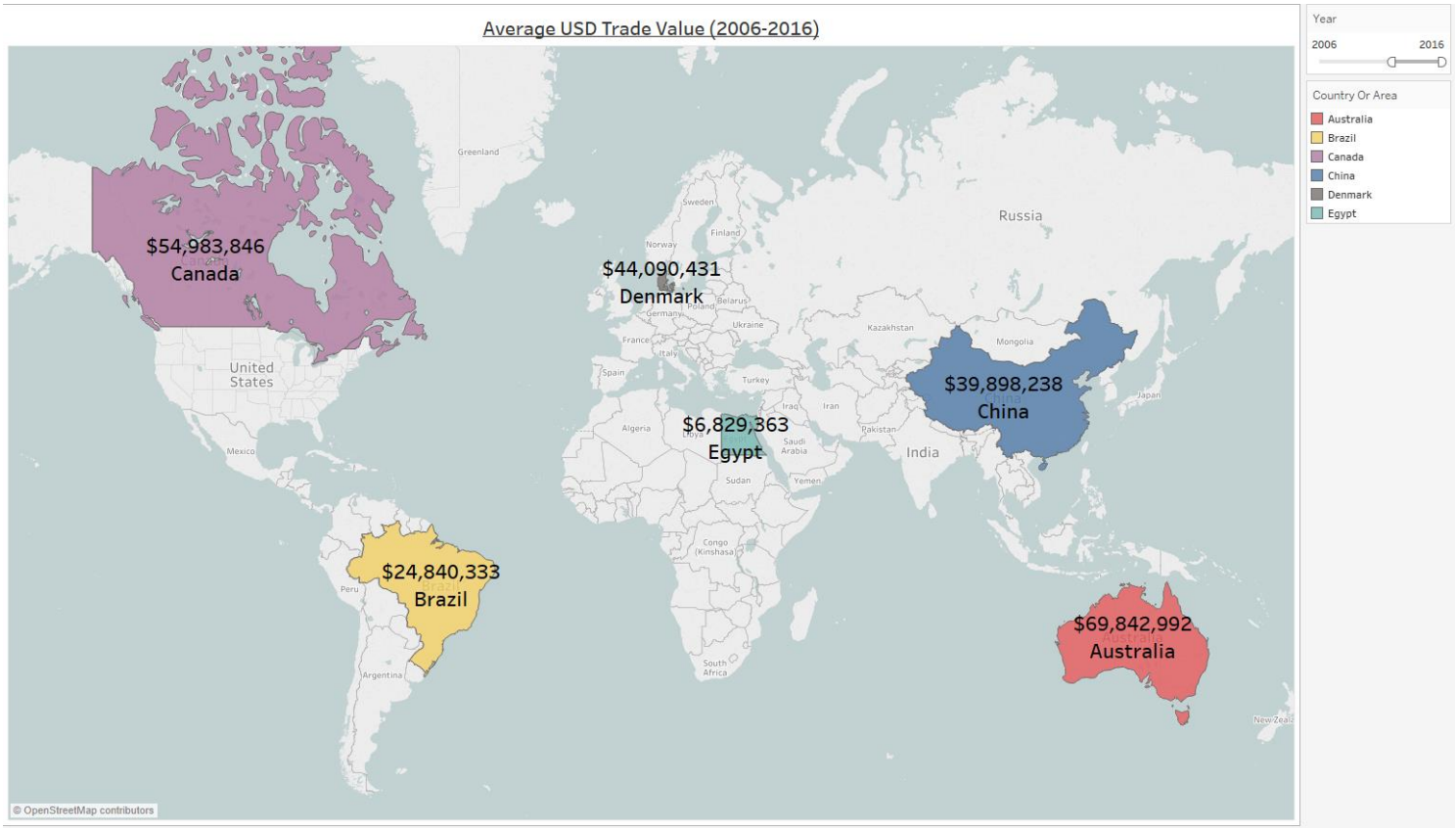
Trade Commodity Dataset

The dataset that we chose for this project focuses on commodity animal trade. This data set was chosen because we thought that it would be interesting to see the differences among countries and continents when it comes to the trade of live animals and which countries or continents exported the most animals and which countries were the ones who were importing the most due to the demand within the country. Within the dataset that we have chosen, there are 10 variables: country_or_area, year, comm_code, commodity, flow, trade_usd, weight_kg, quantity_name, quantity, and category. All of these variables will be useful to us later when we start to explore and create the visualizations. Country_or_area is defined as the country name of record and it is a categorical variable which we will use in a geographical role as country/region. As mentioned above we will be looking at 6 different countries that we selected at random. The next variable that we have year. The dataset defines year as "the year in which the trade has taken place", basically the dataset looked at all of the imports and exports of animals within the given country and the last time that specific product was imported or exported is going to show up as the year within the dataset. Year will be a categorical variable as well and the data type is date. Comm_code is a unique number given to the individual exports and imports of each country based on the specific animals that they are importing and exporting, this variable is a categorical variable. The next variable that we have is commodity, this tells us what exactly each country was importing and exporting. Commodity is a categorical variable. Flow defines whether the country imports or

exports a certain commodity and it is a categorical variable. Trade_usd is a quantitative measure for the amount spent on the import and export of a specific commodity. This measure will be used in average to see the average amount spent on imports and exports within the particular country. We will use this variable in currency with 0 decimal places. Weight_kg is also a quantitative measure that we will use in average. The weight_kg is a measure of the total weight of the commodity that the country has imported or exported. The next measure that we have is quantity_name, which is correlated to the quantity because it explains what type of variable is being used to calculate the total quantity. Quantity_name is a categorical measure. Like previously mentioned, quantity is a measure of the amount of imports or exports the country has traded. Quantity is based on quantity_name and the quantity is a quantitative measure that will be used in average. The final measure that we have is category. This measure is correlated to the commodity that the country imports or exports. The category is a categorical variable. Another correlation that we saw in this data set is between quantity and trade_usd. It seemed as though the higher the quantity average, the higher the trade_usd average would be. More of these correlations will be explained later within this report and the visualizations will help show the correlations between the data.

Visualizations & Findings:

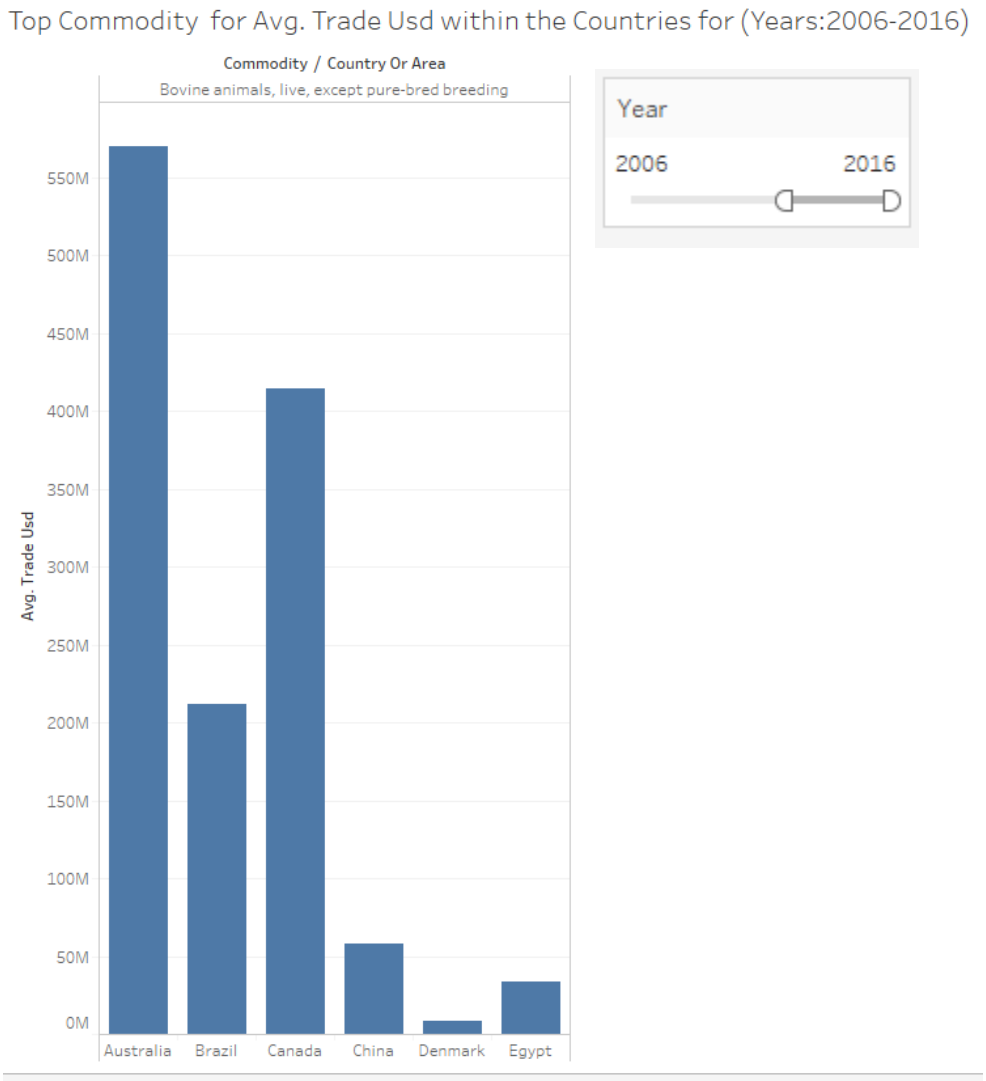
Visualization 1: Geographic Map



For our first visualization we decided to use a geographic map for our analysis. This geographic map allows for a perfect illustration of each of the 6 countries (and continents). When analyzing trade commodity data, we felt it was very necessary to provide an image of all of the countries and where they are located around each other. Additionally, this illustration contains the average trade value (in USD) for all of the 6 countries from 2006-2016. Per the visualization, the countries with the highest average

trade value (in USD) are as follows: Australia ($69,842,992), Canada ($54,983,846), Denmark ($44,090,431), China ($39,898,238), Brazil ($24,840,333), and Egypt ($6,829,363). The main goal of this visualization was to give a geographic and locational view of all of the countries in our analysis as well as displaying one of if not the most important attribute in our data, Trade value (USD), to show how the countries ranked based on that attribute. It is very clear that Australia earned the most trade value throughout the ten-year period.

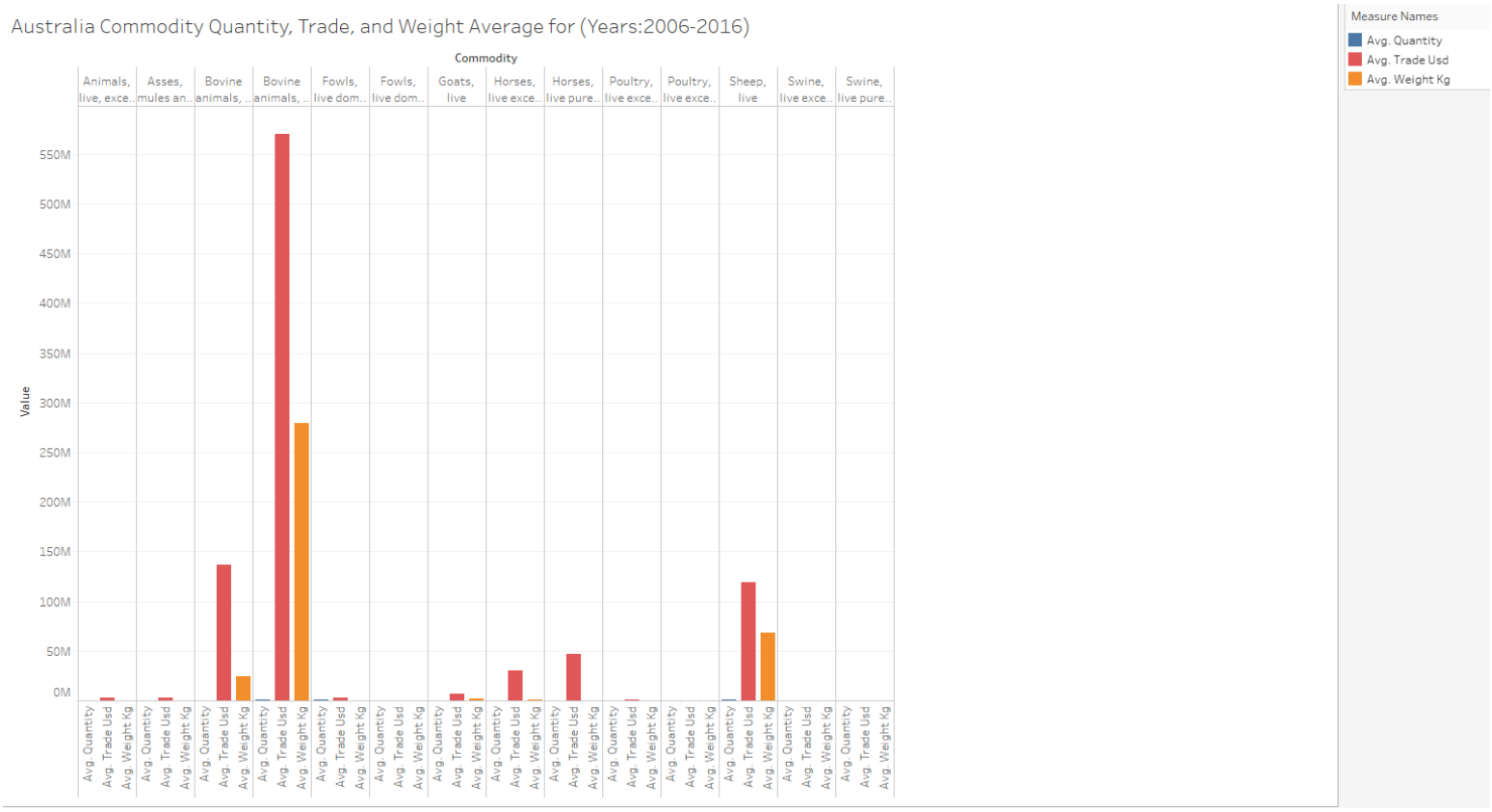
Visualization 2: Bar Chart



We decided to use a bar chart for this demonstration to show what the top commodity for trade USD is within the six countries/continents that we decided to analyze. Utilizing a bar chart for this visual was most fitting and practical for the purpose since we wanted to show what the top commodity is with the six different countries. Ultimately, we wanted to compare different variables as a whole while applying a year filter range of 2006-2016. Originally this visualization showed all the commodities that are traded with different countries. For example, if we get rid of the top commodity filter

the visualization will drill up and show all the other commodities. Essentially, we drilled down to show what the top commodity is with the six countries that are within the continents. Furthermore, this showed a clear visual over the 10 years on which country has the highest average USD trade dollars for the top trade commodity. Canada through 2006-2010 had the highest average trade USD for the top commodity (Bovine animals, live, except pure-bred breeding), however Australia was rapidly increasing their average trade USD ($433,622,242) and eventually surpassed Canada in 2011 and maintained to be the highest average trade USD country among the six countries to be studied.

Visualization 3: Bar Chart



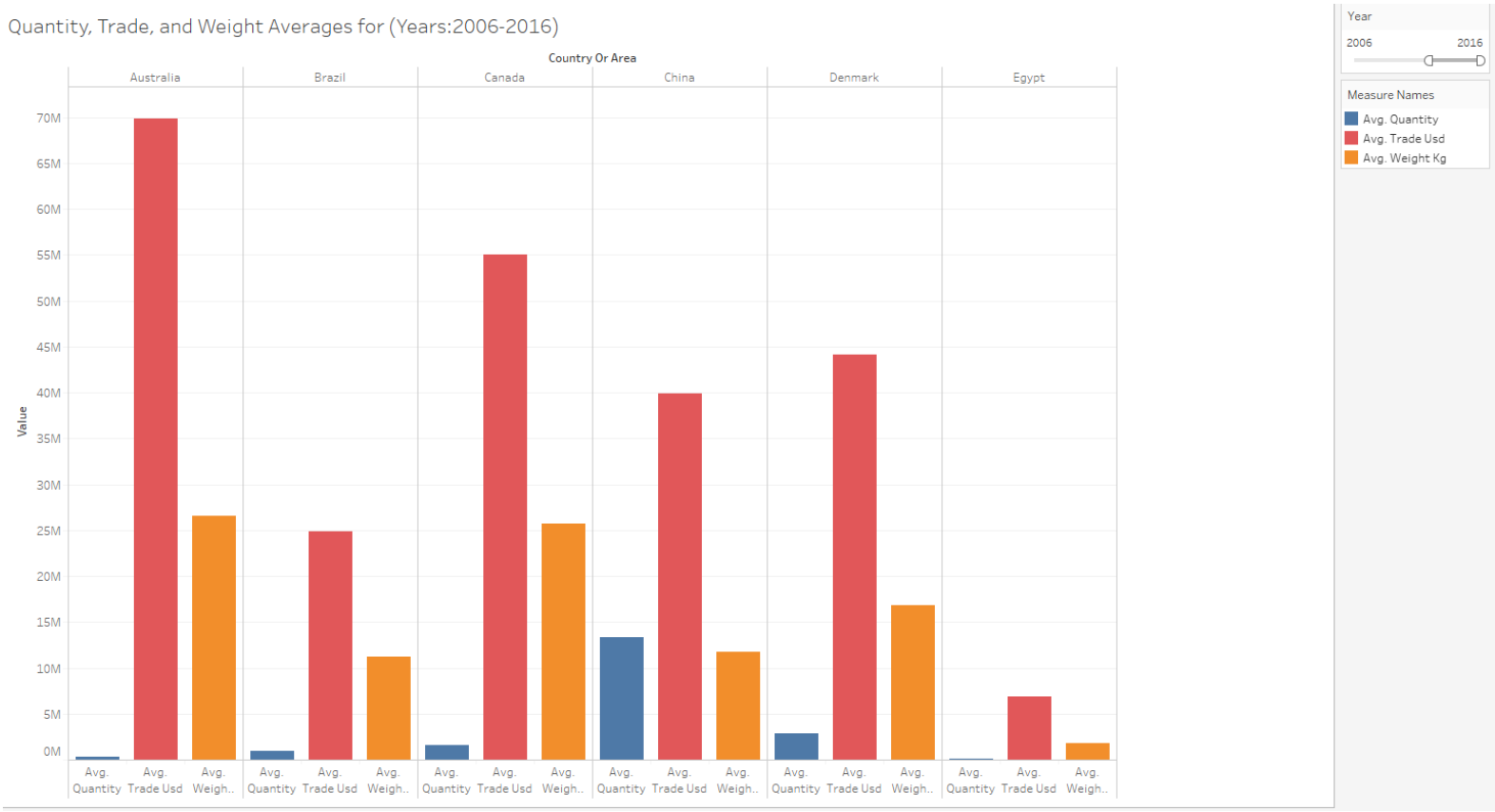
It was very clear from our previous two visualizations that Australia was quickly becoming the top ranked country out of the 6 countries chosen for our analysis on trade from 2006-2016. This visualization was made to dive deeper into Australia specifically and try and gather more information as to why they were the top trade player during the ten-year period. This bar chart contains Avg. Quantity (blue), Avg. Trade USD (red), and Avg. Weight Kg. (orange) for each trade commodity for the country of Australia. Per the visualization it is clear the top commodity sought after by Australia during this ten-year trade period was "Bovine Animals, Live, except pure breeding". This commodity had an Avg. Quantity of 832,841, an Avg. Trade USD of $569,968,408 and an Avg. Weight Kg. of 279,667,000. Other notable commodities sought after by Australia include: "Bovine Animals, live pure-breeding" and "Sheep, Live".

Visualization 4: Table

Flow	Country Or Area	Avg. Quantity	Avg. Trade Usd	Avg. Weight Kg
Export	Australia	453,053	105,579,490	43,740,415
	Brazil	1,926,839	48,374,741	22,108,034
	Canada	1,683,579	127,488,464	65,975,344
	China	22,539,438	43,651,425	18,470,257
	Denmark	4,485,942	73,512,027	29,051,742
	Egypt	33,886	1,448,261	57,142
	Total	5,310,944	70,643,913	30,909,639
Import	Australia	1,178	22,642,758	312,924
	Brazil	25,684	1,709,227	581,668
	Canada	2,347,632	11,959,924	3,926,421
	China	723,491	38,152,604	3,620,145
	Denmark	597,941	4,484,437	504,814
	Egypt	108,473	14,938,910	4,557,697
	Total	900,343	14,638,762	2,202,233
Re-Export	Canada	1,529	2,186,375	129,006
	Total	1,529	2,186,375	129,006
Re-Import	Australia	287	2,255,937	20,318
	Brazil	9	40,712	4,698
	Canada	37	76,691	13,322
	China	6	292,964	849
	Total	101	657,728	13,278
Grand Total		3,110,014	42,316,667	16,965,894

For this visual we wanted to make a table to demonstrate the six countries that utilize the different type of flows, such as export, import, re-export, re-import. Also, applying average quantity, average trade USD, and average weight kg furthers the analysis and purpose of the table. The table does a good job demonstrating what country has the highest flow requisite within average quantity, average trade USD, and average weight kg. For example, looking at export, China has the highest average quantity (22,539,438) while Egypt has the lowest (33,886). This visualization also shows what countries aren't included in certain flows, such as re-export and re-import. By analyzing the first flow, export, Canada has the lowest average quantity (1,683,579) and the highest average weight kg (65,975,344). This makes sense as Canada's top trade commodity are bovine which are large/heavy animals. Therefore, explaining why Canada's exporting average quantity is low when comparing to Canada's high exporting average weight kg. Over the 10 years for importing the six countries growth increases at a normal rate except China. China's average trade USD increased immensely when compared to the other countries. In 2006 China's trade USD was $7,051,206 and in 2016 it's at $38,152,604. This shows that China has the most interest for importing among the six countries. This table also demonstrates that Canada is the only country that re-exports and only four countries re-import (Australia, Brazil, Canada, and China).

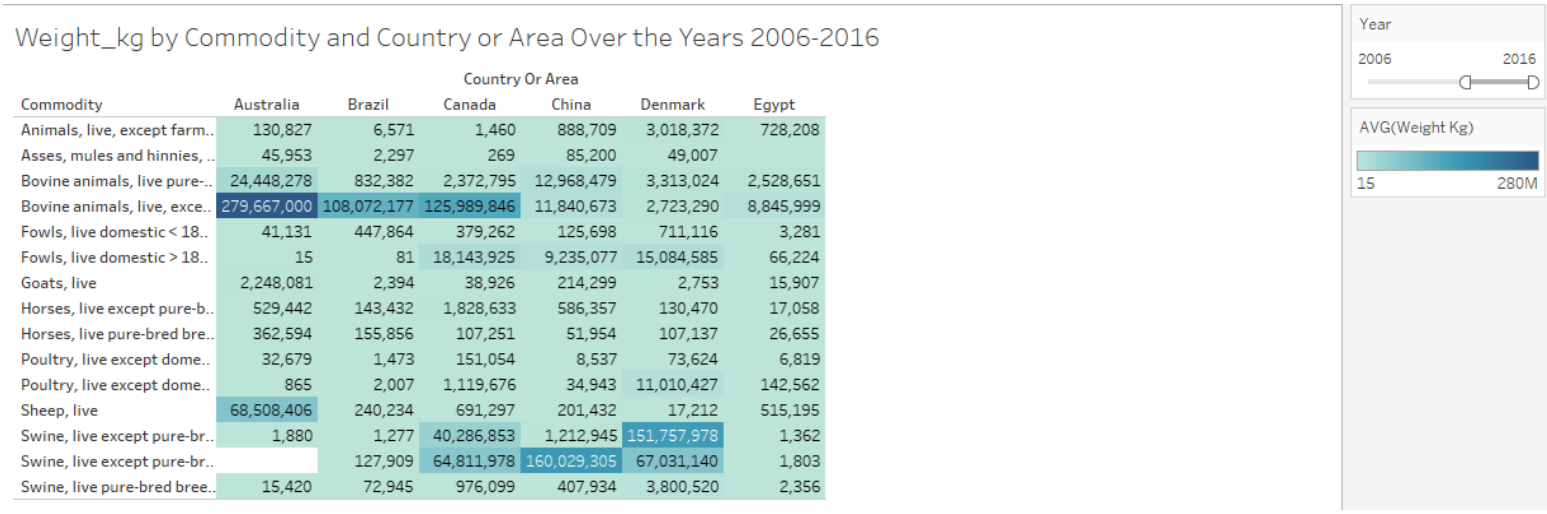
Visualization 5: Bar Chart



This visualization utilizes a column chart. Ultimately, a column chart was used to demonstrate three values (average quantity, average trade USD, and average weight kg) that shows a comparison for each of the six countries with the range of 2006-2016. The chart clearly demonstrates which countries has the highest values among the three over the 10 years. This visual has similar results that are in visualization 2. Canada during 2006-2010 has the average highest trade USD (2006: $54,049,655, 2007: $59,654,259, 2008: $60,912,430, 2009: $53,672,128, 2010: $55,319,363) and average weight kg (2006: 26,239,00, 2007: 33,860,395, 2008: 34,286,891, 2009: 31,091,306, 2010: 29,727,396) . 2011 and onward, Australia shows to be the dominant country with average

trade USD (2016: $69,842,992) and average weight kg (2016: 26,564,620). China throughout the 10 years has the highest average quantity (2016: 13,292,192).

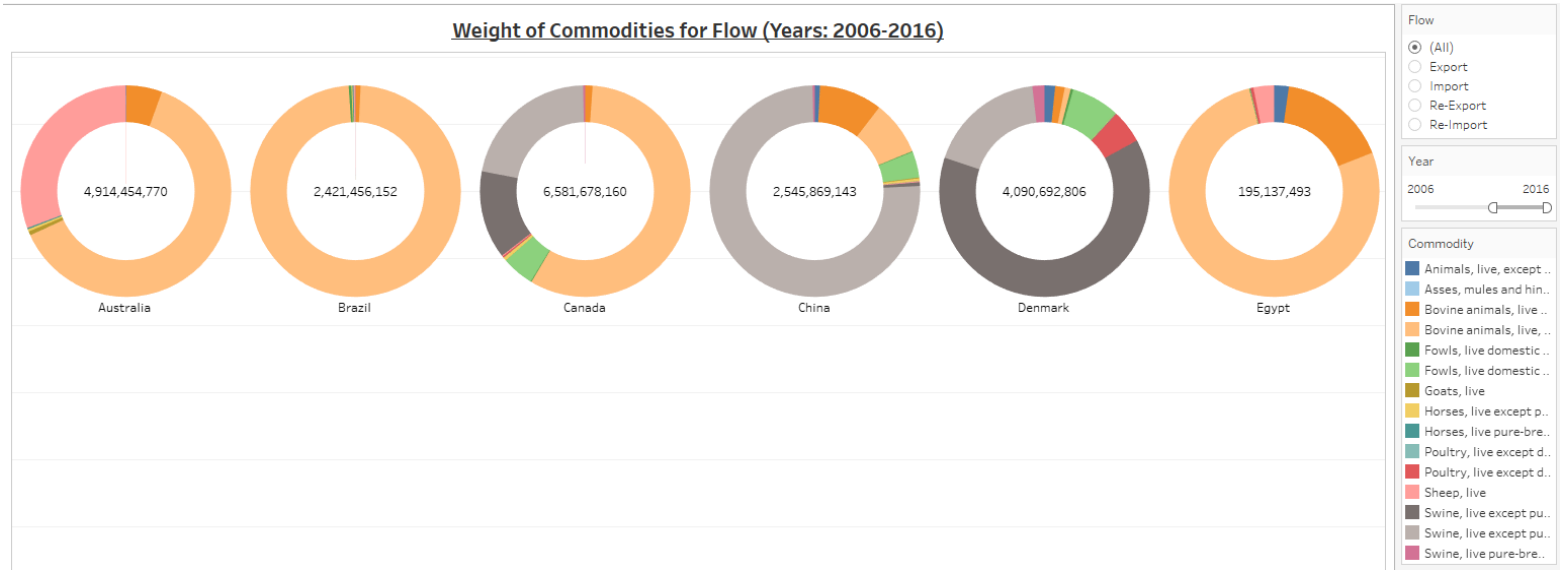
Visualization 6: Heat Map



The purpose of this visualization is to show the six countries highest average weight kg by the different commodities during the years 2006-2016. Utilizing a heatmap/highlighted table makes the visualization and purpose clear for higher values. Also, utilizing the year slider allows the demonstration to show the overall changes if any for the weight kg values. This visualization provides clear information that Bovine animals, live, except pure-bred breeding over the 10 years are the top contenders for overall weight (2016: 279,667,000) in Australia. This shows that Australia deals the most with this certain commodity since the number is overwhelming higher than every other commodity (weight variation). Also, the same commodity is the top for Brazil (2016: 108,072,177) and Canada (2016: 125,989,846). Furthermore, the 2nd (2016: 160,029,305)

and 3rd (2016: 151,757,978) highest weight within the heatmap/highlight table is Swine, live except pure-bred breeding > 50 kg in China and Denmark.

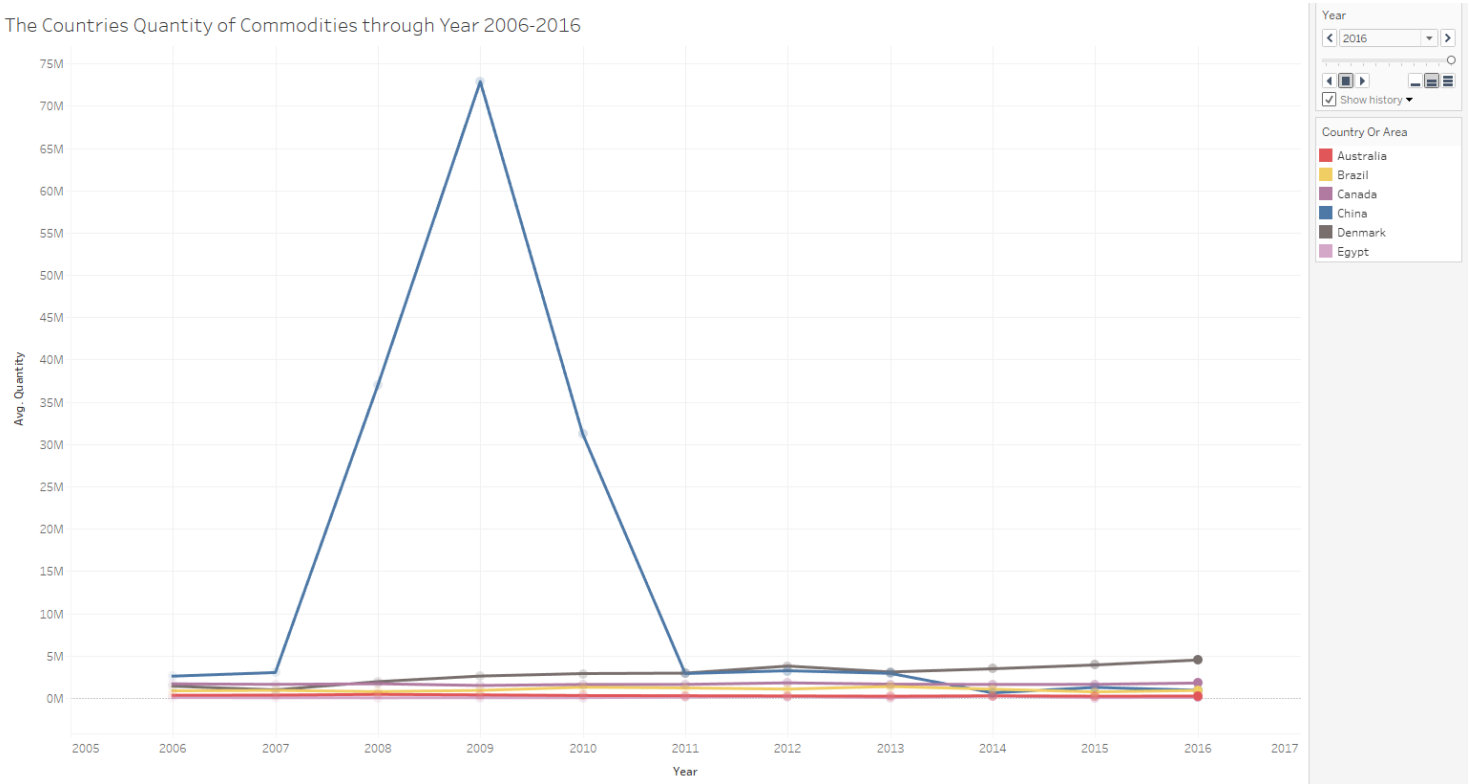
Visualization 7: Donut Chart(s)



This donut chart visualization was used to illustrate the weight of all commodities for each country during the ten-year period by flow. Flow is the method in which the commodities were transported and categorized (import, export, re-import, re-export). This visualization brings value by showing which commodities each country brought in via their exports and imports by weight. The most sought-after trade commodity was "Bovine animals, live, except pure-bred breeding" which is shown by the cream color in each donut chart. This commodity was the most dominant trade commodity by weight for the following countries: Australia (3,076,337,005 kg), Canada (3,779,695,375 kg), Brazil (2,377,587,884 kg), and Egypt (150,381,985 kg). It is worth noting that again Australia seems to be the leading country in most trade categories during the ten-year period of 2006-2016. Additionally, when the flow filter is changed from "All" to "Re-Export" the only country displayed is Canada and the trade commodity most prevalent is again

"Bovine animals, live, except pure-bred breeding". Re-exports are exports of foreign goods in the same state as previously imported. When the flow filter is changed from "All" to "Re-Import" the countries shown are: Australia, Brazil, Canada, and China. China specifically is interesting with their Re-Import as the only commodity Re-Imported by China was "Animals, live, except farm animals". Re-Imports are goods imported in the same state as previously exported. For the countries who did Re-Import, Australia mainly re-imported "Horses, live except pure-bred breeding", Brazil mainly re-imported "Horses, live pure-bred breeding" and Canada mainly re-imported "Bovine animals, live pure-bred breeding". This visualization is extremely valuable because it provides the ability to analysis each country by viewing their trade commodities and the flow of those commodities from 2006-2016!

Visualization 8: Motion Chart (Line)

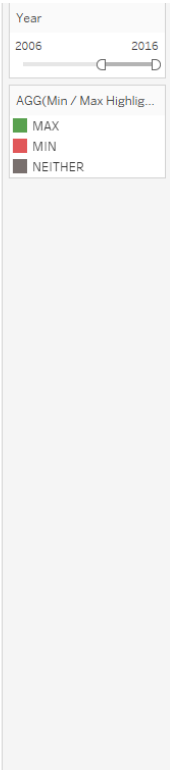


We decided to utilize a motion chart for average quantity for the six different countries over 2006-2016. By analyzing the data, we realized that China's average quantity during 2007-2010 was extremely high (peaked in 2009: 72,845,909) when compared to the other 5 countries. Utilizing a motion chart demonstrates the decreasement and stabilization of commodity quantity over the years for the countries. China decreases even more after 2013 (lowest in 2014: 597,202), while the other 5 are stable over the 10 years. Ultimately, after 2011, the six countries have an overall and similar and stable quantity of trade.

Visualization 9: Highlighted Table (Calculated Field)

Quantity (AVG) of each Commodity per Country

Commodity	Australia	Brazil	Canada	China	Denmark	Egypt
Animals, live, exce..	40,193	33,663	696,804	100,951,004	414,796	168,149
Asses, mules and h..	114	8	209	182	369	188
Bovine animals, liv..	76,399	2,440	4,212	47,156	9,579	6,136
Bovine animals, liv..	832,841	258,209	394,750	42,609	21,539	49,264
Fowls, live domesti..	636,529	9,169,010	15,703,158	2,747,752	15,646,803	108,625
Fowls, live domesti..	15	22	285,589	6,287,570	7,743,562	57,357
Goats, live	64,333	49	1,206	11,032	34	147
Horses, live except ..	1,573	399	18,054	855	314	63
Horses, live pure-b..	1,660	1,431	737	97	510	623
Poultry, live except..	38,613	19,551	6,634,530	38,318	1,531,337	400,832
Poultry, live except..	174	638	517,227	16,900	844,112	93,992
Sheep, live	1,433,851	11,076	12,785	25,969	1,193	10,582
Swine, live except ..	52	8,372	2,325,442	39,608	5,440,447	55
Swine, live except ..		1,406	670,298	1,724,262	613,017	134
Swine, live pure-br..	248	1,125	7,886	6,525	53,405	51



To further analysis the average quantity of each commodity for each of the 6 countries selected, we decided to make a table showing all commodities that were traded during the ten-year period (2006-2016) with each country's average quantity of the commodities traded. Instead of just making a simple table for our illustration we felt it was necessary for the table to provide more of an impact and thus we created a calculated field to highlight the entire table. This calculated field highlights the highest (in green) and lowest (in red) average quantity of each in commodity. For example, the first commodity shown, animals, China's average quantity of 100,951,004 is highlighted in green and Brazil's average quantity of 33,663 is highlighted in red. This table is able to further provide not only quantitative analysis with average quantities, but it also implements a very helpful visual tool by highlighting the highest and lowest average quantities of each commodity, to show the commodities that each country prioritized more in trade and the countries that did not.

Conclusion:

After analyzing the visualizations, it is clear that Australia is the leading country in terms of trade. Followed by Canada, Denmark, China, Brazil, and finally Egypt. Our visualizations showed that the most traded commodity was livestock (bovine, sheep, swine, etc.) And the countries with a higher ratio of livestock trade tended to have a higher trade value in USD. Egypt and Brazil had the lowest average quantity of each commodity and thus had the lowest trade value. This makes sense as Egypt and Brazil are the lowest ranked countries in average trade, both have lower import and export values than the other countries.

One of the more surprising finds from the visualization was that China was ranked as the third lowest of the six countries in terms of trade. China has become one of the leading economies in the world recently, so we assumed that they would have ranked higher in average trade in dollars. China's average trade in USD increased much faster than the other five countries, this is most likely due to the massive amount of products they were exporting between the years of 2007 and 2009. China has the highest amount of exports of the six countries but still has one of the lowest trade values, this is most likely due to the fact that China's exports do not sell as high per unit as livestock.

As previously stated, livestock is the highest traded commodity of the six countries. Canada was originally the leading country in livestock trade but in the recent years Australia surpassed them. Livestock seems to be the most lucrative world trade commodity, Visualization 7 reaffirms this. Livestock is the highest imported and

exported commodity for all countries, and all but China and Denmark have bovine as their most traded livestock good.

Our visualizations showed that for Australia, Canada, Denmark, China, Brazil, and Egypt livestock was the most lucrative trade commodity. It is likely that this trend would be present in other countries as well. Due to this realization, it is highly probable a country could increase their average trade value by exporting more livestock, specifically bovine.

Tableau Dashboard:

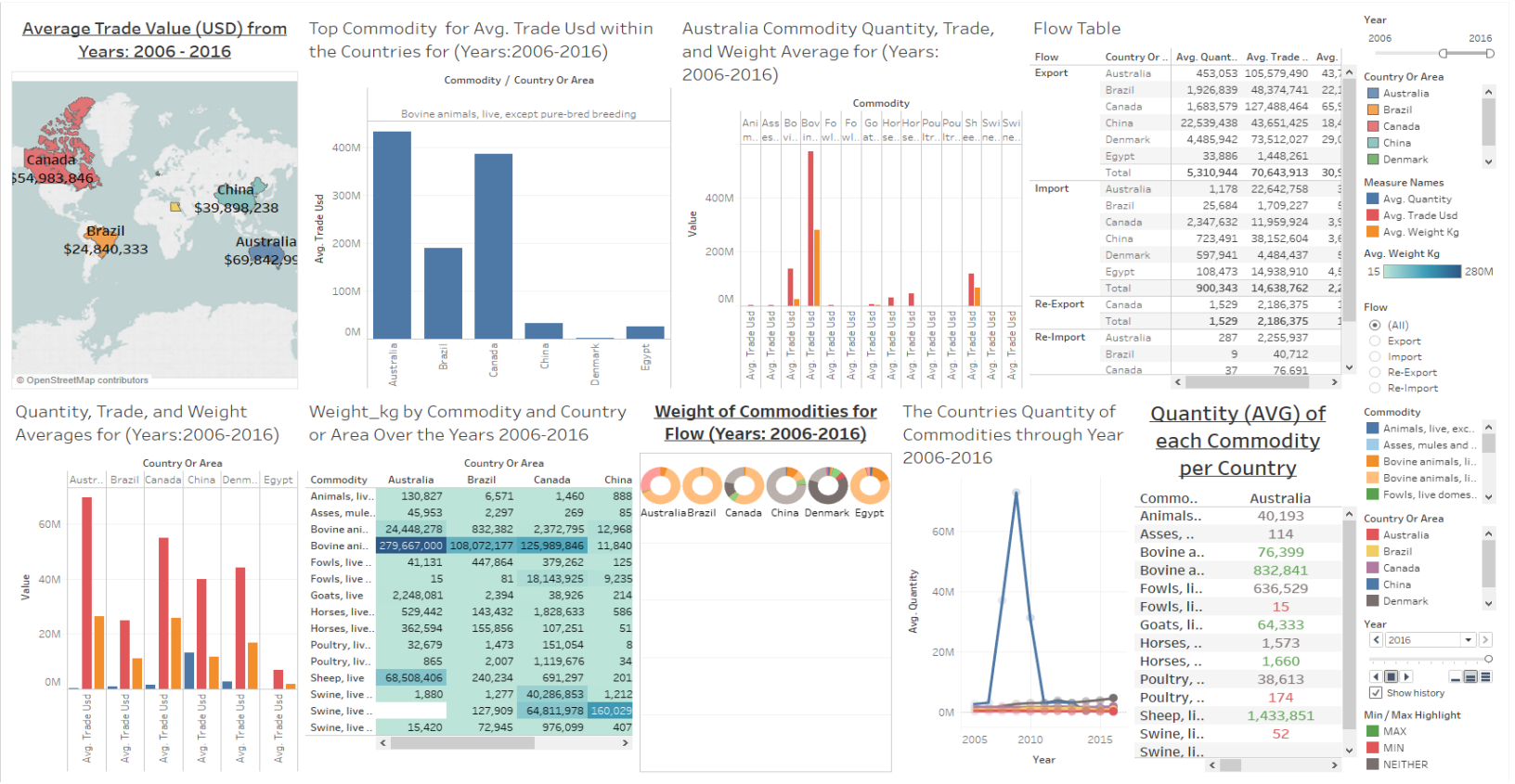


Tableau Public Link:

https://public.tableau.com/profile/kyle.jensen8791#!/vizhome/TradeCommodityAnalysis

Visuals/GeoMapAvgTradeValue?publish=yes

Trade Commodity Dataset:

https://www.kaggle.com/unitednations/global-commodity-trade-statistics

commodity_trade_statistics_data.xls