**APPENDICES**

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**Appendix 1: Prisma checklist**

| **Section and Topic** | **Item #** | **Checklist item** | **Location where item is reported** |
| --- | --- | --- | --- |
| **TITLE** | | |  |
| Title | 1 | Identify the report as a systematic review. |  |
| **ABSTRACT** | | |  |
| Abstract | 2 | See the PRISMA 2020 for Abstracts checklist. |  |
| **INTRODUCTION** | | |  |
| Rationale | 3 | Describe the rationale for the review in the context of existing knowledge. |  |
| Objectives | 4 | Provide an explicit statement of the objective(s) or question(s) the review addresses. |  |
| **METHODS** | | |  |
| Eligibility criteria | 5 | Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses. |  |
| Information sources | 6 | Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted. |  |
| Search strategy | 7 | Present the full search strategies for all databases, registers and websites, including any filters and limits used. |  |
| Selection process | 8 | Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process. |  |
| Data collection process | 9 | Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process. |  |
| Data items | 10a | List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect. |  |
| 10b | List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information. |  |
| Study risk of bias assessment | 11 | Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process. |  |
| Effect measures | 12 | Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results. |  |
| Synthesis methods | 13a | Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)). |  |
| 13b | Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions. |  |
| 13c | Describe any methods used to tabulate or visually display results of individual studies and syntheses. |  |
| 13d | Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used. |  |
| 13e | Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression). |  |
| 13f | Describe any sensitivity analyses conducted to assess robustness of the synthesized results. |  |
| Reporting bias assessment | 14 | Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases). |  |
| Certainty assessment | 15 | Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome. |  |
| **RESULTS** | | |  |
| Study selection | 16a | Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram. |  |
| 16b | Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded. |  |
| Study characteristics | 17 | Cite each included study and present its characteristics. |  |
| Risk of bias in studies | 18 | Present assessments of risk of bias for each included study. |  |
| Results of individual studies | 19 | For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots. |  |
| Results of syntheses | 20a | For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies. |  |
| 20b | Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect. |  |
| 20c | Present results of all investigations of possible causes of heterogeneity among study results. |  |
| 20d | Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results. |  |
| Reporting biases | 21 | Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed. |  |
| Certainty of evidence | 22 | Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed. |  |
| **DISCUSSION** | | |  |
| Discussion | 23a | Provide a general interpretation of the results in the context of other evidence. |  |
| 23b | Discuss any limitations of the evidence included in the review. |  |
| 23c | Discuss any limitations of the review processes used. |  |
| 23d | Discuss implications of the results for practice, policy, and future research. |  |
| **OTHER INFORMATION** | | |  |
| Registration and protocol | 24a | Provide registration information for the review, including register name and registration number, or state that the review was not registered. |  |
| 24b | Indicate where the review protocol can be accessed, or state that a protocol was not prepared. |  |
| 24c | Describe and explain any amendments to information provided at registration or in the protocol. |  |
| Support | 25 | Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review. |  |
| Competing interests | 26 | Declare any competing interests of review authors. |  |
| Availability of data, code and other materials | 27 | Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review. |  |

*From:*  Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

**Appendix 2: Search Strategy for systematic review**

|  |
| --- |
| **PubMed 180** |
| #1 "Red Meat" [Mesh]  #2 red mea\* [Title/Abstract] OR lamb mea\* [Title/Abstract] OR beef [Title/Abstract] OR veal [Title/Abstract] OR pork[Title/Abstract]  #3 #1 OR #2  #4 Health [Mesh]  #5 health [Title/Abstract] OR nutrition [Title/Abstract] OR "nutritional status" [Title/Abstract]  #6 #4 OR #5  #7 "Meta-Analysis as Topic"[Mesh] OR "Meta-Analysis" [Publication Type]  #8"meta analysis" [Title/Abstract] OR "meta analyses" [Title/Abstract] OR "meta-analysis" OR [Title/Abstract] OR "meta-analyses" [Title/Abstract] OR "systematic review" [Title/Abstract] OR "systematic reviews"[Title/Abstract]  #9 #7 OR #8  #10 #3 And #6 And #9 |
| **Cochrane 187** |
| Cochrane Central Register of Controlled Trials (CENTRAL)  #1 MeSH descriptor: [Red Meat] explode all trees  #2 (red mea\*):ti,ab,kw OR (lamb mea\*):ti,ab,kw OR (beef):ti,ab,kw OR (veal):ti,ab,kw OR (pork):ti,ab,kw  #3#1OR#2  #4 MeSH descriptor: [Health] explode all trees  #5(health):ti,ab,kw OR (nutrition):ti,ab,kw OR (nutritional status):ti,ab,kw  #6#4OR#5  #7#3AND#6 |
| **WOS 477** |
| #1"Red Meat" OR red mea\* OR lamb mea\* OR beef OR veal OR pork  #2 Health OR health OR nutrition OR "nutritional status"  #3 "Meta-Analysis" OR "Meta-Analysis as Topic" OR "meta-analysis" OR "meta-analyses" OR "systematic review" OR "systematic reviews" OR "meta analysis" OR "meta analyses"  #1AND#2AND#3 |
| **Embase 218** |
| #1('red meat'/exp OR 'red mea\*':ab,ti OR 'lamb mea\*':ab,ti OR 'beef':ab,ti OR 'veal':ab,ti OR 'pork':ab,ti)  #2 ('health'/exp OR 'health':ab,ti OR 'nutrition':ab,ti OR ‘nutritional status':ab,ti)  #3 ('meta analysis'/exp OR 'Meta-Analysis':ab,ti OR 'Meta-Analysis as Topic':ab,ti OR 'meta-analysis':ab,ti OR 'meta-analyses':ab,ti OR 'systematic review':ab,ti OR 'systematic reviews':ab,ti OR 'meta analysis':ab,ti OR 'meta analyses':ab,ti) |
| **CNKI 533** |
| (红肉+羊肉+牛肉+羊羔肉+猪肉) AND (系统综述+系统评价+ Meta分析)  (主题=(红肉+羊肉+牛肉+羊羔肉+猪肉)) AND (主题=(系统综述+系统评价+Meta分析)) |
| **CBM 9** |
| #1"红肉"[不加权:扩展]  #2"红肉"[常用字段:智能] OR "牛肉"[常用字段:智能] OR "羊肉"[常用字段:智能] OR "羊羔肉"[常用字段:智能] OR "猪肉"[常用字段:智能]  #3#1 or #2  #4"Meta分析"[不加权:扩展]  #5"系统综述"[常用字段:智能] OR "Meta分析"[常用字段:智能] OR "系统评价"[常用字段:智能]  #6#4or#5  #7#3and#6 |
| **Wangfang 571** |
| (红肉+羊肉+牛肉+羊羔肉+猪肉) AND (系统综述+系统评价+ Meta分析)  主题:(红肉+羊肉+牛肉+羊羔肉+猪肉)\*主题:(系统综述+系统评价+ Meta分析) |
| **VIP 16** |
| (红肉+羊肉+牛肉+羊羔肉+猪肉) AND (系统综述+系统评价+ Meta分析)  (((((题名或关键词=红肉 OR 题名或关键词=羊肉) OR 题名或关键词=牛肉) OR 题名或关键词=羊羔肉) OR 题名或关键词=猪肉) AND ((题名或关键词=系统综述 OR 题名或关键词=系统评价) OR 题名或关键词=Meta分析)) |

**Appendix 3. Citation matrices for reviews with overlapping associations**

**A. Incidence of colorectal/** **colorectal cancer**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Systematic review ID** | Alexander 2011[1] | Smolińska 2010[2] | Alexander 2011[1] | Smolińska 2010[2] |
| **Overlapping associations** | colon cancer | | rectal cancer | |
| **Primary Study** |  |  |  |  |
| Bostick 1994 | **×** |  |  |  |
| Brink 2005 | **×** |  | **×** |  |
| Chao 2005 | **×** | **×** |  |  |
| Chen 1998 |  |  |  |  |
| Chen 2003 | **×** |  |  |  |
| Cross 2007 | **×** |  |  |  |
| English 2004 | **×** |  | **×** |  |
| Flood 2003 |  |  |  |  |
| Hsing 1998 |  |  |  |  |
| Jarvinen 2001 | **×** |  | **×** |  |
| Kabat 2007 | **×** | **×** | **×** | **×** |
| Kato 1997 |  |  |  |  |
| Khan 2004 |  |  |  |  |
| Kojima 2004 | **×** |  |  |  |
| Larsson 2005 |  | **×** | **×** |  |
| Lee 2009 | **×** |  | **×** |  |
| Lin 2004 |  |  |  |  |
| Norat 2005 | **×** | **×** | **×** |  |
| Nothlings 2009 |  |  |  |  |
| Oba 2006 | **×** |  |  |  |
| Pietinen 1999 |  |  |  |  |
| Sato 2006 |  |  |  |  |
| Singh 1998 | **×** |  |  |  |
| Tiemersma 2002 |  |  |  |  |
| Wei 2004 | **×** |  | **×** |  |
| Giovannouci 1994 |  | **×** |  |  |
| Nowell 2008 |  | **×** |  |  |
| Diegaarde 2003 |  | **×** |  |  |
| Butler 2003 |  | **×** |  |  |
| Gunter 2005 |  | **×** |  |  |
| Luchtenborg 2005 |  | **×** |  | **×** |
| Sinha 2005 |  | **×** |  | **×** |
| Martinez 2007 |  | **×** |  |  |
| Cros 2009 |  | **×** |  |  |
| **Total** (No of publications per review) | 14 | 13 | 8 | 3 |
| **Grand Total (N)** | **27** | | **11** | |
| **Rows (r)** | **24** | | **10** | |
| **Columns (c)** | **2** | | **2** | |
| **CCA** | **12.50%** | | **10%** | |

CCA = Corrected covered area. Calculation = CCA (%) = N-r/ rc-r:

Where N = Number of included publications (sum of checked boxes), r = number of rows (primary studies), c = number of columns (number of systematic reviews).

**B. Incidence of type 2 diabetes**

|  |  |  |
| --- | --- | --- |
| **Systematic review ID** | Pan 2011[3] | Rui 2021[4] |
| **Overlapping associations** | Type 2 diabetes | |
| **Primary Study** |  |  |
| Song 2004 |  | **×** |
| Montonen 2005 |  | **×** |
| Villegas 2006 | **×** | **×** |
| Schulze 2007 |  | **×** |
| Steinbredher 2010 | **×** | **×** |
| Mannist o 2010 | **×** | **×** |
| HPFS 2008 |  | **×** |
| EPIC-InterAct 2013 | **×** |  |
| Ericson 2015 | **×** |  |
| Fretts 2012 | **×** |  |
| Kurotani 2013 | **×** |  |
| Lajous 2012 | **×** |  |
| Mari-Sanchis 2016 | **×** |  |
| Pan-HPFS 2011 | **×** |  |
| Talaei 2017 | **×** |  |
| Van 2012 | **×** |  |
| Virtanen 2017 | **×** |  |
| Van Dam 2002 | **×** |  |
| **Total** (No of publications per review) | 14 | 7 |
| **Grand Total (N)** | **21** | |
| **Rows (r)** | **18** | |
| **Columns (c)** | **2** | |
| **CCA** | **16.70%** | |

CCA = Corrected covered area. Calculation = CCA (%) = N-r/ rc-r:

Where N = Number of included publications (sum of checked boxes), r = number of rows (primary studies), c = number of columns (number of systematic reviews).

**C. Risk of Stroke /mortality rate**

|  |  |  |  |
| --- | --- | --- | --- |
| **Systematic review ID** | Kaluza 2012[5] | Yang 2016[6] | Gidyenne 2022[7] |
| **Overlapping associations** | Risk of Stroke /mortality rate | | |
| **Primary Study** |  |  |  |
| Sauvaget 2003 | **×** | **×** |  |
| Larsson 2011 | **×** | **×** | **×** |
| Bernstein 2012 | **×** | **×** | **×** |
| Yaemsiri 2012 | **×** | **×** |  |
| Amiano 2015 |  |  | **×** |
| Takata 2013 |  | **×** |  |
| Ka He 2003 |  | **×** |  |
| **Total** (No of publications per review) | 4 | 6 | 3 |
| **Grand Total (N)** | **13** | | |
| **Rows (r)** | **7** | | |
| **Columns (c)** | **3** | | |
| **CCA** | **42.90%** | | |

CCA = Corrected covered area. Calculation = CCA (%) = N-r/ rc-r:

Where N = Number of included publications (sum of checked boxes), r = number of rows (primary studies), c = number of columns (number of systematic reviews).

**D. Change levels of cardiovascular and cerebrovascular disease risk factors**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Systematic review ID** | Guasch 2019[8] | O'Connor 2017[9] | Guasch 2019[8] | O'Connor 2017  [9] | Guasch 2019[8] | O'Connor 2017  [9] | Guasch 2019[8] | O'Connor 2017  [9] |
| **Overlapping associations** | total cholesterol | | triglyceride concentrations | | LDL cholesterol | | HDL cholesterol | |
| **Primary Study** |  |  |  |  |  |  |  |  |
| Sinclair 1987 | **×** | **×** | **×** | **×** | **×** | **×** | **×** | × |
| Prescott 1998 | **×** |  | **×** |  |  |  | **×** |  |
| Haub 2005 | **×** | **×** | **×** | **×** | **×** | **×** | **×** | × |
| de Mello 2006 | **×** | **×** |  | **×** | **×** | **×** | **×** | × |
| Liao 2007 | **×** | **×** | **×** | **×** | **×** | **×** | **×** | × |
| Hosscinpour 2014 | **×** |  | **×** |  | **×** |  | **×** |  |
| O'Brien 1980 | **×** | **×** |  | **×** |  | **×** | **×** | × |
| Flynn 1981 | **×** | **×** | **×** | **×** |  | **×** | **×** | × |
| Davidson 1999 | **×** | **×** | **×** | **×** | **×** | **×** | **×** | × |
| Zhang 2012 | **×** |  | **×** |  | **×** |  | **×** |  |
| Sayer 2015 | **×** | **×** | **×** | **×** | **×** | **×** | **×** | × |
| Hill BOLD 2015 | **×** |  | **×** |  | **×** |  | **×** |  |
| Gascon 1996 | **×** | **×** | **×** | **×** | **×** | **×** | **×** | × |
| Beauchesne 2003 | **×** | **×** | **×** | **×** | **×** | **×** | **×** | × |
| Ouellet 2008 | **×** |  | **×** |  | **×** |  | **×** |  |
| Navas-Carretero 2009 | **×** |  | **×** |  | **×** |  | **×** |  |
| Lindpvist 2009 | **×** |  | **×** |  | **×** |  | **×** |  |
| Zhang F 2010 | **×** |  | **×** |  | **×** |  | **×** |  |
| Zhang OF 2010 | **×** |  | **×** |  | **×** |  | **×** |  |
| Grieger 2014 | **×** | **×** | **×** | **×** | **×** | **×** | **×** | × |
| Aadland 2015 | **×** | **×** | **×** | **×** | **×** | **×** | **×** | × |
| Scott 1994 | **×** |  | **×** |  | **×** |  | **×** |  |
| Melanson 2003 | **×** |  | **×** |  | **×** |  | **×** |  |
| Mahon 2007 | **×** | **×** | **×** | **×** | **×** | **×** | **×** | × |
| Mamo 2005 | **×** |  | **×** |  | **×** |  | **×** |  |
| Nowson 2009 | **×** | **×** | **×** | **×** | **×** | **×** |  | × |
| Roussell 2012 | **×** |  | **×** |  | **×** |  | **×** |  |
| Thoming 2015 | **×** |  | **×** |  | **×** |  | **×** |  |
| Foerster 2014 | **×** | **×** | **×** |  |  |  |  |  |
| Hodgson 2006 | **×** | **×** | **×** | **×** | **×** | **×** | **×** | × |
| Murphy 2012 | **×** |  | **×** |  | **×** |  | **×** |  |
| Ashton 2009 |  | **×** | **×** | **×** | **×** | **×** | **×** | × |
| Wolmarans 1999 |  | **×** |  | **×** | **×** | **×** | **×** | × |
| Wiebe 1984 |  |  |  |  | **×** | **×** | **×** |  |
| Horrocks 1999 |  |  |  |  | **×** |  |  |  |
| **Total** (No of publications per review) | 31 | 18 | 30 | 17 | 31 | 18 | 32 | 17 |
| **Grand Total (N)** | **49** | | **47** | | **49** | | **49** | |
| **Rows (r)** | **33** | | **33** | | **33** | | **33** | |
| **Columns (c)** | **2** | | **2** | | **2** | | **2** | |
| **CCA** | **48.50%** | | **42.4%** | | **48.50%** | | **48.50%** | |

CCA = Corrected covered area. Calculation = CCA (%) = N-r/ rc-r:

Where N = Number of included publications (sum of checked boxes), r = number of rows (primary studies), c = number of columns (number of systematic reviews).

**Appendix 4: List of excluded studies and reasons for their exclusion**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **1st** | **Author** | **Year** | **Title** | **Reason for Exclusion** |
| 1 | Wang[10] | 2022 | Meta analysis of risk factors for colorectal adenoma | All outcomes were analyzed in conjunction with processed meat |
| 2 | Hongbin[11] | 2021 | Association of Red Meat and Poultry Consumption With the Risk of Metabolic Syndrome: A Meta-Analysis of Prospective Cohort Studies | All outcomes were analyzed in conjunction with processed meat |
| 3 | Khemayanto[12] | 2021 | The association between meat consumption and the metabolic syndrome: a cross-sectional study and meta-analysis | All outcomes were analyzed in conjunction with processed meat |
| 4 | Timothy[13] | 2004 | Diet, nutrition and the prevention of cancer | Overlapping review outdated |
| 5 | G Giles[14] | 1997 | Diet, nutrition and prostate cancer | Overlapping review outdated |
| 6 | Claudia[15] | 2020 | Evaluating adults' health-related values and preferences about unprocessed red meat and processed meat consumption: protocol for a cross-sectional mixed-methods study | Literature review |
| 7 | Daniele[16] | 2020 | Pregnant beef cow's nutrition and its effects on postnatal weight and carcass quality of their progeny | Research on nutritional value |
| 8 | Khanverdiluo[17] | 2022 | Content of potentially toxic elements (PTEs) in various animal meats: a meta-analysis study, systematic review, and health risk assessment | Mixed analysis with white meat |
| 9 | Hawley[18] | 2022 | The potential role of beef and nutrients found in beef on outcomes of wellbeing in healthy adults 50 years of age and older: A systematic review of randomized controlled trials | Interventions included in primary studies are different |
| 10 | Taneri[19] | 2022 | Association Between Ultra-Processed Food Intake and All-Cause Mortality: A Systematic Review and Meta-Analysis | Mixed white meat and processed meat |
| 11 | Zheng[20] | 2022 | The Isocaloric Substitution of Plant-Based and Animal-Based Protein in Relation to Aging-Related Health Outcomes: A Systematic Review | Intervention is animal protein |
| 12 | Neufingerl[21] | 2021 | Nutrient Intake and Status in Adults Consuming Plant-Based Diets Compared to Meat-Eaters: A Systematic Review | All outcomes were analyzed in conjunction with processed meat |
| 13 | Eckert[22] | 2022 | Effects of different sources of dietary protein on markers of kidney function in individuals with diabetes: a systematic review and meta-analysis of randomized controlled trials | Mixed white meat and processed meat |
| 14 | Neves[23] | 2021 | Association of dietary patterns with blood pressure and body adiposity in adolescents: a systematic review | All outcomes were analyzed in conjunction with processed meat |
| 15 | Albracht-Schulte[24] | 2021 | Systematic Review of Beef Protein Effects on Gut Microbiota: Implications for Health | There is no human health component to the study outcome |
| 16 | Qin[25] | 2022 | Diet and Esophageal Cancer Risk: An Umbrella Review of Systematic Reviews and Meta-Analyses of Observational Studies | Inadequate information provided |
| 17 | Farvid[26] | 2021 | Consumption of red meat and processed meat and cancer incidence: a systematic review and meta-analysis of prospective studies | All outcomes were analyzed in conjunction with processed meat |
| 18 | Taneri[19] | 2022 | Association Between Ultra-Processed Food Intake and All-Cause Mortality: A Systematic Review and Meta-Analysis | Ultra-Processed Food |
| 19 | Quan[27] | 2021 | Western Dietary Patterns, Foods, and Risk of Gestational Diabetes Mellitus: A Systematic Review and Meta-Analysis of Prospective Cohort Studies | All results were analyzed together with other diets |
| 20 | Arab[28] | 2022 | Food groups and nutrients consumption and risk of endometriosis: a systematic review and meta-analysis of observational studies | All results were analyzed together with other diets |
| 21 | Hidayat[29] | 2022 | Is replacing red meat with other protein sources associated with lower risks of coronary heart disease and all-cause mortality? A meta-analysis of prospective studies | All results were analyzed together with other diets |
| 22 | Yu[30] | 2022 | Meat Intake and the Risk of Hepatocellular Carcinoma: A Meta-Analysis of Observational Studies | All results are analyzed together with other meats |
| 23 | Hawley[18] | 2022 | The potential role of beef and nutrients found in beef on outcomes of wellbeing in healthy adults 50 years of age and older: A systematic review of randomized controlled trials | Research on nutritional value |
| 24 | Poorolajal[31] | 2021 | Factors for the Primary Prevention of Breast Cancer: A Meta-Analysis of Prospective Cohort Studies | All results were analyzed together with other diets |
| 25 | Peng[12] | 2022 | The association between meat consumption and the metabolic syndrome: A cross-sectional study and meta-analysis | All results are analyzed together with other meats |
| 26 | Masdor[32] | 2022 | The Link between Food Environment and Colorectal Cancer: A Systematic Review | All results were analyzed together with other diets |
| 27 | Carol[33] | 2020 | Dietary Patterns and Risk of Type 2 Diabetes: A Systematic Review | Literature review |
| 28 | Dena[34] | 2019 | Red and Processed Meat Consumption and Risk for All-Cause Mortality and Cardiometabolic Outcomes: A Systematic Review and Meta-analysis of Cohort Studies | All outcomes were analyzed in conjunction with processed meat |

**Appendix 5: AMSTAR 2 quality appraisal scores**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Item No** | **1** | **2\*** | **3** | **4\*** | **5** | **6** | **7\*** | **8** | **9\*** | **10** | **11\*** | **12** | **13\*** | **14** | **15\*** | **16** | **Overall Rating** |
| Alexander 2011[1] | Y | PY | Y | PY | Y | Y | N | Y | N | N | Y | Y | N | Y | Y | N | Critically Low |
| Smolińska 2010[35] | Y | PY | N | PY | Y | Y | PY | Y | N | N | Y | N | N | N | N | N | Critically Low |
| Song 2014[36] | Y | Y | N | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y | Y | Moderate |
| Jalal 2021[31] | Y | PY | N | Y | Y | Y | N | Y | Y | N | Y | N | Y | Y | Y | Y | Low |
| Fallahzadeh2014[37] | Y | PY | N | Y | Y | Y | PY | Y | N | N | Y | Y | Y | Y | Y | N | Low |
| Kaluza 2012[5] | Y | N | Y | Y | Y | Y | PY | Y | Y | Y | Y | Y | Y | Y | Y | Y | Moderate |
| Yang 2016[6] | Y | PY | N | PY | Y | Y | N | Y | Y | N | N | Y | Y | Y | Y | N | Critically Low |
| Gidyenne 2022[7] | Y | PY | N | Y | Y | Y | N | Y | Y | N | Y | N | Y | Y | Y | Y | Low |
| O'Connor 2020[38] | Y | Y | N | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | High |
| Pan 2011[3] | Y | PY | N | PY | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y | Y | Moderate |
| Rui Zhang 2021[4] | Y | PY | N | Y | Y | Y | N | Y | Y | N | Y | N | Y | Y | Y | Y | Low |
| Zeraatkar 2019[39] | Y | Y | Y | Y | Y | Y | Y | Y | Y | N | NA | NA | Y | Y | NA | Y | High |
| Keren 2021[40] | Y | Y | N | Y | Y | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | High |
| Guasch 2019[8] | Y | Y | N | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | High |
| O'Connor 2017[9] | Y | Y | N | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | Y | Y | Moderate |
| Farzaneh Asoudeh 2022[41] | Y | Y | N | Y | Y | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | High |
| Cristina 2022[42] | Y | PY | N | Y | Y | Y | N | Y | Y | N | Y | N | Y | Y | Y | Y | Low |
| An 2020[43] | Y | PY | N | PY | Y | Y | PY | Y | Y | N | Y | N | N | N | Y | Y | Low |

Critical items identified in the AMSTAR2 scale; Y: Yes; PY: Part of yes; N: no; NA: No meta-analysis. Item 1: Research question and whether the inclusion criteria include elements of PICO; Item 2: Whether to report that the methodology of the system evaluation study has been determined prior to implementation, and whether to report inconsistencies with the plan; Item 3: Whether the author explains the reasons for selecting the type of study design included in the systematic evaluation. Item 4: Whether the author uses a comprehensive literature search strategy; Item5: Whether two persons independently completed literature screening; Item 6: Whether data extraction is completed by two persons independently; Item7: Whether a list of excluded references is provided and the reasons for exclusion; Item 8: Whether the author’s description of the basic features of the included study is detailed ;Item 9: Whether the author uses appropriate tools to assess the risk of bias in the included literature; Item 10: Whether the author reports on the sources of funding for studies included in the systematic evaluation; Item 11: If the meta-analysis is carried out, whether the author USES appropriate statistical methods to merge the results for analysis; Item 12: If a meta-analysis is conducted, whether the author considers the potential impact of the bias risk of included studies on meta-analysis or other evidence integration; Item 13:Whether the author considers the risk of bias in the included study when interpreting or discussing the results of the system evaluation; Item 14: Whether the author gives a satisfactory explanation or discussion of heterogeneity in the results of systematic evaluation; Item 15: If quantitative synthesis is performed, whether publication bias has been adequately investigated and its possible influence on the results discussed; Item 16: Whether the author reports any potential conflicts of interest, including any funding received to conduct a systematic review.

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | |
| **Appendix 6: General characteristics of reviews with overlapping associations.** | | | | | | | |
| **Index of overlapping associations** | **Study ID** | **AMSTAR 2 rating** | **Interventions** | **Outcome** | **Synthesis type (number)** | **Corrected covered area (CCA)** | **Decision to retain √=Yes ×=No** |
| 1 | Alexander 2010[1] | Critically Low | The highest intake of red meat | Incidence of colorectal cancer | MA (13) | CCA=12.5% high | **×** |
| Smolińska 2010[35] | Critically Low | Intake of red meat ≥50g/day and >1 times /day | Incidence of colorectal cancer | MA (13) | **√** |
| 2 | Alexander 2011[1] | Critically Low | The highest intake of red meat | Incidence of rectal cancer | MA (8) | CCA=5% slight | **√** |
| Smolińska 2010[35] | Critically Low | Intake of red meat ≥50g/day and >1 times /day | Incidence of rectal cancer | MA (3) | **√** |
| 3 | Pan 2011[3] | Moderate | Fresh red meat 100g/ day | Incidence of type 2 diabetes | MA (14) | CCA=16.7% very high | **√** |
| Rui 2021[4] | Low | The highest intake of red meat | Incidence of type 2 diabetes | MA (7) | **×** |
| 4 | Kaluza 2012[5] | Moderate | Increase your red meat intake by one serving a day; One serving equals 100 to 120 g of fresh red meat | Risk of Stroke /mortality rate | MA (4) | CCA=42.9% very high | **√** |
| Yang 2016[6] | Critically Low | The highest intake of red meat | Risk of Stroke /mortality rate | MA (6) | **×** |
| Gidyenne 2022[7] | Low | The highest intake of red meat | Risk of Stroke /mortality rate | MA (3) | **×** |
| 5 | Guasch-Ferré 2019[8] | High | intervention and comparison diets that prescribed differing amounts of red meat | total cholesterol | MA (31) | CCA=48.5% very high | **√** |
| O'Connor 2017[9] | Moderate | Total red meat ≥0.5 servings (35 grams or 1.25 ounces) per day | total cholesterol | MA (18) | **×** |
| 6 | Guasch-Ferré 2019[8] | High | intervention and comparison diets that prescribed differing amounts of red meat | triglyceride concentrations | MA (30) | CCA=42.4% very high | **√** |
| O'Connor 2017[9] | Moderate | Total red meat ≥0.5 servings (35 grams or 1.25 ounces) per day | triglyceride concentrations | MA (17) | **×** |
| 7 | Guasch-Ferré 2019[8] | High | intervention and comparison diets that prescribed differing amounts of red meat | LDL cholesterol | MA (31) | CCA=48.5% very high | **√** |
| O'Connor 2017[9] | Moderate | Total red meat ≥0.5 servings (35 grams or 1.25 ounces) per day | LDL cholesterol | MA (18) | **×** |
| 8 | Guasch-Ferré 2019[8] | High | intervention and comparison diets that prescribed differing amounts of red meat | HDL cholesterol | MA (32) | CCA=48.5% very high | **√** |
| O'Connor 2017[9] | Moderate | Total red meat ≥0.5 servings (35 grams or 1.25 ounces) per day | HDL cholesterol | MA (17) | **×** |

MA = Meta-analysis; CCA = Corrected covered area; LDL= Low density lipoprotein; HDL= High density lipoprotein.

**Appendix 7:**

**A. List of studies included in analysis**

|  |  |  |  |
| --- | --- | --- | --- |
| **1st** | **Author** | **Year** | **Title** |
| 1 | Alexander[1] | 2011 | Meta-analysis of prospective studies of red meat consumption and colorectal cancer. |
| 2 | Smolińska[35] | 2010 | Risk of colorectal cancer in relation to frequency and total amount of red meat consumption. Systematic review and meta-analysis. |
| 3 | Song[36] | 2014 | Red meat consumption and stomach cancer risk: a meta-analysis. |
| 4 | Jalal[31] | 2021 | Factors for the Primary Prevention of Breast Cancer: A Meta-Analysis of Prospective Cohort Studies |
| 5 | Fallahzadeh[37] | 2014 | Red meat intake and risk of non-Hodgkin lymphoma: a meta-analysis. |
| 6 | Kaluza[5] | 2012 | Red meat consumption and risk of stroke: a meta-analysis of prospective studies. |
| 7 | O'Connor[38] | 2020 | Effects of Total Red Meat Intake on Glycemic Control and Inflammatory Biomarkers: A Meta-Analysis of Randomized Controlled Trials. |
| 8 | Pan[3] | 2011 | Red meat consumption and risk of type 2 diabetes: 3 cohorts of US adults and an updated meta-analysis. |
| 9 | Zeraatkar[39] | 2019 | Effect of Lower Versus Higher Red Meat Intake on Cardiometabolic and Cancer Outcomes: A Systematic Review of Randomized Trials. |
| 10 | Keren[40] | 2021 | Meat consumption and risk of ischemic heart disease: A systematic review and meta-analysis |
| 11 | Guasch[8] | 2019 | Meta-Analysis of Randomized Controlled Trials of Red Meat Consumption in Comparison With Various Comparison Diets on Cardiovascular Risk Factors. |
| 12 | Farzaneh[41] | 2022 | Associations of Total Protein or Animal Protein Intake and Animal Protein Sources with Risk of Kidney Stones: A Systematic Review and Dose-Response Meta-Analysis |
| 13 | Cristina[42] | 2022 | Linkage between a plant-based diet and age-related eye diseases: a systematic review and meta-analysis |
| 14 | An[43] | 2020 | Pork Consumption in Relation to Body Weight and Composition: A Systematic Review and Meta-analysis. |

**B. List of contemporary reviews with overlapping associations excluded from analysis**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **1st** | **Author** | | | **Year** | **Title** | |
| 15 | Yang[6] | | | 2016 | Red Meat Consumption and the Risk of Stroke: A Dose-Response Meta-analysis of Prospective Cohort Studies. | |
| 16 | | O'Connor[9] | | 2017 | Total red meat intake of ≥0.5 servings/d does not negatively influence cardiovascular disease risk factors: a systemically searched meta-analysis of randomized controlled trials. |
| 17 | | | Gidyenne[7] | 2022 | Associations of the consumption of unprocessed red meat and processed meat with the incidence of cardiovascular disease and mortality, and the dose-response relationship: A systematic review and meta-analysis of cohort studies | |
| 18 | | | Rui[4] | 2021 | Processed and Unprocessed Red Meat Consumption and Risk for Type 2 Diabetes Mellitus: An Updated Meta-Analysis of Cohort Studies | |

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