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Comment on FR Doc # 2019-12806

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Comment

RE: Growing Body of Evidence Demonstrates the Role of Beef in Supporting Healthy Pregnancies

The Beef Checkoff appreciates the opportunity to provide evidence for consideration on the development of the 2020-2025 Dietary Guidelines for Americans (DGA), particularly as this DGA process will provide dietary guidance for pregnant women for the first time. The Beef Checkoff is a producer-funded marketing and research program, which includes a significant commitment to supporting nutrition research to better understand beef's role in healthy diets, including its role in supporting maternal health.

The prenatal diet has been identified as a crucial factor in childhood development and adult disease risk including obesity, hypertension, and diabetes. In fact, the American Academy of Pediatrics position on improving nutrition in the first 1000 days of life identifies protein, zinc, vitamin B6, vitamin B12, iron, riboflavin, and choline as key contributors to a child's neurodevelopment. Beef is an excellent source of protein, zinc, vitamin B6, vitamin B12, and a good source of iron, riboflavin, and choline.

Evidence indicates that substantial numbers of women who are capable of becoming pregnant, including adolescent girls, are at risk of iron-deficiency anemia due to low intakes of iron. Iron deficiency anemia during pregnancy increases risk of preterm and low birthweight babies. A 3-oz serving of cooked beef provides about 9% of the daily value of iron for pregnant and nursing women.

In addition, it is estimated that greater than 90% of pregnant women in the United States are not meeting the adequate intake level for choline, despite the importance of this nutrient for fetal neurocognitive development. A 3-oz serving of cooked beef provides about 16% of the daily value for choline.

Finally, the evidence relied upon by recent Nutrition Evidence Systematic Review (NESR) publications to recommend a limitation of red meat during pregnancy was derived from a dietary pattern approach. The NESR conclusions regarding dietary patterns low in red meat before and during pregnancy were reached following systematic review of an evidence base almost exclusively derived from observational studies using three specific dietary pattern methods. Dietary pattern methodology lacks the discernment needed to make individual food group recommendations, thus confounding advice for red meat intake derived solely from dietary pattern methodology.

Thank you for the opportunity to share this evidence overview for consideration as the Committee examines Topics and Questions that are relevant to evaluating the role of beef in healthy diets, including its impact on maternal health and fetal development.

Attachments (1)

BeefCheckoff_MaternalHealthEvidenceOverview(FINAL)

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National Cattlemen's Beef Association
a contractor to the Beef Checkoff

January 17, 2020

Barbara Schneeman, PhD
Chair, 2020-2025 Dietary Guidelines Advisory Committee

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CC: 2020-2025 Dietary Guidelines Advisory Committee Members
U.S. Department of Agriculture
U.S. Department of Health and Human Services
Brandon Lipps, Deputy Undersecretary, Food and Nutrition Consumer Services

RE: Growing Body of Evidence Demonstrates the Role of Beef in Supporting Healthy Pregnancies

Dear Members of the Dietary Guidelines Advisory Committee:

The Beef Checkoff appreciates the opportunity to provide evidence for consideration on the development of the 2020-2025 Dietary Guidelines for Americans (DGA), particularly as this DGA process will provide dietary guidance for pregnant women for the first time. The Beef Checkoff is a producer-funded marketing and research program, which includes a significant commitment to supporting nutrition research to better understand beef's role in healthy diets, including its role in supporting maternal health.

The prenatal diet has been identified as a crucial factor in childhood development and adult disease risk including obesity, hypertension, and diabetes [1]. In fact, the American Academy of Pediatrics (AAP) position on improving nutrition in the first 1000 days of life identifies protein, zinc, vitamin B6, vitamin B12, iron, riboflavin, and choline as key contributors to a child's neurodevelopment [1]. Beef is an excellent source of protein, zinc, vitamin B6, vitamin B12, and a good source of iron, riboflavin, and choline [2,3].

Evidence indicates that substantial numbers of women who are capable of becoming pregnant, including adolescent girls, are at risk of iron-deficiency anemia due to low intakes of iron [4]. Iron deficiency anemia during pregnancy increases risk of preterm and low birthweight babies [4]. A 3-oz serving of cooked beef provides about 9% of the daily value of iron for pregnant and nursing women [2,3].

In addition, it is estimated that greater than 90% of pregnant women in the United States are not meeting the adequate intake level for choline, despite the importance of this nutrient for fetal neurocognitive development [5]. A 3-oz serving of cooked beef provides about 16% of the daily value for choline [2].

Finally, the evidence relied upon by recent Nutrition Evidence Systematic Review (NESR) publications to recommend a limitation of red meat during pregnancy was derived from

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a dietary pattern approach [6,7,8]. The NESR conclusions regarding dietary patterns low in red meat before and during pregnancy were reached following systematic review (SR) of an evidence base almost exclusively derived from observational studies using three specific dietary pattern methods. Dietary pattern methodology lacks the discernment needed to make individual food group recommendations, thus confounding advice for red meat intake derived solely from dietary pattern methodology [9,10].

Thank you for the opportunity to share this evidence overview for consideration as the Committee examines Topics and Questions that are relevant to evaluating the role of beef in healthy diets, including its impact on maternal health and fetal development.

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RE: Growing Body of Evidence Demonstrates the Role of Beef in Supporting Healthy Pregnancies

The 2020-2025 Edition of the Dietary Guidelines for Americans (DGA) will mark the first to provide dietary guidance for pregnant women [1]. The prenatal diet has been identified as a crucial factor in childhood development and adult disease risk including obesity, hypertension, and diabetes [2]. In fact, the American Academy of Pediatrics (AAP) position on improving nutrition in the first 1000 days of life identifies **protein, zinc, vitamin B6, vitamin B12, iron, riboflavin, and choline as key contributors to a child's neurodevelopment** [2]. As shown in Figure 1, beef is an excellent source of protein, zinc, vitamin B6, vitamin B12, and a good source of iron, riboflavin, and choline [3,4].

Despite recognition by the American College of Obstetrics and Gynecology and the Academy of Nutrition and Dietetics of meat as an important source of key nutrients in the maternal diet [5,6], and in particular red meat as a source of iron, recent Nutrition Evidence Systematic Review (NESR) publications conclude that maternal dietary patterns low in red meat are associated with a reduced risk of gestational diabetes mellitus (GDM) and hypertensive disorders (HTN) of pregnancy, [7,8,9] while research from randomized controlled trials (RCTs) continue to demonstrate that lean beef can be the predominant protein source in DASH-style, Mediterranean-style, and fruit and vegetable rich diets [10,11,12]. The evidence relied upon by NESR to recommend a limitation of red meat during pregnancy was derived from a dietary pattern approach [7,8,9]. **Dietary pattern methodology lacks the discernment needed to make individual food group recommendations, thus confounding advice for red meat intake derived solely from dietary pattern methodology [13,14].** In fact, evidence recently published by Dietary Guidelines Advisory Committee (DGAC) member, Dr. Regan Bailey, indicates that **a significant number of pregnant women in the United States are not meeting recommendations for iron, choline, and zinc, nutrients readily supplied by beef (Figure 1), even with the use of dietary supplements [15].**

Iron is an essential component of hemoglobin and myoglobin, proteins found in blood and other tissues, necessary for the transport of oxygen throughout the body [16]. During pregnancy, the demand for iron increases significantly as plasma volume and red cell mass expand [16]. Consequently, the recommended dietary allowance (RDA) for iron increases by 10 mg/day for pregnant women [16]. According to the 2015-2020 DGA**, "Substantial numbers of women who are capable of becoming pregnant, including adolescent girls, are at risk of iron-deficiency anemia due to low intakes of iron [17]." Iron deficiency anemia during pregnancy increases risk of preterm and low birthweight babies [17].** The current DGA recommend that "To improve iron status, women and adolescent girls should consume foods containing heme iron, such as lean meats, poultry, and seafood, which is more readily absorbed by the body [17]." **A 3-oz serving of cooked beef provides about 9% of the daily value of iron for pregnant and nursing women** [Figure 1; 3,4].

Evidence suggests that maternal choline intake during pregnancy, and possibly lactation, has lasting beneficial neurocognitive effects on the offspring [2, 18]. In fact, in a recent randomized controlled trial, choline intake (480 vs 930 mg/day from foods and supplements) during the third trimester of pregnancy resulted in consistently greater infant information processing speeds and reaction times throughout the first year of life [19]. Animal foods typically contain more choline per unit weight than plants, causing concern that current plant-based diet and veganism could result in "…unintended consequences for choline intake/status" [20]. The American Academy of Pediatrics has affirmed the importance of maternal choline for early infant brain development [2]. **It is estimated that greater than 90% of pregnant women in the United States are not meeting the adequate intake level for choline, despite the importance of this nutrient for fetal neurocognitive development [15]. Beef is a good source of**

choline; a 3-oz serving of cooked beef provides about 16% of the daily value for choline [Figure 1; 3, 21].

Increased adoption of vegan and vegetarian diets also threatens zinc status. Red meat and poultry provide the majority of zinc in the American diet while, in contrast, phytates common in whole-grains, cereals and legumes, bind zinc and inhibits its absorption [22]. Low serum zinc levels may be associated with suboptimal outcomes of pregnancy including hypertensive disorders, preterm labor and post-term pregnancies [23]. **Beef is an excellent source of zinc; a 3-oz serving of cooked beef provides about 53% of the value for zinc during pregnancy [Figure 1; 3].**

B-vitamins and, in particular, vitamin B12 are important for maintaining a healthy nervous system. Vitamin B12, when combined with folate, is important for reducing risk of neural tube defects [24]. B12 is not found naturally in any plant food, which can make it difficult for people with limited animal food intake to get the necessary amount of vitamin B12 [24]. Due to increased demand for B12 during pregnancy, and the importance of animal food as a source, women who consume limited amounts of animal protein are advised to seek supplemental sources of B12 [5,6]. **A 3-oz serving of cooked beef is an excellent source of B12 and provides nearly all the B12 required by women during pregnancy and nursing [Figure 1; 3,4].** Although riboflavin deficiency is rare in the U.S., the National Institutes of Health (NIH) reports that pregnant or lactating women who rarely consume meats or dairy products are at risk of riboflavin deficiency, which can result in adverse health effects including maternal preeclampsia [25]. **Beef is a good source of riboflavin; a 3-oz serving of cooked beef provides about 17% of the daily value for riboflavin during pregnancy and nursing [Figure 1; 3, 4].**

The NESR conclusions **regarding dietary patterns low in red meat before and during pregnancy were reached following systematic review (SR) of an evidence base almost exclusively derived from observational studies using three specific dietary pattern methods, i.e. indices and scores, cluster or factor analysis and reduced rank regression [7,8,9].** Due to the largely observational nature of the evidence base, and specificity toward dietary pattern research created by the NESR SR inclusion criteria, **included studies also lack specificity with regards to meat categories and types [Table 1].** Specifically, **of the 11 studies used by NESR to conclude that diets and dietary patterns lower in red and processed meat reduce risk of GDM, one failed to discuss meat at all [26], two simply identified "meat" [27,28] and three identified "red and processed meat" without further specification of the meat type [29,30,31]. Most of these studies also provided null evidence for red meat restriction [Table 1; 26,27,28,31].** As noted by O'Connor and coworkers, documentation of meat categories and descriptions has meaningful implications when inferring causal associations between intake and disease [32]. **The studies collected via the NESR review process provide little detail regarding meat species source, nutrient content, or degree of processing which can lead to confusion when interpreting results [32].** Studies that report how meats were grouped can more effectively contribute to public dietary guidance regarding meat intake [33, 34]. **Outside of more specific meat information, DGAC guidance can recognize dietary pattern evidence limitations and provide appropriate evidence grades [35,36].**

The DGAC has highlighted six dietary patterns in the review of evidence regarding dietary patterns and health outcomes for the 2020-2025 DGA [37]. Two of these dietary patterns, low-carbohydrate and high-fat, were not considered in the existing NESER GDM, preterm birth, and HTN reviews [7,8,9]. Recognition of these dietary patterns as part of the evidence base expands the evidence relating diet and dietary patterns to maternal health outcomes. Specifically, the NESR search and study selection criteria utilized in the existing NESR SRs resulted in the inclusion of only 11 publications for GDM and 8 for HTN [7,8]. In contrast, according to the excluded studies list for these SRs, an estimated 156 studies

(~46%) were excluded from the evidence considered for GDM and HTN due to an excluded "independent variable", i.e. the dietary pattern studied [7,8]. **These excluded studies provide examples of evidence relevant to low-carbohydrate dietary patterns and maternal health outcomes [38,39] that could provide information relevant to diets considered in current DGAC questions.**

In summary, the exclusive dietary pattern focus of existing NESR reviews, and related DGAC research questions, has been shown to result in a smaller evidence base, that excludes studies with relevant information, resulting in less precise conclusions than might otherwise be made [40]. Dietary pattern methodology lacks the discernment needed to make individual food group recommendations, thus further confounding advice for red meat intake derived from dietary pattern methodology alone [13,14]. As recently noted, in the United States "improved dietary guidance appears to be warranted to help pregnant women to meet but not exceed dietary recommendations [15]". **Science-based dietary guidance must rely on systematically reviewing the totality of relevant evidence [35,41]. In an effort to align the existing NESR systematic reviews for dietary patterns and pregnancy with the current DGAC research questions [35], the DGAC is at liberty to request a NESR search designed to capture all the relevant evidence, including that related to low-carbohydrate and high-fat diets.**

With a unique combination of high-quality protein, iron, zinc, choline and B vitamins [3], beef is a nutrient-rich food that helps Americans build diets and dietary patterns that avoid nutrient shortfalls across the lifespan [42,43] and support healthy pregnancies [5,6,8].

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Table 1. Meat Specificity in Studies Used by NESR to Recommend Diets "Lower in Red and Processed Meat" Before and During Pregnancy for Prevention of Gestational Diabetes*

Author, Year	Stage of Pregnancy	Dietary Pattern Method/Diet Pattern	Subject # Country	Relevant Outcome	Red Meat Specificity
Clapp, 1998	Pre-pregnancy and during	**RCT** comparing high vs low glycemic diets – "aboriginal CHO diet" vs "cafeteria CHO diet" 17-19% protein; 20-25% fat; 55-60% CHO	N=12 USA	↑ Blood glucose level and response with high glycemic CHO diet	**Evidence null for red meat restriction** **Meat intake is not described, specified, or different between diets**** "the diets differed only in the type of carbohydrate ingested"
Schoenaker, 2015 Australian Longitudinal Study on Women's Health [see Schoenaker, 2016 below] 9 years follow-up	Pre-pregnancy	**Principle component factor analysis** '**Meats, snacks and sweets' pattern** = red and processed meat, cakes, sweet biscuits, fruit juice, chocolate and pizza; **'Mediterranean-style' pattern**= vegetables, legumes, nuts, tofu, rice, pasta, rye bread, red wine and fish; **Fruit and low-fat dairy' pattern**= fruits and lowfat dairy, yoghurt, low-fat cheese, skimmed milk; **'Cooked vegetables' pattern** = carrots, peas, cooked potatoes, cauliflower and pumpkin.	N=3853 Australia 292 GDM cases (rate - 4.4%)	↑ GDM risk with "meats, snacks and sweets" pattern (1.35; 0.98-1.81) ↓GDM risk with Mediterranean-style pattern 0.85 [0.76, 0.98]	**Factor loading for chicken and sausage equivalent** in "meats, snacks, and sweets" patter, i.e 49 and 50, respectively.
Schoenaker, 2016 Australian Longitudinal Study on Women's Health [see Schoenaker, 2015 above] 9 years follow-up	Pre-pregnancy	**Mediterranean diet score** **Meat, poultry** and high fat dairy **scored negative**	N=3378 Australia 240 GDM cases (rate-7.1%)	↑ GDM risk with low adherence to Mediterranean diet (OR: 1.35; 95% CI: 1.02, 1.60)	**Poultry intake** not reported despite being **scored negatively**; low vs high adherence score differs ± 10 g or 0.35 ounces of red meat

Author, Year	Stage of Pregnancy	Dietary Pattern Method/Diet Pattern	Subject # Country	Relevant Outcome	Red Meat Specificity
Tobias, 2012 Nurses'Health Study II [see also Zhang, 2006; Zhang, 2014] 12 year follow-up	Pre-pregnancy	Index/score – aMED; DASH; aHEI Diets score negatively for red and processed meat; aHEI scoring of red/processed meat unclear	N=15,254 USA 872 GDM cases (rate-5.7%)	GDM aMED was associated with a 24% lower risk (RR: 0.76; 95% CI: 0.60, 0.95; P-trend = 0.004), DASH with a 34% lower risk (RR: 0.66; 95% CI: 0.53, 0.82; P-trend = 0.0005), and aHEI with a 46% lower risk (RR: 0.54; 95% CI: 0.43, 0.68; P-trend, 0.0001).	**Red meat one of many factors scored negatively and not adequately defined**
Zhang, 2006 Nurses'Health Study II [see also Tobias, 2012; Zhang, 2014] 8 year follow-up	Pre-pregnancy	Principle Component Factor Analysis Prudent pattern= positively correlated with fruits, green leafy vegetables, poultry and fish Western Pattern = red meat, processed meat, refined grain products, sweets and deserts, French fries and pizza.	N=13,110 USA 758 GDM cases (rate - 5.8%)	↑GDM risk with Western pattern scores, 1.63 (95% CI 1.20–2.21; ptrend=0.001), whereas the RR comparing the lowest with the highest quintile of the prudent pattern scores was 1.39 (95% CI 1.08–1.80; ptrend=0.018). The RR for each increment of one serving/ day was 1.61 (95% CI 1.25–2.07) for red meat and 1.64 (95% CI 1.13–2.38) for processed meat.	**Western dietary pattern and red and processed meat, specifically, associated with increased risk of GDM**
Zhang, 2014 Nurses'Health Study II [see also Tobias, 2012; Zhang, 2006] 12 year follow-up	Pre-pregnancy	Index/Score -aHEI	N=14,437 USA 823 GDM cases (rate-5.7%)	All quintiles of aHEI associated with decreased risk of GDM from 0.95-0.75	**Red meat one of many factors scored negatively and not adequately defined**

Author, Year	Stage of Pregnancy	Dietary Pattern Method/Diet Pattern	Subject # Country	Relevant Outcome	Red Meat Specificity
He, 2015 Born in Guangzhou Cohort Study 2 years follow-up	24-27 weeks	Principle Component Factor Analysis: vegetable pattern; protein-rich pattern – **poultry, red meat,** animal organ meat, grains (mainly refined), **processed meat,** fish, soups, leafy and cruciferous vegetables, and eggs; prudent pattern – **low in processed meat, red meat not identified**; sweets and seafood pattern	N=3063 China 544 GDM cases (rate-17.8%)	↓ GDM risk (RR 0.79) with highest tertile of the vegetable pattern; ↑ GDM risk (RR 1.23) with highest tertile of the sweets and seafood pattern;	**Evidence null for red meat restriction** **Protein-rich pattern not associated** with GDM risk (RR 0.95); **Prudent pattern not characterized as low in red meat**; low only in processed meat. Prudent pattern not associated with GDM risk.
Karamanos, 2014	24-32 weeks	Author created Med Diet Index; Daily intake of meat (undefined) only variable presented (no red or processed designation mentioned);	N=1076 10 Medi countries GDM cases NR (rate – 9.5%)	↓GDM risk with higher adherence to a MedDiet pattern	**Evidence null for meat restriction** meat intake did not differ (P=0.701) between groups
Radesky, 2008 Project Viva [see also Rifas-Shiman, 2009]	26-28 weeks	**Principle Component Factor Analysis**: **prudent pattern**, high in vegetables, fruit, legumes, fish, poultry, eggs, salad dressing and whole grains; and the **Western pattern**, which included red and processed meats, sugar-sweetened beverages, French fries, high-fat dairy products, desserts, butter and refined grains.	N=1733 USA 91 GDM cases (rate 5.0%)	Neither dietary pattern was associated with risk of IGT or GDM, when examined as continuous variables or in quartiles	**Evidence null for red meat restriction** Red and processed meats specified and defined, processed meat from **white processed meat not clearly distinguished**;

Author, Year	Stage of Pregnancy	Dietary Pattern Method/Diet Pattern	Subject # Country	Relevant Outcome	Red Meat Specificity
Rifas-Shiman, 2009 Project Viva [see also Radesky, 2008]	26-28 weeks	**Alternate Healthy Eating Index, slightly modified for pregnancy (AHEI-P)**	N=1777 USA [see above]	AHEI-P was associated lower screening blood glucose level;	**Red meat one of many factors scored negatively and not adequately defined**
Tryggvadottir, 2016	Weeks 23-28	Principle Component Analysis 2 patterns identified, only one reported **'prudent dietary pattern'** = seafood, eggs, vegetables, fruit and berries, vegetable oils, nuts and seeds, pasta, breakfast cereals, and coffee and tea, and negative for soft drinks and French fries.	N=168 Iceland GDM cases NR Rate-2.3% normal wt; 18.3% overwt and obese]	The prudent dietary pattern was associated with lower risk of GDM (OR: 0.54; 95% CI: 0.30, 0.98).	**Evidence null for red meat restriction** Icelandic prudent diet does not specifically restrict or promote red and processed meat.

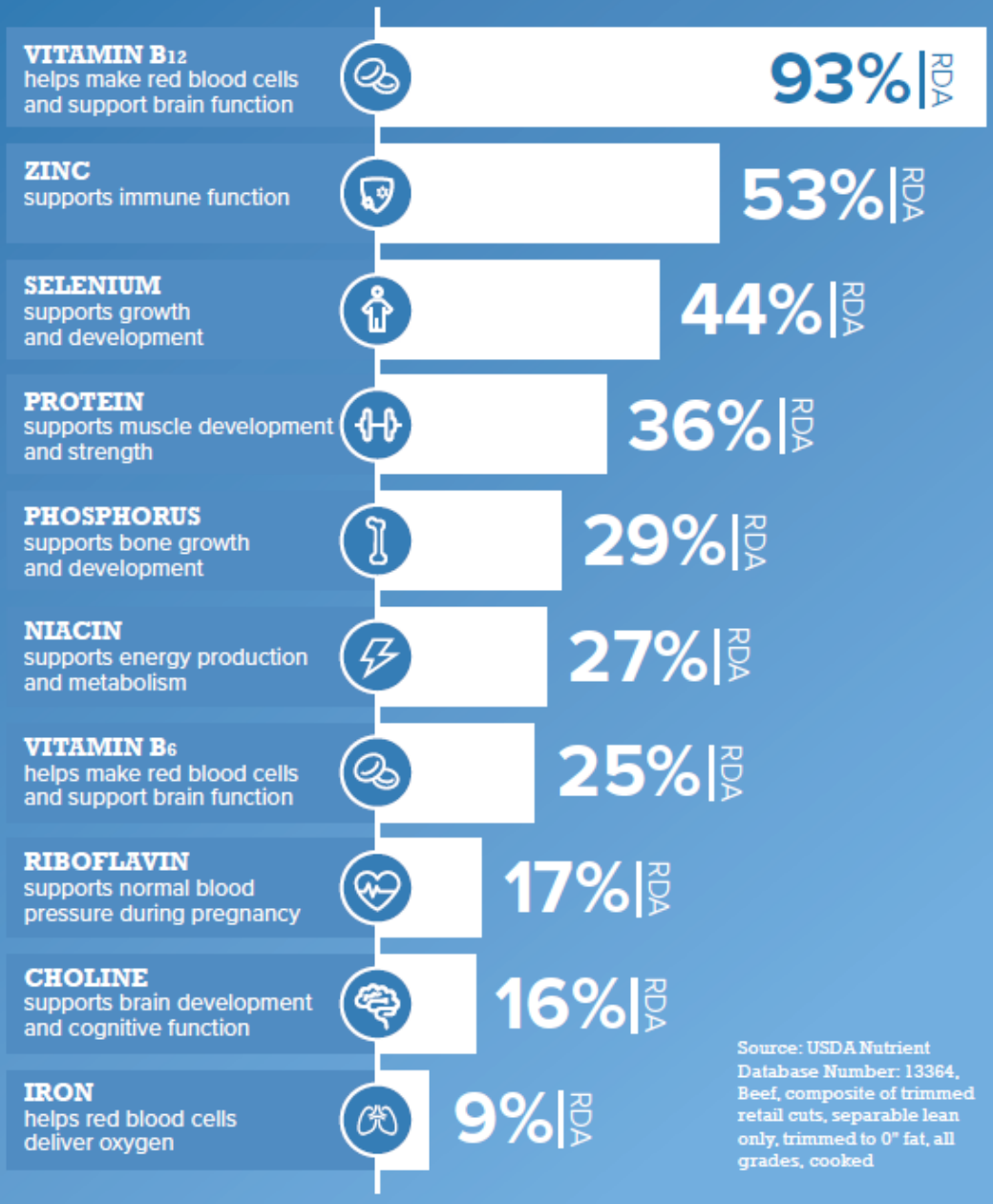
*Conclusion Statement and Grades: "Limited but consistent evidence suggests that certain dietary patterns before pregnancy are associated with a reduced risk of gestational diabetes mellitus. These protective dietary patterns are higher in vegetables, fruits, whole grains, nuts, legumes, and fish and lower in red and processed meats. Most of the research was conducted in healthy, Caucasian women with access to health care."

**1 day sample menu includes chicken/turkey no red meat; was this interpreted as being a diet low in red and processed meat? Diets also contained ice cream and chocolate, should those be recommended?

aHEI – alternative healthy eating index; AHEI-P – alternative healthy eating index for pregnancy; aMED – alternative Mediterranean diet score; CHO – carbohydrate; CI – confidence interval; DASH – Dietary Approaches to Stop Hypertension; GDM – gestational diabetes mellitus; IGT – impaired glucose tolerance; RCT – randomized controlled trial; RR- relative risk; wt- weight; overwt-over weight

Figure 1. BEEF'S CONTRIBUTION TO NUTRIENT REQUIREMENTS DURING PREGNANCY

On average, a 3-ounce (85 grams) serving of cooked beef provides 175 calories and:



Source: USDA Nutrient Database Number: 13364, Beef, composite of trimmed retail cuts, separable lean only, trimmed to 0" fat, all grades, cooked