

University of Life Science, Prague

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Bachelor Thesis

Tendencies in meat consumption in the EU

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Declaration

I declare that I have written my bachelor thesis on the topic Tendencies in meat consumption in the EU on my own and I have used sources that are mentioned in the thesis.

In Prague on _____

Acknowledgement

I would like to thank to my supervisor Ing. Jiri Mach, Ph.D. for supporting me during the elaboration of the thesis.

Tendencies in meat consumption in the EU

Abstract

The main goal of the bachelor thesis is to investigate the meat consumption trends of several European countries and to demonstrate an influence of income on consumption of meat. Data is investigated between 2013 and 2022. The descriptive and comparative analysis demonstrate that the meat consumption increases with the increase of income that is typical for normal goods, whose elasticity is less than 1. It has been confirmed in the case of the EU ($e=0,12$), the Czech Republic ($e=0,56$), the Netherlands ($e=0,2$), Spain ($e=0,8$), Poland ($e=0,55$), Great Britain ($e=0,04$, 2015), Great Britain (for years 2016 -2018).

Besides, the linear regression is used for the observation to demonstrate whether there is a statistical significance between income and consumption. If p-value is less than 0,05, it reveals that there is dependence between them. Therefore, according to the research only the Czech Republic (R-square= 62%, p-value=0,0115), Poland (R-square= 79%, p-value=0,0069) and Great Britain (2018) (R-square= 79%, p-value=0,0074) fulfill this condition. Namely, these three countries reveal a significant relationship between the meat consumption and income because they are statistically significant.

Keywords: meat consumption, the EU, beef, pork, chicken, competitiveness, comparison, price, income

Tendence ve spotřebě masa v EU

Abstrakt

Hlavním cílem bakalářské práce je prozkoumat trendy spotřeby masa v několika evropských zemích a prokázat vliv příjmů na spotřebu masa. Data jsou zkoumána v letech 2013 až 2022. Popisná a srovnávací analýza ukazuje, že spotřeba masa se zvyšuje s nárůstem příjmů, které jsou typické pro běžné zboží, jehož elasticita je menší než 1. Ta byla potvrzena v případě EU ($e=0,12$), České republiky ($e=0,56$), Nizozemska ($e=0,2$), Španělska ($e=0,8$), Polska ($e=0,55$), Velké Británie ($e=0,04$, 2015), Velké Británie (v letech 2016 -2018).

Kromě toho se lineární regrese používá pro pozorování k prokázání, zda existuje statistická významnost mezi příjmem a spotřebou. Pokud je p-hodnota menší než 0,05, ukazuje to, že mezi nimi existuje závislost. Podle výzkumu tedy tuto podmínku splňuje pouze Česká republika (R-kvadrát = 62 %, p-hodnota = 0,0115), Polsko (R- kvadrát = 79 %, p- hodnota = 0 0069) a Velká Británie (2018) (R- kvadrát = 79 %, p- hodnota = 0 0074). Tyto tři země konkrétně ukazují významný vztah mezi sebou.

Klíčová slova: spotřeba masa, EU, hovězí maso, vepřové maso, kuře, konkurenceschopnost, srovnání, cena, příjem

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List of Abbreviations

EU	European Union
GDP	Gross domestic product
OECD	Organization for Economic Co-operation and Development

1 Introduction

Intakes of meat were somewhat little of pre- industrial societies, and they were not included into people's diet. Even so, meat is consumed on a daily basis in a contemporary society. Above all, it is the largest source of the protein from animals. Increasing meat consumption is supposed to signify a change of diets in the world as it is stated by several researchers, such as Smil¹. Nevertheless, according to R. Black who investigates in his research the increase of meat consumption that is perceived as the source to environmental worries all over the world. Namely, issues with the change of climate or loss of biodiversity of international organizations².

Consequently, consumption and production of beef are regarded to be not friendly to environment. Above all, fermentation processes produce large quantity of excrements produced by animals. As a result, they have a negative impact on the environment in the form of methane and nitrous oxide emissions. According to researchers, such as Steinfeld who asserted that forests and savannas were converted into agricultural land, which are used for production of livestock from 70% of the agricultural land³ as a result. The process of conversion has been a large contributor to decrease in biodiversity, quality of water and services of ecosystem. As a matter of fact, a team of scientists⁴ investigated conversions of land for production of livestock in their work. They discovered that the conversions are the main cause of CO₂ emissions. What is more, nature and environment have been under pressure due to the contemporary level of the consumption of meat.

Hence, it is necessary to investigate the increase of consumption of beef because the economic growth is said to be the reason. Admittedly, the richer people are, the more they want to consume the meat as it is demonstrated in the work of a group of researchers⁵, who

¹Smil, V. (2002), *Eating Meat: Evolution, Patterns and Consequences. Population and Development*[online]. [cit. 2019-02-13].

² Black, R. (2007), *Shun Meat, says UN Climate Chief* [online]. [cit. 2019-02-13]

³ Steinfeld, H. (2006), *Livestock's long shadow: Environmental issues and options*[online]. Rome: Fao [cit. 2020-02-03].

⁴ McAlpine (2009), *Increasing World Consumption of Beef as a Driver of Regional and Global Change: Global Environmental Change* [online]. [cit. 2019-02-13]

⁵ Chern, W. (2003), *Analysis of food consumption: Social development paper* [online]. Rome:[cit. 2019-02-13].

reveal that beef positively reacts to income 's increase and it is supposed to be a luxurious meat item. Whereas, it has been vice versa in Europe since the consumption of meat dropped in Europe.

Besides income, there are other aspects that have made the meat consumption increase. For instance, some studies⁶ provide several explanations why people eat meat. Customs, health and comfortability are associated with it. Religion has somewhat influence on meat consumption.

However, literature is not fully complete as for the beef consumption research. They focus on one impact and complete overview of the most important influences is missing. Many studies concentrate on a particular country. Therefore, it cannot be valid for the rest of the world.

⁶ Hungerman, D. (2011), *Do religious proscriptions matter: Evidence from a theory-based test* [online]. Cambridge (USA): [cit.2019-02-13].

2 Objectives and Methodology

2.1 Objectives

The main goal of the bachelor thesis is to demonstrate tendencies in consumption of meat in the European Union. Moreover, the dependency of the consumption of meat on the income per household is investigated.

Another aim of the thesis is to research whether there is a dependency between expenditure, beef and the income in Great Britain.

2.2 Question of the Research

With the object of the bachelor thesis, the bachelor thesis assesses the response for the research question.

„What influence has the increase of income per household on the consumption of meat for necessary goods? “

2.3 Methodology

Methodology consists of two parts. Aspects that refer to meat consumption are included in the theoretical part. The data has been taken from sources that are scientifically oriented, for instance researching reports, books and web pages referring to meat consumption.

The income elasticity and price elasticity of the beef consumption are investigated in the practical part.

A change of price influences the sales turnover. As a matter of fact, the price elasticity is a function that measures this influence.

$$\text{Price elasticity of demand} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in Price}} \quad (1)$$

$$e_{Q,P} = \frac{(Q_1 - Q_0) / (Q_1 + Q_0)}{(P_1 - P_0) / (P_1 + P_0)} \rightarrow (\partial Q) / (P) * (\partial P) / (Q) \text{ when } \Delta \rightarrow 0 \quad (2)$$

To start with the topic, Q and P correspond to the demanded quantity called price. Provided that the demand Q is dependent on price P. More precisely $Q=f(P)$. Dots in the equation refer to other additional variables than P (Parkin, 2000). The additional variables are supposed to remain unchanged.

A positive percentage change in price commonly ends with a negative percentage change in quantity that is demanded $e_{Q,P}$ frequently negative (Nicholson, 1998). On condition that the demand is measured for elasticity, the absolute value is considered (Powel, 2000). However, there is a distinction between absolute values $e_{Q,P}$ that are less sizeable than 1, equal to or larger than 1 as it is demonstrated in table 1.

Table 1 Terminology for a demand curve to differ values for $e_{Q,P}$

	Absolute value of $e_{Q,P}$ at a point	Terminology curve at this point
	$ e_{Q,P} > 1$	Elastic
	$ e_{Q,P} = 1$	Unit elastic
	$ e_{Q,P} < 1$	Inelastic

source: Nicholson, (1998), p191

As for the elastic curve, a price increase indicates that a larger proportional quantity decreases, or increases in the case that $e_{Q,P} > 1$. Subsequently, it signifies that price has a larger influence on demand. Granted that the demand curve is unit elastic the increase in quantity and price are proportionally identical. As a final point, an inelastic demand curve does not respond profoundly to price changes in comparison to the elastic and unit elastic demand curve.

Income elasticity of demand

The income elasticity $e_{Q,I}$ measures the influence of income's change on the demand provided that all other variables are constant⁷.

The value of $e_{Q,I}$ can be divided into three groups as it is revealed in the table2

Table 2 Terminology for a demand curve to differ values for $e_{Q,I}$

Value of $e_{I,P}$	Good classification
$e_{Q,I} > 1$	Normal good, income elastic
$0 < e_{Q,I} < 1$	Normal good, income inelastic
$e_{Q,I} < 0$	Inferior good

Source: Matthews, (2000), p80f

The linear regression models

Begin with the topic, the linear regression deals with the dependance of the dependent variable on other variables called explanatory variables. The goal of the regression model is to estimate the value of the dependent variable y , as for the values of the explanatory variables, \mathbf{X} .

- \mathbf{x}_i , $\boldsymbol{\beta}$ and \mathbf{b} are $1 \times K$ vectors 'elements.

Besides, the linear relationship is between the dependable variable y , and the explanatory variable. However, the relationship can be with the parameters, $\boldsymbol{\beta}$. As a result, the conditional estimation of y , $E(y|\mathbf{X})$ is a function of linearity of \mathbf{X} . In that case, the value of \mathbf{X} is either one or zero to make the definition of linearity be valid.

Nevertheless, the linearity in parameters indicates that $E(y|\mathbf{X})$ is the linear function of elements in $\boldsymbol{\beta}$. Admittedly, it does not have to be linear in the variable \mathbf{X} . As a consequence, $E(y|\mathbf{X}) = \beta + \beta X$ is a linear regression model (Gujarati, 2003).

Classical linear regression model

- linearity: it is linear in the parameters

$$y = X\beta + \varepsilon, y_i = \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 x_{i3} + \varepsilon_i \quad (3)$$

⁷ POWELL, Melanie (2000). *Economics Theory: Fifth Edition* [online]. Italy: Addison-Wesley Publishing Company, [cit. 2021-7-18]

Torquist functions

According to Torquist, the relationship between the consumption expenditures and the income are quantified by three consumption functions. The distinction between them is whether goods which are considered are necessary and essential goods, less necessary goods, or exclusive and luxury goods. What is more, this distinction is on the basis of the relation of individual consumer goods to the necessities of people (Sznajder and Adamczyk, 2003).

Torquist 1. function

- for strictly necessary goods, $E < 1$ (Kubicova, 2010)

$$C1 = \frac{m1}{v} * v + n1$$

(4)

C- demand for the product (or product group) taken into the account.

V- income

m,n,p – econometric parameters

Torquist 2. function

- for everyday consumer goods, E is approaching 1 (Lusnakova, 2010)

$$C2 = \frac{m2*(V-p2)}{v} + n2$$

(5)

C- demand for the product (or product group) taken into the account.

V- income

m,n,p – econometric parameters

Torquist 3. function

- for luxury goods, $E > 1$ (Niitamo, 1968)

$$C3 = \frac{m3*(V-p3)}{v} + n3$$

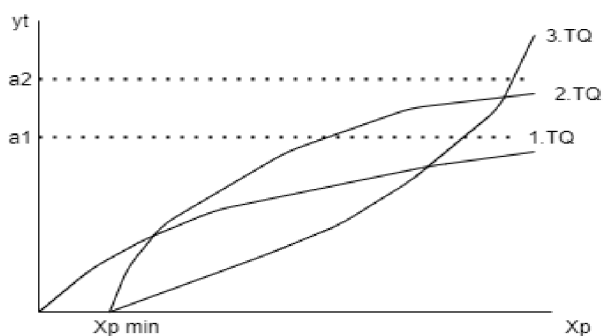
(6)

C- demand for the product (or product group) taken into the account.

V- income

m,n,p – econometric parameters

Figure1 Torquist's functions



source: Nicolae et al.,2010

As for the summary of these functions:

- a) The demand (C1) increases at a less sizeable rate with the increase of the income. As a matter of fact, the demand is inclined to be capped as it is demonstrated in Figure 1. As a result, the function serves for modeling strictly necessary goods, for example bread.
- b) The demand (C2) is similar to C1 as for the relationship between demand and income. However, its threshold of saturation (a2) is somewhat higher. What is more, income and demand are larger as well as it is revealed in Figure 1. The function is used for modeling of necessary goods, for example butter.
- c) The third function is common for products that require a continuous increase with increasing demand as it is demonstrated in Figure1. The function serves for modeling of luxurious goods as it is revealed in the work of L.Kubicova⁸.

So that, 13 European countries have been selected for the research. Figures illustrate economic indicators. In addition, the income elasticity on the beef expenditure is observed in the case of Great Britain. The data has been obtained from Eurostat, OECD and ceic.data. Data has been analyzed between 2013 and 2022.

Moreover, the linear regression is used for investigating the dependency of the meat consumption on the income per household. The model has one dependable variable (income) and one independent variable (consumption or expenditure).

2.4 Restrictions of the Research

To start with the topic, the investigation of the bachelor thesis is restricted by several aspects. Furthermore, the bachelor thesis does not possess sufficient amount of data for obtaining a prime result. The observation data deals with the data between 2013 and 2022. On the whole, descriptive, comparison methods and the elementary statistical method are used for the analysis

⁸ Kubicova L. (2010) *Consumer foodstuffs* [online]. 2010 [cit. 2021-7-22].

3 Literature review

3.1 Definition of the Elasticity

It corresponds to the degree that causes individuals and producers to alter their requirements or to change a quantity supplied referring to cost or revenue alters. Above all, it is for evaluating the alteration in the request as a consequence when the cost alters. The request for the item or service is influenced by cost. When the elasticity is less than 1, the elasticity is inelastic. Elasticity is perfectly elastic when it equals 0. It keeps unaltering at any cost. An item is elastic when there is an adjustment to items required as a reaction when their cost alters. However, there are 4 types of elasticity:

1) Demand's elasticity

The quantity of an item that is requested relies on several aspects, such as cost, revenue and fondness. When something alters in them, it has some impact on the required quantity. What is more, its cost is influenced by it as well.

2) Income's elasticity

It demonstrates the required volume of a specific product that alters in real revenue. However, the rest of items must be constant. The quantity is altered by 1 percent that is requested. It is divided by the conversion of one percent in revenue. Revenue elasticity reveals if a specific item is necessary or luxurious.

3) Cross elasticity

It evaluates responsiveness of the quantity of the requested item whereas the cost alters for the other item.

4) Supply's elasticity

As a matter of fact, according to A. Hayes, who investigates elasticities, he states that it is a measurement of the responsiveness to the supply of an item or service whose cost alters. Namely, he declares that when the price goes up, the supply of the good or service will go down. It works vice versa which is demonstrated ⁹ in his lectures.

3.2 The European Union

The European Union is a political and an economic union. It used to consist of 28 countries, but The Great Britain left the EU in 2020. Due to the creation of this union, Europe has become more significant in the world. What is more, Europe is perceived as a unit which increases competitiveness of all participants (Eur-lex.europa.eu, 2010).

⁹ Hayes, Adam *Elasticity*[online]. Investopedia, 2022 [cit. 2023-02-05].

3.2.1 History of the European Union

The situation in Europe was needed to be stabilized after the end of the Second World War. As a matter of fact, they managed to create European Coal and Steel Community in 1951 by signing Treaty of Paris. It was signed by six countries (Italy, Germany, France, Belgium, Netherlands, and Luxembourg). They wanted a free movement of coal and steel inside the area of the states of those members. It enabled them to have free access to resources.

What is more, later they managed to create the European Economic Community that was founded in 1958. That establishment was supposed to have two goals. The first one was to prevent possible military conflicts in the area. The other one was supposed to bring more economic independence. EURATOM was established in the same year.

There were only 6 countries in European Economic Community. Nevertheless, another 22 countries entered the union later on. They managed to create a single market. They developed into not only economic establishment but into political one as well. Therefore, the Economic Community became the European Union in 2017 as it is all demonstrated by Europa.eu¹⁰.

3.2.2 Growth and Development of the European Union

The European Coal and Steel Community was founded in 1951 by Germany, France, Italy, Belgium, the Netherlands and Luxembourg as was already mentioned above. European Economic Community and European Atomic Energy were established by same countries in 1958. The group of those 6 countries grew for the first time in 1973. The United Kingdom, Ireland and Denmark entered the group.

The group was further enlarged in 1980s when Greece (1981), Portugal and Spain (1986) were accepted as members of the group.

The largest enlargement of the group occurred in 2004 when 10 former communistic countries entered the group. Those countries were: Cyprus, the Czech Republic, Hungary, Estonia, Malta, Lithuania, Slovakia, Poland, Latvia and Slovenia. Romania and Bulgaria entered in 2007. Croatia became a member of the group in 2013(Europa.eu, 2017).

¹⁰ Europa.eu. *EUR-Lex: Access to European Union Law* [online]. Brussel, 2017 [cit. 2021-6-27]. Available at:
<https://eur-lex.europa.eu/legalcontent/CS/TXT/?uri=CELEX%3A32017R0745>

3.3 Production of beef in the EU

Due to its mild climate and agronomic wealthy soil the EU has a diversified area for agriculture production. The final production is based on the animal production from 40%. According to a team of researchers around Roguet¹¹, the livestock production started being concentrated on big farms and competitive areas.

3.3.1 Production of Cattle in the EU

The EU has the 5th largest cattle herd in the world. It had approximately 89 million pieces of cattle in 2016. Only 5 countries (France, Germany, the UK, Ireland, and Italy) own 60% of it. Yet, the EU cattle has decreased by 6% since 2010 due to the decapitalization of the dairy herd. They had 23.5 million cows for milk and 12.3 cows for beef (Eurostat 2017).

3.3.2 Beef production in Europe

The EU is the 3rd most beef significant area in the world. The EU has produced 11.5% of the total production of beef. Beef was produced from culled cows and young bulls. It depends on whether the country is specialized in milk making or whether they are focused on beef production. Cull cows are used for production of milk whereas males are fattened to be used for beef production (Eurostat)

¹¹ Roguet et al.: *Neutral community model explains the bacterial community assembly in freshwater lakes* [online]. Brussel: OXFORD Academica, 15 October 2015n. l. [cit.2021-6-27]. Available at: <https://academic.oup.com/femsec/article/91/11/fiv125/2467434?login=true>

3.4 Production of meat

Food and agriculture industry have crucially changed since the end of the second World War¹². To satisfy important consumption of meat, a critical meat production has been developed. It has been mainly done industrially. Nevertheless, meat is largely produced by an industrial method. What is more, a large quantity of world's production of chickens and pigs are produced on farms that use some industrial methods for their production. This type of industrial production has been growing exponentially¹³, though. As a consequence, this production has created several problems. They can be separated into four groups. One group is relating to health of people, another group is concerning health of animals and another two are relating to risks for environment and ethical issues are involved as well.

Begin with the topic, meat that is produced industrially can affect safety of people or safety of food. It can cause the risk of diseases as well. Subsequently, due to the farming of domestic animals a sizeable majority of viral illnesses have been caused over last 10000 years. Besides, the development of the meat production must have caused a dramatic increase of the infectious illnesses in the world, which have been originating from animals¹⁴. The meat is contaminated by therapeutic antibiotics or growth hormones, which are risky to the human's health.

There are other factors that endanger human's lives. By way of contrast, the meat industry is considered as the industry with one of the poorest working conditions (Foer,2009). Further, consumption of meat can cause several illnesses. Cancer or cardiovascular illnesses are caused by excessive consumption of red meat and processed meat¹⁵.

¹² van Otterloo (2012), *Healthy, safe and sustainable* [online] [cit. 2020-02-03].

¹³ Gura, S. (2010), *Industrial livestock production and biodiversity* [online]. London [cit. 2020-02-03].

¹⁴ Greger, M. (2010), *Industrial animal agriculture's role in the emergence and spread of disease*. [online]. London: Earthscan [cit. 2020-02-03].

¹⁵ Sinha, R. (2009), *Meat intake and mortality* [online]. [cit. 2020-02-03].

As a final point, poverty and malnutrition have been caused by the production of meat. According to C. Tudge who stated in his work¹⁶ that poverty has been increased by the industrial production of meat. As a consequence of it, unemployment has increased and access to food has decreased that was confirmed in another work¹⁷ by N. Fiddes.

As far as the attitude towards health of animals is concerned, they have been connected with the type of the production system. Some problems might have been caused by lack of physical or mental health of animals, which might have endangered health of human beings as well.

The lack of health of animals is connected with another group. Ethics of meat production in connection with intensive production of meat have been controversial. On the one hand, being cruel to animals has been not allowed, on the other hand, it has had some disadvantages, for example corrupted ethics¹⁸ that was researched by N. Williams. According to the work of K. Rawles¹⁹ who stated in his work that health of animals should be a part of the sustainability of development together with other sciences, for example economy and environment. Although there has been a conflict between health of animals and environmental worries (Westhoek, 2011). As a result, requirement for feed and greenhouse gas levels of emissions have been growing. The problem could be solved with decreasing of the meat consumption.

¹⁶ Tudge, C (2010), *How to raise livestock*[online]. London: Earthscan [cit. 2020-02-03]

¹⁷ Fiddes, N. (1991), *Meat - A natural symbol*. [online]. London: Routhledge [cit. 2020-02-03].

¹⁸ Williams, N.M. (2008), *Affected ignorance and animal suffering* [online]. [cit. 2020-02-03].

¹⁹ Rawles, K. (2010), *Sustainable and compassionate food policies* [online]. [cit. 2020-02-03].

Above all, the impacts of inputs, for example land and oil. What is more, according to research of T. Garrett, who investigates the issues in his work, he alerts that they must be taken into account including their outputs, for example excrements from animals that pollute air or water pollution. He estimates in his research that agriculture has been contributing up to 30% of all emissions²⁰. Dairy products and industrial meat's contribution on emissions is nearly 50 % of the total food impact but the largest harm is at the farm level.

Overall, the life stock production needs 2/3 of agricultural land and 1/3 of the land surface. Due to the fact that the rainforest has been continually destroyed including variety of species and ecosystems. Subsequently, Westhoek²¹ confirms in his work that they have been damaged by the meat production. As a matter of fact, the same issue is explored by S.Gura²², who outlines the fact that the biodiversity has been endangered by the intensive farming. He suggests in his work that small- scale farming is better for stable meat production and increases employment. Even so, according to H. Steinfeld and Fao who identify in their work the fact that the industrial livestock production has been growing²³ many times quicker than small-scale farming²⁴.

Production and consumption of meat have been gradually increasing and the trend is expected to continue because the whole population has been growing. In that case, negative impacts on the environment are likely to get worse as a result of intensive meat production.

V. Smil claims in his investigation that meat is one of the most important food groups. It contains essentially important number of proteins and minerals necessary for human body. All this is also reported by G. Davey²⁵ in his work. Due to the economic modernization, meat

²⁰ Garnett, T. (2010), *Livestock and climate change* London: Earthscan [cit. 2020-02-03].

²¹ Westhoek, H. (2011), *The Protein Puzzle* [online]. The Hague [cit. 2020-02-03].

²² Gura, S. (2010), *Industrial livestock production and biodiversity* [online]. London [cit. 2020-02-03].

²³ Steinfeld H. (2006), *The long shadow* [online]. Italy [cit. 2020-02-03]. Available at: <http://www.fao.org/3/a0701e/a0701e00.htm>

²⁴ FAO (2007), *Animal genetic resources* [online]. Italy: Fao [cit. 2020-02-03]

²⁵ Davey G.K. (2003), *Lifestyle characteristics* [online]. [cit. 2019-02-13].

Available at: <https://www.ncbi.nlm.nih.gov/pubmed/12740075>

changes humans' diet²⁶. He indicates that meat is undoubtedly important factor in the diet of every human being, and it ensures optimal growth and development from childhood up to the end of humans' life.

A scientist J. Linseisen and his team²⁷ managed to separate meat into several groups, for example fish, veal, chicken and turkey. However, consumption of meat can cause several negative factors that is reported by G. Fraser as one of many researchers in their work²⁸. He warns in his research that it can also inflict cancer or cardiovascular diseases.

What is more, increase of meat production causes higher scale of deforestation. As a result, it is the soil erosion and desertification. Primary source of protein is represented in seafood and fish, which is reported in the team- work lead by Yaktine²⁹. They reveal that seafood is the best prevention against stroke and heart disease.

Status of consumers and macroeconomic situation have the largest impact on meat consumption. Taljaard and his team³⁰ investigate in their research the issue and recognize that healthy diet causes higher urbanization and better live standard.

A relation between increased income and meat consumption was researched by a group of scientists around H. Meissner³¹, which reported that higher consumption of meat has a negative impact on increasing prices of meat that is also reported by M. Hermann³². Consequently, it

²⁶SmilV.,(2002),*EatingMeat*[online].[cit.2019-02-13].Availableat:<https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1728-4457.2002.00599.x>

²⁷ Linseisen J. (2002), *Meat consumption* [online]. [cit.2019-02-13].Availableat:<https://www.cambridge.org/core/journals/public-health-nutrition/article/meat-consumption-in-the-european-prospective-investigation-into-cancer-and-nutrition-epic-cohorts-results-from-24hour-dietary-recalls/DD3319939C162BA94B5ECE08FC2C9B49>

²⁸ Fraser G. (1999), *Association between diet and cancer* [online]. [cit.2019-02-13]. Available at:<https://www.ncbi.nlm.nih.gov/pubmed/10479227>

²⁹ Yaktine Al. *Nutrient and contaminant tradeoffs* [online]. [cit. 2008]. Available at: <https://academic.oup.com/nutritionreviews/article/66/3/113/1857813?login=true>

³⁰ TALJAARD P., (2006) *Meat in South Africa* [online]. [cit. 2020-02-05].

³¹ Meissner HH, Scholtz MM. *Sustainability of the South African Livestock* [online]. [cit. 2014]. Available at: <https://www.ajol.info/index.php/sajas/article/view/99337>

³² Hermann, (2009), *Food security and agricultural development: United nation conference*[online]. [cit.2019-02-13]. Available at:https://unctad.org/en/Docs/osgdp20094_en.pdf

causes economic growth, which is a positive indicator.

Economics of meat production

As a matter of fact, fondness decides how a specific item is preferred. The utility function is created according to this liking. Its slope is determined by costs and revenue. The more people gain, the more they can purchase items, such as meat. Furthermore, as for the costs when an item, for instance meat is less expensive, it is possible to buy a larger quantity of it. However, the quantity of the item depends on the taste. What is more, the taste is influenced by other aspects, such as comfortability or plans.

Revenue from meat consumption

To begin with the topic, how much a particular item is required is influenced by costs and revenue. A relationship between costs and revenue have been investigated by a great number of authors. They have mainly focused on how the requirement for a specific item is impacted by alterations in revenue by estimating the elasticity of the revenue. According to a research lead by W. Chern³³ who asserted in his investigation that the elasticity of beef is more than one, which means that beef is a luxury item. By way of contrast, according to W. Kinnucan and his colleagues³⁴ who stated in their work that beef is a normal item. As a result, its elasticity is less than 1.

Furthermore, the consumption of beef has been decreasing in Europe although revenue has been increasing. Even more, the revenue elasticity of beef has been going down in Europe and it has been reaching numbers less than one. Beef has been substituted by chicken in the way that it cannot be formulated by revenue and costs, which was more closely investigated by J. Eales and his team³⁵.

As to the structural change in the requirement of beef that was again explored by J. Eales

³³ Chern, W. (2003), *Analysis of food consumption* [online]. Rome: [cit.2019-02-13]. Available at:<http://www.fao.org/3/a-ae025t.pdf>

³⁴ Kinnucan, W. (1997), *Effects of health information* [online]. [cit. 2019-02-13] Available at:https://www.researchgate.net/publication/277396269_Effects_of_Health_Information_and_Generic_Advertising_on_US_Meat_Demand

³⁵ Eales J., (1999) *Separability of Japanese Meat* [online]. [cit. 2020-02-05].

and his teammate³⁶. They researched the reason why chicken became a strong substitute for beef. However, testing for structural change is researched by G. Moshini³⁷, who states that the alteration was inclined to show misspecifications and therefore the complete proof for structural change was not accurate.

Cost from meat consumption.

Majority of studies outlines that the beef elasticity is inelastic based on how much it costs. Consumers do not allow costs to have an impact on the consumption of beef. The weak separability in connection with meat has been studied by many authors. Namely, a specific type of meat is required according to the origin of the animal, which was elaborated in the work of Eales, which is demonstrated above. What is more, they investigated the importance between a low quality of meat types and a high-quality of meat types. According to their research, the substitution has been mainly done between the low quality of meat. Nevertheless, according to another research investigated by W. Kinnucan³⁸, who stated that how much fish costs has no impact on how much beef costs. However, cost of pork has a larger influence on the beef elasticity than the cost of chicken. On the whole, meat products are weakly separable except for fish.

Beef production

As a matter of fact, beef production is considered as environmentally unfriendly. Urine and as a consequence, manure that is produced cause higher oxide emissions. Namely, it is eventually greenhouse gases. As for feed production, vast areas must be cleared for producing it. A team of scientists taken the lead by H. Steinfeld³⁹ state that about 70 % of all agricultural land is used for livestock production. However, the livestock production is the largest contributor to

³⁶ Eales, (1993) *Structural Change in US Meat Demand* [online]. [cit. 2020-02-05].

³⁷ Moschini G., K. Meilke, (1984) *Parameter Stability and the U.S. Demand for Beef* [online]. *Western Journal of Agricultural Economics*, 9 (2), 271-282. [cit. 2023-02-06].

³⁸ Kinnucan, W. (1997), *Effects of health information* [online]. [cit. 2019-02-13]. Available at:https://www.researchgate.net/publication/277396269_Effects_of_Health_Information_and_Generic_Advertising_on_US_Meat_Demand

³⁹ Steinfeld, H. (2006), *The long shadow* [online]. Italy [cit. 2020-02-03]. Available at:<http://www.fao.org/3/a0701e/a0701e00.htm>

CO₂ emissions. The negative results are investigated and reported in the work by McAlpine⁴⁰. As a result, meat production in general, nature and the environment are put under extreme pressure.

T. Masuda demonstrates in his work⁴¹ why the beef consumption is in a tight relationship with revenue of inhabitants. He investigates in his work why beef is regarded as a luxurious food item.

Fondness towards meat consumption

As a matter of fact, countries differ from each other when the meat consumption per capita is considered. Non- economic aspects have an impact on the requirement of meat, such as worries or promotion.

- **Community issues:** Above all, meat is associated with a genuinely negative impact on the environment. As a reason, the consumption of meat should be restricted. From a community point of view, there are two issues that can clarify it. According to Gossard and his colleague York⁴², who investigate the structural impact of meat, they state that one aspect relates to the individual liking and the other aspect is identified with traditions or habits. They wonder in their work whether such an amount of available meat in society is necessary. What is more, they are alarmed in their investigation by the fact that the amount of meat that is nowadays consumed in Western societies is not adequate. They identify in their research that the meat consumption is three times the amount that is supposed to be healthy, and it cannot be made clear by biological needs. For the purpose of it, they confirm that particularly eating-habits must influence it. However, they recognize in their observation that revenue does not play a large role in the meat consumption.
- **Comfortability:** Nevertheless, Eales recognizes in his investigation⁴³ that comfortability is the reason why beef has been becoming less attractive in-comparison to poultry. As a matter of fact, he states in his research that the inclination for poultry can be partly described by

⁴⁰ McAlpine (2009), Increasing World Consumption of Beef [online]. [cit. 2019-02-13] . Available at:<https://repository.si.edu/handle/10088/12045>

⁴¹ Masuda, T. (2010), China's Meat Consumption [online]. USA [cit. 2019-02-13]. Available at:https://ageconsearch.umn.edu/bitstream/61601/2/Poster11972AAEA_MasudaGoldsmith20100503b.pdf

⁴² Gossard (2003), *Structural influences* [online]. [cit. 2019-02-13]. Available at:<http://www.w.humanecologyreview.org/pastissues/her101/101gossardYork.pdf>

⁴³ Eales, J., & Unnevehr, L. (1988) *Demand for Beef and Chicken Products* [online]. [cit. 2023-02-06].

healthy issues. He warns in his observation that a higher level of cholesterol is caused by the beef consumption. However, E. Anderson⁴⁴ suggests in his investigation that the shift from beef happened above all among a high-quality meat. What is more, he confirms in his research that the shift did not take place among a low-quality meat (hamburgers). He questions in his research whether the healthy issues are connected with the meat consumption. He suggests in his work that consumers are probably better aware of the high-quality meat. Even so, comfortability has been regarded as a more essential factor than healthy issues.

- **Likings:** According to the research of Eales, who investigates in his analysis why beef was losing market to poultry. As a result, he confirms in his work that healthy issues were probably playing a significant role on the market. However, he states that it mainly occurred to a high quality of meat. However, according to the research of E. Anderson who reported that it rather occurred from convenience reasons.
- **Healthy issues:** According to W. Kinnucan and his team⁴⁵, who research impact of meat consumption on health, they reveal that as for healthy issues, the requirement for poultry was higher at the expense of the requirement for beef.

⁴⁴ Anderson E. (1991), *Reposition on changing preferences* [online].[cit. 2019-02-13].

Available at:<https://journals.sagepub.com/doi/abs/10.1177/002224299405800304>

4 Practical Part

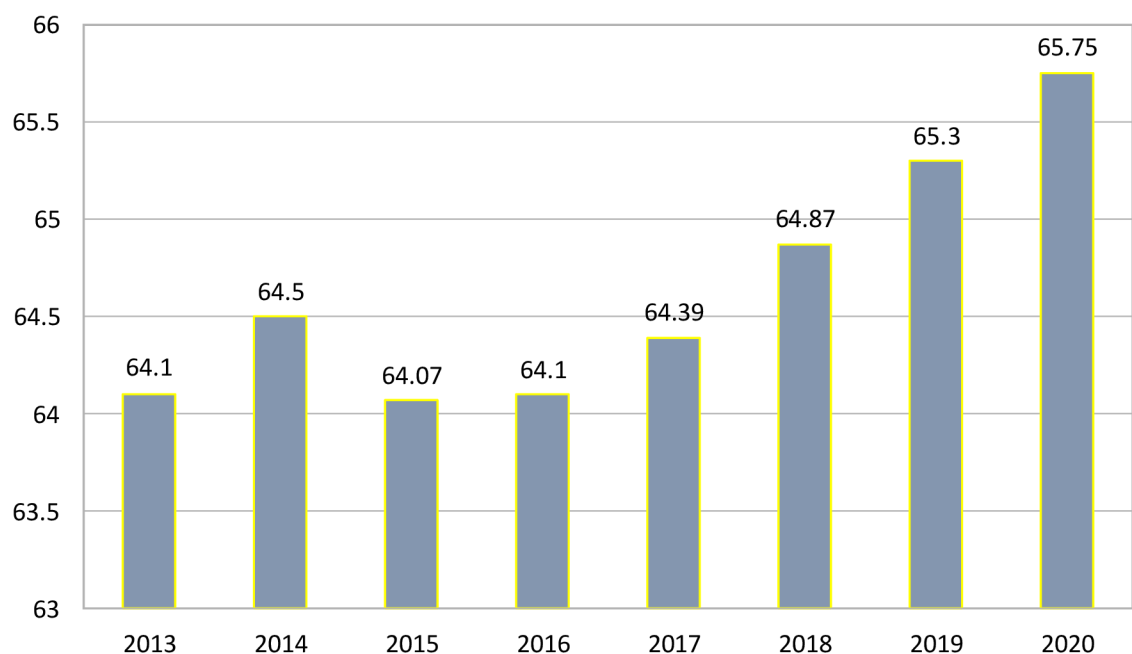
The influence of income on meat consumption has been investigated by manifold researchers, such as (Schroeder et al., 2003). Income per household and beef consumption are elaborated in the practical part. The income elasticity is hence used for all 14 observed countries.

Linear regression researches the impact of income on meat consumption. Data between 2013 and 2022 are used for the purpose of analysis. In addition to it, the impact of income on the beef expenditure is observed in the case of Great Britain.

4.1 Meat consumption in the EU

According to Eurostat, the lowest consumption of meat in the EU was in 2015 at the amount of 64,07 kg per one person. It was almost at the same amount of consumption as in a year 2013 (64,01). The consumption of meat was growing from 2015 to 2020. It reached the highest consumption level in 2020 at the amount of 65,75 kg per one person.

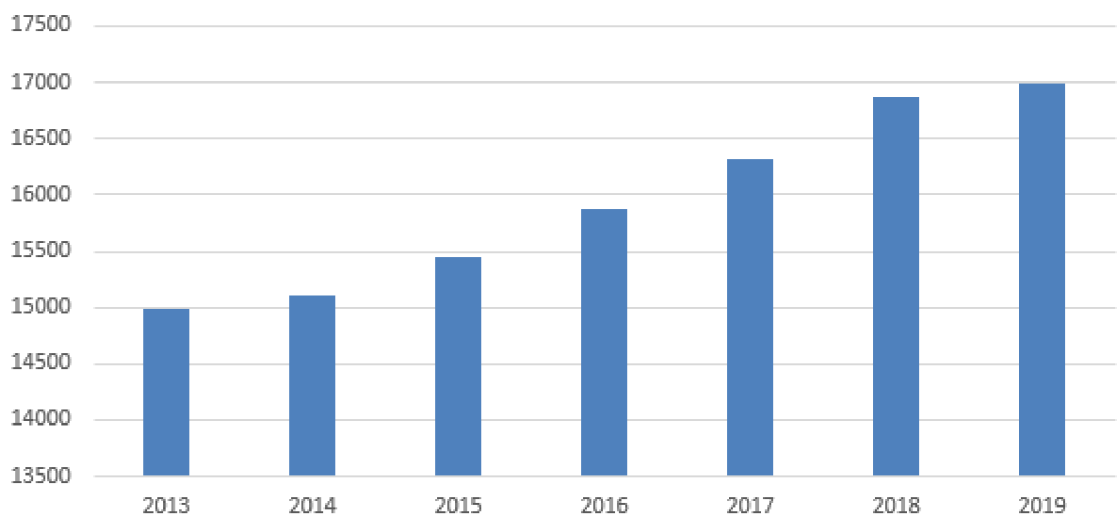
Figure 2: Consumption of meat in EU in kg



source: Eurostat

The lowest income per household was in 2013 at the rate of 15538 EURO. It started increasing from 2013 and it reached the highest income in 2019 at the rate of 17800 EURO.

Figure3: Income per household in EU in EURO



Source: Eurostat

Data set for consumption of meat in kg and income per household in Euro is presented in Table3 as it is demonstrated below:

Table3: Data set for EU (observation 2013-2019)

	y	x
2013	64,3	15000
2014	64,5	15100
2015	64,2	15400
2016	64,2	15900
2017	64,4	16300
2018	64,8	16800
2019	65,3	17000

Resources: Eurostat 2020

y= consumption of meat in kg

x= income per household in Euro

Income EU elasticity = $\frac{32000}{259200} = 0,12$. Even so, income per household as well as consumption of meat was increasing during the period. This type of elasticity is associated with necessary goods. Namely, the larger the income is, the larger the consumption is. However, the consumption did not grow as fast as the income. Admittedly, the consumption was in the shape of concave (Nicolaev et al.,2010).

R-square = 0,46

p=0,09

Y= -81057 + 1502x

In the model, the R-square =0,46. It reports that meat consumption (independent variable) is influenced from 46%. What is more, p-value is 0,09. As a result, it is statistically insignificant.

4.2 Meat consumption in Germany

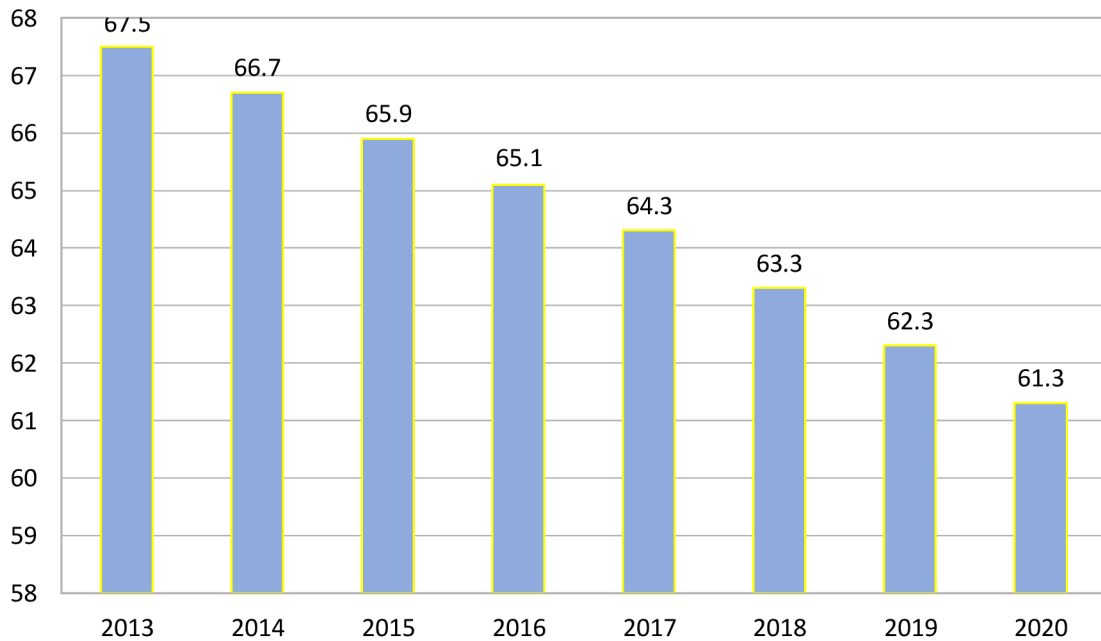
Germany is a critical dairy producer in the EU. Although its production has declined by 27 % since 2000 (Inra, Eurostat), it has remained relatively consistent over last 10 years.

Due to BSE crises in 2001 beef consumption experienced a decrease by 30 % compared to 2000. Consumption has been slightly decreasing since then.

A beef production consists of two types of animals. Beef is produced from young bulls (45%) and culled cows (35%). The cattle herd consists of 4.2 million dairy cows and 670 000 suckling cows. Nevertheless, dairy sector has an impact on the beef production with calves. However, cattle are not necessary for dairy production, it is only for meat production (Deblits et al. 2008).

Consumption of meat in Germany was steadily decreasing from 2013 to 2020. The highest consumption was in 2013 at the rate of 67,5 kg per person and 61,1 kg per person was the lowest consumption in 2020.

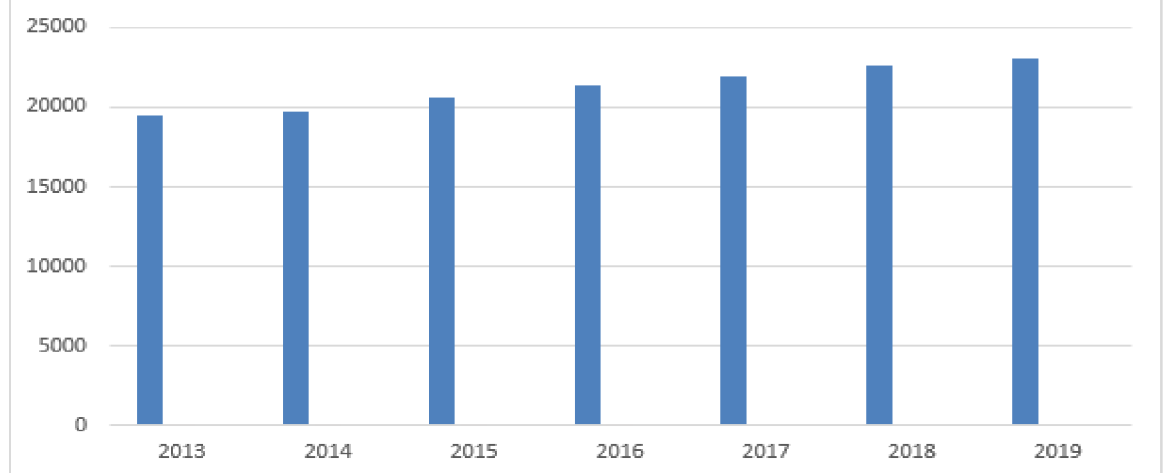
Figure 4: Consumption of meat in Germany in kg (2013-2020)



Resources: Eurostat

Income per household was continuously increasing from 2013 to 2019. The lowest income per household was in 2013 at the amount of 19545 and income per household reached 22660 in 2019.

Figure 5: Income per household in Germany in EURO



source: Eurostat

Data set for consumption of meat in kg and income per household in Euro is presented in Table4 as it is demonstrated below:

Table4: Data set for Germany (observation 2013-2019)

	y	x
2013	67,3	19500
2014	66,8	19600
2015	65,9	20600
2016	65,1	21100
2017	64,2	22100
2018	63,2	22500
2019	62,3	23000

Source: Eurostat

y= consumption of meat in kg

x= income per household in Euro

Income elasticity in Germany = $\frac{-212500}{453600} = -0,47$ was between 2013 and 2019. Whatever

the case, the German income elasticity was inferior during that period. What is more, the more money they were earning during the period, the less they were consuming meat.

R-square = 0,98

P=0,0001

Y= 69530 – 743,8x

R-square=0,98=98%. It claims that the dependent variable (meat consumption) is impacted from 98%. Moreover, p-value is 0,0001. Consequently, the result is statistically significant.

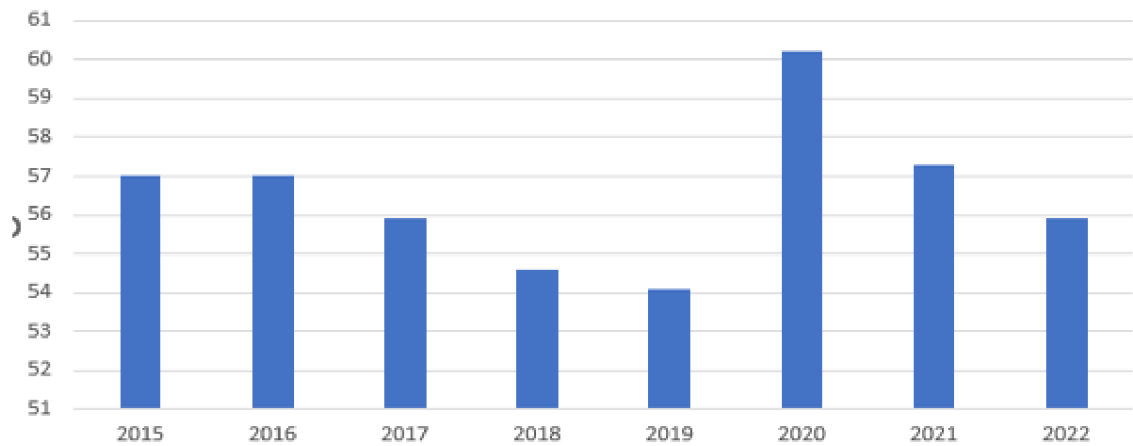
4.3 Meat consumption in France

Meat industry is popular in France, and it has a long tradition. France has the most sizeable cattle in Europe. It consists of 3.7 million cattle for milk and 4 million suckler cows. There are 200000 farmers of cattle who produce 1.5 million tons in carcasses, which makes France the largest beef producer.

France is the most significant exporter of cattle. 50% of agriculture area is used for cattle-raising. There are 13 million hectares of pastures and grazing (businessfrance,2020).

The consumption reached the highest point in 2020 at the amount of 60,2. It was somewhat decreasing from the year 2015 till 2019. It went to its lowest point 54,1 in 2019 as it is illustrated in Figure 6.

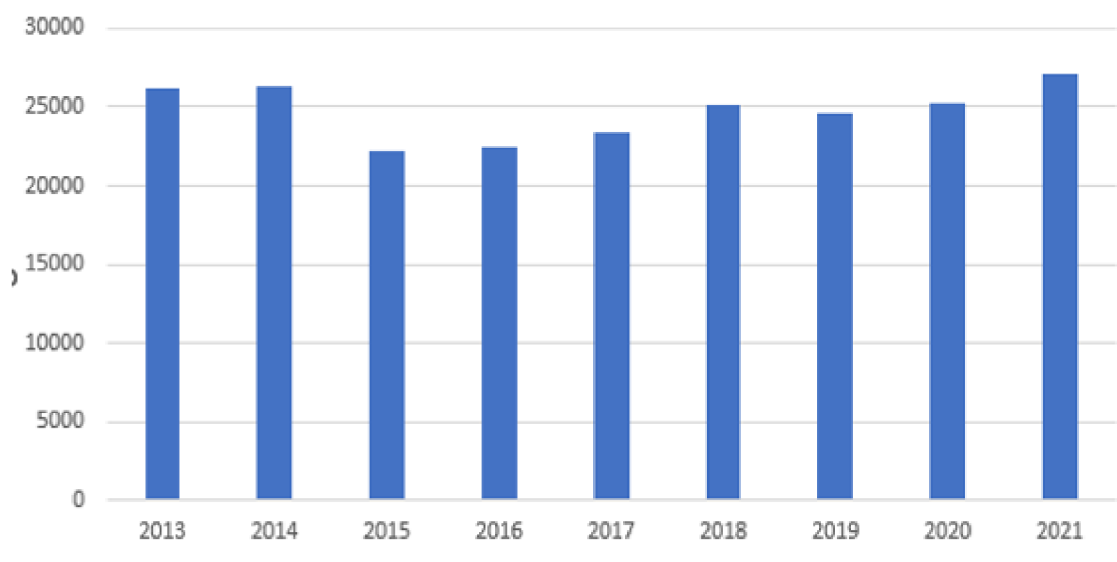
Figure 6: Meat consumption in kg in France



source: Eurostat

Income by household was steadily increasing from 2015. 22152 dollars was at its lowest point in 2015 and it culminated up to 27 123 in 2021.

Figure 7: Income per household in France in USD



source: ceic

Table5: Data set for France (observation 2013-2022)

Source: Eurostat

	x	y
2013	26164	-
2014	26308	-
2015	22152	57
2016	22425	57
2017	23414	55.9
2018	25123	54.6
2019	24557	54.1
2020	25230	60.2
2021	27122	57.3
2022	-	55.9

y= consumption of meat in kg

x= income per household in USD

Income France elasticity = $\frac{-58,614}{112,9*958} = -0,43$. It states that the elasticity in France was inferior

between 2013 and 2021. Therefore, the larger the income is, the least the consumption is.

R-square = 0,92

p=0,83

Y= 0.0001106 + 53,9x

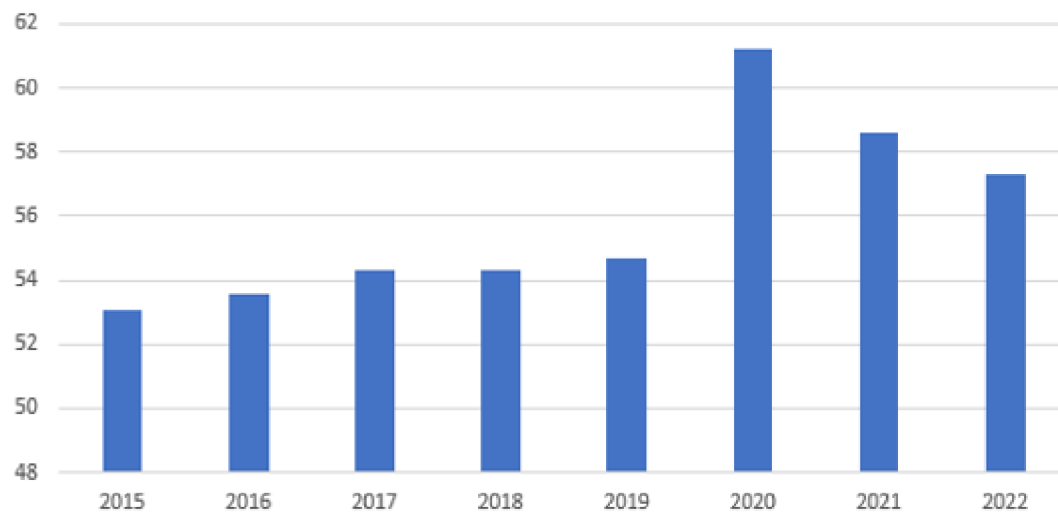
In the model, the R-square =0,92. It reports that meat consumption (independent variable) is influenced from 92%. However, p-value is 0,83. As a result, it is statistically not significant.

4.4 Meat consumption in Italy

Beef is important in Italy. It represents 50% of the meat tonnage, which is consumed in Italy (GEB-IDELE 2011). It is the 4th largest producer of beef in Europe (GEB-IDELE 2013a). However, production has diminished by 25% since 2010. It happened in tonnage as well as in slaughter. Consumers started preferring cheaper meat as a consequence of the lower purchasing power. Tender and light-colored meat are popular between Italian consumers. This type of meat refers to young cattle aged between 16 and 22 months. It represents 66% of their production (GEB-IDELE 2011).

However, Italy's consumption was at its highest point at 61,2 kg per person in 2020 between 2013 and 2022. It declined somewhat after that year. It was 58,6 kg per person in 2022 as it is depicted in Figure 8.

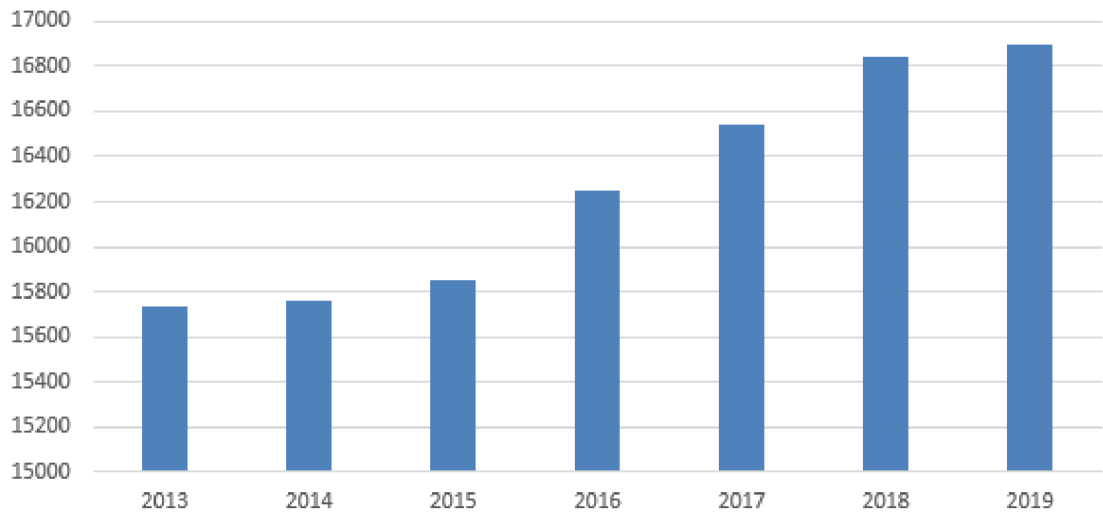
Figure 8: Meat consumption in Italy in kg



source: Eurostat

In terms of income per household in Italy, it was somewhat lower in comparison with Germany. The lowest point was reached in 2013 at the amount of 15 640 Euro. It was steadily increasing from 2013. It reached the highest point in 2019 at the amount of 16800 Euro.

Figure 9: Income per household in Italy in EURO



source: Eurostat

Data set for consumption of meat in kg and income per household in Euro is presented in Table6 as it is demonstrated below:

Table6: Data set for Italy (observation 2013-2022)

	y	x
2013	-	15700
2014	-	15750
2015	53.1	15800
2016	53.6	16200
2017	54.3	16500
2018	54.3	16800
2019	54.7	16900
2020	61.2	-
2021	58.6	-
2022	57.3	

source: Eurostat

y= consumption of meat in kg

x= income per household in Euro

Income elasticity in Italy = $\frac{136920}{132480} = 1,03$. It claims that the elasticity in Italy was elastic

between 2013 and 2022. The income was going up during the researching-period and the meat consumption was going up as well.

R-square = 0,94

p=0,006

Y= 31.32 + 0.001379x

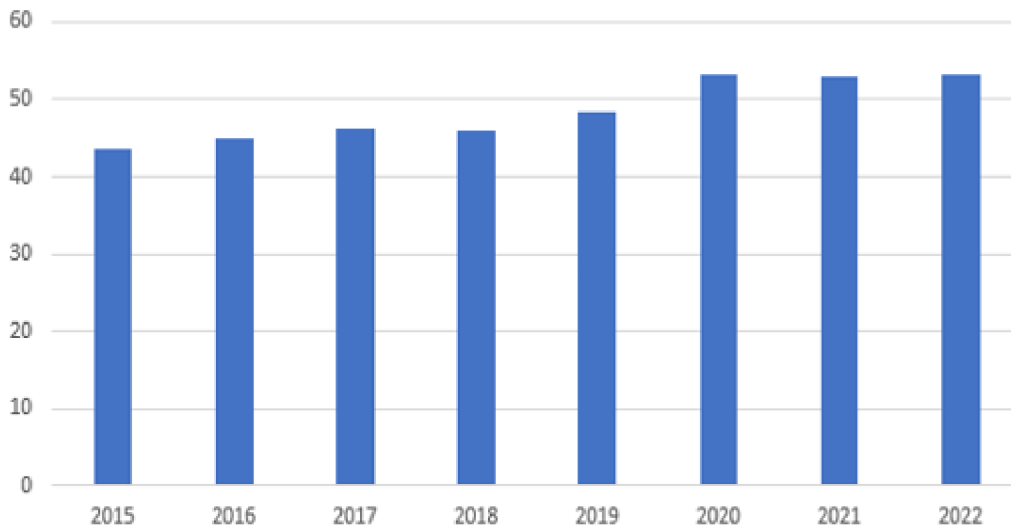
In the model, the R-square =0,94. It states that meat consumption (independent variable) is influenced from 89%. What is more, p-value is 0,006. As a result, it is statistically significant.

4.5 Meat consumption in The Czech Republic

The Czech Republic has experienced a long-term decrease of animal production. The Czech herd of cattle was approximately 1.366 million head of cattle in 2015 (CSU, 2015) including 566319 cows. The data demonstrates a continuous decrease of dairy cows. However, beef cows have increased by 3.6%. As a consequence of it, another reduction of cow herd was expected.

The consumption of meat was stable during the observed period without any fluctuations as it is illustrated in Figure 10.

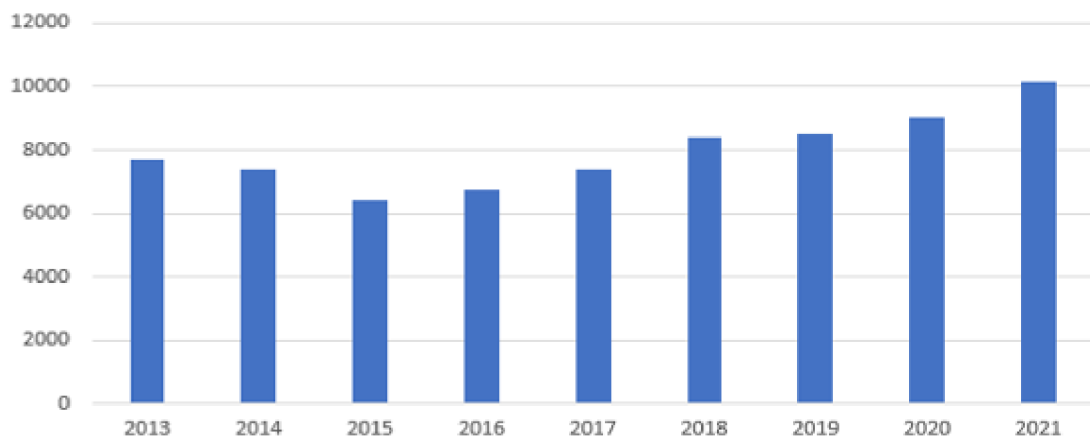
Figure 10: Consumption of meat in kg



source: ceic.data

As to the income per household in the Czech Republic, the highest point was reached in 2021 at the amount of 10158 USD. It was steadily decreasing from 2013 up to a year 2015. It started increasing from that year. It reached 6408 USD at that time as it is demonstrated in Figure11.

Figure 11: Income per Household in The Czech Republic in USD



source: ceicdata

Data set for consumption of meat in kg and income per household in USD is presented in Table7 as it is demonstrated below:

Table7: Data set for the Czech Republic (observation 2013-2019)

	y	x
2013	40,3	7689
2014	40,7	7383
2015	43,5	6408
2016	44,8	6745
2017	46,2	7365
2018	48,4	8396
2019	48,4	8506
2020	53,1	9039
2021	52,8	10158

Source: ceicdata

y= consumption of meat in kg

x= income per household in USD

Income elasticity in the Czech Republic = $\frac{134664}{229864} = 0,56$. It demonstrates that the elasticity in the Czech Republic was relatively stable for meat even when the price changed between 2013 and 2021. Therefore, the income elasticity for meat was considered as inelastic during the investigating period.

R-square = 0,62

p=0,0115

Y= 0.003124x + 21.58

In the model, the R-square =0,62. It claims that meat consumption (independent variable) is influenced from 62%. What is more, p-value is 0,0115. As a result, it is statistically significant.

4.6 Meat consumption in Poland

Production

A cattle population was estimated for 6.18 million head. Admittedly, it had been one per cent more in comparison to a previous year. Cows for milk reached 2.23million head. The number had increased by 1 per cent compared to a previous year. However, there was less interest in beef cattle production.

Consumption

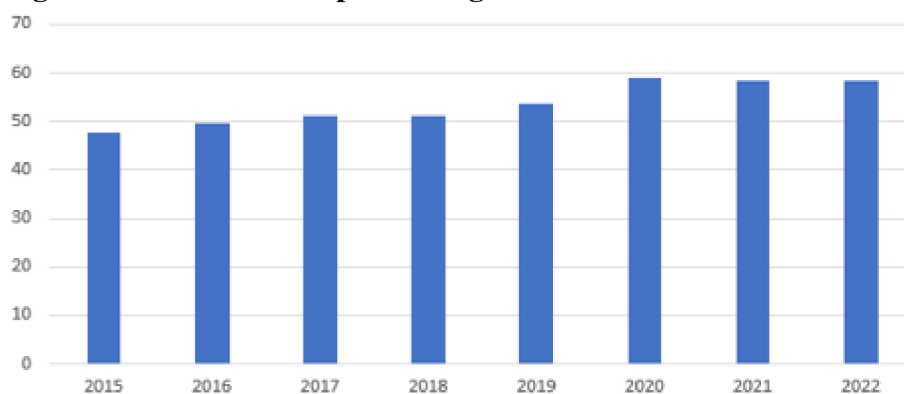
The cattle slaughter decreased by 3 per cent compared to a year 2018. As a consequence, farm-gate price for fattening cattle declined too.

Trade

Begin with the topic, Poland is a cattle importer. Consequently, Polish farmers became more focused on domestic slaughtering of fattening cattle than on exporting calves abroad. As a result, imports of live cattle decreased by 20 per cent in 2019 compared to a year 2018(Rucinski,2020).

The consumption of meat was steadily increasing up to a year 2020. It was at the amount of 59.1. It was somewhat decreasing after that year as it is depicted in Figure 12.

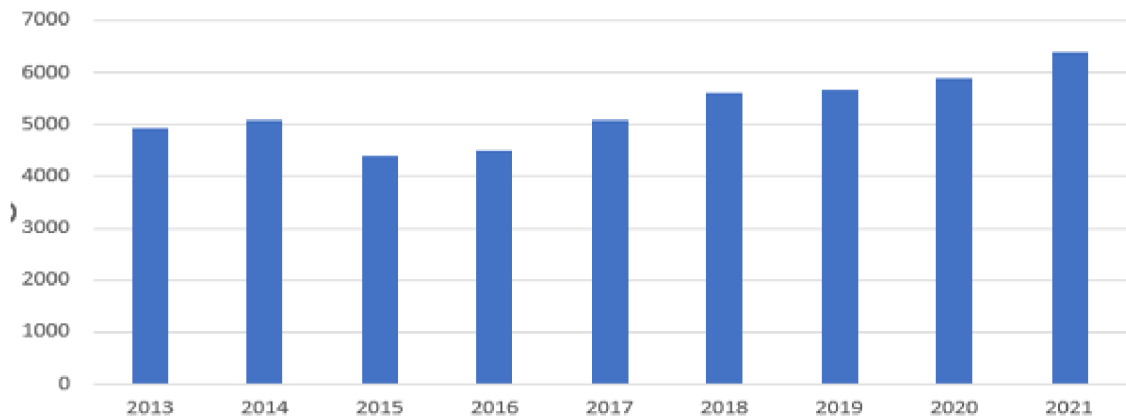
Figure 12: Meat consumption in kg



source: Eurostat

Income by household was steadily going up from 2015. It reached the highest point in 2021 at the amount of 6406.

Figure 13: Income per household in USD



source:seicdata

Data set for consumption of meat in kg and income per household in USD is presented in Table8 as it is demonstrated below:

Table8: Data set for Poland (observation 2015- 2022)

	x	y
2015	47.6	4412
2016	49.5	4487
2017	51,2	5074
2018	51,1	5626
2019	53.8	5685
2020	59.1	5905
2021	58.4	6406
2022	58.4	-

Source: Eurostat

x= consumption of meat in kg

y= income per household in USD

Income elasticity in Poland = $\frac{116834}{211364} = 0,55$. It states that the elasticity in Poland was positive between 2013 and 2021. In case of Poland, meat was considered as a normal good during the investigating period.

R-square = 0,79

p=0,0069

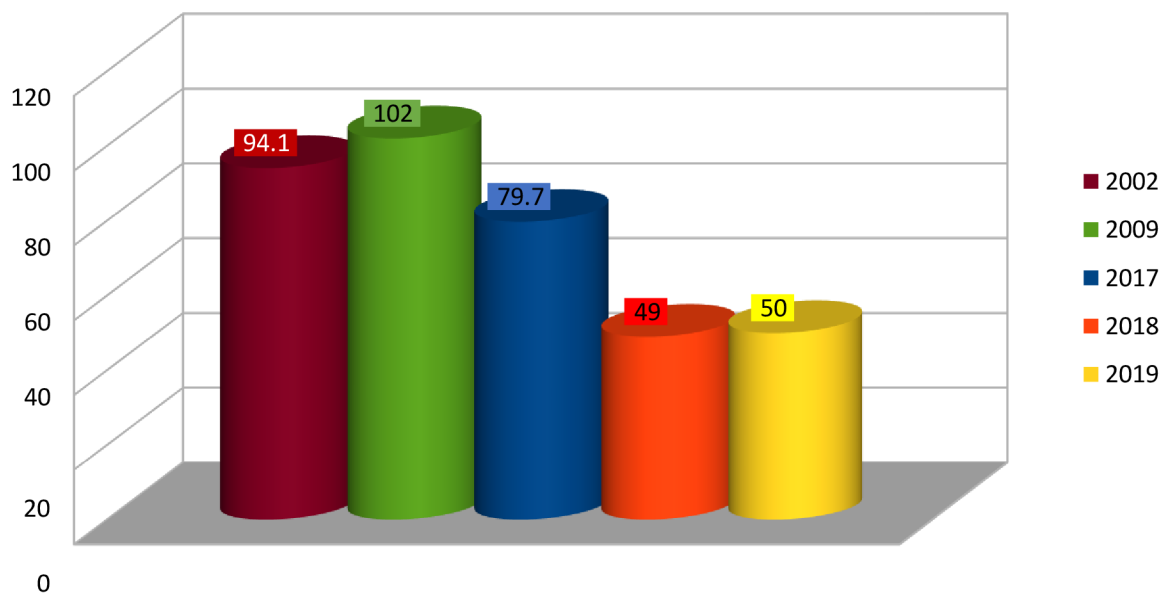
$$Y = -2633 + 151,1x$$

In the model, the R-square =0,79. It reports that meat consumption (dependent variable) is influenced from 79%. Even so, p-value is 0,0069. As a result, it is statistically significant.

4.7 Meat consumption in Austria

The consumption of meat was at its highest level in 2009 at the amount of 102. However, the consumption dropped significantly in 2018 up to an amount of 49 as it is illustrated in Figure 14.

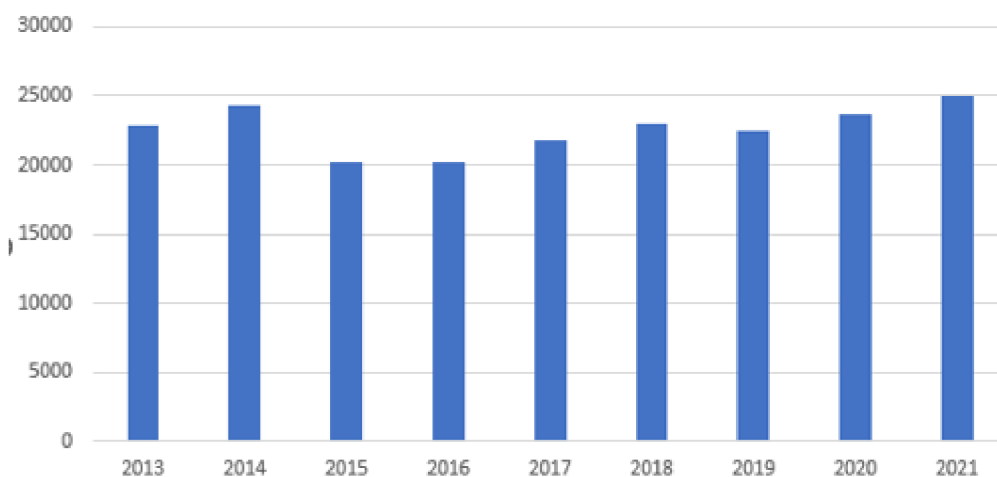
Figure 14: Consumption of beef in Austria in kg



source: Eurostat

In term of Income per household in Austria, it was somewhat higher compared to Poland. It was relatively high even in 2002. Nevertheless, it reached its highest point in 2019 at the amount of 22472 as it is revealed in Figure15.

Figure 15: Income per Household. In EURO



source: ceic.data

Data set for consumption of meat in kg and income per household in Euro is presented in Table9 as it is demonstrated below:

Table9: Data set for Austria (observation 2009-2019)

	y	x
2009	94,1	21332
2015	102	20234
2017	79,7	21303
2018	49	22939
2019	50	22472

y= consumption of meat in kg(mil.)

x= income per household in Euro(tis.)

Income elasticity in Austria = $\frac{-192}{164} = -1.2$. It outlines that the elasticity in Austria was

negative between 2009 and 2019. In case of Austria, meat was considered as an inferior good during the investigating period.

R-square = 0,91

p=0,001

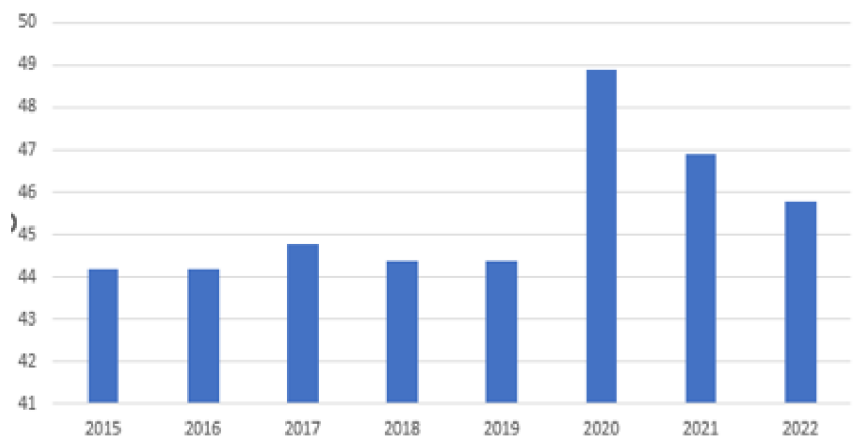
Y= 34757 – 41,3x

In the model, the R-square =0,91. It reports that beef consumption (independent variable) is influenced from 91%. What is more, p-value is 0,001. As a result, it is statistically significant.

4.8 Meat consumption in Netherlands

Consumption of meat crucially increased in 2020 in comparison with a year 2015 as it is reported in Figure 16.

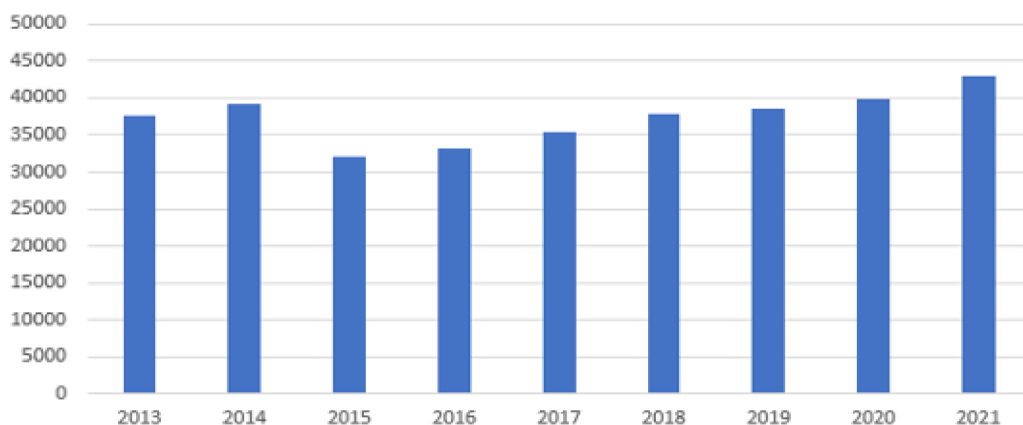
Figure 16 Consumption of meat in kg



source: Eurostat

Income per household was continuously increasing between 2015 and 2021. It reached its highest level at the amount of 43033 in 2021.

Figure 17: Income per Household in USD



source: ceicdata

Data set for consumption of meat in kg and income per household in USD is presented in Table10 as it is demonstrated below:

Table10: Data set for Netherlands (observation 2015- 2021)

	y	x
2015	32160	44,2
2016	33135	44.2
2017	35396	44.8
2018	37937	44.4
2019	38553	44.4
2020	39782	48.9
2021	43033	46.9

source: Eurostat

x= consumption of meat in kg

y= income per household in USD

Income elasticity in the Netherlands = $\frac{203021}{990530} = 0,21$. In case of the Netherlands, meat was considered as a strictly necessary good during the investigating period.

R-square = 0,51

p=0,07

Y= -35996 + 1622x

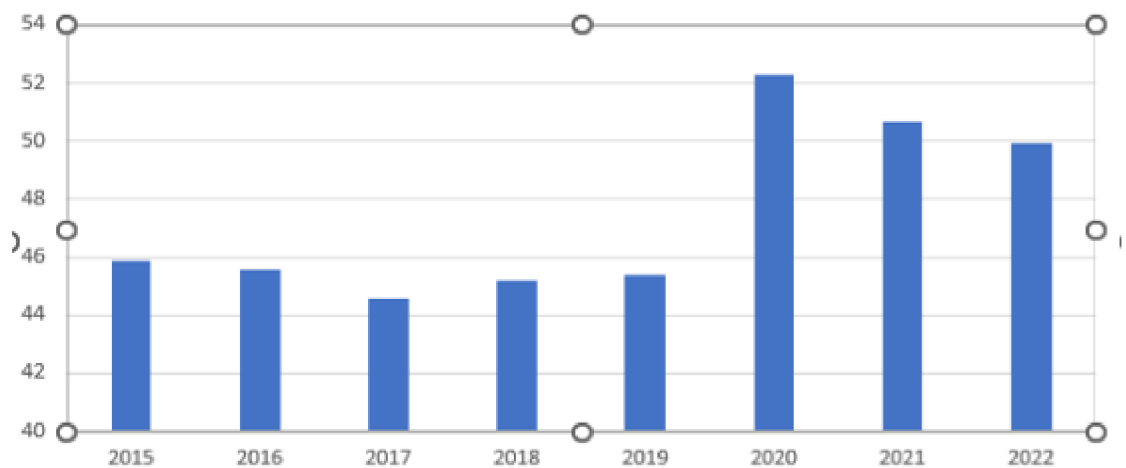
In the model, the R-square =0,51. It claims that meat consumption (independent variable) is influenced from 51%. Furthermore, p-value is 0,07. As a result, it is statistically not significant.

4.9 Meat consumption in Spain

Spain has about 6.4 million head of cattle. There are particular parts of Spain typical for growing cattle, for example Castile-Leon, Castile-La Mancha and Aragon.

The consumption of meat reached the highest point in 2020 at the amount of 52.3. However, the consumption started declining from that period as it is depicted in Figure 18.

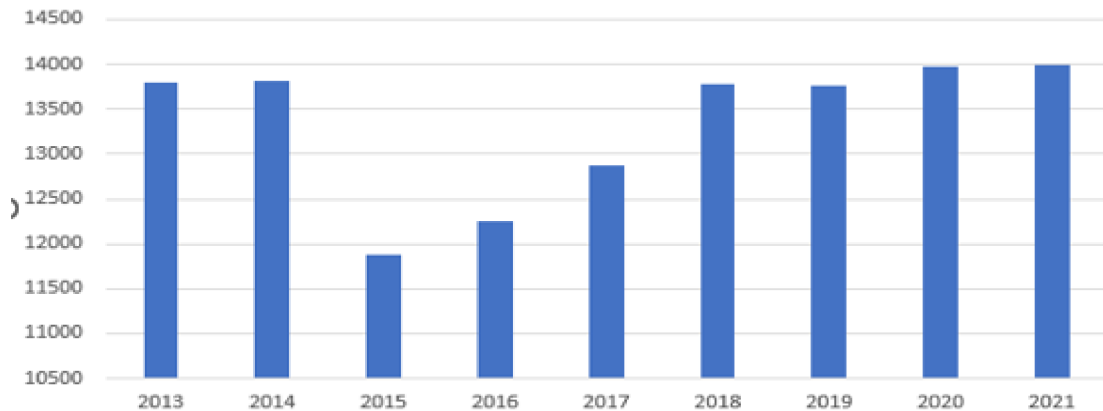
Figure 18: Meat consumption in Spain in kg



source: Eurostat

In terms of income per household in Spain, the highest point in income was reached in 2021 at the amount of 13991 USD. However, the income dropped to its lowest point in 2015. From that point, it was steadily increasing from that time up to a year 2021 when the highest point was achieved as it is demonstrated in Figure 19.

Figure 19: Income per Household in USD



source:ceicdata

Data set for consumption of meat in kg and income per household in USD is presented in Table11 as it is demonstrated below:

Table11: Data set for Spain (observation 2015-2021)

	x	y
2015	11880	45.9
2016	12250	45.6
2017	12866	44.6
2018	13786	45.2
2019	13760	45.4
2020	13982	52.3
2021	13991	49.8

source: Eurostat

y= consumption of meat in kg

x= income per household in USD

Income Spain elasticity= $\frac{165}{206} = 0,8$. It asserts that the elasticity in Spain was for normal goods between 2015 and 2021. Therefore, the more sizeable the income is, the more the consumption is. What is more, the consumption grew faster with the increase of the income (Nicolae et al., 2010).

R-square = 0,18

p=0,39

$$Y = 28.47 + 0.001377x$$

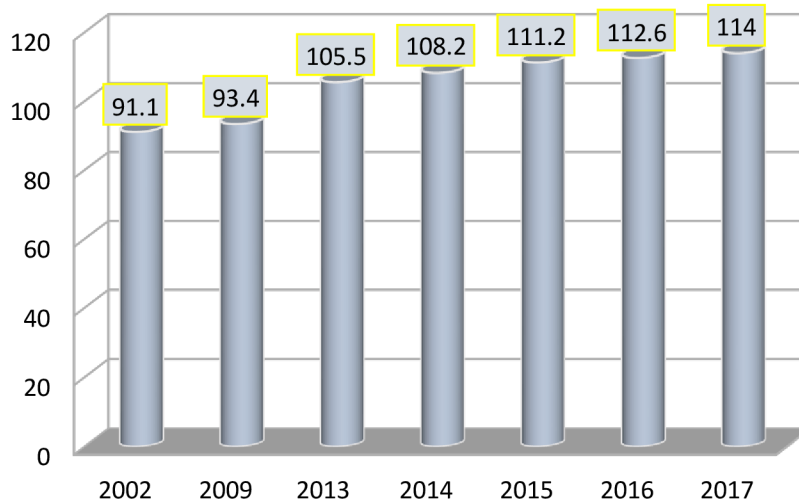
In the model, the R-square = 0,18. It reports that meat consumption (independent variable) is influenced from 60%. Moreover, p-value is 0,39. As a result, it is not statistically significant.

4.10 Meat consumption in Portugal

Cattle production started increasing in 2015 again after years of decline. Slaughtering went up by 1.6 per cent in 2018. Total cattle beginning stocks increased by 2.1 per cent in 2018. Total beginning stocks for beef went up somewhat by 0.8 per cent as a consequence of domestic demand. Whereas the Portuguese live cattle market depends on imports from Spain. Imports of live cattle increased by 235 per cent in 2017 (Gain Report, 2019).

Consumption of meat has been continuously increasing since 2002. It was at its lowest point in 2002 at the amount of 91.1. However, it reached the highest level of its consumption in 2017 at the amount of 114.

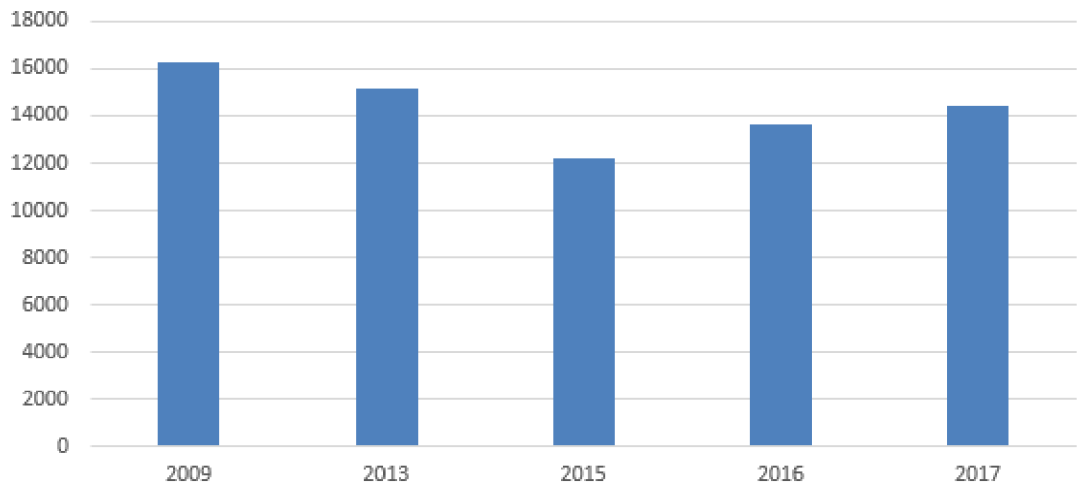
Figure 20: Consumption of meat Portugal in kg



source: Eurostat

To start with the topic, the average household income in Portugal is below the OECD average. There is a distant gap between the richest and the poorest. Above all, the income per household was decreasing from 2009 to 2015. It reached its bottom level in 2015. Yet, it started increasing from 2015 as it is reported in Figure 21.

Figure 21: Income per household in Portugal in USD



source: ceic.data

Table12: Data set for Portugal (observation 2009-2017)

	y	x
2009	93,4	16295
2013	105,5	15165,3
2014	108,2	-
2015	111,2	12160
2016	112,6	13658
2017	114	14400

source: ceic.data

y= consumption of meat in kg

x= income per household in USD

Income elasticity in Portugal = $\frac{656823}{-393023} = -1,7$. It reports that the elasticity in Portugal was inferior between 2009 and 2017. In spite of the fact that income was going up during the researching period, the beef consumption was going down.

R-square = 0,83

p=0,03

Y= 13273 8,69x

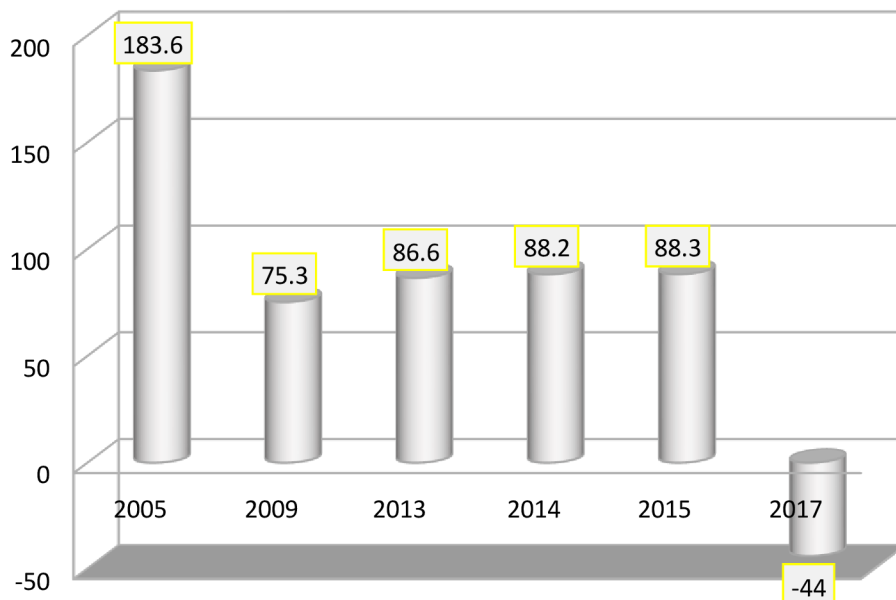
In the model, the R-square =0,83. It claims that meat consumption (independent variable) is influenced from 83%. What is more, p-value is 0,03. As a result, it is statistically significant.

4.11 Meat consumption in Slovakia

For the purpose of the decreasing purchasing power and BSE disease issues, demand for meat has been decreasing for two decades in Slovakia. Subsequently, the demand for meat is price and income inelastic.

Consumption of meat genuinely dropped between 2005 and 2009. By way of contrast, it was somewhat increasing from that year as it is revealed in Figure 22.

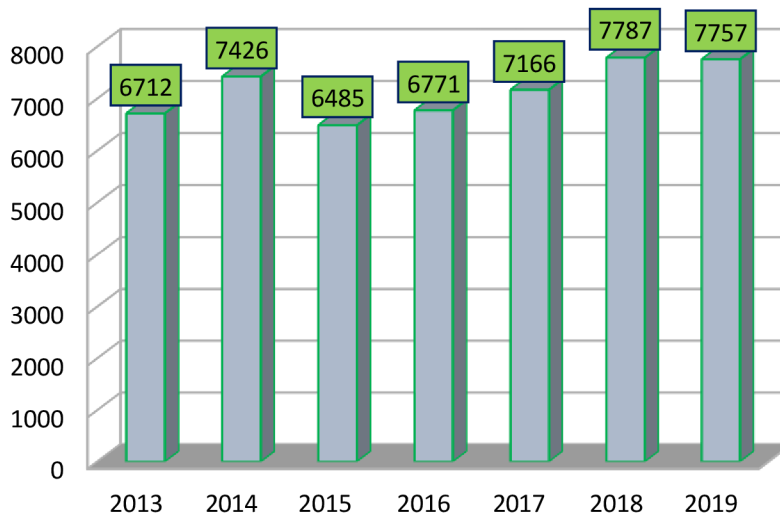
Figure 22: Meat consumption in kg



source: ceic.data

Income per household in Slovakia is profoundly not wanted in comparison to the OECD average, which is one of the best at the rate of 20474 USD. There is a large gap between the poor and the rich (OECD, 2017).

Figure 23: Income per household in Slovakia in USD



source: ceic.data

Table13: Data set for Slovakia (observation 2013-2019)

	y	x
2013	86,6	6712
2014	88,2	7426
2015	88,3	6485
2016	96,2	6771
2017	59.34	7166
2018	64.5	7787
2019	-	7757

source: ceic.data

y= consumption of meat in kg

x= income per household in USD

Income elasticity in Slovakia = $\frac{-319765}{157899} = -2$. It demonstrates that the elasticity in Slovakia

was relatively stable for meat even when the price changed between 2013 and 2019. As a result, the elasticity for meat was considered as inferior during the investigating period.

R-square = 0,65

p=0,76

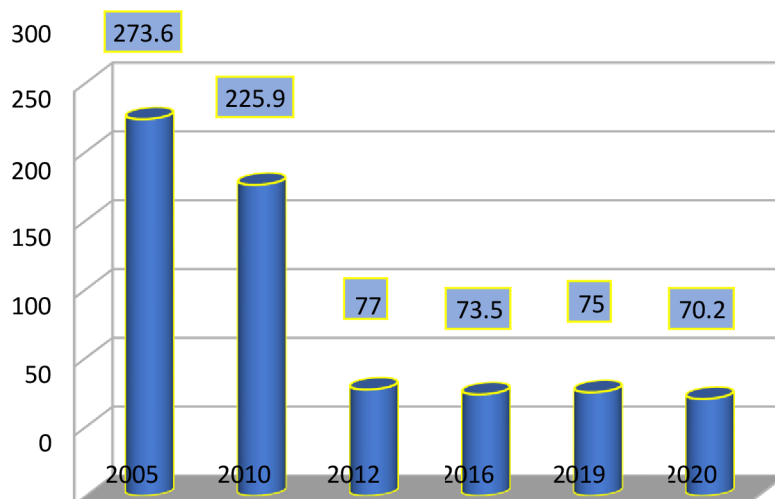
$$Y = -11939 + 215x$$

In the model, the R-square =0,65. It reports that meat consumption (independent variable) is influenced from 65%. In fact, p-value is 0,76. As a consequence, it is statistically insignificant.

4.12 Meat consumption in Belgium

According to ceic.data, the highest consumption of meat in Belgium was in 2005 at the amount of 273,6 kg per one person. The consumption of meat was decreasing from that point. It reached the lowest consumption level in 2020 at the amount of 70,2 kg per one person as it is revealed in Figure 24.

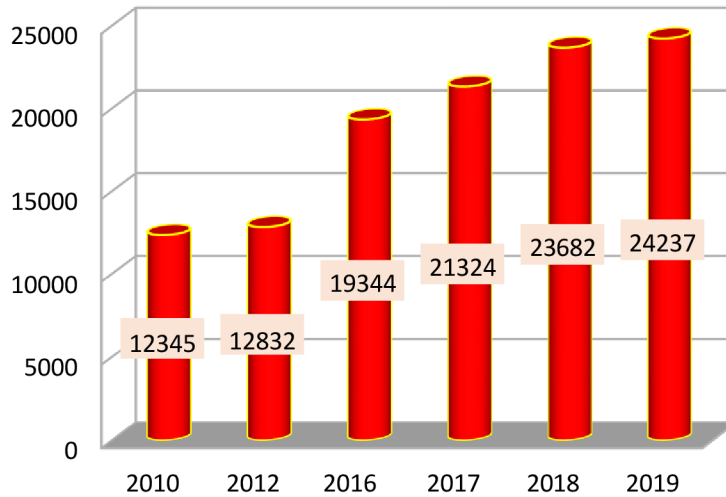
Figure 24: Meat consumption in Belgium in kg



source:ceic.data

As for the income per household in Belgium, the lowest point was reached in 2010 at the amount of 12345 USD. It was steadily increasing from 2013. It reached the highest point in 2019 at the amount of 24237 USD.

Figure 25: Income per household in Belgium in USD



source: ceic.data

Data set for consumption of meat in kg and income per household in USD is presented in Table14 as it is demonstrated below:

Table14: Data set for Belgium (observation 2005-2020)

	y	x
2005	273,6	-
2010	225,9	12345
2012	77	12832
2016	73,5	19344
2017	-	21324
2018	-	23682
2019	75	24237
2020	70.2	-

y= consumption of meat in kg

x= income per household in USD

Income elasticity in Belgium = $\frac{-0,72}{0,96} = -0,75$. It outlines that the elasticity in Belgium

is regarded as inferior. In view of increase of the income, it decreases the demand for meat.

R-square = 0,52

p=0,0004

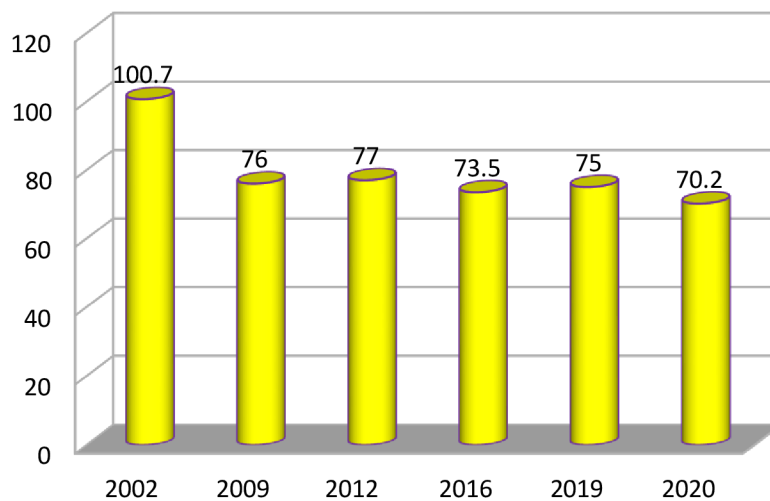
Y= 23672 – 45,7x

In the model, the R-square =0,52. It reports that meat consumption (independent variable) is influenced from 52%. What is more, p-value is 0,0004. Hence, it is statistically significant.

4.13 Meat consumption in Hungary

Consumption of meat dropped in 2009 manifold compared to a year 2002. Consequently, it continued in the same token for another 20 years as it is demonstrated in Figure 26.

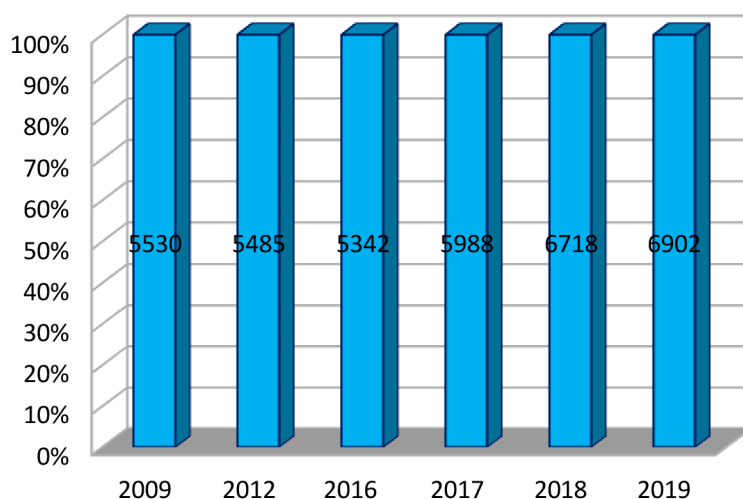
Figure 26: Consumption of beef in Hungary in kg



source: ceic.data

In terms of income per household in Hungary, it reached the lowest point in 2009 at the amount of 5530 USD. It was somewhat increasing from 2009. It reached the highest point in 2019 at the amount of 6902 USD.

Figure 27: Income per household in Hungary in USD



source: ceic.data

Table15: Data set for Hungary (observation 2002-2020)

	y	x
2002	100,7	-
2009	76	5530
2012	77	5485
2016	73,5	5342
2017	75	5988
2019	75	7787
2020	70,2	-

source: ceic.data

y= consumption of meat in kg

x= income per household in USD

Income elasticity in Hungary = $\frac{-0,3}{0,4} = -0,75$. It affirms that the elasticity in Hungary was referred as inferior. In other words, increase of salary did not affect a positive demand for meat during the investigated period.

R-square = 0,28

p=0,02

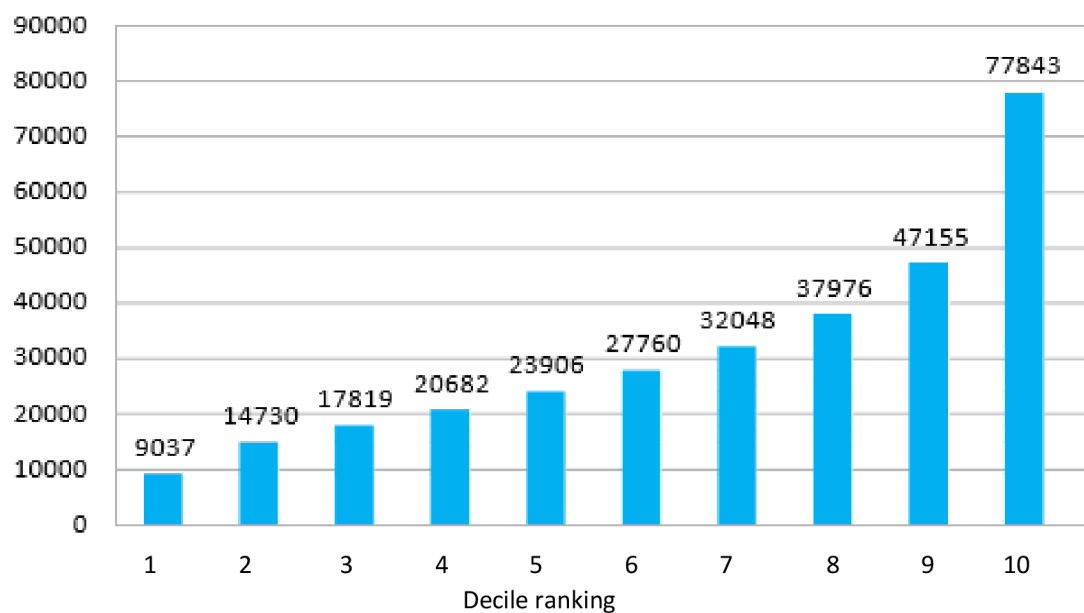
Y= 11143 – 63,6x

In the model, the R-square =0,28. It claims that meat consumption (independent variable) is influenced from 28% and p-value is 0,02. So that, it is statistically significant.

Meat consumption in Great Britain

The disposable income was steadily increasing during the observed period 2014/ 2015 in Great Britain. The highest income was at the last decile at the rate of 77843 USD as it is demonstrated in Figure 28.

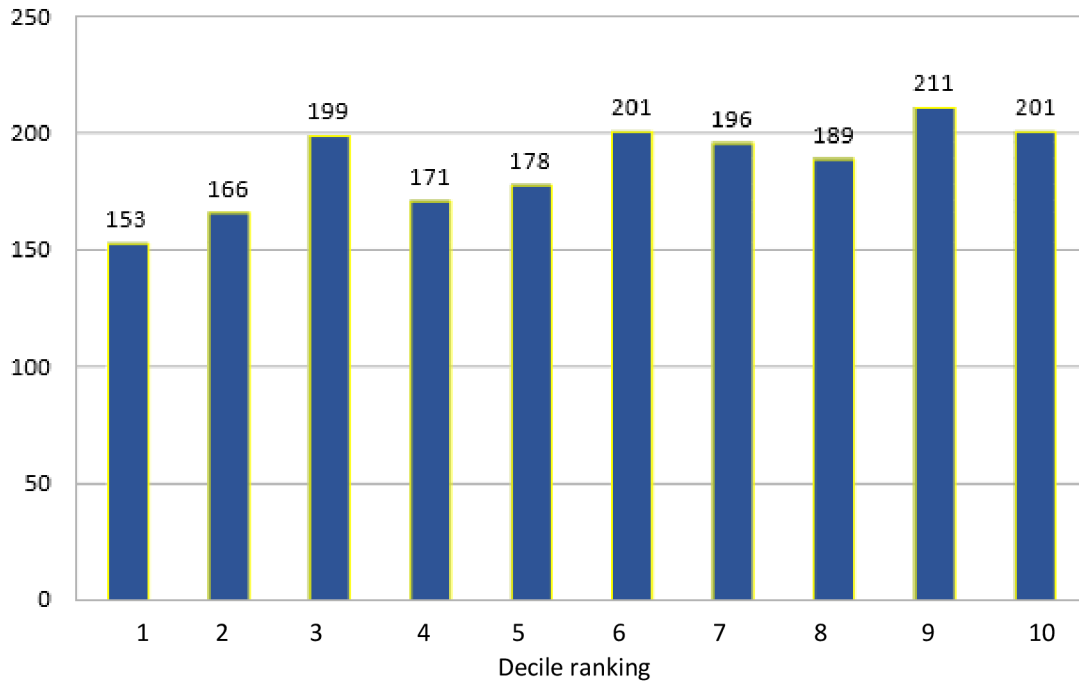
Figure28 Equivalized disposable income 2014-2015 in USD in Great Britain



source: OECD

As for the meat consumption, it was steadily increasing during the first 3 deciles of the researched period of 2015 in Great Britain. Nevertheless, it was fluctuating through the rest of deciles. The highest consumption was reached at the ninth decile at the rate of 211 kg as it is revealed in Figure 29.

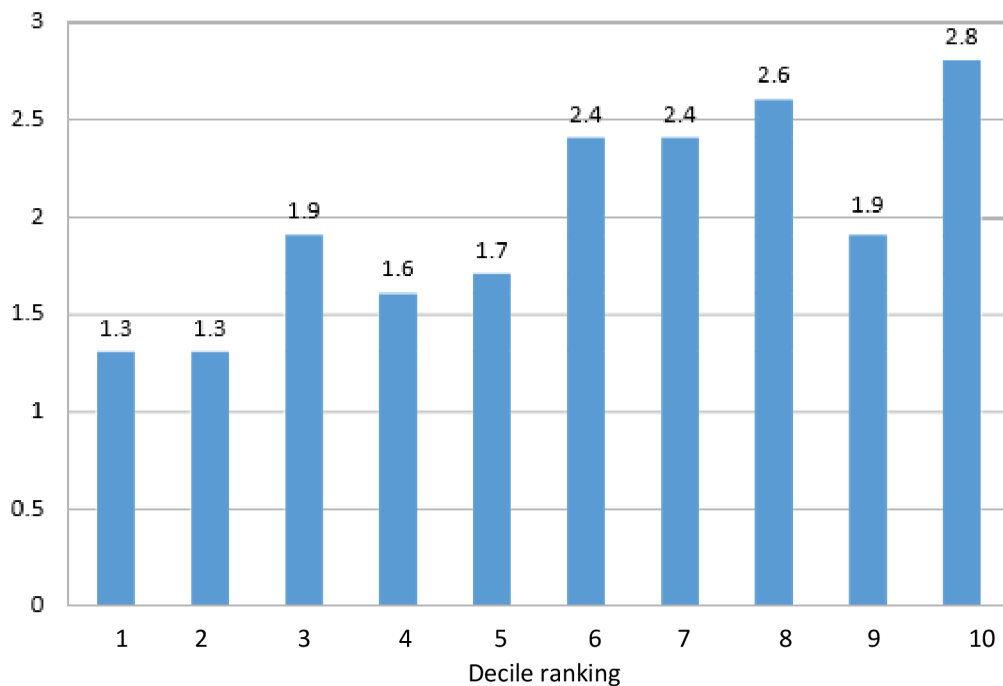
Figure 29: Consumption of meat 2015 in grams per week in Great Britain



source: OECD

The expenditure of beef was steadily increasing during the investigated period of 2015 in Great Britain. The highest expenditure was recorded at rate of £2.8 at the last decile as it is demonstrated in Figure 30.

Figure 30: Expenditure on beef in £ 2015 in Great Britain



source: OECD

Data set for consumption of meat in grams, income per household in USD and expenditure in pounds are presented in Table16 as it is demonstrated below:

Table16: Data set for Great Britain (observation 2014-2015)

Deciles	x	y	z
1	9037	153	1,3
2	14730	166	1,3
3	17819	199	1,9
4	20682	171	1,6
5	23906	178	1,7
6	27760	201	2,4
7	32048	196	2,4
8	37976	189	2,6
9	47155	211	1,9
10	77843	201	2,8

y= consumption of meat in grams per week

x= income per household in USD

z=expenditure on beef in pounds

Income elasticity (meat) in Great Britain (2015) for deciles = $\frac{0,31}{7,61} = 0,04$. It reports that the income elasticity during that period in Great Britain was considered as inelastic. In spite of the fact that income was going up during the researching period, the meat consumption was going down.

Income elasticity (expenditure on beef) in Great Britain (2015) for deciles = $\frac{1,15}{7,61} = 0,15$. It claims that the income elasticity during that period in Great Britain corresponded to necessity goods. In spite of the fact that income was going up during the researching period, the beef expenditure was going down.

Consumption

R-square = 0,42

p=0,1

Y= -99073 + 696,6x

R-square = 0,42

p=0,1

Y= -99073 + 696,6x

Expenditure

R-square = 0,58

p=0,17

Y= -26034 + 28608x

In the model, the R-square =0,42. It declares that beef consumption (independent variable) is influenced from 42%. Moreover, p-value is 0,1. In this case, it is statistically insignificant.

R-square = 0,58

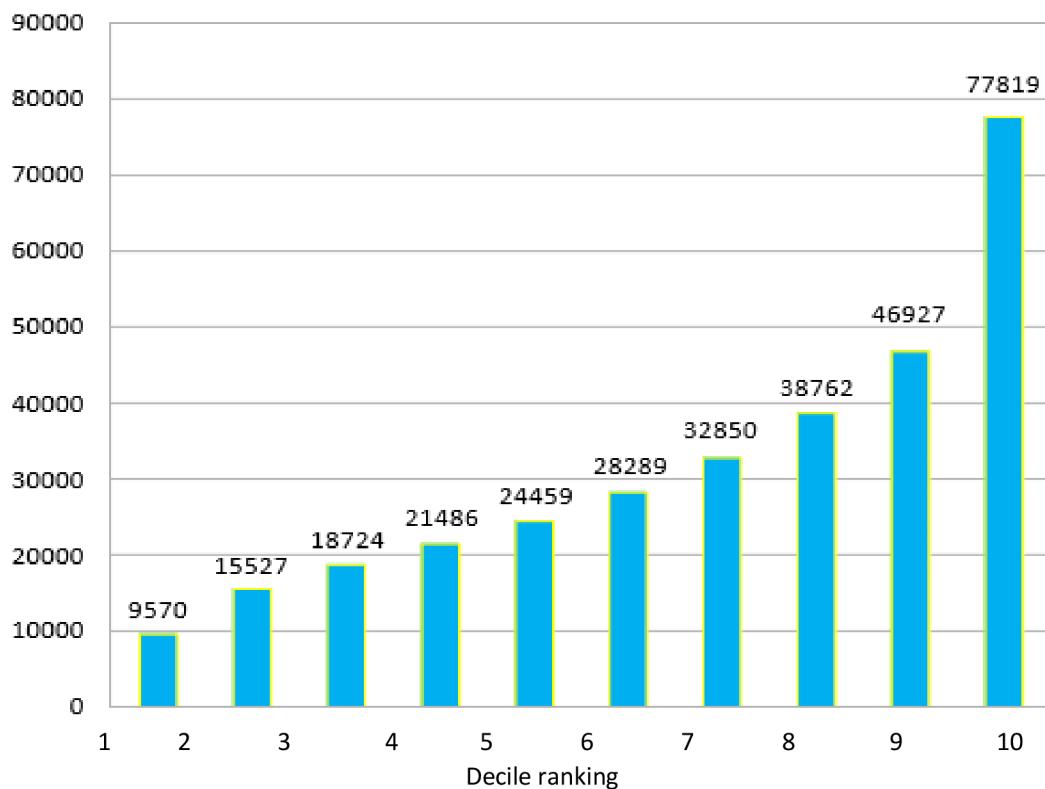
p=0,17

Y= -26034 + 28608x

In the model, the R-square =0,58. It reports that beef expenditure (independent variable) is influenced from 58%. What is more, p-value is 0,17. So, it is statistically insignificant.

The disposable income was steadily increasing during the observed period 2015/ 2016 in Great Britain. The highest income was at the last decile at the rate of 77819 USD as it is demonstrated in Figure 31.

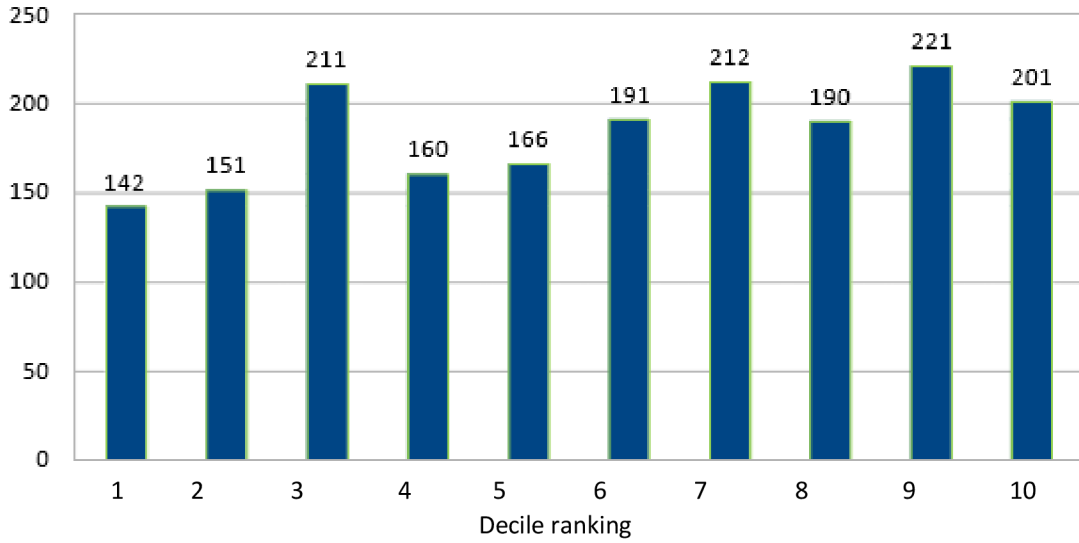
Figure 31: Equivalized disposable income 2015-2016 in USD in Great Britain



source: OECD

As to the meat consumption, it was going up during the first 3 deciles of the observed period of 2016 in Great Britain. However, it was fluctuating through the rest of deciles. The highest consumption was reached at the ninth decile at the rate of 211 kg as it is revealed in Figure 32.

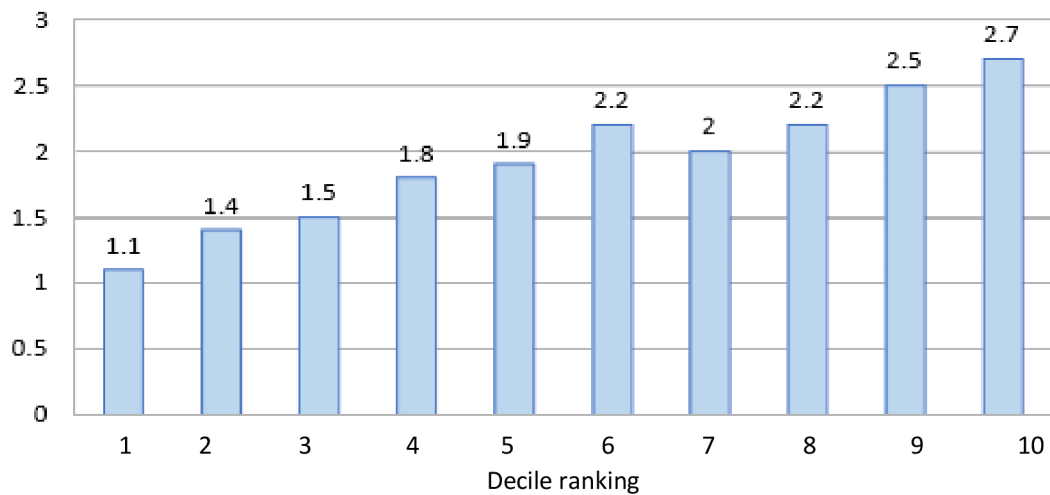
Figure 32: Consumption of meat 2016 in grams per week in Great Britain



source: OECD

The expenditure of beef was steadily increasing during the investigated period of 2016 in Great Britain. The highest expenditure was recorded at the rate of £2.7 at the last decile as it is revealed in Figure 33.

Figure 33: Expenditure on beef in £ per week 2016 in Great Britain



source: OECD

Data set for consumption of meat in grams, income per household in USD and expenditure in pounds are presented in Table17 as it is demonstrated below:

Table17: Data set for Great Britain (observation 2015-2016)

Deciles	y	x	z
1	9570	142	1,1
2	15527	151	1,4
3	18724	211	1,5
4	21486	160	1,8
5	24459	166	1,9
6	28289	191	2,2
7	32850	212	2
8	38762	190	2,2
9	46927	221	2,5
10	77819	201	2,7

x= consumption of meat in grams

y= income per household in USD

z=expenditure on beef in pounds

Income elasticity (meat) in Great Britain (2016) for deciles = $\frac{0,41}{7,1} = 0,06$. It reports that the income elasticity during that period in Great Britain corresponded to necessity goods. In spite of the fact that income was going up during the researching period, the meat consumption was going down.

Income elasticity (expenditure on beef) in Great Britain (2016) for deciles = $\frac{1,45}{7,1} = 0,2$. It reports that the elasticity in Great Britain during the period was inelastic. In spite of the fact that income was going up during the researching period, the beef expenditure was going down

Consumption

R-square = 0,34

p=0,27

Y= -44600 + 412.1x

R-square = 0,34

p=0,27

Y= -44600 + 412,1x

Expenditure

R-square = 0,80

p=0,01

Y= -36872 + 35396x

In the model, the R-square =0,34. It declares that beef consumption (independent variable) is influenced from 34%. Moreover, p-value is 0,27. Consequently, it is statistically insignificant.

R-square = 0,80

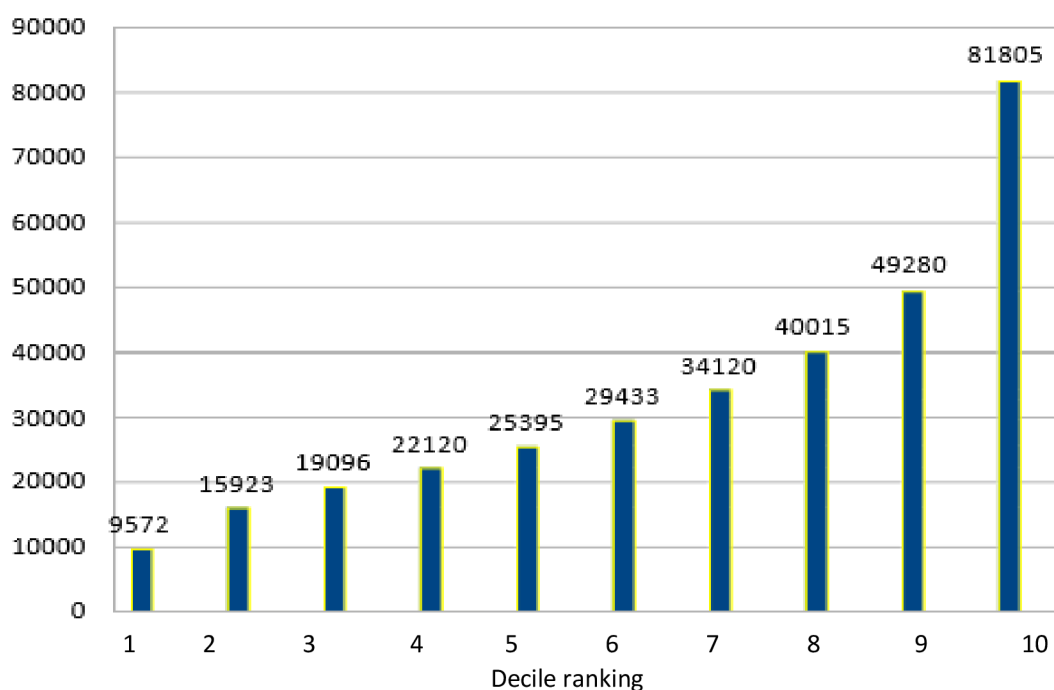
p=0,01

Y= -36872 + 35396x

In the model, the R-square =0,80. It claims that beef expenditure (independent variable) is influenced from 80%. What is more, p-value is 0,01. So, it is statistically significant.

The disposable income was steadily increasing during the observed period 2016/2017 in Great Britain. The highest income was at the last decile at the rate of 81805 USD as it is demonstrated in Figure 34.

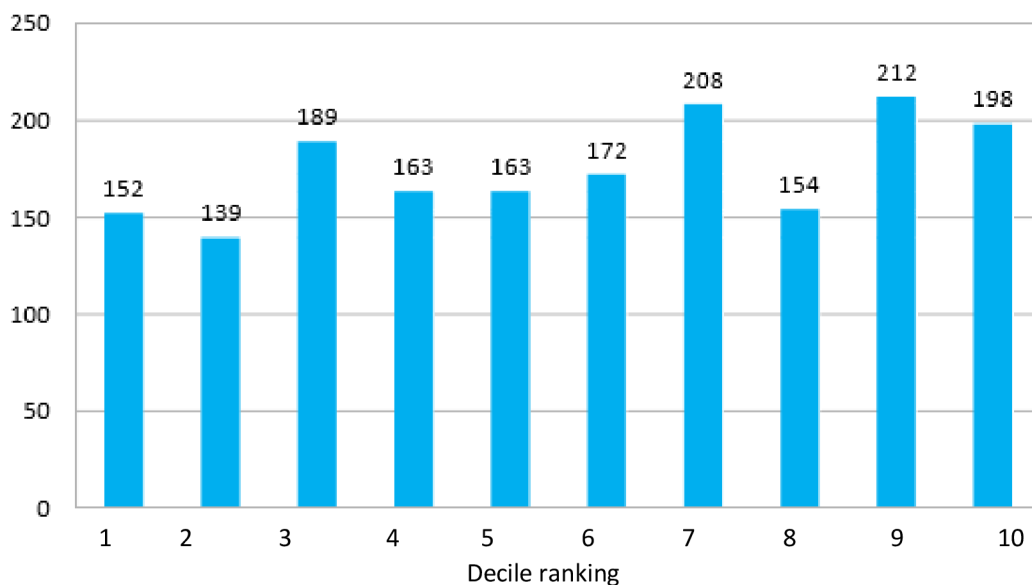
Figure 34: Equivalized disposable income 2016/2017 in USD in Great Britain



source: OECD

As to the meat consumption, it was going up and down during the observed period of 2017 in Great Britain. However, the highest consumption was reached at the ninth decile at the rate of 212 kg as it is demonstrated in Figure 35.

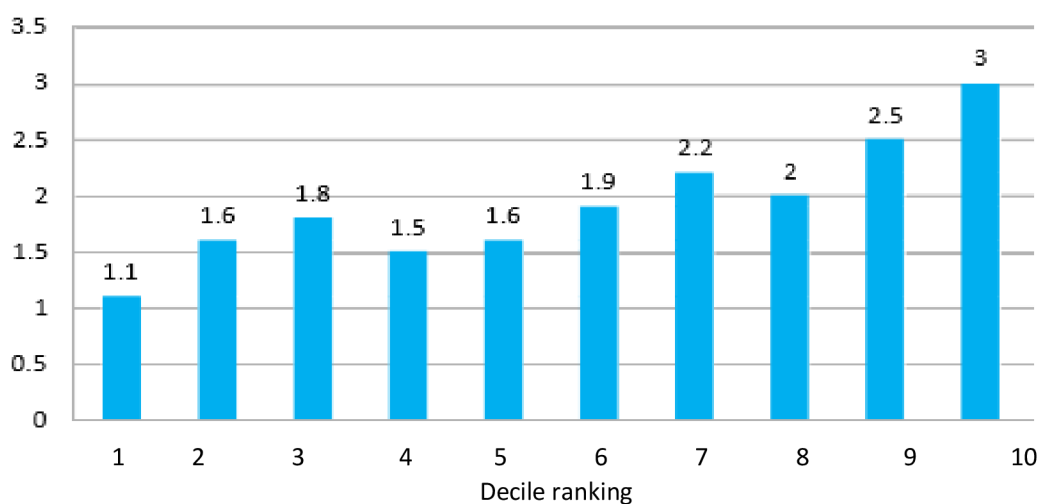
Figure 35: Consumption of meat 2017 in grams per week in Great Britain



source: OECD

The expenditure of beef was up and down steadily increasing during the investigated period of 2017 in Great Britain. The highest expenditure was recorded at the rate of £3 at the last decile as it is demonstrated in Figure 36.

Figure 36: Expenditure on beef in £ per week 2017 in Great Britain



source: OECD

Data set for consumption of meat in grams, income per household in USD and expenditure in pounds are presented in Table18 as it is demonstrated below:

Table18: Data set for Great Britain (observation 2016-2017)

Deciles	x	y	z
1	9572	152	1,1
2	15923	139	1,6
3	19096	189	1,8
4	22120	163	1,5
5	25395	163	1,6
6	29433	172	1,9
7	34120	208	2,2
8	40015	154	2
9	49280	212	2,5
10	81805	198	3

y= consumption of meat in grams per week

x= income per household in USD

z=expenditure on beef in pounds

Income elasticity (meat) in Great Britain (2017) for deciles = $\frac{0,23}{7,54} = 0,03$. It reports that

the income elasticity during that period corresponded to strictly necessary goods in Great Britain. In spite of the fact that income was going up during the researching period, the meat consumption was going down.

Income elasticity (expenditure on beef) in Great Britain (2017) for deciles = $\frac{1,72}{7,54} = 0,22$. It reports that the elasticity was regarded as inelastic. In spite of the fact that income was going up during the researching period, the beef expenditure was going down.

Consumption

R-square = 0,33

p=0,14

Y= -330705 + 2251.9x

R-square = 0,33

p=0,14

Y= -330705 + 2251,9x

In the model, the R-square =0,33. It declares that beef consumption (independent variable) is influenced from 33%. Furthermore, p-value is 0,14. Hence, it is statistically insignificant.

R-square = 0,89

Expenditure

R-square = 0,89

p=0,003

Y= -37044 + 36312x

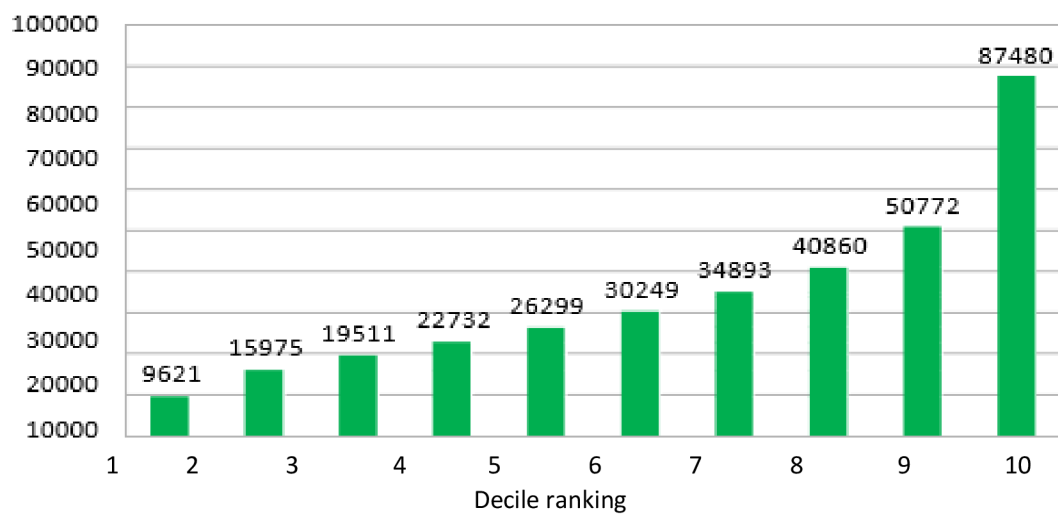
p=0,003

$$Y = -37044 + 36312x$$

In the model, the R-square =0,89. It asserts that beef expenditure (independent variable) is influenced from 89%. What is more, p-value is 0,003. So that, it is statistically significant.

The disposable income was steadily increasing during the observed period 2017/2018 in Great Britain. The highest income was at the last decile at the rate of 87480 USD as it is demonstrated in Figure 37.

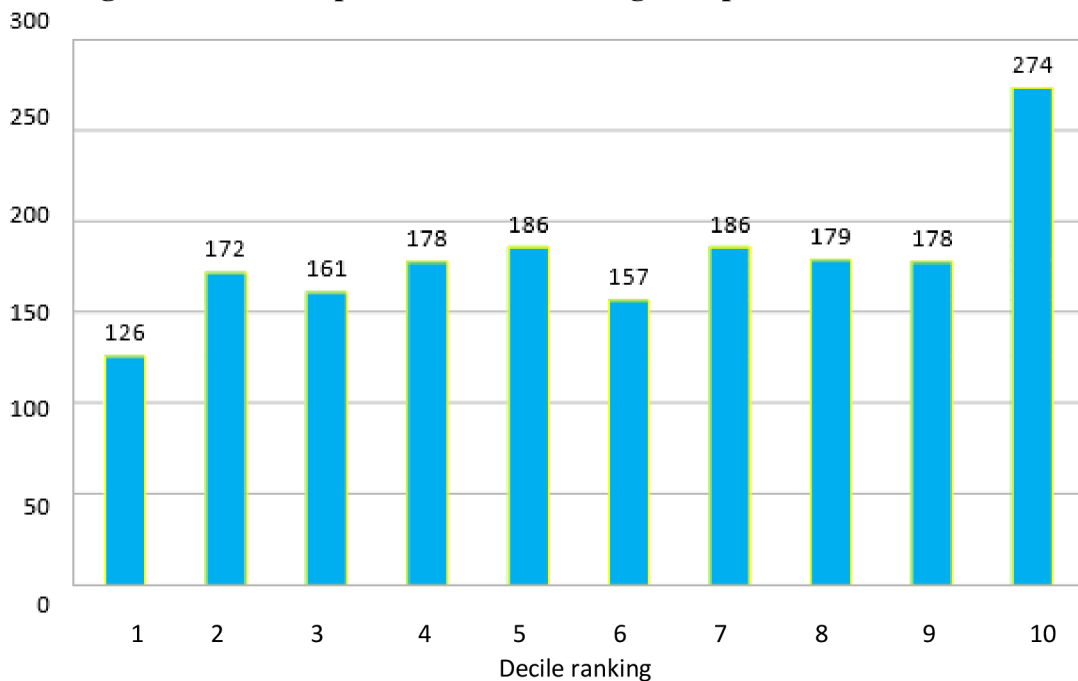
Figure 37: Equivalized disposable income 2017/2018 in USD in Great Britain



source: OECD

As to the meat consumption, it was fluctuating during the observed period of 2018 in Great Britain. Nevertheless, the highest consumption was reached at the ninth decile at the rate of 274 g as it is revealed in Figure 38.

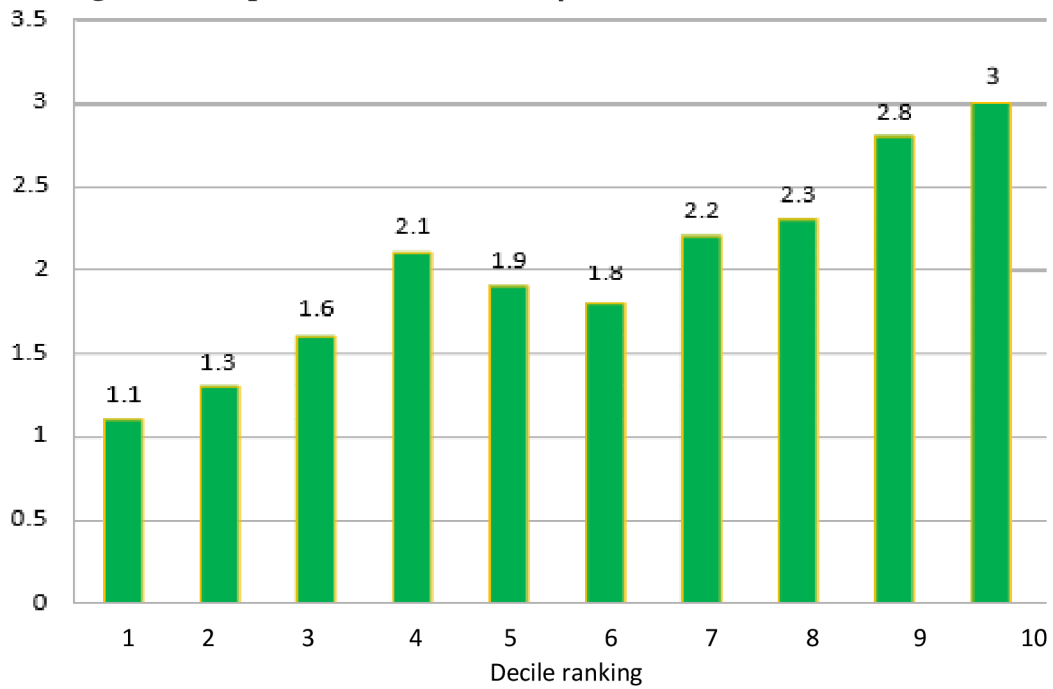
Figure 38: Consumption of meat 2018 in grams per week in Great Britain



source: OECD

The expenditure of beef was steadily increasing with some ups and down during the observed period of 2018 in Great Britain. The highest expenditure was recorded at the rate of £3 at the last decibel as it is revealed in Figure 39.

Figure 39: Expenditure on beef in £ per week 2018 in Great Britain



source: OECD

Data set for consumption of meat in grams, income per household in USD and expenditure in pounds are presented in Table 19 as it is demonstrated below:

Table 19: Data set for Great Britain (observation 2017-2018)

Deciles	y	x	z
1	9621	126	1,1
2	15975	172	1,3
3	19511	161	1,6
4	22732	178	2,1
5	26299	186	1,9
6	30249	157	1,8
7	34893	186	2,2
8	40860	179	2,3
9	50772	178	2,8
10	87480	274	3

x= consumption of meat in grams per week

y= income per household in USD

z=expenditure on beef in pounds

Income elasticity (meat) in Great Britain (2018) for decile = $\frac{1,17}{8,09} = 0,14$. It reports that the income elasticity corresponded to necessary goods. In spite of the fact that income was going up during the researching period, the beef consumption was going down.

Income elasticity (expenditure on beef) in Great Britain (2018) for decile = $\frac{1,72}{8,09} = 0,21$. It declares that the income elasticity corresponded to necessity goods. In spite of the fact that income was going up during the researching period, the beef consumption was going down.

Consumption

R-square = 0,79

p=0,0074

Y= -61592 + 531,1x

R-square = 0,42

p=0,1

Y= -99073 + 696,6x

In the model, the R-square =0,79. It declares that meat consumption (independent variable) is influenced from 79%. Furthermore, p-value is 0,0074. Hence, it is statistically significant.

R-square = 0,81

p=0,02

Y= -33323 + 33414x

In the model, the R-square =0,81. It reports that beef expenditure (independent variable) is influenced from 81%. Moreover, p-value is 0,02. So that, it is statistically significant.

5. Discussion

To start with the topic, a great number of studies investigated a long-term relation between demand and income. So that, the income elasticity is constantly spread over the income levels. As a matter of fact, the reality is somewhat different. According to manifold studies (Chern et al., 2003, Kinnucan et al., 1997), the income elasticity drops when the income goes up. Furthermore, the consumption level remains till a specific level of the income when it is reached (Taljaard, 2004). For this reason, a flexible demand form is preferable when there is a nonlinear relationship between income and demand. Moreover, prices appear to be constant. The consumption of meat increases with the growing income (Eales & Unnevehr, 1993). This type of elasticity is connected with necessary goods. The elasticity is positive but less than 1. It has been confirmed in the case of the EU ($e=0,12$), the Czech Republic ($e=0,59$), the Netherlands ($e=0,2$), Spain ($e=0,8$), Poland ($e=0,55$), Great Britain ($e=0,04$, 2015), Great Britain ($e=0,06$, 2016), Great Britain ($e=0,03$, 2017) and Great Britain ($e=0,14$, 2018). As for the dependency between the meat consumption and income, it has been confirmed in the case of the Czech Republic from 62%, Poland from 79%, and Great Britain (2018) from 79%. Furthermore, all are statistically significant.

Consequently, meat was considered as a luxurious good on behalf of several previous studies. The elasticity is more sizeable than one for luxurious goods. It is profoundly sensitive to an increase in price. What is more, this type of meat elasticity is common for poorer countries. The elasticity of Italy referred to the elasticity of 1.03. There is not a profound relationship between the beef consumption and the income. Above all, the R-square is 60% and p-value is 0,006. Granted that the result is statistically insignificant.

Whereas the elasticity for the other countries was negative during the investigating period. The elasticity is set to be insensitive to the price. Hence, the more money people had, the less they spent it on buying meat. This researching result is valid for Germany ($e=-0,47$), Slovakia ($e=-2$), Belgium ($e=-0,75$), Portugal ($e=-1,7$), Austria ($e=-1,2$), Hungary ($e=-0,75$) and France ($e=-0,43$). Even more, there is a crucial relationship between the meat consumption and income in all investigated countries in this group. What is more, besides France (p-value=0.83) and Slovakia (p-value=0.76) all are statistically significant namely, Germany (R-square= 98%, p-value=0,0001), Belgium (R-square= 52%, p-value=0,0004), Portugal (R-square= 83%, p-value=0,03), Austria (R-square= 91%, p-value=0,0001), Hungary (R-square= 28%, p-value=0,02).

As a final point, as far as the meat consumption and the beef expenditure in Great Britain are concerned, a significant relationship between a meat consumption, a beef expenditure and income has been confirmed for a year 2018. Subsequently, it is statistically significant relationship, whose p-value= 0,0074. Nevertheless, the meat consumption for a year 2015, 2016 and 2017 were statistically insignificant. As for the beef expenditure, only a year 2015 is statistically insignificant (R-square=0,58, p-value= 0,7) otherwise the other years are statistically significant. Namely, R-square=80% and p-value=0,01 for a year 2016, R-square=89% and p-value=0,003 for a year 2017 and R-square=81% and p-value=0,02 for a year 2018.

6. Conclusion

As a matter of fact, the consumption of meat does not stop all over the world. It is on the point of increasing tendencies in poorer countries. However, more water and places for growing it are required. It is even more than for plant production and therefore this issue is so controversial. What is more, production of meat is connected with many influences that are regarded as negative to human beings and animals themselves. As a result, some visible reduction of the production of meat would be welcomed. On the other hand, meat contains many nutrients that are essential from a health point of view. As for the production of meat, it is a source that offers many opportunities for gaining some living on it.

The consumption of meat should become more balanced. Some decrease of the consumption is necessary in some parts of the world on the other hand the increase of the meat consumption is required in the others. However, how to balance this issue is still not solved.

There are somewhat differences between countries as for the income elasticity. More precisely, the scale of the income elasticity is large owing to the wealth diversity of countries in the EU.

As for the investigating question, which was to research what influence the increase of income has on the consumption of meat for necessary goods. Admittedly, the meat consumption increases with the increase of income. It has been demonstrated in the case of the Czech Republic, Poland, Spain, the EU, the Netherlands, and Great Britain (2015- 2018). However, only the Czech Republic (R-square= 62%, p-value=0,0115), Poland (R-square= 79%, p- value=0,0069) and Great Britain (2018) (R-square= 79%, p- value=0,0074) reveal a significant relationship between the meat consumption and income. In addition, their p-value is less than 0.05 and as a result, they are considered as statistically significant.

7 References

Anderson E. (1991), *Reposition on changing preferences: Journal on consumer research* [online]. [cit.2019-02-13]. Available

at:<https://journals.sagepub.com/doi/abs/10.1177/002224299405800304>

Black, R. (2007), *Shun Meat, says UN Climate Chief* [online]. [cit. 2019-02-13]

BOX, George E.P., (2015) *Time Series Analysis: Forecasting and Control, 5th Edition.*

[online]. [cit. 2020-02-06]. Available at: ISBN: 978-1-118-67502-1

Chavas P. *Structural Change in the Demand for Meat* [online]. American Journal of Agricultural Economics. 1983. Available at:

<https://onlinelibrary.wiley.com/doi/abs/10.2307/1240351>

Chern, W. (2003), *Analysis of food consumption: Social development paper* [online]. Rome: [cit. 2019-02-13]. Available at: <http://www.fao.org/3/a-ae025t.pdf>

Cosgrove M. (2005), *Consumption of red meat: British journal of nutrition* [online]. [cit. 2019-02-13]. Available at:<https://jissn.biomedcentral.com/articles>

Cross, A. J. (2007), *A study of red meat intake: Cancer risk* [online]. Available from: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2121650/>

at:<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2121650/>

Davey G.K. (2003), *Lifestyle characteristics: Public health nutrition* [online]. [cit. 2019-02-13].

Available at:<https://www.ncbi.nlm.nih.gov/pubmed/12740075>

Deblits. *Impact of potential dairy-beef production on China's beef supply, demand and international trade: AgEconSearch* [online]. 2008. Available at:

<https://ageconsearch.umn.edu/record/125734>

Eales, J., & Unnevehr, L. (1993) *Simultaneity and Structural Change in US Meat Demand: American Journal of Agricultural Economics*[online]. [cit. 2020-02-05].

Eales, J., & Unnevehr, L. *Testing Separability of Japanese Demand for Meat and Fish within Differential Demand Systems: American Journal of Agricultural Economics* [online]. 1999 [cit. 2020-02-05].

Eur-lex.europa.eu. *EUR-Lex: Access to European Union Law* [online]. Brussel, 2010 [cit.2021-6-27]. Available at:
<https://eur-lex.europa.eu/legal-content/DE/ALL/?uri=CELEX%3A32010L0063>

Europa.eu. *EUR-Lex: Access to European Union Law* [online]. Brussel, 2017 [cit.2021-6-27]. Available at:
<https://eur-lex.europa.eu/legalcontent/CS/TXT/?uri=CELEX%3A32017R0745>

European Commission. (2009) *Environmental impact of products (EIPRO): Analysis of the life cycle environmental impacts related to the final consumption of the EU-25* [online]. [cit. 2020-02-03].

FAO (2007), *State of the world's animal genetic resources* [online]. Rome: Fao [cit. 2020-02-03]

Foreign Agricultural Service (2020), *Retail Food 2019: Gain Report* [online], [cit. 2021-6-28]. Available at:
<https://www.fas.usda.gov/data/portugal-retail-foods-2019>

Fiddes, N. (1991), *Meat - A natural symbol*. [online]. London: Routhledge [cit. 2020-02-03].

Fraser G. (1999), *Association between diet and cancer: American journal of clinical nutrition* [online]. [cit.2019-02-13]. Available
at:<https://www.ncbi.nlm.nih.gov/pubmed/10479227>

Garnett, T. (2010), *Livestock and climate change.: The meat crisis - Developing more sustainable production and consumption*. [online]. London: Earthscan [cit. 2020-02-03].

Gossard (2003), *Social structural influences on meat: Human ecology review* [online]. [cit. 2019-02-13]. Available at:<http://ww.w.humanecologyreview.org/pastissues/her101/101gossardyork.pdf>

Greger, M. (2010), *Industrial animal agriculture's role in the emergence and spread of disease.: The meat crisis* [online]. London: Earthscan [cit. 2020-02-03].

Gura, S. (2010), *Industrial livestock production and biodiversity: The meat crisis* [online]. London [cit. 2020-02-03].

GUJARATI, Damodar N. (2000) *Basic Econometrics: Fourth Edition* [online]. USA:The McGraw-Hill Company, [cit. 2021-7-18]

HAYES, Adam. *Elasticity* [online]. Investopedia, Feb 25, 2021 [cit. 2021-6-27]

Hermann M. (2009), *Foodsecurity and agricultural development: United nation conference*[online]. [cit.2019-02-13]. Available at:https://unctad.org/en/Docs/osgdp20094_en.pdf

Hill M., Gossard,Richard York. *Social Structural Influences on MeatConsumption: Research in Human Ecology* [online]. USA, 2003. Available at:
https://www.researchgate.net/publication/229051259_Social_Structural_Influences_on_Meat_Consumption

Hungerman, D. (2011), *Do religious proscriptions matter: Evidence from a theory-based test* [online]. Cambridge (USA): [cit. 2019-02-13]. Available at:<https://pdfs.semanticscholar.org/52d2/89cb6000af7be27888bafaeaa9dc5df21dc6.pdf>

Johnson A. (2009), *The role of the red meat: Meat science (beef and lamb)* [online]. New Zeland: [cit.2019-02-13]. Available at:<https://pdfs.semanticscholar.org/0e3f/00cd4b05e94cc39214f7e358d70043509108.pdf>

Linseisen J. (2002), *Meat consumption: Investigation into cancer and nutrition* [online]. [cit. 2019-02-13]. Available at: <https://www.cambridge.org/core/journals/public-health-nutrition/article/meat-consumption-in-the-european-prospective-investigation-into-cancer-and-nutrition-epic-cohorts-results-from-24hour-dietary-recalls/DD3319939C162BA94B5ECE08FC2C9B49>

Kelemen. *Associations of dietary protein with disease: American journal of Epidemiology* [online]. [cit. 2005]. Available at: <https://academic.oup.com/aje/article/161/3/239/127005?login=true>

KENT, Matthews (2000). *Economics Theory: Fifth Edition* [online]. Italy: Addison-Wesley Publishing Company, [cit. 2021-7-18]

Kubicova L. (2010) *Consumer foodstuffs demand and income standard development in the household in Slovakia: Acta Universitatis Agriculturae Mendelianae Brunensis* [online]. 2010 [cit. 2021-7-22].

Lusnakova Z. (2010) *Consumer foodstuffs demand and income standard development in the household in Slovakia: Acta Universitatis Agriculturae Mendelianae Brunensis* [online]. 2010 [cit. 2021-7-22].

Key figures on Europe, ISBN 978-92-79-72272-1: 2017 edition [online]. Luxembourg, 2017 [cit. 2021-6-27]. Available at: <https://ec.europa.eu/eurostat/documents/3217494/8309812/KS-EI-17-001-EN-N.pdf/b7df53f5-4faf-48a6-aca1-c650d40c9239>

Kinnucan, W. (1997), *Effects of health information: Meat demand* [online]. [cit. 2019-02-13]. Available at: https://www.researchgate.net/publication/277396269_Effects_of_Health_Information_and_Generic_Advertising_on_US_Meat_Demand

Masuda, T. (2010), *China's Meat Consumption: An Income Elasticity Analysis and Long-Term Projections* [online]. Denver: [cit. 2019-02-13]. Available at: https://ageconsearch.umn.edu/bitstream/61601/2/Poster11972AAEA_MasudaGoldsmith20100503b.pdf

McAlpine (2009), *Increasing World Consumption of Beef as a Driver of Regional and Global Change: Global Environmental Change* [online]. [cit. 2019-02-13]. Available at: <https://repository.si.edu/handle/10088/12045>

McAfee A.J. (2010), *Red meat consumption: Meat science* [online]. [cit. 2019-02-13]. Available at: <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1747-0080.2007.00197.x>

Meissner HH, Scholtz MM. *Sustainability of the South African Livestock Sector towards 2050 Part 1: Worth and impact of the sector* [online]. [cit. 2014]. Available at: <https://www.ajol.info/index.php/sajas/article/view/99337>

Meissner H.H. (2013), *Sustainability of livestock sector: Worth and impact* [online]. [cit. 2019-02-13]. Available at: https://www.researchgate.net/publication/260434386_Sustainability_of_the_South_African_Livestock_Sector_towards_2050_Part_1_Worth_and_impact_of_the_sector

Moschini G., Meilke K. *Modelling the pattern of structural change in u.s. meat demand* [online]. Explore JSTOR. 1989 [cit. 2014]. Available at: <https://onlinelibrary.wiley.com/doi/abs/10.2307/1241582>

NICHOLSON, Walter (1998). *Microeconomics Theory: Basic Principles and Extensions. Seventh Edition* [online]. USA: The Dryden Press, [cit. 2021-7-18].

Nicolae et al. *Mathematical model for forecasting and estimating of market demand: Recent advances in applied math* [online]. 2010 [cit. 2021-7-27].

Niitamo O. (1968) *Consumption and Prices of Alcoholic Beverages: The Swedish journal of economics* [online]. [cit. 2021-7-22].

OECD. Stat: ORGANISATION FOR ECONOMIC COOPERATION AND DEVELOPMENT [online]. Foreign Agricultural Service, 2017 [cit. 2021-6-28].

Available at:

https://stats.oecd.org/OECDStat_Metadata/ShowMetadata.ashx?Dataset=HIGH_AGLINK_2017&ShowOnWeb=true&Lang=en

PARKIN, Michael (2000). *Economics Theory: Fifth Edition* [online]. Italy: Addison-Wesley Publishing Company, [cit. 2021-7-18].

Piotr Rucinski (2020). *Poland 2019 Livestock and Products: Livestock and Products* [online]. Warsaw. Available at:

https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Poland%202019%20Livestock%20and%20Products_Warsaw_Poland_01-13-2020

POWELL, Melanie (2000). *Economics Theory: Fifth Edition* [online]. Italy: Addison-Wesley Publishing Company, [cit. 2021-7-18]

Rawles, K. (2010), *Developing ethical, sustainable and compassionate food policies.: The meat crisis - Developing more sustainable production and consumption* [online]. [cit. 2020-02-03].

Safran Jonathan Foer. *Agriculture at a Crossroad: International Assessment* [online]. [cit. 2007]. Available at:

[http://www.agassessment-watch.org/report/Global%20Report%20\(English\).pdf](http://www.agassessment-watch.org/report/Global%20Report%20(English).pdf)

Sznajder M., Adamczyk G. (2003) *Evaluation of methods for determining the income elasticity coefficient of demand: Seria Economica* [online]. [cit. 2021-7-22].

Roguet et al.: *Neutral community model explains the bacterial community assembly in freshwater lakes* [online]. Brussel: OXFORD Academica, 15 October 2015n. 1. [cit. 2021-6-27]. Available at:

<https://academic.oup.com/femsec/article/91/11/fiv125/2467434?login=true>

Safran Jonathan Foer. *Eating Animals: 2017 edition* [online]. Little, Brown and Company, TX392.F58 2009 [cit. 2021-6-27]. Available at:
<https://www.goodreads.com/book/show/6604712-eating-animals>

Sinha, R. (2009), *Meat intake and mortality: A prospective study of over half a million people: Archives of Internal Medicine* [online]. [cit. 2020-02-03].

Smil, V. (2002), *Eating Meat: Evolution, Patterns and Consequences. Population and Development* [online]. [cit. 2019-02-13].

Available at: <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1728-4457.2002.00599.x>

Steinfeld, H. (2006), *Livestock's long shadow: Environmental issues and options* [online]. Rome: Fao [cit. 2020-02-03]. Available at: <http://www.fao.org/3/a0701e/a0701e00.htm>

TALJAARD, P. (2006) *The Demand for Meat in South Africa: an Almost Ideal Estimation* [online]. [cit. 2020-02-05].

Taljar P.R. (2006), *Consumer spending on meat: Agricultural economics research* [online]. [cit. 2019-02-13]. Available at: <https://www.tandfonline.com/doi/abs/10.1080/03031853.2006.9523744>

Ted C. Schroeder. *U.S. Meat Demand: Household Dynamics and Media Information Impacts: Research in Human Ecology* [online]. USA, 2003. Available at:
<https://ideas.repec.org/a/ags/jlaare/61056.html>

The Economic Times (2019), *Definition of 'Gross Domestic Product': Budget* [online]. [cit. 2019-02-11] Available at: <https://economictimes.indiatimes.com/definition/gross-domestic-product>

Tudge, C (2010), *How to raise livestock: Developing more sustainable production and consumption* [online]. London: Earthscan [cit. 2020-02-03]

Yaktine Al. *Nutrient and contaminant tradeoffs: exchanging meat for dietary protein* [online]. [cit. 2008]. Available at:
<https://academic.oup.com/nutritionreviews/article/66/3/113/1857813?login=true>

van Otterloo (2012), *Healthy, safe and sustainable: Consumers and the public debate on food in Europe and the Netherlands since 1945* [online] [cit. 2020-02-03].

Westhoek, H. (2011), *The Protein Puzzle* [online]. The Hague [cit. 2020-02-03].

Williams, N.M. (2008), *Affected ignorance and animal suffering: Why our failure to debate factory farming puts us at moral risk* [online]. [cit. 2020-02-03].