Supplementary tables and figures

Table S1. Baseline characteristics, protein intake and protein adequacy among Norwegian adults (18-64 years) in the Norkost 4 study (2022-2023), including energy under-reporters, stratified by Protein Adequacy and Quality Score (PAQS) (median (IQR); mean).

Adults (18-64 years)	All (n=1583)	PAQS <1 (n=248)	PAQS ≥ 1 (n=1335)
Gender, % female	52	67	50
Age, years	43 (31-53); 42	44 (33-53); 43	42 (31-53); 42
BMI, kg/m^2	24.8 (22.5-27.8); 25.5	28.4 (24.9-31.2); 28.6	24.4 (22.2-26.9); 24.9
# of vegetarians, vegans, and/or flexitarians (%) *	60 (3.8%)	14 (5.6%)	46 (3.4%)
Level of physical activity, n (%)			
1: sedentary	159 (10%)	35 (14%)	124 (9%)
2: at least 4 hours of movement/week	694 (44%)	128 (52%)	566 (42%)
3: at least 4 hours of moderate activity/week	563 (36%)	75 (30%)	488 (37%)
4: strenuous activity multiple times/week	163 (10%)	9 (4%)	154 (12%)
Energy intake, megajoules/day	8.7 (6.7-11.4); 9.3	6.4 (4.6-8.1); 6.7	9.2 (7.1-11.7); 9.8
BMR-factor**	1.3 (1.0-1.6); 1.3	0.9 (0.8-1.1); 1.0	1.4 (1.1-1.6); 1.4
Crude protein intake, E%	17.2 (14.7-20.1); 17.7	14.8 (12.3-17.4); 15.3	17.5 (15.1-20.4); 18.1
Of which plant protein, %	33.3 (24.9-42.8); 35.3	39.0 (30.2-52.3); 43.0	32.4 (24.3-41.4); 33.9
Crude protein intake, g/kg/d	1.1 (0.9-1.4); 1.2	0.7 (0.6-0.7); 0.6	1.2 (1.0-1.5); 1.3
Digestible protein intake, g/kg/d	1.1 (0.8-1.3); 1.1	0.6 (0.5-0.7); 0.6	1.1 (0.9-1.4); 1.2
Weighted digestibility of daily protein intake	0.90 (0.88-0.92); 0.92	0.89 (0.87-0.93); 0.94	0.90 (0.88-0.92); 0.92
PAQS	1.5 (1.1-1.9); 1.6	0.8 (0.7-0.9); 0.8	1.6 (1.3-2.0); 1.7

* Number of individuals that reported that they were vegan, vegetarian, or flexitarian at the time of the survey.

** Degree of activity during free time in the past 12 months.

*** Ratio of estimated energy intake (MJ/d): basal metabolic rate calculated according to self-reported weight, height, and age.

Table S2. Baseline characteristics, protein intake and protein adequacy among Norwegian older adults (65-80 years) in the Norkost 4 study (2022-2023), including energy under-reporters, stratified by Protein Adequacy and Quality Score (PAQS) (median (IQR); mean).

Older adults (≥65 years)	All (n=514)	PAQS <1 (n=91)	PAQS ≥ 1 (n=423)
Gender, % female	49	74	45
Age, years	72 (69-75); 72	74 (68-77); 73	72 (69-75); 72
BMI, kg/m^2	25.0 (22.8-27.5); 25.5	24.6 (22.7-26.3); 24.8	25.0 (22.9-28.1); 25.6
# of vegetarians, vegans, and/or flexitarians (%) *	4 (0.8%)	1 (1.1%)	3 (0.7%)
Level of physical activity, n (%)			
1: sedentary	60 (12%)	20 (22%)	40 (10%)
2: at least 4 hours of movement/week	291 (57%)	47 (52%)	244 (58%)
3: at least 4 hours of moderate activity/week	155 (30%)	22 (24%)	133 (31%)
4: strenuous activity multiple times/week	6 (1%)	0 (0%)	6 (1%)
Energy intake, megajoules/day	8.4 (6.8-10.0); 8.6	6.3 (5.2-7.1); 6.2	8.9 (7.3-10.3); 9.1
BMR-factor* **	1.3 (1.1-1.6); 1.3	1.3 (1.0-1.5); 1.3	1.3 (1.1-1.6); 1.3
Crude protein intake, E%	16.7 (14.7-19.5); 17.3	14.0 (12.3-16.8); 14.6	17.2 (15.4-20.0); 17.9
Of which plant protein, %	32.2 (25.0-41.1); 33.6	40.0 (32.2-48.9); 41.0	31.0 (24.6-37.9); 32.0
Crude protein intake, g/kg/d	1.1 (0.9-1.4); 1.2	0.7 (0.6-0.8); 0.7	1.2 (1.0-1.4); 1.3
Digestible protein intake, g/kg/d	1.0 (0.8-1.2); 1.0	0.6 (0.5-0.7); 0.6	1.0 (0.9-1.3); 1.1
Weighted digestibility of protein intake	0.89 (0.88-0.90); 0.89	0.88 (0.86-0.90); 0.88	0.90 (0.88-0.91); 0.89
PAQS	1.4 (1.1-1.8); 1.5	0.8 (0.7-0.9); 0.8	1.5 (1.3-1.9); 1.6

* Number of individuals that reported that they were vegan, vegetarian, or flexitarian at the time of the survey.

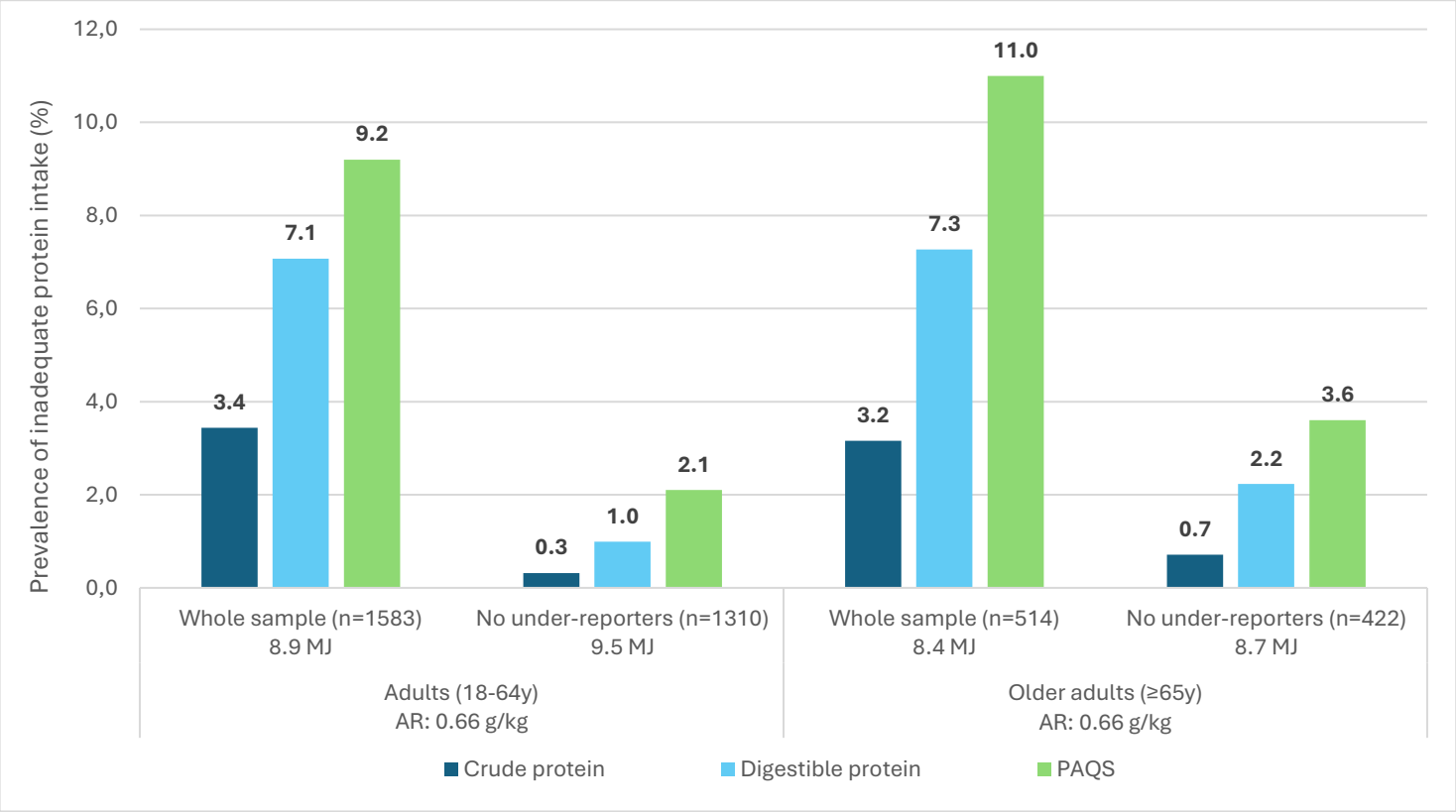
** Degree of activity during free time in the past 12 months.

*** Ratio of estimated energy intake (MJ/d): basal metabolic rate calculated according to self-reported weight, height, and age.

Table S3. Fecal digestibility factors for 30 food groups, from Heerschop et al. (22).

Food group name	**Digestibility factor**
Ungrouped	1
Potatoes	0.55
Alcohol	0.65
Bread	0.9
Eggs	0.97
Fruits	0.76
Pastry	0.9
Cereals	0.7
Vegetables	0.65
Spreads	0.9
Sauces animal-based	0.9
Sauces plant-based	0.65
Sauces mixed	0.9
Snacks animal-based	0.9
Snacks plant-based	0.65
Cheese	0.95
Spices	0.65
Dairy	0.95
Beverages	0.65
Nuts	0.75
Legumes	0.75
Clinical formulas	0.9
Sweets	0.8
Fats plant-based	0.65
Fats mixed	0.9
Fish	0.9
Meat	0.95
Substitutes	0.94
Miscellaneous plant-based	0.65
Miscellaneous mixed	0.9

Figure S1. Prevalence of inadequate protein intake among Norwegian adults (age 18 to 64) and older adults (age 65 to 80), including and excluding energy under-reporters. Inadequacy was calculated according to crude protein intake, digestible protein intake, and the Protein Adequacy and Quality Score (PAQS), according to an Estimated Average Requirement (EAR) of 0.66 g/kg/day.



PAQS was calculated by taking the sum of digestible amino acids per meal after considering amino acid digestibility, amino acid requirements, and crude amino acid intake. Prevalences were estimated by the Statistical Program to Assess usual Dietary Exposure (SPADE), which models usual intake distributions and removes within-person variations, and subsequently applies the EAR cut-point method using an Estimated Average Requirement (EAR) of 0.66 g/kg/d.