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CONVERSION RATIOS FOR THE FOODSTUFFS AND BIOTA ENVIRONMENTAL SURVEILLANCE PROGRAM

P.R. Fresquez and J.K. Ferenbaugh

ABSTRACT

This paper reports the mean ash to dry and dry to wet weight moisture conversion ratios for a variety of foodstuffs and biota commonly collected as part of the Environmental Surveillance Program at Los Alamos National Laboratory.

INTRODUCTION

The foodstuffs and biota monitoring programs at Los Alamos National Laboratory (LANL) comprises two of the five Environmental Surveillance Programs mandated by Department of Energy Orders, and LANL has conducted these studies since the early 1970s (ESR 1997). Because foodstuffs and biota commonly contain very small amounts of radionuclides in the edible portions of the tissue, samples are commonly ashed to concentrate the radioisotope (s) in order to adequately detect the element; therefore, results are usually reported in units per gram of ash. To compensate for the differing water contents in various matrices (gram of ash are usually two to four orders of magnitude higher than live weights), units in gram of ash are converted to units of gram of dry material—the standard representation of data. Further, results in units per gram dry weight are converted to units of wet weight in order to estimate radiation doses to the public from the ingestion of these products.

This paper reports the mean ash to dry and dry to wet weight moisture conversion ratios for a variety of foodstuffs and biota that have been collected as part of the Environmental Surveillance Program at LANL from 1990 to present.

METHODS

During the course of processing foodstuffs (produce, fish, game animals, domestic livestock, and native wild foods) and biota (native vegetation) dry, wet, and ash weights are determined. Normally, samples for chemical analysis for the Environmental Surveillance Program at LANL are (1) placed in tarred glass beakers and weighed, (2) placed into a drying oven and heated at 70°C for approximately 120 hrs., (3) weighed and

placed back into the oven and slowly burned to a final temperature of 500°C for 120 h. After ashing, samples are allowed to cool for approximately one hour and weighed.

RESULTS

Results of the moisture conversion ratios determined from a host of commonly collected foodstuffs and biota for the Environmental Surveillance Program at LANL from 1990 to present can be found in Table 1.

Table 1. Mean ash/dry and dry/wet ratios for a variety of foodstuffs and biota commonly collected as part of the Environmental Surveillance Program at LANL.^a

Foodstuff/Biota	Ash/Dry	Dry/Wet
Produce (Edible Tissue)^{1,2,3}		
Apples	0.036	0.167
Apricots	0.164	0.138
Carrots	0.100	0.089
Cherries	0.098	0.130
Chile	0.073	0.091
Corn	0.064	0.263
Corn (Nonedible Tissue)	0.090	0.150
Crab Apples	0.021	0.250
Cucumbers	0.133	0.049
Green Beans	0.078	0.132
Lettuce	0.250	0.090
Melons	0.118	0.047
Nectarines	0.078	0.159
Peaches	0.076	0.135
Pears	0.031	0.187
Plums	0.123	0.172
Pinto Beans	0.050	0.640
Pinto Beans (Nonedible Tissue)	0.150	0.180
Pumpkins	0.120	0.066
Radish	0.140	0.053
Spinach	0.133	0.213
Squash	0.131	0.049
Squash (Nonedible Tissue)	0.180	0.080
Tomatoes	0.100	0.074
Herbs¹		
Parsley	0.110	0.450

Table 1. (Continued).

Navajo Tea (Cota)	0.066	0.324
Fish (Muscle and Bone)^{1,4,5,6}		
Bass	0.120	0.250
Carp	0.116	0.283
Carp sucker	0.071	0.164
Catfish	0.082	0.301
Crappie	0.151	0.236
Pike	0.110	0.250
Sucker	0.126	0.235
Trout	0.077	0.284
Walleye	0.118	0.263
Game Fish (Surface Feeders)	0.121	0.256
Game Fish (Surface Feeders) Vicera	0.128	0.232
Non-Game Fish (Bottom Feeders)	0.095	0.288
Non-Game Fish (Bottom Feeders) Vicera	0.086	0.292
Game Animals^{7,8}		
Elk Brain	0.068	0.230
Elk (leg) Bone	0.500	0.600
Elk (jaw) Bone	0.622	0.755
Elk Hair	0.027	0.718
Elk Heart	0.031	0.293
Elk Kidney	0.052	0.216
Elk Liver	0.042	0.312
Elk Muscle	0.044	0.240
Deer Bone	0.440	0.700
Deer Muscle	0.045	0.250
Rock Squirrel Muscle ⁹	0.040	0.220
Rock Squirrel Bone ⁹	0.340	0.350
Domestic Animals⁹		
Beef Cow Bone	0.500	0.720
Beef Cow Muscle	0.037	0.270
Wild Foods (Edible Tissue)⁹		
Acorns (Unshelled)	0.030	0.310
Wax Currant	0.050	0.190
Wild (Hip) Rose	0.040	0.400
Wild Strawberry	0.060	0.200
Wild Raspberry	0.030	0.210
Wild Rhubarb	0.240	0.090

Table 1. (Continued).

Native Vegetation^{1,10,11,12,13}

Understory (Grasses and Forbs)	0.100	0.320
Overstory (Shrubs and Trees)	0.050	0.450
Pinon Pine Shoot Tips	0.080	0.420

^aRefer to reference list for origin of data.

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