

HUMAN NUTRITION

Title: Increased protein intakes from predominantly meat- versus soy protein/pulses-based foods: Effects on daily and postprandial appetite during energy restriction-induced weight loss – **NPB #09-155**

Addendum (NPB Project #10-170): The effects of protein quantity and source on postprandial satiety and plasma amino acid concentrations

This project is co-sponsored by the National Cattlemen's Beef Association

Investigator: Wayne W. Campbell, Ph.D.

Institution: Department of Nutrition Science, Purdue University, West Lafayette, IN

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Scientific Abstract: (The following two abstracts were presented as posters at Experimental Biology, 4/12. In addition, the first abstract was also an oral presentation at Experimental Biology, 4/12)

The effects of quantity and source of dietary protein on appetite and plasma amino acid concentration

Hailey Kay Wilson, Cheryl LH Armstrong, Jacqueline A Hogan, Wayne W Campbell.
Nutrition Science, Purdue University, West Lafayette, IN

This study was designed to assess appetitive and plasma amino acid (AA) responses to protein (P) intakes that span the acceptable macronutrient distribution range (AMDR) and are predominantly from meat vs. plant sources. Thirty-four overweight/obese subjects (53 ± 12 y, BMI 30.8 ± 2.6 kg/m² mean \pm SD) were randomly assigned to consume diets with 750 kcal/d below energy need and beef/pork (5M:12F) or soy/legumes (6M:11F). All subjects randomly completed 3, 28d trials with the diets containing 10, 20 or 30% energy from P. On day 28 of each trial, subjects consumed a trial specific test meal and rated hunger, fullness and desire to eat before and 15, 25, 60, 85, 120, 180 and 240 min after eating. AAs were measured in 5 subjects each from the two P source groups before and 25, 60, 120, 180 and 240 min after eating. PP hunger and desire to eat (weighted averages) was lower and fullness (weighted average) was higher than fasting for all P quantities ($p < 0.01$). In AA subset, PP fullness was higher (weighted average) than fasting for all P quantities ($p < 0.05$). Protein source did not affect appetitive responses. Postprandial (PP) branched chain AA and leucine (weighted averages) were higher for beef/pork vs. soy/legumes ($p < 0.05$) and were progressively higher with increasing P intake ($p < 0.05$). PP total AA were higher for 30 vs. 20 and 10% ($p < 0.01$). PP appetitive responses (weighted average) were not related to PP AA responses (Δ weighted average). Higher protein intake from meat or plant sources promotes reduced desire to eat, unrelated to differential plasma amino acid responses to feeding.

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For more information contact:

National Pork Board • PO Box 9114 • Des Moines, IA 50306 USA • 800-456-7675 • Fax: 515-223-2646 • pork.org

Effect of Protein Source (Animal Versus Vegetable) and Quantity on Indices of Mood, Tryptophan and Large Neutral Amino Acids

Jacqueline A Hogan, Cheryl LH Armstrong, Hailey Kay Wilson, Wayne W Campbell.
Nutrition Science, Purdue University, West Lafayette, IN

The balance between plasma tryptophan (Trp) and other large neutral amino acids (LNAA) from dietary protein (P) influences serotonin synthesis which may impact indices of mood. This study was designed to assess effects of P quantity and source on fed-state (FS) LNAA and Trp and mood. 34 overweight/ obese adults (53 ± 12 y, BMI 30.8 ± 2.6 kg/m², mean \pm SD) were randomly assigned to consume diets with 750 kcal/d below energy need and 10, 20 or 30% energy from P with beef/pork (5M:12F) or soy/legumes (6M:11F) as the predominate P source for 3 randomized 28d trials. On day 28, subjects consumed a trial-specific test meal and completed the Profile of Mood Survey (POMS) before and 15, 25, 60, 85, 120, 180 and 240 min after eating. Fasting and FS LNAA and Trp were measured in 5 subjects each from the two P source groups before and 25, 60, 120, 180 and 240 min after eating. FS LNAA (weighted averages) was higher for beef/pork vs soy/legumes ($p < 0.05$), and progressively higher with increasing P intake ($p < 0.01$). Independent of source, FS Trp was greater ($p < 0.01$) and Trp:LNAA was lower ($p < 0.05$), for 30 vs. 20 and 10% P. FS total AA were higher for 30 vs. 20 and 10% ($p < 0.01$). Protein quantity and source did not affect total mood disturbance or the six POMS subcategories (vigor, fatigue, depression, confusion, tension, anger). While protein intakes predominately from meat or plant sources that span the acceptable macronutrient distribution range affect plasma LNAA and Trp, they do not acutely impact mood.

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