

Table A6: N and P biomass accumulation calculations

Dietary intake, US average omnivore diet pattern (kg/yr):

N intake	P intake
4.01	0.42

Human body composition, calculated from Forbes 1953.

Tissue	% N	% P
Striated muscle	3.5104	0.156
Adipose	0.936	0.031
Whole body	2.9792	0.925

Average weight of US adults (20-74 years old), from Ogden 2004:

Sex	1960 wt (lbs)	2002 wt (lbs)	Rate of change (lbs/yr)	Rate of change (kg/yr)
Female	140.2	164.3	0.573809524	0.260822511
Male	166.3	191	0.588095238	0.267316017

so let's round to 0.3 kg/yr weight increase for adults

and calculate the amount of N and P stored per year in muscle or fat:

Tissue	N storage (kg/yr)	P storage (kg/yr)	% of dietary N	% of dietary P
Striated muscle	0.0105312	0.000468	0.262623441	0.111428571
Adipose	0.002808	0.000093	0.070024938	0.022142857

What about growing kids?

27% of the US population is under age 20 (2010 census, from Howden 2011)

Use average weights for 20-29 year olds

Sex	2002 wt (kg)	Growth (kg/yr)	N storage (kg/yr)	P storage (kg/yr)	% of dietary N	% of dietary P	Population % of dietary N	Population % of dietary P
Female	64.4	3.22	0.09593024	0.029785	2.392275312	7.091666667	0.645914334	1.91475
Male	78.4	3.92	0.11678464	0.03626	2.912335162	8.633333333	0.786330494	2.331
Average	71.4	3.57	0.10635744	0.0330225	2.652305237	7.8625	0.716122414	2.122875

Therefore:

N and P storage due to increasing average weight is negligible.

Even if weight gain were to become double the 1960-2002 level, and all as muscle, N and P storage would still be less than 1% of dietary intake.

Because fat has substantially lower %N and P than muscle, weight gain as fat drives less N and P storage.

In contrast, children store substantial fractions of dietary N and P.

Depending on the age structure, this has the potential to introduce substantial error into our estimates.

For the US population (27% under age 20) overall, the error is less than 1% for N and 2-3% for P

For a nation where half the population is under 20, we could be overestimating excretion by roughly 1.5% for N and 5% for P.

