

Relevance of animal agriculture with understanding of human biological processes and wellness: the importance of animal protein in our diets

畜牧业与人生理过程和健康的相关性:动物蛋白在饮食中的重要性

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ASAS President

ASAS主席

Animal Based Foods

Part of Our Food Culture

动物性食品是我们饮食文化的一部分

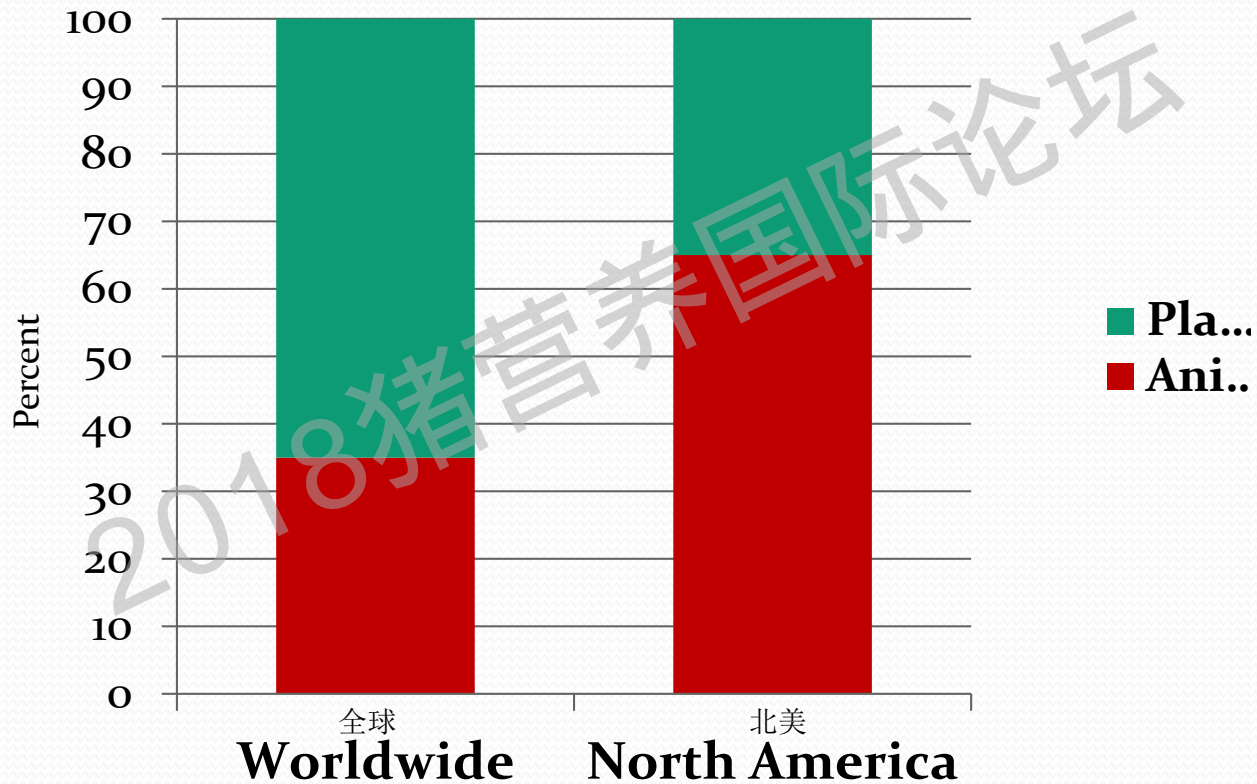


Meat, dairy, eggs, & fish readily provide essential nutrients in the human diet that are critically important and necessary for growth, development, and good health. Let's talk about strong science.

肉类、奶制品、蛋类和鱼类立即提供人类饮食中必不可少的营养物质，这些营养物质对于人类的生长、发育和健康至关重要。让我们来谈谈如何科学的变强壮。

Protein Mix Worldwide

全球蛋白质混合



Projected Total Consumption of Meat and Dairy Products

预计肉类和乳制品的总消费量

		2010	2020	2030	2050	2050/2010
		<i>(million tonnes)</i>				
全球	WORLD					
所有肉类	All meat	268.7	319.3	380.8	463.8	173%
牛肉	Bovine meat	67.3	77.3	88.9	106.3	158%
羊肉	Ovine meat	13.2	15.7	18.5	23.5	178%
猪肉	Pig meat	102.3	115.3	129.9	140.7	137%
家禽肉	Poultry meat	85.9	111.0	143.5	193.3	225%
乳制品非黄油	Dairy not butter	657.3	755.4	868.1	1 038.4	158%
发展中国家	DEVELOPING COUNTRIES					
所有肉类	All meat	158.3	200.8	256.1	330.4	209%
牛肉	Bovine meat	35.1	43.6	54.2	70.2	200%
羊肉	Ovine meat	10.1	12.5	15.6	20.6	204%
猪肉	Pig meat	62.8	74.3	88.0	99.2	158%
家禽肉	Poultry meat	50.4	70.4	98.3	140.4	279%
乳制品非黄油	Dairy not butter	296.2	379.2	485.3	640.9	216%

Source: FAO, 2006c. Some calculations by authors.

Note these figures are based on World Population Prospects: The 2002 Revision.

Proteins Are the Building Blocks of All Tissues in the Body

蛋白质是身体中所有组织的基石



Animal products contain high quality protein with a
balanced mixture of amino acids

动物产品含有高质量的蛋白质和均衡的氨基酸混合物

Animal Proteins contain all indispensable amino acids required (complete proteins) 动物蛋白含有所需的所有必需氨基酸 (完整蛋白质)

Amino acids in human proteins 人体蛋白质中的氨基酸



Amino acids in animal-based protein 动物蛋白中的氨基酸



Amino acids in plant-based protein 植物蛋白中的氨基酸



Plant Proteins are lacking in 1 or more indispensable amino acids (incomplete proteins) 植物蛋白缺乏1种或多种必需氨基酸 (不完整蛋白质)

Trends in the Per Capita Supply Per Day of Energy, Protein and Total Fat

每日能量, 蛋白质和总脂肪的人均供应趋势

	能量 Energy kcal/day 卡路里/天	能量 Energy kJ/day 千焦耳/天	蛋白质 Protein g/day 克/天	蛋白质 Protein %E	总脂肪 Total Fat g/day 克/天	总脂肪 Total Fat %E
Developed Countries 发达国家						
1995-1997	3,205	13,410	97.9	12.2	115.6	32.5
1998-2000	3,251	13,602	98.8	12.2	118.9	32.9
2001-2003	3,320	13,891	100.6	12.1	122.6	33.2
Developing Countries 发展中国家						
1995-1997	2,625	10,983	66.8	10.2	58.9	20.2
1998-2000	2,645	11,067	67.8	10.3	62.5	21.3
2001-2003	2,657	11,117	68.5	10.3	65.9	22.3
World 世界						
1995-1997	2,756	11,531	73.8	10.7	71.7	23.4
1998-2000	2,778	11,623	74.6	10.7	74.9	24.3
2001-2003	2,798	11,707	75.4	10.8	78.0	25.1

Source: Wolmarans,
Ann Nutr Metab,
2009;
Shalene McNeill,
NCBA.

Most of the World Eats Animal Protein

世界上大多数人吃动物蛋白

Diet Description: 饮食组成结构



■ Omnivore
杂食动物

■ Flexitarian*
弹性素食者

■ Vegetarian with poultry/fish
(no red meat)

素食与家禽/鱼
(没有红肉)

■ Strict vegetarian/vegan
(no meat from animals)

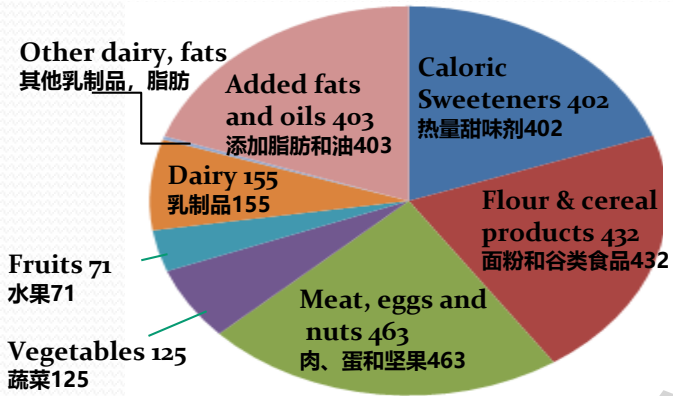
严格素食主义者/纯素食主义者
(不含动物肉)

Consumer Beef Index, September 2014;
Shalene McNeill, NCBA.

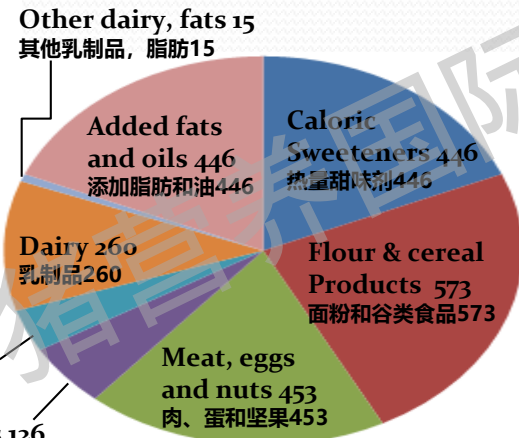
Shifts in U.S. Calorie Sources Over Time

美国卡路里来源随时间的变化

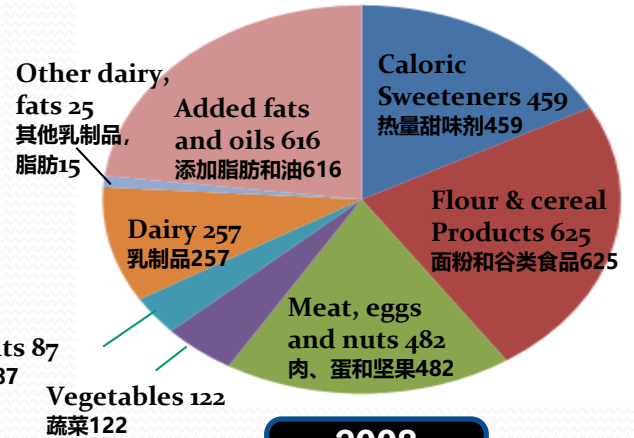
- Caloric Sweeteners
- Flour and cereal products
- Meat, eggs and nuts
- Vegetables
- Fruits
- Dairy
- Other dairy, fats



1970
2057 kcal



1990
2405 kcal



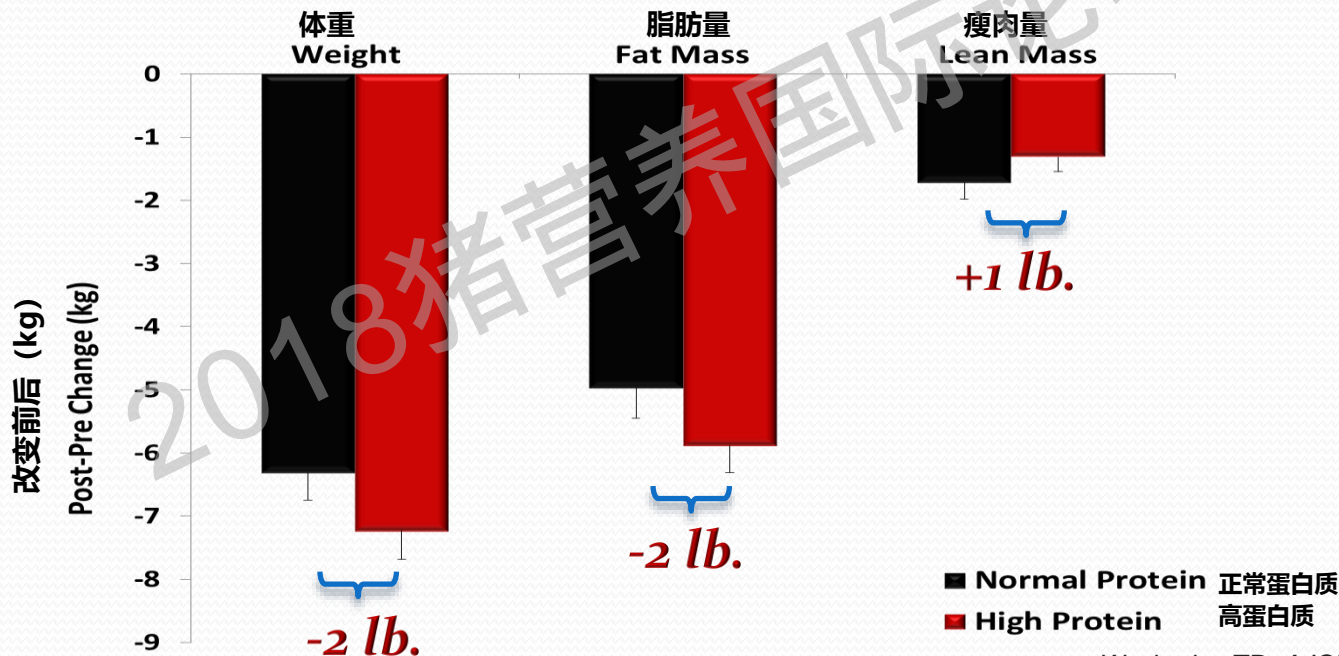
2008
2674 kcal

Protein in Place of Carbs Supports Weight Management

蛋白代替碳水化合物有助于体重管理

Meta Analysis of 24 weight loss trials (~12 wks) 对24项减肥试验的综合分析(~12周)

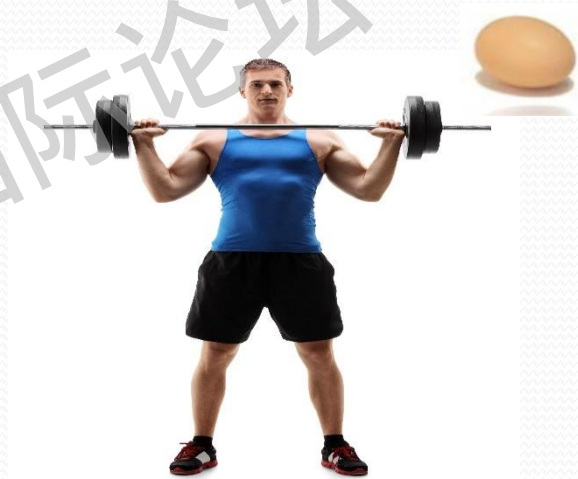
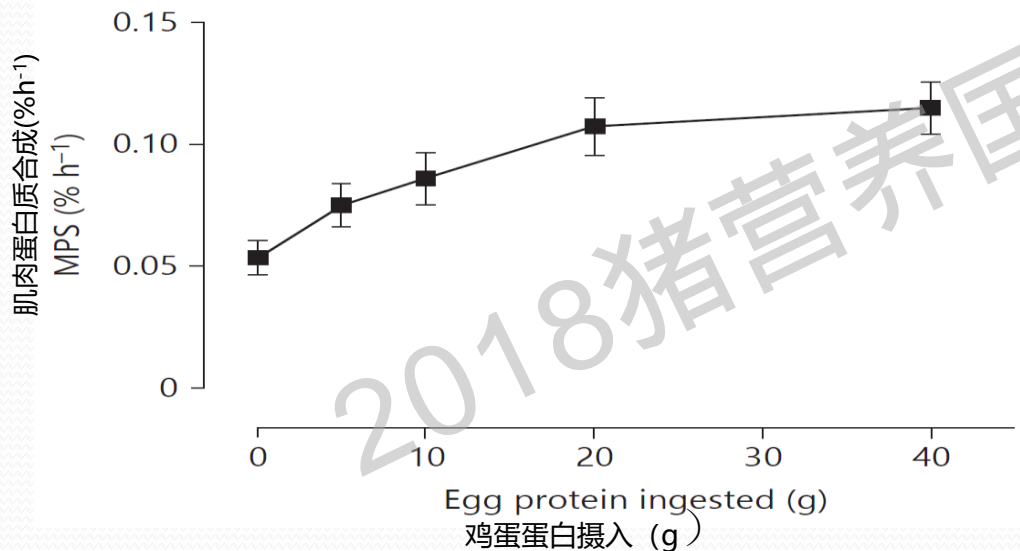
Normal Protein (~15%) vs. High Protein Diets (~30%) 正常蛋白质 (~15%) 与高蛋白饮食 (~30%)



Protein Ingestion Enhances the Impact of Resistance

Exercise on Muscle Protein Synthesis

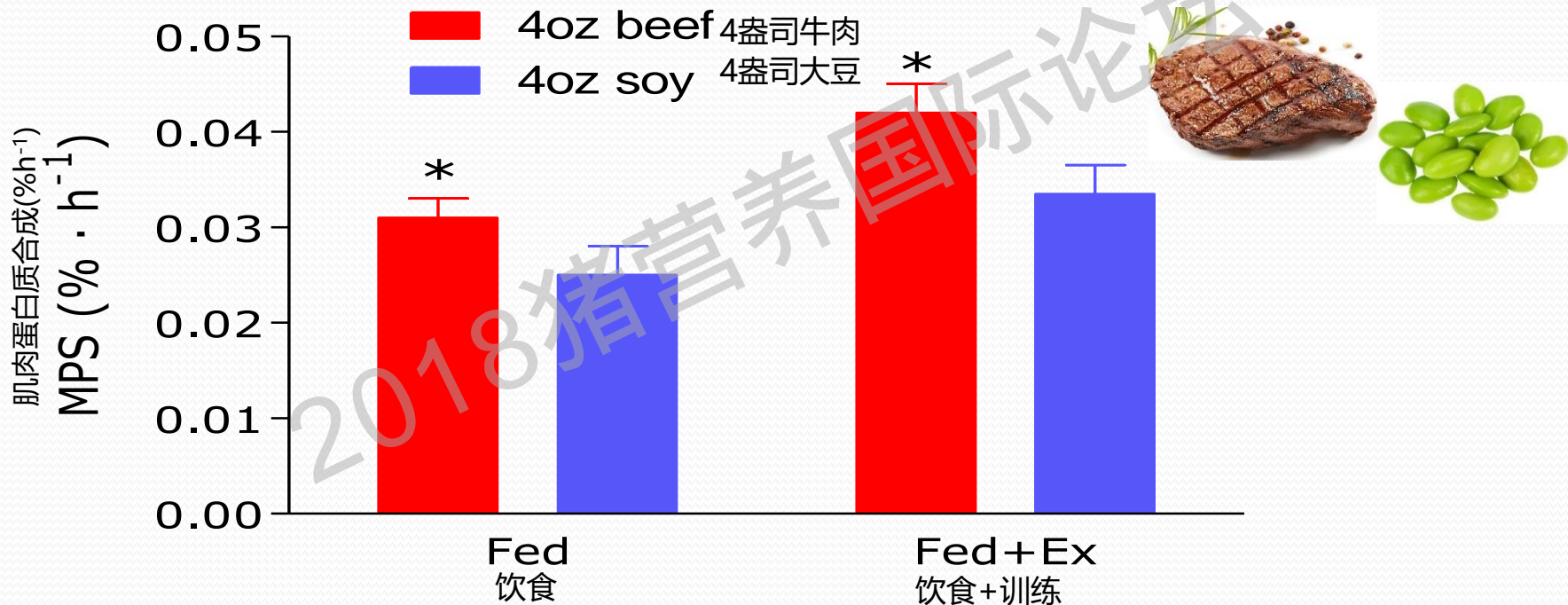
蛋白质摄入增强抗阻力训练对肌肉蛋白质合成的影响



Moore et al, *AJCN*, 89: 16, 2009.

Beef Is Superior to Soy in Stimulating Muscle Protein Synthesis After Exercise and at Rest

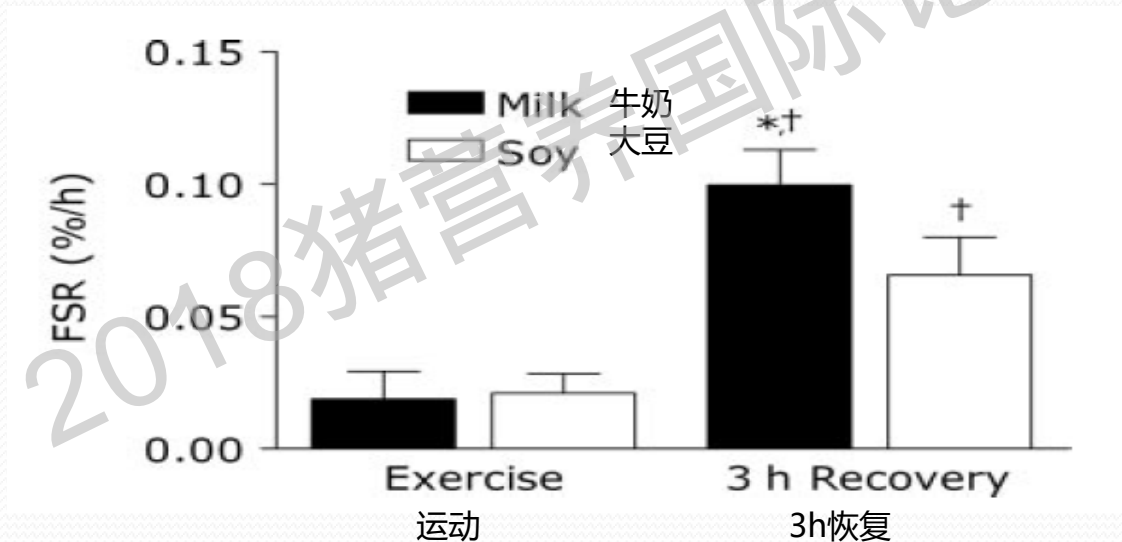
牛肉在运动和休息后刺激肌肉蛋白质合成优于大豆



Phillips, *Meat Sci*, 92:174, 2012.
Adapted from Stuart Phillips, Ph.D.

Milk Proteins Promotes Greater Protein Accretion than Soy Proteins after Exercise

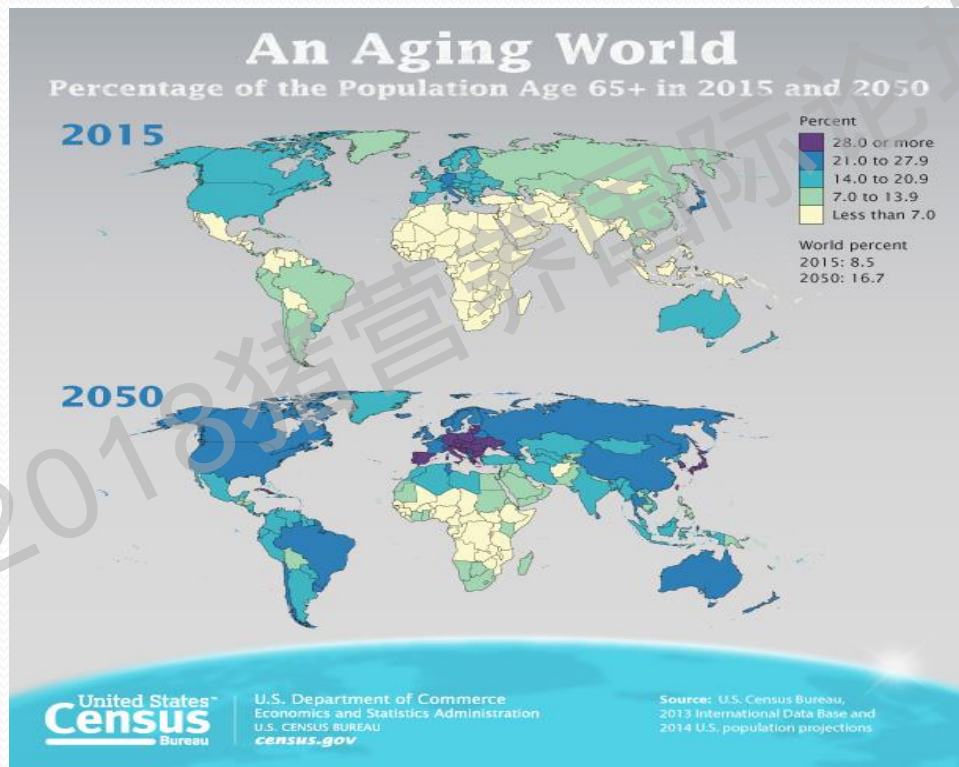
运动后牛奶蛋白质比大豆蛋白质对蛋白质的吸收更高



Wilkinson et al, *Am J Clin Nutr* 85:1031, 2007.
Adapted from Stuart Phillips, Ph.D.

The World's Population Is Aging

世界人口正在老龄化



Older People (>65) Need More Dietary Protein

(1.0-1.2 g/kg/day vs. RDA of 0.8 g/kg/day)

老年人 (> 65) 需要更多的膳食蛋白质 (1.0-1.2克/千克/天 vs. RDA 0.8克/千克/天)

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Special Article

针对老年人最佳膳食蛋白质摄入量的循证建议：来自PROT-AGE研究组的立场文件

Evidence-based Recommendations for Optimal Dietary Protein Intake in Older People: A Position Paper From the PROT-AGE Study Group

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Meat's Calorie Advantage

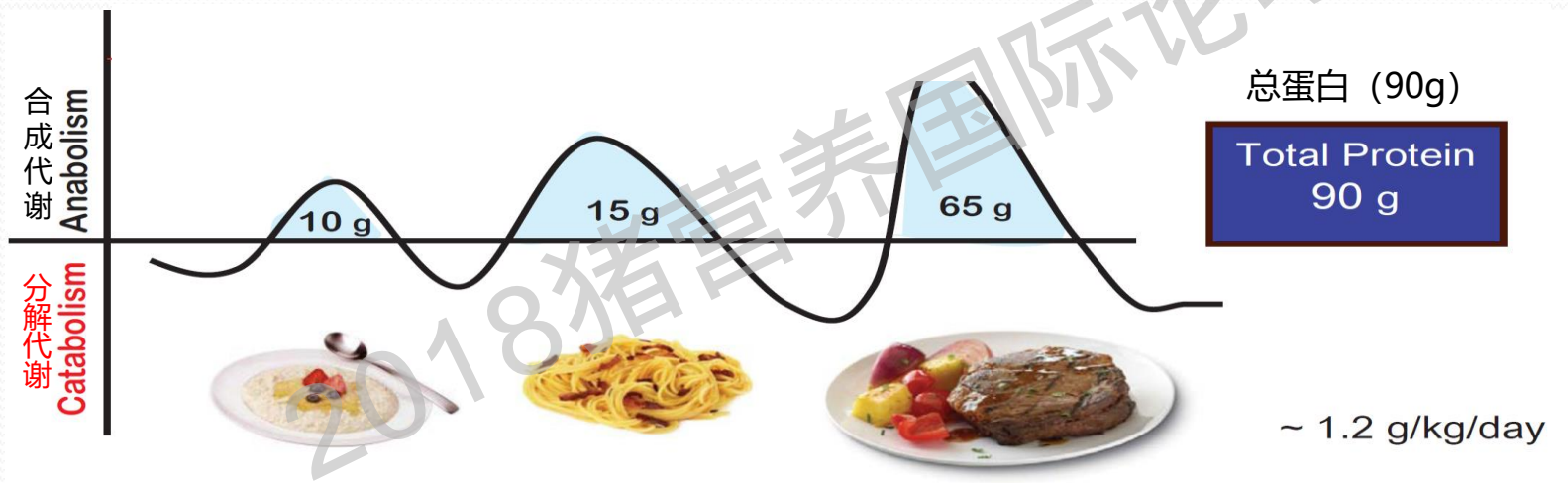
肉类卡路里优势



25 grams Protein = 25克蛋白质 =

A Skewed Protein Distribution Fails to Maximize Muscle Protein Synthesis

不均匀的蛋白质分布不能最大化肌肉蛋白质合成



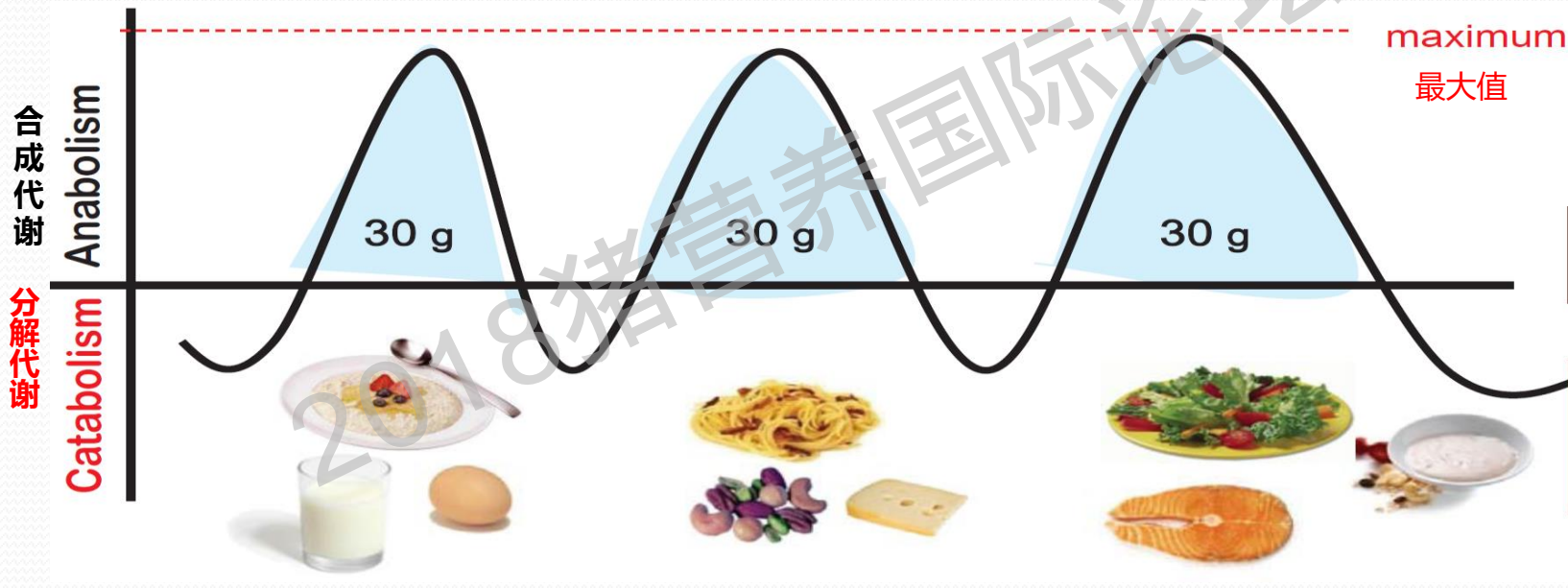
Mamerow et al, *J Nutr*, 144:876, 2014;

Paddon-Jones & Rasmussen, *Curr Opin Nutr Metab Care*, 12:86, 2009;

Paddon-Jones: <http://www.beefnutrition.org/webinars.aspx>

An Even Distribution of Protein at Each Meal Stimulates 24-Hour Muscle Protein Synthesis More Effectively than Skewing Protein Intake Toward the Evening Meal

每餐中均匀摄入的蛋白质比晚餐时摄入更多蛋白质时更能有效刺激24h肌肉蛋白质合成

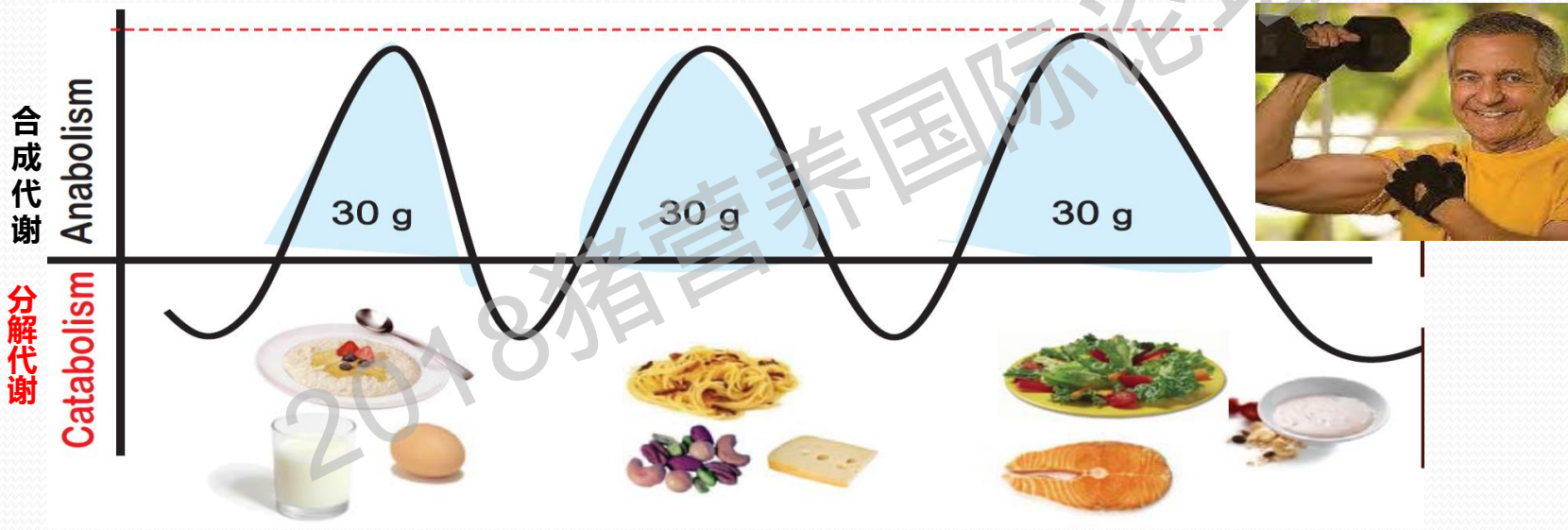


Mamerow et al, *J Nutr*, 144:876, 2014;

Paddon-Jones: <http://www.beefnutrition.org/webinars.aspx>

Greater protein intakes and an even mealtime distribution are associated with increased muscle mass and strength in older adults

提高蛋白质摄入量和均匀的进餐可以提高老年人肌肉质量和强度



Farsijani et al, AJCN, 104:694, 2016; Farsijani et al, AJCN, 2017;
Paddon-Jones: <http://www.beefnutrition.org/webinars.aspx>.

What's the Down Side ?

缺点是什么？



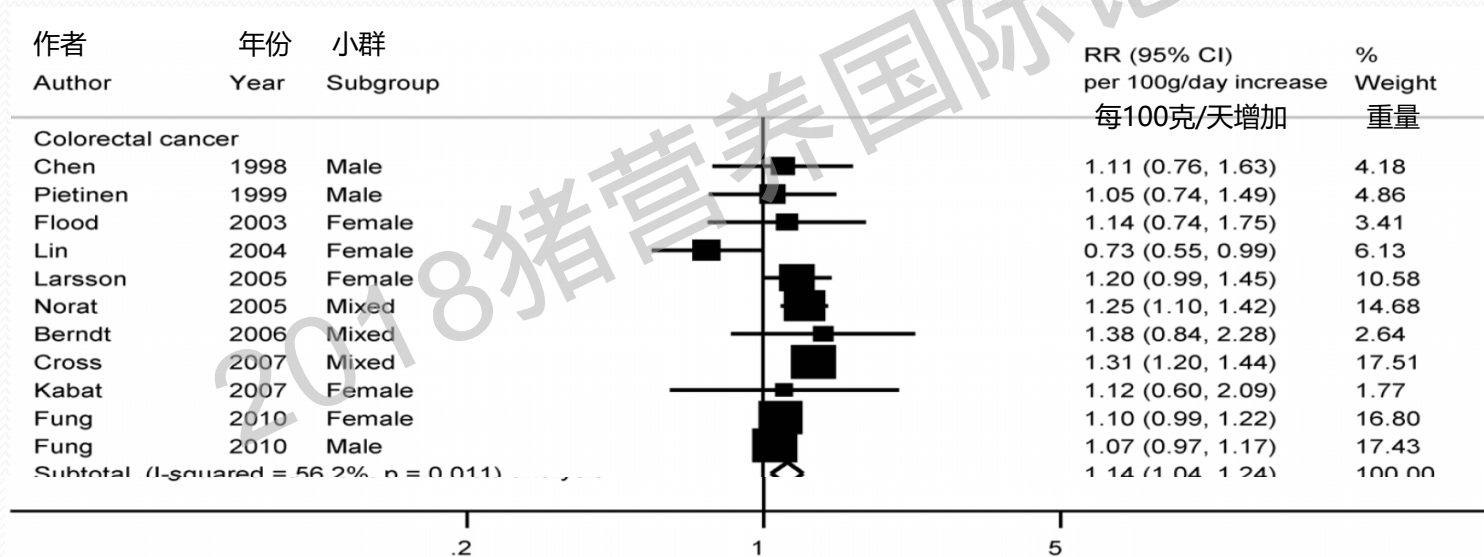
2018猪营养国际论坛

Total Red and Processed Meats Consumption Is Associated with Small Risk of Colorectal Cancer of 14%

红肉和加工肉类总的消费量与结肠直肠癌有14%的小相关性

Numerous confounding dietary and lifestyle factors

众多令人困惑的饮食和生活方式因素



Meta-analysis of red and processed meats consumption and risk of colorectal cancer
红肉和加工肉类总消费和结直肠癌风险的总结分析

Chan et al, *PloS One*. 6(6):e20456, 2011.

Lifestyle May be Main Contributor to Effect of Meat Intake on Risk for Chronic Disease

生活方式是肉食摄入增加慢性疾病风险的主要促成因素

- Numerous confounding dietary and lifestyle factors in population studies of cancer and meat intake
在癌症和肉类摄入的人群研究中，存在众多令人困惑的饮食和生活方式因素
- People who have high intakes of meat, also have: 人们肉类摄入量高，同时：
 - Low fruit and vegetable intake 水果和蔬菜摄入量低
 - Low fiber intake 纤维摄入量低
 - Low physical activity 体力活动量低
 - Increased body weight 体重增加
 - Smoke 吸烟



Red Meat Does Not Adversely Impact

Cardiovascular Health

红肉不会对心血管健康产生不利影响



The American Journal of Clinical Nutrition 美国临床营养杂志

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^{1,2}

*Lauren E O'Connor, Jung Eun Kim, and Wayne W Campbell**

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

总红肉摄入 ≥ 0.5 份/d不会对心血管疾病危险因素产生负面影响，对随机对照试验进行了经过系统的综合分析

Meta analysis of 945 studies: No impact on -

Total cholesterol, LDL cholesterol, triglycerides, total cholesterol: HDL cholesterol, HDL cholesterol, systolic blood pressure, diastolic blood pressure

945项研究的综合分析：红肉对总胆固醇、低密度脂蛋白胆固醇、甘油三酯、总胆固醇：低密度脂蛋白胆固醇、高密度脂蛋白胆固醇、收缩压、舒张压没有影响

Am J Clin Nutr 2017;105:57-69.

Do Animal Sourced Foods Play a Role in the Promotion of Optimal Growth and Development?

动物源性食物促进最佳增长和发展方面发挥作用吗？



How dietary protein is distributed across the day is important in children

膳食蛋白质在一天中分配对儿童很重要

- For most children, protein intake is low at breakfast and higher at the evening meal.
对于大多数儿童来说，早餐时蛋白质摄入量较低，晚餐时蛋白质摄入量较高。



- Milk protein at breakfast improves body protein balance to promote lean tissue growth.
早餐中的牛奶蛋白可改善身体蛋白质平衡，促进瘦肉组织生长。



Mathias et al, *J Nutr* 147:1160, 2017;
Karagounis et al, *J Nutr* 148:729, 2018.

Animal foods can play an important role in obesity prevention in children

动物性食物可以在儿童肥胖预防中发挥重要作用

- In overweight children, eating a higher protein breakfast containing egg:

超重的孩子，吃包括鸡蛋在内的高蛋白早餐：

- Reduces hunger 减少饥饿感
- Increases fullness 增加饱腹感
- Increases fat oxidation 增加脂肪氧化
- Increases energy expenditure 增加能量消耗



Baum et al, *J Nutr*, 145, 2229, 2015.

Malnutrition is a Major Global Health Problem

营养不良是一个主要的全球健康问题

- 150 Million children under 5 are stunted.
1.5亿名5岁以下儿童发育不良。
- 50 Million children under 5 are wasted.
5千万5岁以下儿童瘦弱。
- 38 Million children under 5 are overweight.
3800万5岁以下儿童超重。
- **45 % Of all child deaths are from poor nutrition.**
所有儿童死亡中有45%来自营养不良



GLOBAL TARGETS 2025

To improve maternal, infant and young child nutrition



40% REDUCTION IN THE NUMBER OF CHILDREN UNDER-5 WHO ARE STUNTED

5岁以下发育迟缓的儿童减少40%



50% REDUCTION OF ANAEMIA IN WOMEN OF REPRODUCTIVE AGE

育龄妇女贫血减少50%



30% REDUCTION IN LOW BIRTH WEIGHT

低出生体重减少30%



NO INCREASE IN CHILDHOOD OVERWEIGHT

儿童期超重没有增加



INCREASE THE RATE OF EXCLUSIVE BREASTFEEDING IN THE FIRST 6 MONTHS UP TO AT LEAST 50%

提高前6个月纯母乳喂养率至少达到50%



REDUCE AND MAINTAIN CHILDHOOD WASTING TO LESS THAN 5%

减少和维持童年消瘦至少于5%

The body absorbs 2 to 3 times more iron from animal sources than from plants. Source: Academy of Nutrition and Dietetics 人体从动物源吸收的铁比植物吸收的铁多2至3倍。
资料来源：营养与饮食学会

The addition of animal-source foods to a plant-based diet promotes the recovery of moderately malnourished children. Source: WHO 在植物性饮食中添加动物源食品可促进中度营养不良儿童的康复。
来源：世界卫生组织

Evidence suggests that greater dietary diversity and the consumption of animal source foods are associated with improved linear growth. Source: WHO 有证据表明，更大的膳食多样性和动物源食品的消费与线性增长的改善有关。
来源：世界卫生组织

Poor growth results not only from a deficiency of protein and energy but also from inadequate intake of micronutrients that are vital during rapid growth phases 生长缓慢不仅来自蛋白质和能量的缺乏而且微量营养素摄入不足，在快速生长阶段微量营养素还至关重要的

Animal Sourced Foods Play an Important Role in a Healthy Diet

动物源食物在健康饮食中发挥重要作用

