

TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE

Portland, Oregon

SOIL CONSERVATION SERVICE

AGRONOMY TECHNICAL NOTE NO. 57

January 1987

WEIGHTS, MEASURES, AND CONVERSION FACTORS
WNTC ES TECHNICAL NOTE W-39

Technical Note No. 57
Agronomy

U.S.D.A. Soil Conservation Service
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United States
Department of
Agriculture

Soil
Conservation
Service

West National Technical Center
511 NW Broadway, Room 547
Portland, Oregon 97209-3489

October 20, 1986

WEST NTC ECOLOGICAL SCIENCES TECHNICAL NOTE W-39

SUBJECT: ECS - AGRONOMY - WEIGHTS, MEASURES, AND CONVERSION FACTORS.

Purpose. To transmit the above named technical note.

Effective Date. When received.

Directives Cancelled. Technical Note No. 16, dated 12/9/71.

Filing Instructions. File in technical note binder under Agronomy.

GEORGE C. BLUHM
Director

Attachment

DIST:
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is an agency of the
United States Department of Agriculture



WEST NTC ECOLOGICAL SCIENCES TECHNICAL NOTE W-39

SUBJECT: ECS - AGRONOMY - WEIGHTS, MEASURES, AND CONVERSION FACTORS

Purpose. This technical note transmits information that was prepared chiefly for the Soil Conservation Service (SCS) technicians who have a need for conversion factors. The conversion factors cover most of the important agricultural products.

Background. Weights, measures, and conversion factors are needed in the statistical computations performed by SCS technicians at all levels. The information covers the most frequently asked questions on agricultural products the USDA is involved with. All farm products are not included; nor all the containers for any one product.

This information has been assembled from state schedules of legal weights, sources within the USDA, and other government agencies. For some products, particularly fruits and vegetables, there is a considerable variation in weights (per unit of volume), due to differences in variety or size of the commodity, condition and tightness of pack, degree to which the container is heaped, etc. The point of origin or harvest weights have been used. The weights given in this table do not necessarily have official standing as a basis for packing or as grounds for settling disputes.

Prepared by Travis Stevenson, Conservation Agronomist, West NTC, Portland, Oregon.

WEIGHTS AND MEASURES

Commodity	Unit (1)	Approximate Net Weight		Commodity	Unit (1)	Approximate Net Weight	
		Pound	Kilogram			Pound	Kilogram
Alfalfa seed	Bushel	60	27.2	Bluegrass seed	Bushel	14-30	6.4-13.6
	"	48	21.8	Broccoli	Wirebound crate	20-25	9.1-11.3
Apples	Northwest, box (2)	44	20.0	Broomcorn, (6 bale per ton)	Bale	333	151
	Fiberboard box, cell pk	37-44	16.8-20.0	Broomcorn seed	Bushel	44-50	20.0-22.7
Apricots	Lug, (brentwood) (3)	24	10.9	Brussel sprouts	Drums	25	11.3
Western	4-basket crate (4)	26	11.8	Butter	Box	64	29
Artichokes:				Cabbage	Open mesh bag	50	22.7
Globe	1/2 box	20	9.1		Wirebound crate (7)	50	22.7
Jerusalem	Bushel	50	22.7		Western crate (8)	80	36.3
Asparagus	Crate	30	13.6	Cantaloups	Jumbo crate (9)	83	37.6
Avocados	Lug (5)	12-15	5.4-6.8	Carrots:			
Bananas	Fiber holding box (6)	40	18.1	without tops	Bushel	50	22.7
Barley	Bushel	48	21.8		Open mesh bag	50	22.7
Beans:				Castor beans	Bushel	41	18.6
Lima, dry	Bushel	56	25.4	Castor oil	Gallon	8 (10)	3.6
Other, dry	"	60	27.2	Cauliflower	W.G.A. crate	50-60	22.7-27.2
	Sack	100	45.4		Fiberboard box film wrapped 2 layers	23-35	10.4-15.9
Lima, unshelled	Bushel	28-32	12.7-14.5	Celery	Crate (11)	60	27.2
Snap	"	28-32	12.7-14.5	Cherries	Lug (campbell) (12)	16	7.3
Beets:					Lug	20	9.1
without tops	Bushel	50	22.7	Clover seed	Bushel	60	27.2
bunched	Wirebound crate	45	20.4				
Berries, frozen pack:							
without sugar	50-gallon barrel	380	172				
3 + 1 pack	"	425	193				
2 + 1 pack	"	450	204				
Blackberries	24-qt. crate	36	16.3				

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WEIGHTS AND MEASURES

Commodity	Unit (1)	Approximate Net Weight		Commodity	Unit (1)	Approximate Net Weight	
		Pound	Kilogram			Pound	Kilogram
Corn:				Grapefruit: (contd)			
Ear, husked	Bushel	70 (13)	31.8	Florida	1 3/5 bu.		
Shelled	"	56	25.4	box		85	38.6
Meal	"	50	22.7	Texas	1 2/5 bu.		
Oil	Gallon	7.7 (10)	3.5	box		80	36.3
Syrup	"	11.2	5.3	CA. Desert Val-	Box (18)	64 (19)	29.0
Sweet	Mesh or paper bag	45-50	20.4-22.7	leys and AZ.	Carton (20)	32	14.5
	Wirebound crate	40-60	18.1-27.2	CA. other than Desert Valleys	Box (18)	67	30.4
				Carton (20)		33 1/2	15.2
Cotton	Bale, gross	500 (14)	227	Grapes:			
	Bale, net	480 (14)	218	Eastern	4-qt. climax basket	6	2.7
Cottonseed	Bushel	32 (15)	14.5		12-qt. basket	18-20	8.2-9.1
Cottonseed oil	Gallon	7.7 (10)	3.5	Western	Lug (21)	28	12.7
Cowpeas	Bushel	60	27.2		4-basket crate (22)	20	9.1
Cranberries	Barrel	100	45.4	Hempseed	Bushel	44	20.0
	1/4 barrel, box (16)	25	11.3	Hickory nuts	Bushel	50	22.7
Cream, 40% butter- fat	Gallon	8.38	3.80	Honey	Gallon	11.84	5.4
Cucumbers	Bushel	48	21.8	Honeydew melons	Jumbo crate (23)	44	20.0
Dewberries	24-qt. crate	36	16.3	Hops	Bale, gross	200	90.7
Eggplant	Bushel	33	15.0	Horseradish, roots	Bushel	35	15.9
Eggs, average size	Case, 30 dozen	47	21.3	Barrel		100	45.4
Escarole	Bushel	25	11.3	Hungarian, millet seed	Bushel	48-50	21.8-22.7
Figs, fresh	Box, single layer (17)	6	2.7	Kale	Bushel	18	8.2
Flaxseed	Bushel	56	25.4	Kapok seed	Bushel	35-40	15.9-18.1
Flour, various	Bag	100	45.4	Lard	Tierce	375	170
Grapefruit:				Lemons, CA. and AZ.	Box (24)	76 (19)	34.5
Florida & Texas	1/2 box, mesh bag	40	18.1	Carton (20)		38	17.2

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WEIGHTS AND MEASURES

Commodity	Unit (1)	Approximate Net Weight		Commodity	Unit (1)	Approximate Net Weight	
		Pound	Kilogram			Pound	Kilogram
Lentils	Bushel	60	27.2	Parsnips	Bushel	50	22.7
Lettuce	Fiberboard box, carton	38-55	17.2-24.9	Peaches	Bushel	48	21.8
Lettuce, hothouse	24-qt. basket	10	4.5		Lug box (21)	20	9.1
Limes, Florida	Box	80	36.3		CA. fruit box	18 (26)	8.2
Linseed oil	Gallon	7.7 (10)	3.5	Peanut oil	Gallon	7.7 (10)	3.5
Malt	Bushel	34	15.4	Peanuts, unshelled			
Maple syrup	Gallon	11.02	5.0	Virginia type	Bushel	17	7.7
Meadow fescue seed	Bushel	24	10.9	Runners, Southeastern	Bushel	21	9.5
Milk	Gallon	8.6	3.9	Spanish, Southeastern	Bushel	25	11.3
Millet	Bushel	48-50	21.8-22.7	Southwestern	Bushel	25	11.3
Molasses, edible	Gallon	11.74	5.3	Pears:			
Molasses, nonedible	Gallon	11.74	5.3	CA.	Bushel	48	21.8
Mustard seed	Bushel	58-60	26.3-27.2	Other	"	50	22.7
Oats	Bushel	32	14.5	Western	Box (27)	46	20.9
Olives	Lug (21)	25-30	11.3-13.6	Peas:			
Olive oil	Gallon	7.6 (10)	3.5	Green, unshelled	Bushel	28-30	12.7-13.6
Onions:				Dry	"	60	27.2
Dry	Sack	50	22.7	Peppers, green	Bushel	25-30	11.3-13.6
Green bunched	Crate	60-65	27.2-29.5		Fiberboard, carton	30-34	13.6-15.4
Sets	Bushel	28-32	12.7-14.5	Perilla seed	Bushel	37-40	16.8-18.1
Oranges:				Pineapples	Crate (28)	70	31.8
FL. and TX.	1/2 box, mesh bag	45	20.4	Plums and prunes			
	Box (25)	90	40.8	CA.	4-basket crate (29)	28-34	12.7-15.4
CA. and AZ.	Box (18)	75 (19)	34.0	Other	1/2 bu. basket	28	12.7
	Carton (20)	37 1/2	17.0	Popcorn:			
Orchardgrass seed	Bushel	14	6.4	On ear	Bushel	70 (13)	31.8
Palm oil	Gallon	7.7 (10)	3.5	Shelled	"	56	25.4
				Poppy seed	Bushel	46	20.9

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WEIGHTS AND MEASURES

Commodity	Unit (1)	Approximate Net Weight		Commodity	Unit (1)	Approximate Net Weight	
		Pound	Kilogram			Pound	Kilogram
Potatoes	Bushel	60	27.2	Strawberries	24-qt. crate	36	16.3
	Barrel	165	74.8		12-pt. crate	9-11	4.1-5.0
	Bag	50	22.7				
	Bag	100	45.4	Sudangrass seed	Bushel	40	18.1
Quinces	Bushel	48	21.8	Sugarcane, syrup unsulfured	Gallon	11.45	5.2
Rapeseed	Bushel	50 & 60	22.7 & 27.2	Sunflower seed	Bushel	24 & 32	10.9 & 14.5
Raspberries	24-qt. crate	36	16.3	Sweet potatoes	Bushel	55 (31)	24.9
Redtop seed	Bushel	50 & 60	22.7 & 27.2		Crate	50	22.7
Refiners, syrup	Gallon	11.45	5.2	Tangerines, FL.	4/5 bu. box	47 1/2	21.5
Rice:				Timothy seed	Bushel	45	20.4
Rough	Bushel	45	20.4	Tobacco:			
	Bag	100	45.4	Maryland	Hogshead	775	352
	Barrel	162	73.5	Flue-cured	"	950	431
Milled	Pocket or bag	100	45.4	Burley	"	975	442
Rosin	Drum, net	520	236	Dark air-cured	"	1150	522
Rutagabas	Bushel	56	25.4	Virginia fire cured	"	1350	612
Rye	Bushel	56	25.4	KY. & TN. fire cured	"	1500	680
Sesame seed	Bushel	46	20.9	Cigar leaf	Case	230-365	113-166
Shallots	Crate (4 to 7 doz. bunches)	20-35	9.1-15.9		Bale	150-175	68-79.4
Sorgo:				Tomatoes	Crate	60	27.2
Seed	Bushel	50	22.7		Lug box (21)	32	14.5
Syrup	Gallon	11.55	5.2		2 layer-flat	21	9.5
Sorghum grain (30)	Bushel	56	25.4	Tomatoes, hothouse	12-qt. basket	20	9.1
Soybeans	Bushel	60	27.2	Tung oil	Gallon	7.8 (10)	3.5
Soybean oil	Gallon	7.7 (10)	3.5	Turnips:			
Spelt	Bushel	40	18.1	Without tops	Mesh sack	50	22.7
Spinach	Bushel	18-20	8.2-9.1	Bunched	Crate (8)	70-80	31.8-36.3
				Turpentine	Gallon	7.23	3.3
				Velvetbeans hulled	Bushel	60	27.2

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WEIGHTS AND MEASURES

Commodity	Unit (1)	Approximate Net Weight		Commodity	Unit (1)	Approximate Net Weight	
		Pound	Kilogram			Pound	Kilogram
Vetch	Bushel	60	27.2	Watermelons	Avg or med. sizes	25	11.3
Walnuts	Bushel	50	22.7	Wheat	Bushel	60	27.2
Water, 60 (F)	Gallon	8.33	3.8	Various commodities	Short ton	2000	907
					Long ton	2240	1016
					Metric	2204.6	1000

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To Convert From Avoirdupois Pounds

To	Multiply by
Kilograms	0.45359237
Metric tons	0.00045359237

Conversion Factors

- 1 Metric ton = 2204.622 pounds
- 1 Kilogram = 2.2046 pounds
- 1 Acre = 0.4047 hectares
- 1 Hectare = 2.47 acres
- 1 Square mile = 640 acres = 259 hectare
- 1 Gallon = 3.7853 liters

CONVERSION FACTORS

Commodity	Unit	Approximate equivalent
Apples	1 pound dried	8 pounds fresh
"	1 pound chops	5 pounds fresh
"	1 case canned (32)	1.4 bushels fresh
Applesauce	1 case canned (32)	1.2 bushels fresh
Apricots	1 pound dried	6 pounds fresh
Barley flour	100 pounds	4.59 bushels of barley
Beans, lima	1 pound shelled	2 pounds unshelled
Beans, snap or wax	1 case canned (33)	0.008 ton fresh
Buckwheat flour	100 pounds	3.47 bushels of buckwheat
Calves	1 pound of live weight	0.557 pound dressed weight (1954-63 avg)
Cattle	1 pound live weight	0.561 pound dressed weight (1954-63 avg)
Cane syrup	1 gallon	5 pounds sugar
Cherries, tart	1 case canned (32)	0.023 ton fresh
Chickens	1 pound live weight	0.72 pound cook weight
Corn, shelled	1 bushel (56 lbs.)	2 bushels (70 lbs.) of husked ear corn
Corn, sweet	1 case canned (33)	0.030 ton fresh
Cornmeal:		
w/o germ	100 pounds	3.16 bushels corn
w/germ	"	2 bushels of corn
Cotton	1 pound ginned	3.26 pounds seed cotton, including trash (34)
Cottonseed meal	1 pound	2.10 pounds cottonseed
Cottonseed oil	1 pound	5.88 pounds cottonseed
Diary products:		
Butter	1 pound	21.1 pounds of milk
Cheese	"	10.0 pounds of milk
Condensed milk, whole	"	2.3 pounds of milk
Dry cream	"	19 pounds of milk
Dry milk, whole	"	7.6 pounds of milk
Evaporated milk, whole	"	2.14 pounds of milk
Malted milk	"	2.6 pounds of milk
Nonfat dry milk	"	11 pounds of liquid skim milk
Ice cream (35)	"	15 pounds of milk
Ice cream (fat removed) (35)	"	12 pounds of milk

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CONVERSION FACTORS

Commodity	Unit	Approximate equivalent
Eggs	1 case	47 pounds
Eggs, shell	"	39.5 pounds frozen or liquid whole eggs
Eggs, shell	"	10.3 pounds of dried white eggs
Figs	1 pound dried	3 pounds fresh in CA., 4 pounds elsewhere
Flaxseed	1 bushel	About 2 1/2 gallons of oil
Grapefruit, FL.	1 case canned juice (33)	0.64 box of fresh fruit
Hogs	1 pound of live weight	0.579 pound dressed weight, excluding la (1954-63 avg.)
Lindseed meal	1 pound	1.51 pounds of flaxseed
Lindseed oil	1 pound	2.77 pounds flaxseed
Malt	1 bushel (34 lbs.)	1 bushel barley (48 lbs.)
Maple syrup	1 gallon	8 pounds maple sugar
Nuts:		
Almonds imported	1 pound shelled	3 1/2 pounds unshelled
Almonds, CA.	"	2 pounds unshelled
Brazil	"	2 pounds unshelled
Cashews	"	4.55 pounds unshelled
Chestnuts	"	1.19 pounds unshelled
Filberts	"	2.5 pounds unshelled
Pecans,		
seedlings	"	2.78 pounds unshelled
improved	"	2.50 pounds unshelled
Pignolias	"	1.3 pounds unshelled
Pistachois	"	2 pounds unshelled
Walnuts,		
black	"	5.88 pounds unshelled
persian (english)	"	2.67 pounds unshelled
Oatmeal	100 pounds	7.6 bushels of oats
Oranges FL.	1 case canned juice (33)	0.53 box fresh
Peaches, Ca., freestone	1 pound dried	6 1/2 pounds fresh
Peaches, CA., clingstone	"	7 1/2 pounds fresh
Peaches, clingstone	1 case canned (32)	1 bushel fresh
Peanuts	1 pound shelled	1 1/2 pounds
Pears	1 pound dried	6 1/2 pounds fresh
Pears, barlett	1 case canned (33)	1.1 bushel fresh
Pears, bartlett	"	0.026 ton fresh

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CONVERSION FACTORS

Commodity	Unit	Approximate equivalent
Peas, green	1 pound shelled	2 1/2 pounds unshelled
Peas, green	1 case canned (33)	0.009 ton fresh (shelled)
Prunes	1 pound dried	2.7 pounds fresh CA., 3 to 4 elsewhere
Raisins	1 pound	4.3 pounds fresh grapes
Rice, milled (excluding brewers)	100 pounds	152 pounds rough or unhulled rice
Rye flour	100 pounds	2.23 bushels of rye
Sheep and lambs	1 pound of live weight	0.482 pound dressed weight (1954-63 avg)
Soybean, meal	1 pound	1.27 pounds of soybeans
Soybean, oil	"	5.49 pounds of soybeans
Sugar	1 ton raw	0.9346 ton refined
Tomatoes	1 case canned (33)	0.018 ton fresh
Turkeys	1 pound live weight	0.80 pounds of ready to-cook weight
Wheat flour	100 pounds	2.3 bushels of wheat (36)
Wool, domestic apparel shorn	1 pound greasy	0.48 pound scoured
Wool, domestic apparel pulled	"	0.73 pound scoured

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FOOTNOTES

1. Standard U.S. container sizes - bushel, 2150.42 cubic inches; gallon, 231 cubic inches; cranberry barrel, 826 cubic inches; fruit and vegetable barrel, 7056 cubic inches. Many products are, sold on the basis of heaped bushels etc. which will exceed the volume of a level full container.
2. Approximate inside dimensions, 10.5 by 11.5 by 18 inches.
3. Approximate inside dimensions, 4 5/8 by 12 1/2 by 16 1/4 inches.
4. Approximate inside dimensions, 4 1/2 by 16 by 16 1/8 inches.
5. Approximate dimensions, 4 1/2 by 13 1/2 by 16 1/8.
6. Approximate inside dimensions, 13 by 12 by 32.
7. Inside dimensions vary. Common sizes are 13 by 13 by 22 1/8 inches, and 13 by 15 1/8 by 23 inches.
8. Approximate inside dimensions, 13 by 18 by 21 5/8 inches.
9. Approximate inside dimensions, 13 by 13 by 22 1/8 inches.
10. This is the weight commonly used in trade practices, the actual weight varies according to temperature conditions.
11. Approximate inside dimensions, 9 3/4 by 16 by 20 inches.
12. Approximate inside dimensions, 4 1/8 by 11 1/2 by 14 inches.
13. The standard weight by 70 pounds is usually recognized as being about two measured bushels of corn, husked on the ear, because it required 70 pounds to yield 1 bushel, or 56 pounds, shelled.
14. For statistical purpose the bale of cotton is 500 pounds or 480 pounds net weight. Prior to 1946, the net weight was estimated at 478 pounds. Bale weights varies considerably, and the weight of foreign bales differ from that of the American square bale.
15. This is the average weight of cottonseed, legal weights in some states varies from the figure of 32 pounds.
16. Approximate inside dimensions, 9 1/4 by 10 1/2 by 15 inches.
17. Approximate inside dimensions, 1 3/4 by 11 by 16 1/8 inches.
18. Approximate inside dimensions, 11 1/2 by 11 1/2 by 24 inches.
19. In CA. and AZ. from 1942 through 1953, the net weight used by the Department Of Agriculture were 77 pounds for oranges, 79 pounds for lemons, and 65 pounds for Desert Valley grapefruit. Grapefruit in CA. areas, other than the Desert Valleys, average 68 pounds. The new weight since 1954 reflects the shift from the box to the other 1/2 box container.
20. Approximate inside dimensions, 10 1/4 by 10 11/16 by 16 3/8 inches for oranges or lemons, and 9 3/4 by 10 11/16 by 16 3/8 inches for grapefruit.
21. Approximate inside dimensions, 5 3/4 by 13 1/2 by 16 1/8 inches.
22. Approximate inside dimensions, 4 3/4 by 16 by 16 1/8 inches.
23. Approximate inside dimensions, 7 3/4 by 16 by 21 7/8 inches.
24. Approximate inside dimensions, 9 7/8 by 13 by 25 inches.
25. Approximate inside dimensions, 12 by 12 by 24 inches.
26. Approximate inside dimensions vary. Common size is 4 1/2 by 11 1/2 by 16 1/8 inches.
27. Approximate inside dimensions, 8 1/2 by 11 1/2 by 18 inches.
28. Approximate inside dimensions, 12 by 10 1/2 by 33 inches.
29. Inside dimensions vary. Ranges from 4 by 16 by 16 1/8 inches to 6 by 16 by 16 1/8 inches.
30. Includes both sorghum grain (kafir, milo, hegari, etc) and sweet sorghum varieties.
31. This average 55 pounds indicates the unusual weight of sweet potatoes when harvested. Weight is less in curing or drying and net weights when sold in terminal markets may be below 55 pounds.
32. Case of 24 no 2 1/2 cans.
33. Case of 24 NO. 303 cans.
34. Varies widely by method of harvest.
35. The milk equivalent in ice cream is from milk and cream, the remainder being from butter and concentrated milk. Thus the milk equivalent of the milk and the cream in a gallon of ice cream is about 12 pounds.
36. This is equivalent to 4.51 bushels of wheat per barrel (196 pounds) Of flour and has been used in conversions since 1957.